



# SALEM PORT EXPANSION

Salem, Massachusetts

## Environmental Notification Form Supplemental Information

Vine Associates, Inc.  
372 Merrimac St.  
Newburyport, MA 01950  
978-465-1428  
978-465-2640



*Submitted to:*  
**MEPA Office  
100 Cambridge Street  
Boston, MA**

*Submitted by:*  
**Vine Associates, Inc.  
with Bourne Consulting Engineering**

*Submitted for:*  
**City of Salem  
120 Washington Street  
Salem, MA**

**June 10, 2008**



## **Salem Port Expansion Project Supplemental Information**

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# 1 ALTERNATIVE ANALYSIS AND POSSIBLE MITIGATION

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## 1 INTRODUCTION

The following analysis was undertaken to determine if there is a more practical and feasible alternative to the Salem Port Expansion project described in the April 2008 ENF that would avoid, and if avoidance is not possible, minimize and mitigate the amount of intertidal dredging and still provide the required berthing for the intended users of the facility.

## 2 RATIONALE FOR PROPOSED SITE PROGRAMMING

Maritime commerce has always been an important industry in the City of Salem beginning shortly after its founding in 1626. The Salem Port Expansion project would enhance this tradition by creating a much needed multi use water transportation and commercial berthing facility in the City of Salem.

As noted in Section 2 of this Supplemental Information Package, the City of Salem has been planning the Salem Port Expansion project at this site for the past ten years and there have been numerous public meetings held on the plan to solicit public input. The original 1998 plan was included in the City's 2000 Harbor Plan and the current plan was included in the 2008 update to the Harbor Plan. As described in more detail below, the property on which the Salem Port Expansion is proposed provides a unique opportunity for the City to develop and realize the economic benefits of this long planned multi use transportation facility.

### 2.1 Location in State Designated Port Area

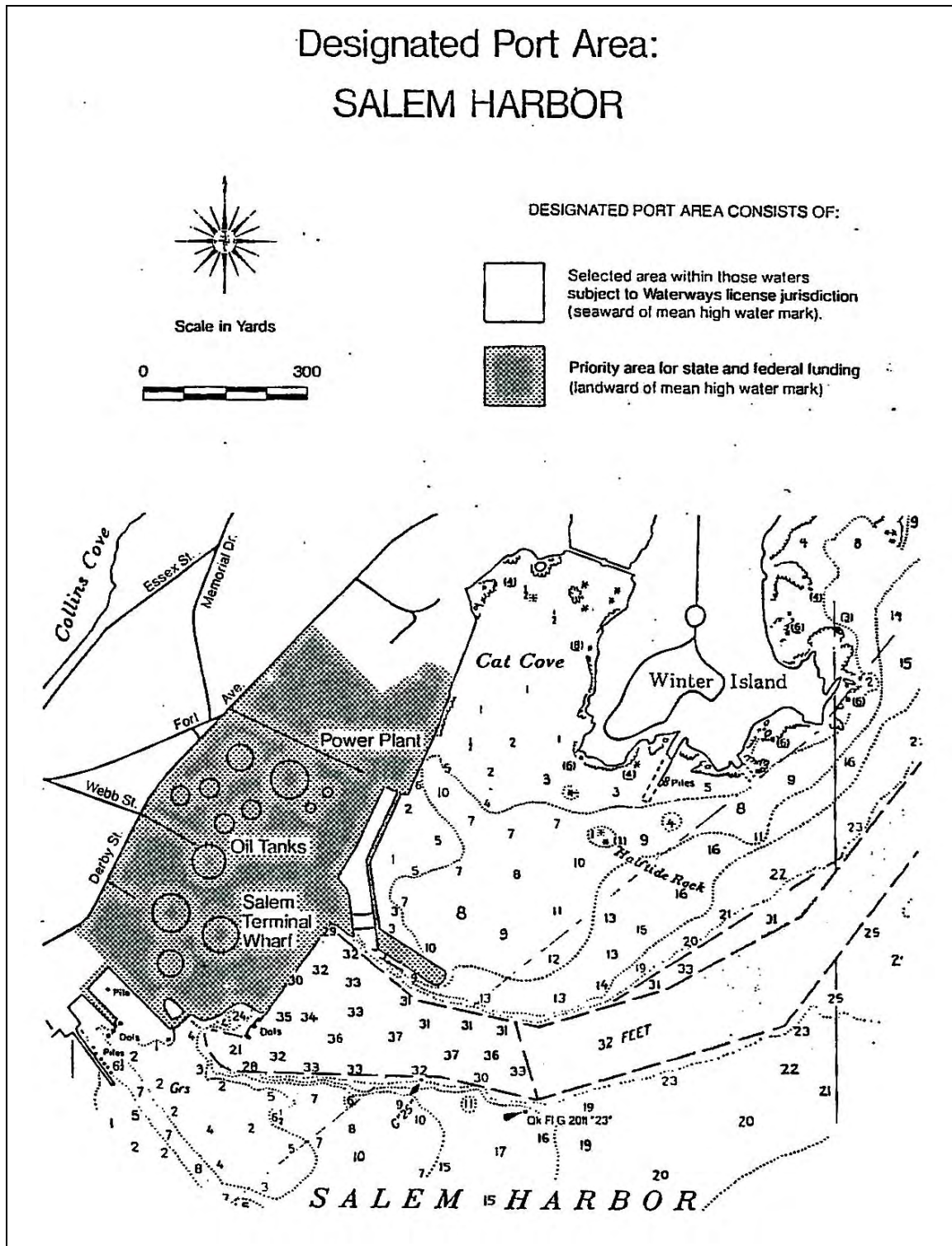
The Project site is located in the *Salem Harbor Designated Port Area* (DPA), one of only 12 such areas located in the Commonwealth of Massachusetts (see Figure 1).

This strategic location allows the City to develop the site in a manner that capitalizes on the site's proximity to the recently dredged federal channel and to achieve the development of marine industrial uses at the site that cannot be accomplished elsewhere in the community. The uses programmed for the site comply with state policy and regulations governing DPAs.

DPAs are special areas that were designated in the late 1970's by the state Office of Coastal Zone Management (CZM) to recognize their importance for maritime commerce and to reserve these areas as the "...primary host areas to meet both the foreseeable and the unanticipated space needs of industrial uses that depend on proximity to a waterway, either for the transportation of goods/passengers or the withdrawal/discharge of large volumes of process water."<sup>1</sup>

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<sup>1</sup> Preamble to the 1994 DPA regulations (301 CMR 25.00)



DPA's are special areas that were designated in the late 1970's by the state Office of Coastal Zone Management (CZM) to recognize their importance for maritime commerce and to reserve these areas as the "...primary host areas to meet both the foreseeable and the unanticipated space needs of industrial uses that depend on proximity to a waterway, either for the transportation of goods/passengers or the withdrawal/dischARGE of large volumes of process water."<sup>2</sup>

State regulations characterize DPAs as "...geographic areas of particular state, regional, and national significance with respect to the promotion of commercial fishing, shipping and other vessel-related activities associated with water-borne commerce, and of manufacturing, processing, and production activities reliant upon marine transportation or the withdrawal or discharge of large volumes of water." The regulations further suggest that such areas should be preserved to the maximum extent practical in order to "...meet the long term, cumulative space needs of the water-dependent industries which these areas are so well-suited to accommodate".<sup>3</sup>

To support the state policy of reserving DPAs for marine related industrial uses, the performance standards found in the state wetland and waterways regulations (310 CMR 10.00 and 310 CMR 9.00 respectively) are relaxed for activities proposed in such areas. The wetlands regulations at 310 CMR 10.26, state that coastal beaches, tidal flats and land containing shellfish located in DPAs are "not likely to be significant to marine fisheries, storm damage prevention or flood control." The regulations recognize that DPAs are developed harbors that typically contain "high concentrations of contaminants, from vessel discharges and point and non-point source discharges." They also reduce the impact standard for activities proposed in land under ocean resource areas from avoid to minimize.

## 2.2 Ownership

The Project site is the only property under the control of the City of Salem where a multi-use water transportation and commercial berthing facility can be developed. The proposed use has been planned for this property since 1998 and considerable city and state efforts have been expended on the project.

## 2.3 Lack of Sites with Deep Water

The City of Salem is a densely developed, relatively small (8.10 square miles) urban area located along the Massachusetts coast. The City has approximately 14 miles of shoreline containing very limited areas of deep water and extensive areas of shallow tidal flats.

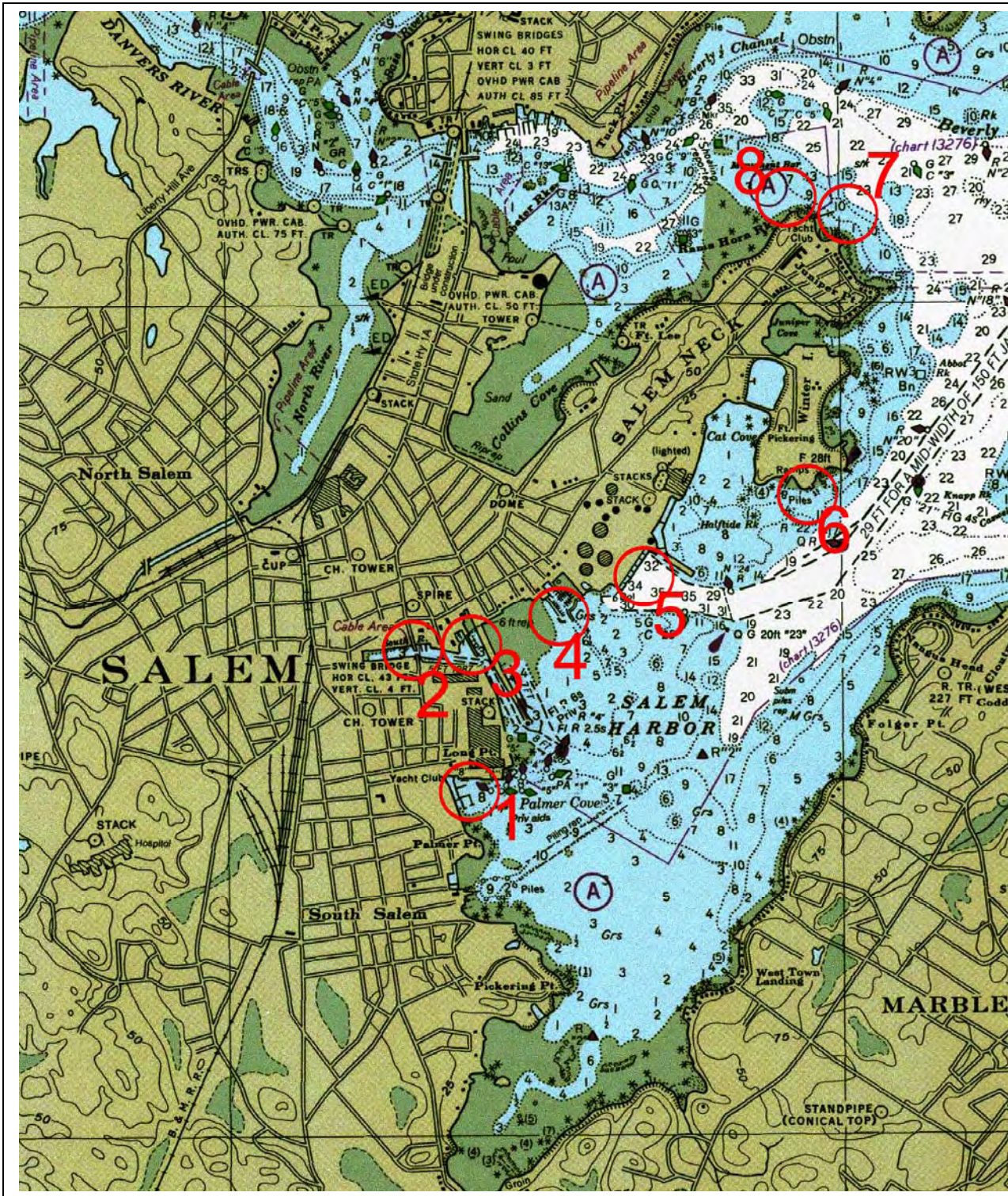
The deep water locations are already developed with marinas and berthing areas. These areas are shown on Figure 2 and include Palmers Cove Yacht Club ("1"), Pickering Wharf Marina ("2"), north west side of Derby Wharf ("3"), Hawthorne Cove Marina ("4"), the berth along Dominion's property("5"), Winter Island Pier and Ramp ("6"), Salem Willows Pier ("7") and Salem Willows Yacht Club ("8").

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<sup>2</sup> Preamble to the 1994 DPA regulations (301 CMR 25.00)

<sup>3</sup> 301 CMR 25.00







As noted and illustrated on Figure 2, the extent of tidal mud flats along the coastline is extensive. To demonstrate this fact, a quick calculation of intertidal<sup>4</sup> areas within the City of Salem was performed based on the U.S. Coast Chart of Salem and Lynn Harbors. The results of the calculation show that the City of Salem contains approximately 346 acres (15,100,000 square feet) of intertidal areas located along about 74% of its shoreline.

## 2.4 Economic

As noted in the April 2008 ENF filing, the Salem Port Expansion project is a vital economic development initiative being undertaken by the City of Salem. The Project will provide several benefits that will significantly contribute to the local economy including but not limited to the following:

- redevelop a brownfields site into a state of the art multi use water transportation and commercial berthing facility
- provide berthing and backland support for a variety of water transportation uses including a commuter ferry boat (*Nathaniel Bowditch*), a LNG supply boat, excursion vessels and cruise ships
- provide sorely needed year round protected berthing for the local lobster/commercial fishing fleet
- reduce operating expenses for local lobster fleet
- create employment opportunities for local and regional residents
- stimulate the local economy including the City's tourism related industries

## 3 SITE DESCRIPTION

### 3.1 Physical Characteristics

The Project site, which is currently used to support the Salem commuter ferry service *Nathaniel Bowditch*, is bordered by the Dominion Power Plant to the east, Hawthorne Cove Marina to the west, the Derby Street neighborhood to the north and Salem Harbor to the south.

The 2.2 acre site is comprised of urban fill and is long, narrow, fairly level and unpaved. The site is narrowest in the center (approximately +/- 40 feet in width, which constrains the ability to accommodate necessary, parking and pedestrian and vehicular circulation.

The entire shoreline has been altered over time and is bordered by intertidal areas which vary in lateral extent. Water depths along the shoreline range from elevation 5 MLW to elevation -20 at the outer edge of the existing ferry facility. The northern portion of the site includes an embayment which is almost fully exposed at low tide.

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<sup>4</sup> Depicted as extending from Mean Low Low Water to Mean High Water on Coast Charts.

### 3.2 Wave Climate

Winter coastal storms can generate strong wave action and surges throughout Salem Harbor. These winter storms are primarily associated with northeast and easterly winds. The predominate winter wind storm direction is from the northeast, most often originating from an east to southeast direction and then returning to the northeast, as the storm passes up the coast.

Unlike nearby Marblehead Harbor, which is more open to the northeast, the mouth of Salem Harbor has greater eastern exposure. This exposure mitigates to some extent the affect of northeast storm surges due in part to the natural shape of the harbor, especially along the northern edge.

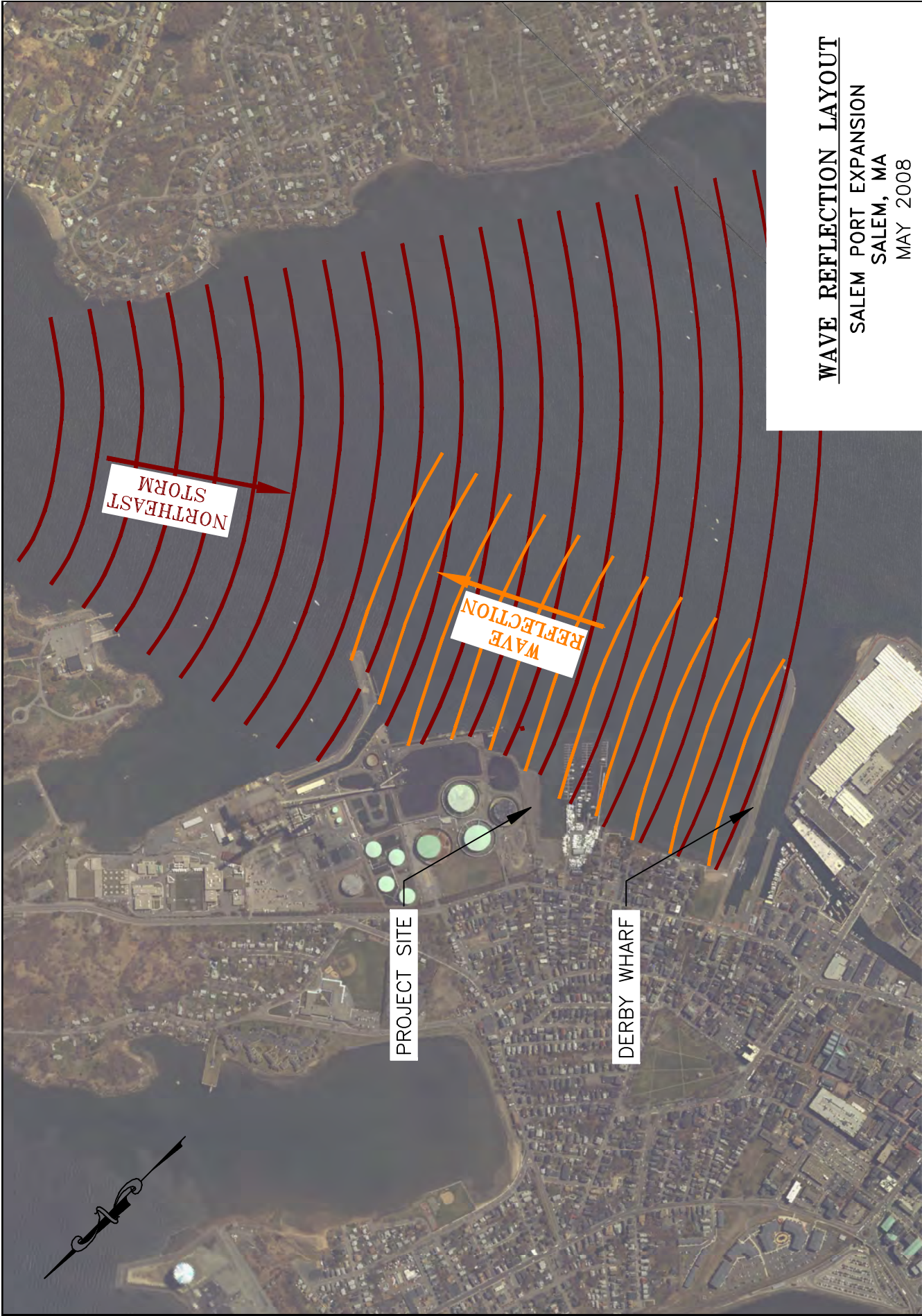
There is, however, a strong secondary or reflective wave generated from waves reflecting off the existing wharf structures located in Salem's inner harbor (primarily Derby Wharf). The reflected wave pattern is primarily felt in the northern edge of Salem Harbor in the area extending from Derby wharf to the Dominion property, located just east of the Project site (see Figure 3). The reflective wave approaches the Project site from the west/southwest direction and has almost the same period and height at the primary northeasterly generated winter wave (see Figure 4).

As a result of this reflected wave surge, most of the berthing areas proposed for the Project site will be subject to significant winter wave action that would preclude safe use of the docks during winter months. While not of concern to the uses that will berth at the site during non-winter months such as cruise ships, the Nathaniel Bowditch, and excursion vessels, this condition is unsuitable for vessels that require year round berthing such as the local lobster fleet. The only area on the Project site that would be protected year round from both primary and reflected waves is the existing "cove" located east of the Hawthorne Cove marina behind the wharf (see Section 5.3 below).

## 4 PURPOSE AND NEED FOR INTERTIDAL DREDGING

As noted, the entire shoreline of the Project site contains intertidal areas. The "cove" area which is the most protected portion of the site, is comprised entirely of intertidal areas that are exposed at low tide. As a result, dredging is required to create a basin with adequate depths to accommodate the lobster vessels which average 40 feet in length with a draft of four feet. As noted in Section 3 above, this is the only area on the site that is protected from all directions of wind and wave surge including the reflective waves and which also can provide protection from storms with gale force winds or higher. This area is the only berthing proposed on the Project site that the local lobstermen consider suitable for permanent, year round berthing.

At present, the local lobster fleet changes locations from the summer to the winter which adds to the operating costs. The need to provide safe, year round berthing protected from winter storms for the local lobster fleet cannot be understated and was identified as far back as 1998 when the first plan for the site was created.



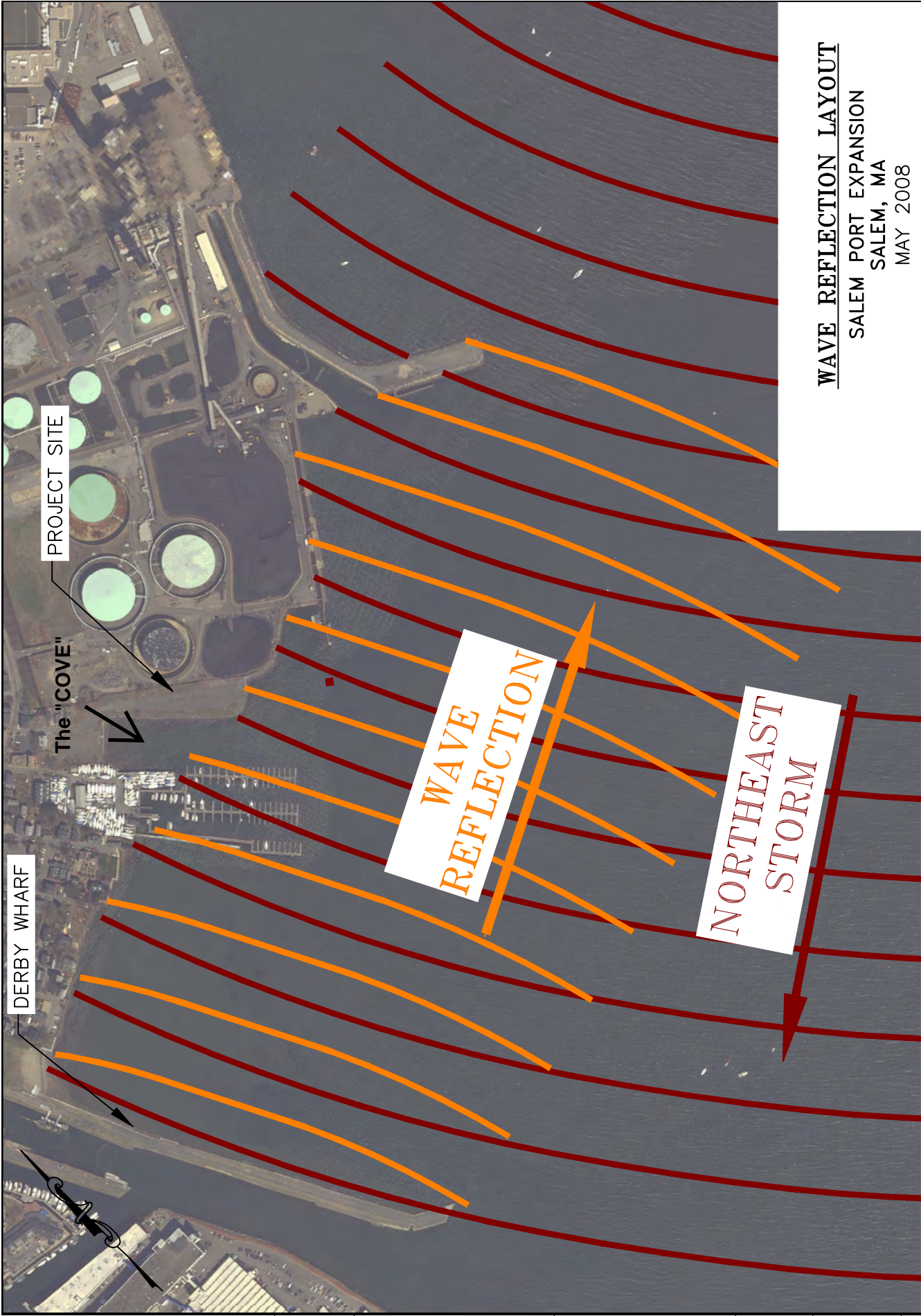
**WAVE REFLECTION LAYOUT**  
SALEM PORT EXPANSION  
SALEM, MA  
MAY 2008

0 1000  
SCALE: 1" = 1000' - 0"

**BCE** *Bourne Consulting Engineering*  
3 Beal Street  
Framingham, MA 01000  
TEL (508) 535-0000 FAX (508) 535-0000

Figure 3





**WAVE REFLECTION LAYOUT**  
SALEM PORT EXPANSION  
SALEM, MA  
MAY 2008

0 500  
SCALE: 1" = 500' - 0"

**BCE** *Bourne Consulting Engineering*  
3 Pearl Street  
Framingham, MA 01001  
TEL: (508) 535-0000 FAX: (508) 535-0000

Figure 4



As indicated in the memorandum prepared by Portscape dated April 11, 2008 (see Exhibit A), commercial lobster fishing is the “most economically significant fishery” in Massachusetts with landings valued at \$52.4 million dollars in 2006. Essex County is first in the state in the number of pounds of lobster landed and in the number of active fishermen. Yet, despite the importance of this industry, there is a shortage of year round commercial fishing dockage in the area.

Currently the only year round berthing available for the local lobster fleet is located in the City of Beverly. The City of Salem does not have any year round berthing dedicated to lobster boats. During the summer, most of the Salem fleet stays on moorings in Marblehead. Other lobster boats berth either in the cities of Beverly or Gloucester. During the winter, berthing is available at the Pickering Wharf marina but the vessels can not load or unload from that location. There are two lobster boats that moor off of Winter Island but this area is exposed to winter storms.

Based on interviews with local fishermen, Portscape estimated a potential demand for 15 to 20 year round commercial fishing vessels ranging from 25 to 45 feet in length. More recent discussions with local lobstermen indicate that if a year round facility is provided, demand for the berths would exceed 20 vessels. For the purpose of this analysis, a demand for 20 berths is assumed. Provision of year round berthing is expected to improve economic health of lobster fleet resulting from increased revenues. The memo also reiterates the fact that the issue of weather exposure is significant for the lobster fleet in the area.

## **5 ALTERNATIVES ANALYSIS**

As requested by MEPA, the following sections describe and analyze alternatives to the intertidal dredging proposed in the Salem Port Expansion ENF that meet the identified berthing needs of the uses programmed for the Project site.

### **5.1 Alternative Sites**

There are no alternative sites under the City’s control where a multi-use water transportation facility can be developed. The City has already expended over \$700,000 on berthing facilities and site improvements at the Project site and will re-use as many of the components of the existing berthing facility as possible for the new facility.

There are no alternative sites within the City of Salem where a year round protected berthing facility can be developed for the local lobster/commercial fishing fleet (see Section 1 above).

### **5.2 Proposed Building Footprint and Location**

The program of landside support uses for the site was determined through a process of interviews with existing and prospective users, as described in the document, *Analysis of Existing Port Plans*, prepared by Bourne Consulting Engineering, November 2007. As noted, the 2.2 acre site is long and narrow and

must accommodate internal roadways, sidewalks, loading areas, passenger pickup/drop off and a water transportation terminal building. The physical layout of the vehicular turning area limits the area available for the proposed terminal building which, as a result, must be located along the waters edge. The project proposes to fill a small area (1580 sf) of the intertidal revetment slope to allow the placement of the building at grade and not on pilings. Pilings would be especially difficult due to the amount of large stone present in this area.

A summary of the alternatives analyzed for the design and programming of the upland is provided in Exhibit B.

### 5.3 Vessel Berthing Locations and Dredging

#### *Pier Fixed and Floating Docks*

The fixed pier and associated floating docks are located at the most seaward end of the existing upland portion of the site. Such location allows closer access to the recently dredged federal channel; reduces the amount of required dredging due to the presence of deeper water in this location; and minimizes interference with the adjacent Dominion berth and Hawthorne Cove Marina.

An initial alternative analysis was performed in association with the development of site layout alternatives and the proposed water transportation terminal building as described in the April 2008 ENF (see also Exhibit B). The alternatives presented illustrate the layouts for the pier as well as commercial floating barges which are utilized by the passenger ferry and the offshore supply vessel and were based on the program elements identified from a review and investigation of previous project studies and direct discussion with current and future users of the facility. Some of the specific design requirements included:

- Meeting of ADA and MAAB accessibility requirements for passenger vessel facilities
- Floating barges for commercial vessel berthing (Offshore supply vessel)
  - o Sufficient berthing for two vessels on each face.
  - o Suitable for small cruise ships, visiting vessels, excursion vessels
- Fixed pier with direct berthing face to provide:
  - o Truck access for
    - Material/supply transfer
    - Refueling
    - Crane access for vessel maintenance and material transfer
    - Trash removal
  - o Larger Cruise Ship Berthing (greater than 200 feet)
  - o Commercial marine support
  - o Visiting vessel berthing space

The ADA Barge docks are existing and are required at the site to meet MAAB regulations for scheduled passenger vessel services at Salem. The alternatives integrate the existing facility within each layout.

*Lobster/Commercial Fishing Berthing*

Bourne Consulting Engineering investigated alternatives for the development of year round berthing for the commercial fishing/lobster vessels. In performing the alternative analysis, a number of key design/performance issues were identified by existing and potential site users and local lobstermen and include the following:

- Year round well protected safe berth
- Demand for 20+ slips for berthing of lobster vessels
- Vessel lengths from 35 to 42 feet (40 foot average assumed)
- Support services including close truck access and dockside utilities

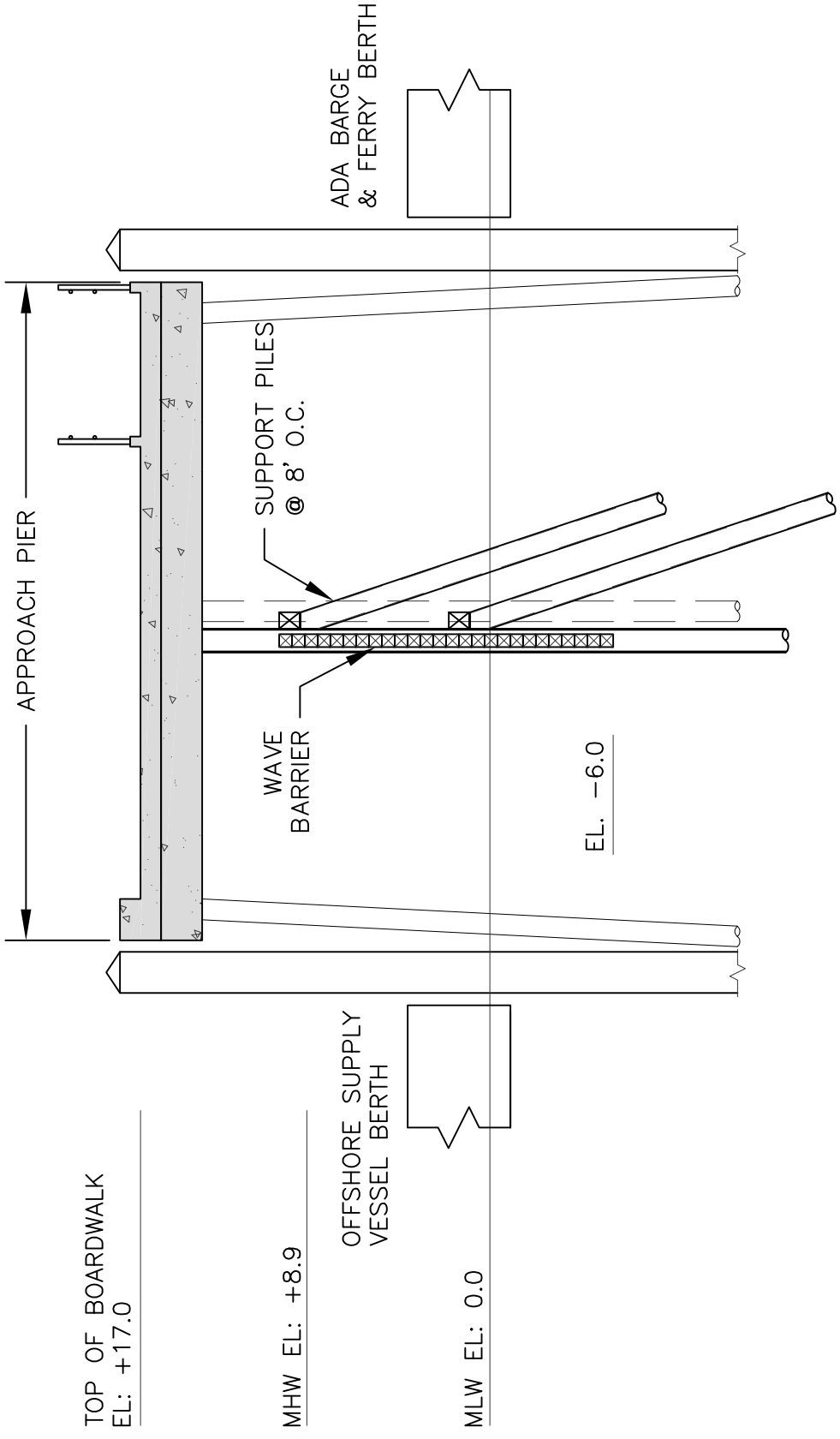
*Year Round Berth – Storm Protection*

The existing wave climate at the site was discussed with current site users and local lobstermen to determine the optimal berthing configuration for the site. Through these conversations it was learned that an unusual wave climate exists at the site caused by the length and location of Derby Wharf, a historic structure which is part of the National Park Service Salem Maritime National Historic Site, located west of the site (see discussion of wave climate in Section 3.2 above).

While the most significant exposure to storms of the Project site is from the northeast (and east), the storm related waves from the northeast reflect off Derby Wharf and travel back toward the northeast and into the Project site (passing under the floats at Hawthorne Cove Marina). While not a concern during summer months, this wave pattern creates a significant wave climate during winter storm conditions and would create an unsafe year round berthing facility in that portion of the site where the waves occur. The affect of this wave condition is shown on Figures 3 and 4 in Section 3 which illustrate the overall harbor and the specific area of concern with the initial storm wave train and the reflection off Derby Wharf.

To help combat these storm conditions and wave effects, a wave attenuation structure is now proposed under the fixed pier proposed at the southerly portion of the site. This wave attenuator will lessen wave impacts for the offshore supply vessel and other similar vessels that are proposed to berth on the leeward side of the pier. The attenuator will also provide some protection from the northeast to smaller vessels including lobster boats but not from the winter storm reflected wave conditions. The typical section of the wave attenuator, which would run the length of the approach pier, is shown on Figure 5.

The possibility of a second water attenuator on the southwest side of the Project site was also investigated in an effort to develop protection from the reflected wave conditions. A review of the ability to install this second wave barrier revealed that it would need to be placed at least 60 feet away from the edge of Hawthorne Cove Marina to allow adequate room for boat access to/from the marina slips. This results in insufficient room to construction berthing for the lobster/commercial fishing vessels and still provide for normal vessel movements associated with commercial passenger vessel operations on the southwest side of the proposed pier.



WAVE ATTENUATOR SECTION



SCALE: 1/8"=1'-0"

WAVE ATTENUATION

SALEM PORT EXPANSION  
CITY OF SALEM  
SALEM, MA  
JUNE 2008

**BCE** *Bourne Consulting Engineering*  
3 Paul Street  
Provincetown, MA 01909  
TEL: (508) 535-0000 FAX: (508) 535-0000



The location of the reflected winter storm wave train within the Project site was determined and is shown on the alternative lobster/commercial fishing berthing layout plans. Two wave boundary conditions are illustrated that represent the 0.25 and 0.50 fraction of the open water wave height for that portion of the wave which is transmitted into the “Cove”. Bourne Consulting Engineering believes that once the wave has reached the  $\frac{1}{4}$  height boundary that vessel berthing inshore of this boundary will be adequately protected from winter storm conditions. Berthing of vessels outshore of these boundary conditions would not be protected.

**As illustrated on Figure 4, the “cove” area at the Project site is protected from the southwest wave conditions (reflected Derby Wharf waves) due to the presence of the existing solid bulkhead structure that projects out into the harbor at Hawthorne Cove Marina. Hence the year round slips, in order to be protected and meet the needs of the lobster fleet, must be located within this “cove”.**

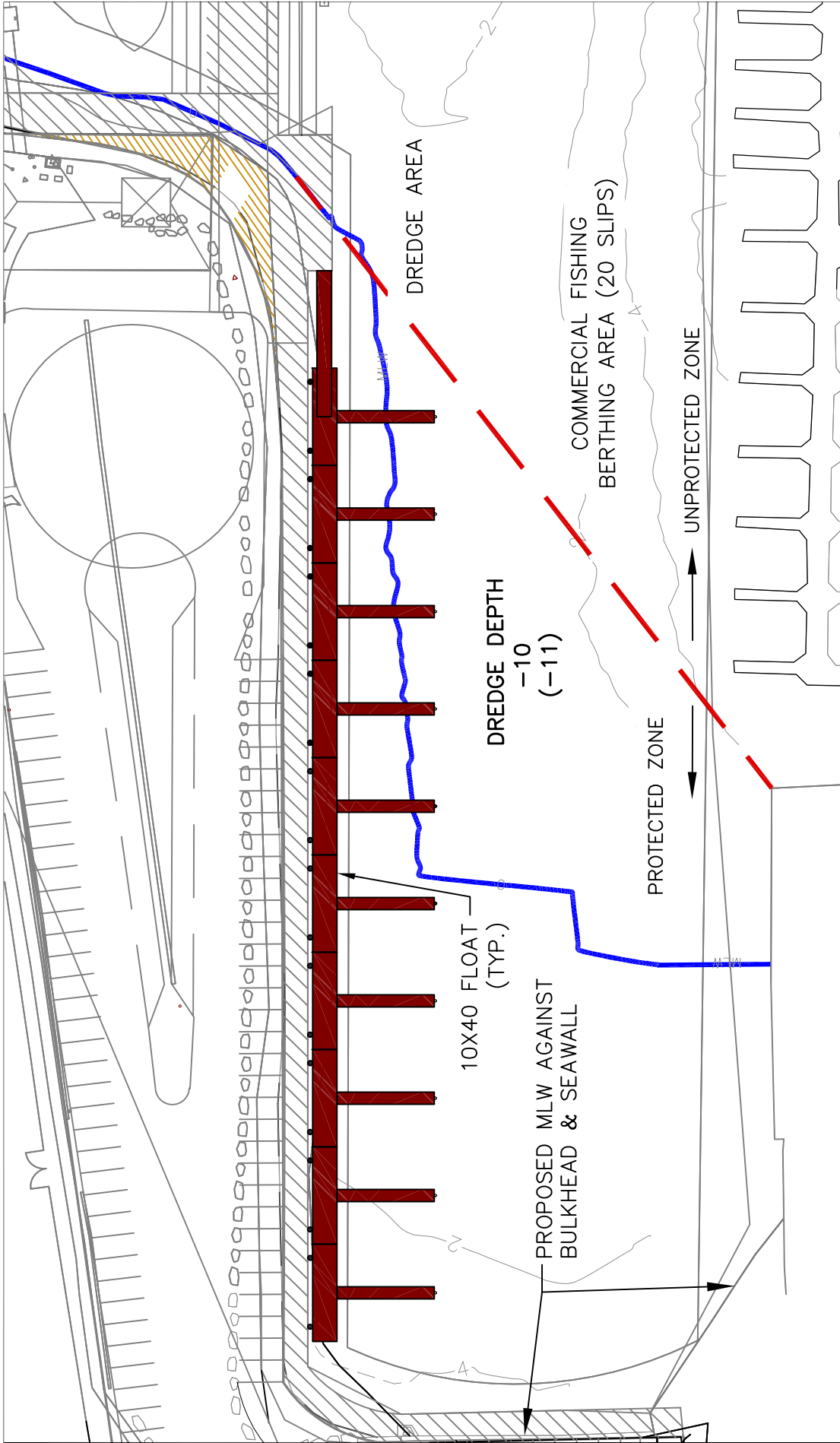
#### *Alternative Lobster/Commercial Fishing Berthing Configurations*

Four alternative berthing configurations (in addition to the layout proposed in the ENF filing shown on Exhibit 1) were identified and evaluated to determine if intertidal dredging could be avoided or minimized (see Exhibits 2 through 5). Based on the results of the analysis and review by local lobstermen, the City of Salem, the Salem Port Advisory Committee, and the Salem Partnership, Alternative V shown on exhibit 5 was selected as the preferred alternative to replace the layout included in the ENF (see Exhibit 1). A discussion of each alternative is provided below which identifies the number of berths provided, including year round berths, and the associated intertidal dredging required to accommodate the berths.

Alternative I: This alternative, shown on Exhibit 1, was developed from earlier facility layouts and was included in the original ENF filing. Twenty slips are provided for the lobster/commercial fishing vessels 40 feet in length. The area of intertidal dredging required for this alternative is 44,190 square feet (sf). This alternative provides **safe year round berthing for 7 vessels** (slips to the left of the 0.25 line).

It should be noted that had the reflected winter wave condition been identified at the time of the ENF filing, the configuration included in the ENF would have been modified to increase the number of slips with year round protection. This alternative does not accommodate the known year round berthing demand for lobster/commercial fishing vessels (20 slips) and results in more intertidal dredging than the other alternatives (see Section 4 above).

Alternative II: This alternative, shown on Exhibit 2, attempts to minimize the impact to the intertidal area and still provide some safe berthing. Twenty slips are provided for the lobster/commercial fishing vessels. The area of intertidal dredging required for this alternative is reduced to 26,800 sf. However, this alternative only **provides safe year round berthing for up to 7 vessels which is 13 vessels below the existing need**. Furthermore, although this alternative indicates up to seven protected slips, there is concern that the commercial vessels operators may find these slips to be too exposed and therefore may not be interested in utilizing them.




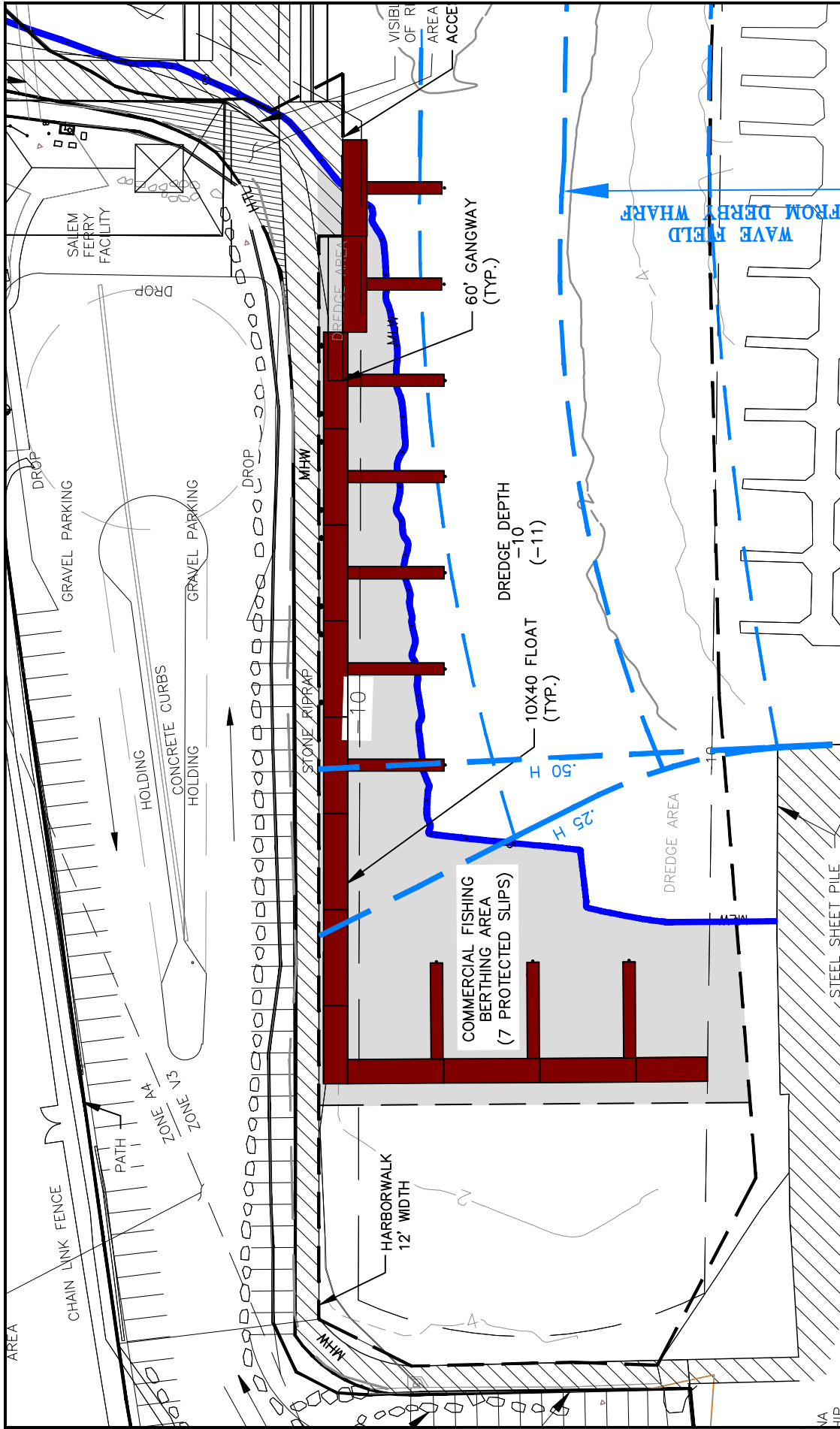
<b>INTERTIDAL ZONE:</b>	
FILLED AREA (BUILDING):	1580 SF.
INTERTIDAL IMPACT AREA:	47557 SF.
TOTAL AREA:	49137 SF.

**LOBSTER VESSEL BERTHING**  
**ALTERNATIVE I**

SALEM PORT EXPANSION  
SALEM, MA  
MAY 2008

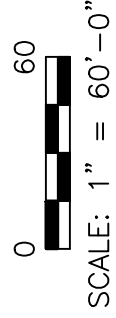


**Bourne Consulting Engineering**  
3 Reed Street  
Framingham, MA 01905  
TEL (508) 535-0000 FAX (508) 535-0000



INTERTIDAL ZONE:  
 FILLED AREA (BUILDING): 1580 SF.  
 INTERTIDAL IMPACT AREA: 26800 SF.  
 TOTAL AREA: 28380 SF.

**LOBSTER VESSEL BERTHING**  
**ALTERNATIVE II**  
**SALEM PORT EXPANSION**  
**SALEM, MA**  
**MAY 2008**



**BCE** *Bourne Consulting Engineering*  
 3 Beal Street  
 Framingham, MA 01901  
 TEL (508) 553-0000 FAX (508) 553-0000

Alternative III: In this alternative, shown on Exhibit 3, 17 slips are provided and the impact to the intertidal area is further reduced to 8,817 sf. However, this **alternative provides no year round protected berthing** and was deemed unacceptable by the commercial vessel operators who reviewed the alternative.

Alternative IV: This alternative, shown on Exhibit 4, presents an option that eliminates intertidal dredging in this location and provides for seasonal berthing for 14 commercial vessels. However, this **alternative provides no year round protected berthing**. This was deemed unacceptable by the commercial vessel operators who reviewed the alternative.

Alternative V): This alternative, shown on Exhibit V, attempts to maximize the amount of safe, year round berths for lobster/commercial fishing vessels and to minimize the intertidal impacts proposed in Alternative 1. The area of intertidal dredging required for this alternative (shown as the shaded area) is reduced to 41,600 sf which is illustrated as the shaded area. This alternative shows berthing for up to 30 lobster/commercial fishing vessels, with **safe, year round berthing for up to 17 vessels**.

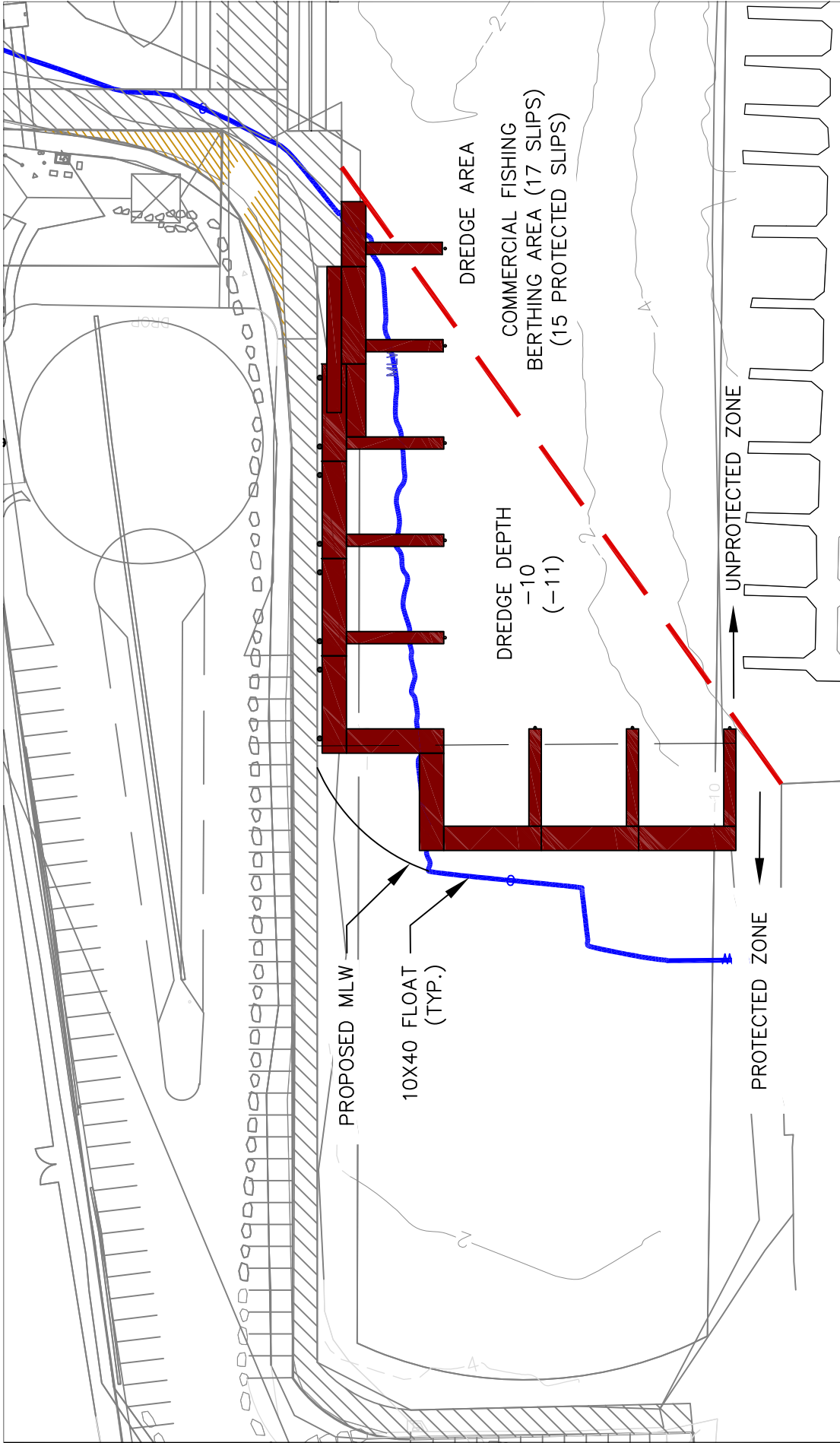
*Summary and Preferred Alternative:*

As shown on see Figure 1, there are very few areas along the shoreline that contain deep water and therefore, opportunities to create new berthing areas are extremely limited. The Project Site occupies about 2.5% of the City's entire shoreline and contains just over one acre of intertidal area (44,867 square feet) which represents about 0.29% of the total intertidal area in the City.

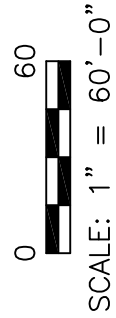
Dredging of the intertidal area is required in order to create a protected embayment that will provide a year round berthing area for the local commercial fishing fleet. The project identified a definitive need for year round lobster/commercial fishing vessel berthing for 20 plus vessels. No alternate sites are available within Salem. Currently the local lobster fleet uses seasonal moorings in Marblehead Harbor and winter berthing at Pickering Wharf or other recreational boating facilities. Alternative berthing configurations were analyzed to determine if the year round berthing need for the lobster/commercial fishing fleet could be accommodate and at the same time reduce the required amount of intertidal dredging.

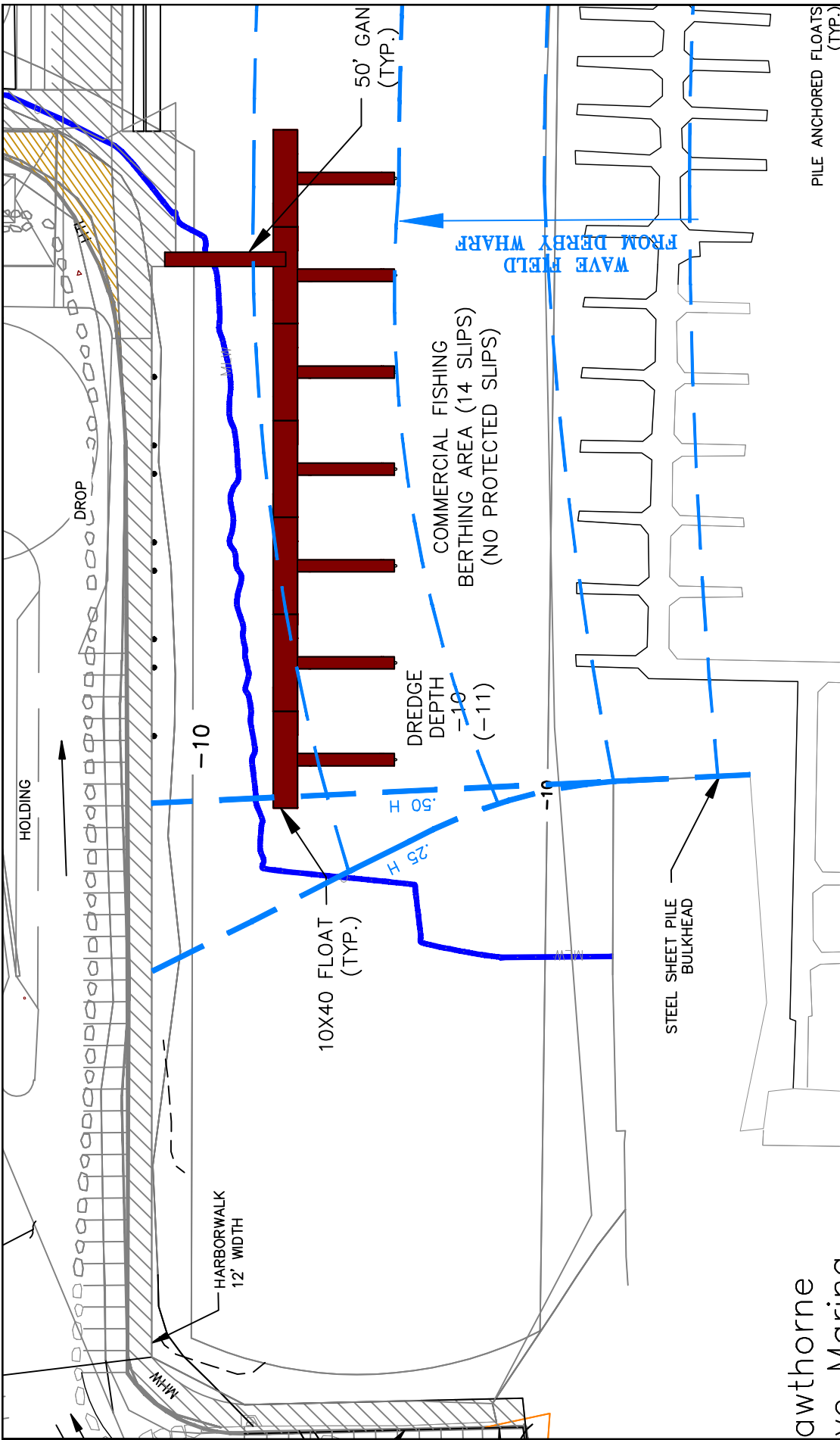
Based on this analysis, Alternative I was eliminated as it does not provide the required number of berths and results in the most intertidal dredging. Alternatives III and IV were eliminated as they do not provide any year round berthing. Alternative II was eliminated as the proposed berthing configuration was not supported by local lobster mean and only 7 year round berths are provided. The **preferred alternative** is Alternative V which provides 17 protected year round berths for the lobster/commercial fishing fleet and reduces the amount of intertidal dredging by 2,590 sf. The alternatives were reviewed with commercial vessel operators, the City of Salem, the Salem Partnership and the Salem Port Advisory Committee and all parties endorsed **Alternative V** as the preferred alternative as it provides the maximum year round berthing.





INTERTIDAL ZONE:	
FILLED AREA (BUILDING):	1580 SF.
INTERTIDAL IMPACT AREA:	8837 SF.
TOTAL AREA:	10417 SF.





**LOBSTER VESSEL BERTHING**

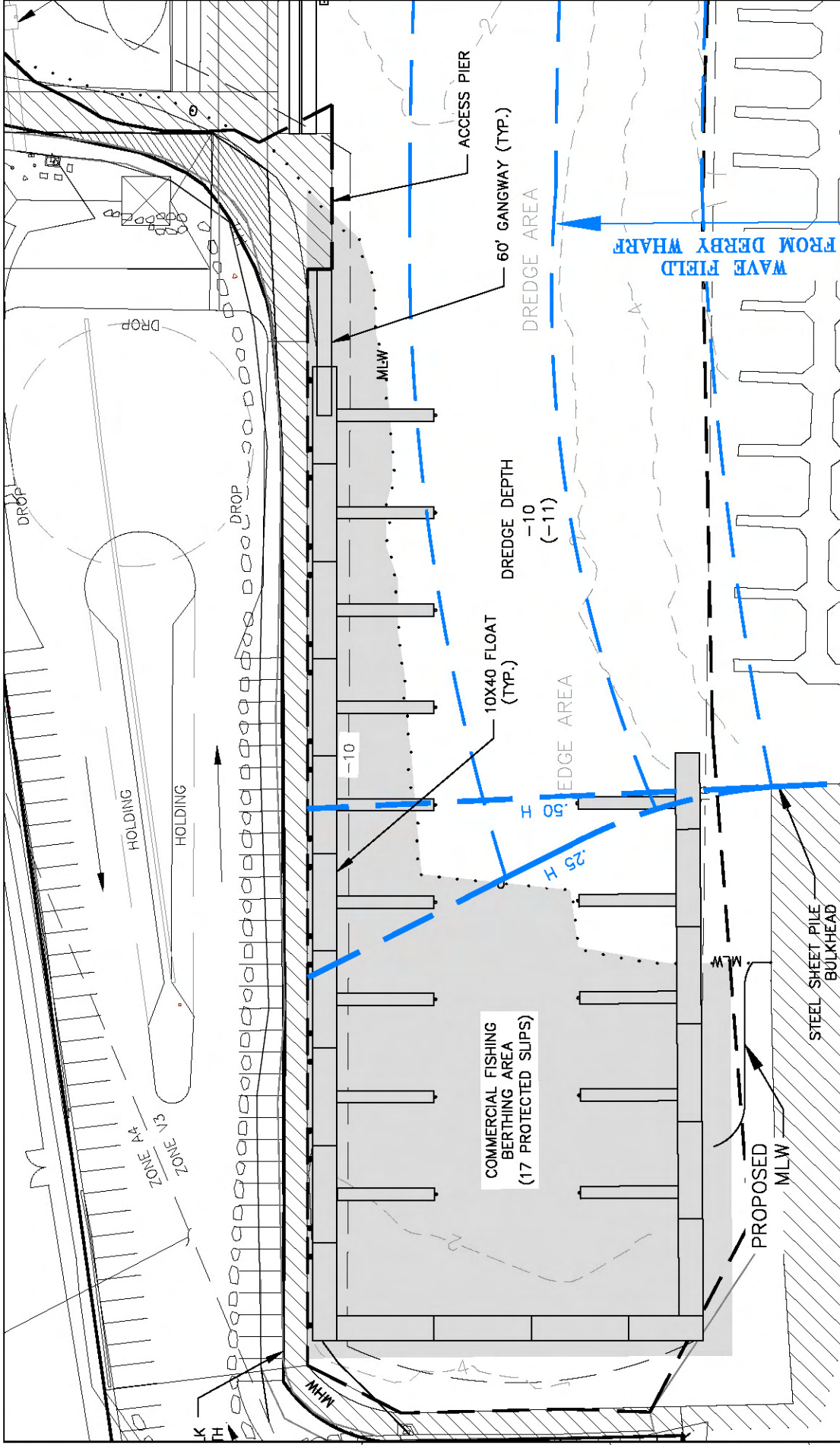
**ALTERNATIVE IV**  
 SALEM PORT EXPANSION  
 SALEM, MA  
 MAY 2008

INTERTIDAL ZONE:	
FILLED AREA (BUILDING):	1580 SF
INTERTIDAL IMPACT AREA:	0 SF
TOTAL AREA:	1580 SF



SCALE: 1" = 60'-0"

**BCE** *Bourne Consulting Engineering*  
 3 Beal Street  
 Franklin, MA 01909  
 TEL (508) 533-0000 FAX (508) 533-0000



# **LOBSTER VESSEL BERTHING** **ALTERNATIVE V**

SALEM PORT EXPANSION  
SALEM, MA  
MAY 2008

INTERTIDAL ZONE:  
FILLED AREA (BUILDING): 1580 SF.  
INTERTIDAL IMPACT AREA: 41600 SF.  
TOTAL AREA: 43180 SF.



SCALE: 1" = 60'-0"

## 6.0 CONCEPTUAL MITIGATION

Bourne Consulting Engineering, in conjunction with the City of Salem Mayor's Office and the Department of Planning and Development with input from the Salem Conservation Commission, Salem Sound Coast Watch, the MA Office of Coastal Zone Management and other State and Federal agencies developed a conceptual plan that identifies potential mitigation sites in the City of Salem to offset the proposed intertidal impacts at the Project site.

The conceptual mitigation plan will be used as framework for developing a more refined mitigation program as part of the Project permitting phase. This mitigation plan has been developed based on the results of the alternatives analysis which demonstrate that dredging impacts to the intertidal area cannot be avoided without severely comprising the need to provide safe, year round berthing for the local lobster fleet. The preferred alternative does minimize environmental impacts to the greatest extent possible given the unique configuration of the property and the identified berthing needs. Additionally, the dredging is not proposed in a natural, unaltered site. Rather, the property is located in a state Designated Port Area that has historically been used for marine industrial purposes.

The City will work closely with local, state and federal agencies specifically the Salem Conservation Commission, the state Division of Marine Fisheries, and the National Marine Fisheries Service to reach agreement on the functions and values of the existing intertidal area, to identify the Project impact on those functions and values, and to create a mitigation program that affectively offsets the impacts to the functions and values. The intertidal area that will be affected by the project is a 41,600 sf mud flat. The area has not been officially designated as a Shellfish resource area by the state DMF however at the MEPA Scoping session a DMF staff member stated that the area should be mapped as such. The mudflat is also located in the Salem Harbor Designated Port Area and as a result of the site's existing and long history of commercial and maritime industrial usage, is not thought to be an area of high environmental value. Nevertheless the area is a protected state and federal wetland resource area and because impacts cannot be avoided, mitigation must be provided. The following sites are listed in order of their perceived suitability and value in relation to the area to be impacted.

### Pioneer Village

Pioneer Village is a City-owned historical site (recreation of a 1630's Salem Village) located along Salem Harbor. The site historically contained a salt marsh system which was altered as part of the original work associated with Pioneer Village to create a freshwater pond. This mitigation effort would restore tidal flushing to the pond by removing a portion of the existing concrete retaining wall along the beach and open



Photo 1: Retaining Wall at Pioneer Village



a channel to Salem Harbor. The restoration effort would return approximately 20,000 sf of lost salt marsh habitat to an intertidal system with the anticipation of the reestablishment of its previous environment.

### Furlong Park

Furlong Park is an urban riverfront park situated along Franklin Street in the City of Salem. It is a multi use facility with picnic tables, benches, a playground, sports fields, a basketball court, and a tennis court. This area has been subject to bank erosion and filling of the intertidal area due to continuing degradation of the upland edge and material falling into the mudflat. In order to restore this bank and to protect it from further erosion and to restore the previous area of mud flats, this project would limit the edge of the existing park lawn, formalizing that edge with rip rap and excavating the filled area to below MHW (see Figure 6).

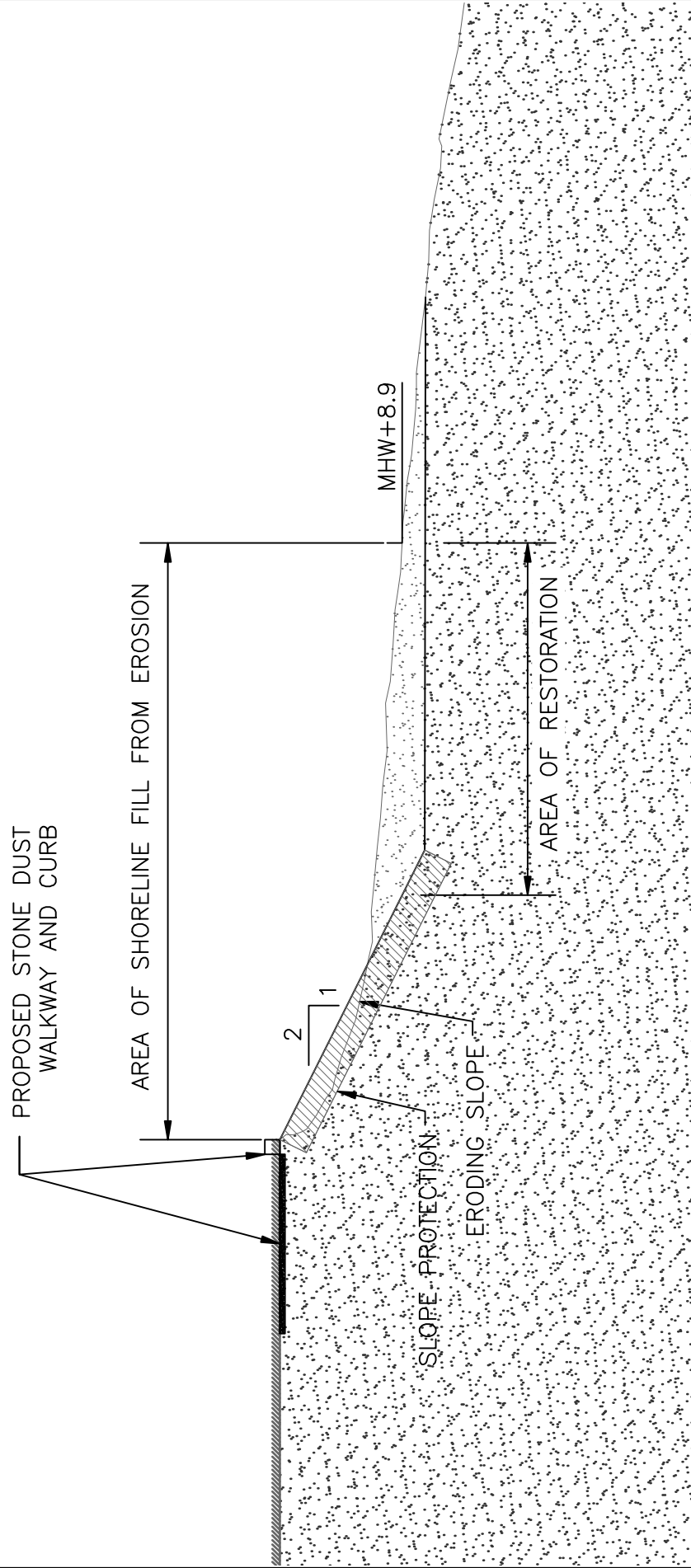


**Photo 2: Edge Degradation at Furlong Park**

This would establish an approximately 12' -15' wide area of intertidal mud flat that would restore approximately 20,000 sf of habitat that is of the same type as the area being impacted. There is also the possibility to extend the park both to the north and south of the existing park limits and to create a kayak / canoe beach landing area to further enhance the recreational value of this area.



**Photo 3: Aerial of Furlong Park Shoreline**



# TYPICAL SECTION PROPOSED MITIGATION

SALEM PORT EXPANSION  
 SALEM, MA  
 MAY 2008

### Kernwood Golf Club

On the Kernwood Golf Club property there is an approximately 5,000 sf salt pond that has been cut of from the tidal flow of the sound. The proposed restoration would involve restoring a link to the estuary to allow for tidal flushing of the pond.

Similar to the pond at Pioneer Village it is anticipated that this salt pond would return to its native inter tidal cycle and reestablish the historic environment for this system. The potential concern with this project is that it is on land that is privately owned.



**Photo 5: Aerial of Kernwood GC Salt Pond**

### Kernwood Park

The proposed project at Kernwood Park is similar to that at Furlong Park. The edge of the park is being eroded and causing the intertidal area adjacent to it to fill. This project area is smaller, at approximately 50 linear feet, but is also a direct in-kind project.

It is proposed that the edge of the area would be formalized again potentially with rip rap and excavation to below mean high water would be completed.



**Photo 3: Edge Degradation at Kernwood Park**

### Other Potential Mitigation Sites

Additional sites that are still being investigated for potential mitigation are also included in this proposal. These include:

#### *Forest River*

The Forest River and the adjacent Forest River Park are important recreational and environmental resources for the City of Salem. While our initial investigation of this area has not yielded any immediate sites for mitigation, we are continuing to work with local agencies to identify potential opportunities for preservation and conservation. There may be opportunity to undertake soft shell clam seeding in this

area which, based on the report prepared by the Division of Marine Fisheries published in 2002,<sup>5</sup> contains suitable habitat that does not have presently contain soft shell clams. Additionally, this area would be a strong candidate should any direct in-kind mitigation opportunities arise.

*Smith Pool, Winter Island, Salem State College*

This is a potentially large area of salt pond restoration that is located at the Salem State College Cat Cove Marine Lab. This area could potentially be reconnected to the sound and restored through tidal flushing. The potential concern with this project is that this is an area that is actively used by the College and there may be concerns with changing its current use.

*Other sites*

There is potential for other wetland restoration projects in the Salem Sound area including the support of fish runs in the Danvers River and the potential for working in conjunction with a flood control project that is expected to have impacts in the North River area at the Peabody line.

Additionally, Salem Sound has been previously investigated as a potential site for the establishment of an artificial reef habitat. A site in Boston Harbor was chosen over the Salem Sound site, and has been successful in the establishment of a healthy reef system. It is thought that a similar project could be equally successful if completed in Salem Sound although costs must be considered.

Summary

The above proposed areas for potential mitigation would restore approximately 42,000 sf of inter tidal / mudflat habitat to the Salem area. This mitigation would be in-kind with the potential impacts that are anticipated with this project. Out of kind mitigation such as seeding the Forest River with soft shell clams is another mitigation opportunity that will be explored with local, state and federal agencies. Bourne Consulting Engineering and the City of Salem are anticipating continuing the collaborative efforts with state and federal agencies that have already been established as we move forward with the permitting process for the Port Expansion for the City of Salem.

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<sup>5</sup> The Marine Resources of Salem Sound, 1997. Prepared by Massachusetts Division of Marine Fisheries, Department of Fisheries, Wildlife and Environmental Law Enforcement, Executive Office of Environmental Affairs in 2002.

## **2 SUMMARY OF PREVIOUS STUDIES**

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As noted in the Salem Port Expansion ENF filed with MEPA on April 15, 2008, several planning and economic studies have been prepared for the Project over the past ten years. Dredge sediment sampling and testing has occurred and the U.S. Army Corps of Engineers has determined that the sediments are suitable for open ocean disposal. There are no mapped shellfish beds in the area however a representative from the state Division of Marine Fisheries indicated at the MEPA Scoping session held on May 1, 2008 that the area should be mapped as containing shellfish resources. The City agreed at the MEPA Scoping Session to undertake a shellfish survey prior to the submittal of permit applications for the Project. A brief description of the pertinent previous studies is provided below.

### **1998 New Salem Wharf Study, Salem Harbor Plan (The Cecil Group, et al)**

As noted in the Salem Port Expansion ENF, the re-development of the Project Site into a multi use facility including significant water transportation use was originally proposed in 1998 in preparation and support of the subsequent Salem Harbor Plan which was subsequently published in 2000.

The Project at that time was conceived as a multi use marine facility capable of berthing large cruise ships (800 feet long) as well as accommodating excursion/charter vessels, transient vessels and the local commercial fishing fleet. The landside development included retail and hotel uses as well as support facilities for the commercial fishing and water transportation operations. The proposed development was designed to take advantage of the site's proximity to the federal channel and its location in the Salem Harbor Designated Port Area. A large solid filled pier was proposed along with a ½ acre area of fill to accommodate retail uses in two buildings and a hotel was proposed on the existing upland. Dredging of approximately 550,000 cubic yards of material was proposed including intertidal and subtidal areas.

This study was the foundation for the City of Salem Harbor Plan which was developed in 2000 for this specific area of the City. The study was scaled down in subsequent development plans to address site constraints and provided the original market analysis that was utilized in this as well as subsequent study updates.

### **2001 The Salem Ferry and New Salem Wharf Project, A Phased Approach to Completion and Findings Report - New Salem Wharf Project, Salem, Massachusetts (Vine Associates, Inc.)**

These studies analyzed the potential to phase development of the 1998 development plan for the site.

### **2005 Final Site Development Plan, Salem City Pier (Vine Associates et al)**

In 2005, the development program was reduced in scope based in part on public input as well as the results of market studies which demonstrated that smaller cruise ships would be more likely to utilize the facility than larger ships. The changes included elimination of a large filled pier; elimination of the ½ acre of fill formerly proposed for the construction of retail uses; a reduction in the size of the fixed pier to accommodate smaller class cruise vessels; and reduction of the dredge footprint and volumes.

The changes also removed the hotel and retail uses from the project altogether. The water transportation terminal and commercial fishing support buildings were retained. Parking was reduced to reflect the revised program.

#### **2005 Ferry Facility Design and Program (Vine Associates, Inc.)**

In 2005, design plans including alternative configuration were developed for the existing ferry facility located on the site.

#### **2006/2007 Dredge Sediment Sampling and Testing (Vine Associates, Inc.)**

In May 2005 a dredge sediment and sampling plan for the proposed dredging was approved by the U.S. Army Corps of Engineers and the sampling and testing were conducted in 2005 through 2007. The U.S. Army Corps of Engineers determined in February 2008 that the sediments are suitable for open ocean disposal in the Mass Bay Disposal Site (see Exhibit C).

#### **2007 Hydrographic Survey (Vine Associates, Inc.)**

In 2007, a bathymetric survey of the Project Site was undertaken. Sheet 2 of 2 in Exhibit D includes the results of the survey. The current dredge footprint and dredge volumes were calculated based on that survey.

#### **2007 Present Review and Analysis of Existing Salem Port Plans (Bourne Consulting Engineering)**

The City of Salem retained a waterfront consultant to analysis the existing port plans developed to date as well as review the current market analysis and to develop a preferred alternative for both upland and marine development. The task was based on the current City controlled land of Blaney Street. The Project is currently underway and is incorporating additional market analysis to reflect current economic conditions and site constraints. Alternatives were developed and utilized as basis for the proposed development included in the April 2008 ENF filing with MEPA.

#### **2008- Present Market Analysis, Management and Operations Plan and Regulatory Approvals, (Bourne Consulting Engineering)**

As noted in the Salem Port Expansion ENF, the City retained a waterfront consultant to develop perform a current market analysis for the project taking into consideration, among other factors, existing facility use by the commuter/visitor passenger ferry *Nathaniel Bowditch*, potential use by an offshore supply vessel to support the Northeast Gateway deep water LNG Port and current interest expressed by commercial fisherman (lobster boats), commercial marine and coastal cruise companies. The market analysis results have indicated that in addition to the existing usage for passenger vessel service and for offshore supply vessel operations that there was a strong demand for year round berthing for lobster boats. A memorandum of the findings is found in Exhibit A. The full study, which is currently underway, is anticipated to be completed in early July.



### 3 DESCRIPTION OF IMPACTS AND ASSOCIATED CALCULATIONS

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The calculations provided in the Environmental Notification Form filed for the *Salem Port Expansion Project (EEA 14234)* have been revised based on a refinement of the proposed dredge area using up to date bathymetry and adjustments to the portion of the site located above the 100 year flood level. The revised calculations result in an overall wetland impact of 9.8 acres which is below the 10 acre threshold for a categorical EIR requirement pursuant to 301 CMR 11.03(3)(a)(1)(b).

#### 1. SITE AREA CALCULATIONS

Upland (landward of top of bank) = 2.19 acres

Waterside (seaward of top of bank) = 7.95 acres

**Total Site Area = 10.14**

#### 2. TOTAL DREDGE

Coastal Beach = 1.01 acres

Land Under Ocean = 6.69 acres

**Total Dredge = 7.70**

#### 3. OVERALL WETLANDS IMPACT (WITH INTERTIDAL DREDGING REDUCED)

Upland (Land Subject to Coastal Storm Flowage) = 1.85 acres

Waterside (Coastal Bank, Coastal Beach and Land Under Ocean) = 7.95 acres

**Total Wetland Impact = 9.80 acres**

#### 4. IMPACT BY RESOURCE AREA

LSCSF = 1.85 acres

Coastal Bank = 850 lf (0.25 acres)

Coastal Beach = 1.01 acres

Land Under Ocean = 6.69 acres

#### Detailed Description of Calculations

The impact calculations were performed using AutoCAD drawings and an updated hydrographic survey/dredge footprint to refine the estimated wetland impacts identified in the ENF. Based on this information, the proposed impacts to wetland resource areas is 9.80 acres which is below the 10 acre thresholds for categorical EIR. Please note that this calculation assumes that the Designated Port Area calculation is not included as such areas are not defined as wetland resource areas per 310 CMR 10.02 (1).

#### Resource Area Calculations

The upland portion of the site measured from the top of bank to the property line is 2.19+/- acres. The waterside portion of the site measured from the top of bank to the top of the dredge slope in the proposed dredged basins is 7.95 acres. A description of the calculation of wetland impacts is provided below.

### 1. Land Under Ocean

Impacts to Land Under Ocean (measured from mean low water seaward) were defined by the limit of dredging. (Note that the proposed piers and floating dock/barge systems are located within the dredge footprint). The dredge footprint was further analyzed and the boundary of the outer basin was refined as shown on the attached plan. This refinement results in a dredge footprint in Land Under Ocean of 291,564 square feet (6.69 acres).

### 2. Coastal Beach

Impacts to Coastal Beach (measured from mean low water to bottom of coastal bank) were defined by the limits of dredging and total 44,190 square feet (1.01 acres).

### 3. Coastal Bank

Approximately 850 linear feet of coastal bank is being altered as a result of bank stabilization, installation of a concrete retaining wall, installation of sheetpile wall, installation of piles to support a harborwalk, and placement of fill in front of the proposed water transportation terminal building. The total area of coastal bank covered by the Harborwalk and proposed to be filled is 10,890 square feet (0.25 acres).

### 4. Land Subject to Coastal Storm Flowage (LSCSF)

The existing site elevations were reviewed in relation to the FEMA flood maps. Approximately 80,586 square feet (1.85 acres) of the landside are within the Zone A4 or Zone V3 flood elevations and therefore considered Land Subject to Coastal Storm Flowage. These areas were measured from the top of coastal bank inland to the property line.

### Updated ENF Calculations

The calculations included in the ENF are shown below in red and the revised calculations are shown in blue.

Calculations in Original Filing		Revised Calculations
Land Under Ocean	317,000 sf	291,564 sf
Coastal Beach	45,000 sf	44,190 sf
Coastal Bank	850 lf	850 lf (10,890 sf)
LSCSF	88,900 sf	80,586 sf
<b>Total Wetland Impact</b>	<b>450,900 sf</b>	<b>427,323 sf</b>
Designated Port Area	362,000 sf	346,738 sf <sup>6</sup>

<sup>6</sup> A portion of the landside of the site is located outside of the DPA. Furthermore, Designated Port Area is not defined as a wetland resource under the state wetland regulations at 310 CMR 10.00 and therefore was not included in the calculation of wetland impacts.

**Exhibit A**  
**Portscape Memorandum dated April 11, 2008**

## MEMORANDUM

**DATE:** APRIL 11, 2008

**TO:** RON BOURNE

**FROM:** LAUREL RAFFERTY, PORTSCAPE

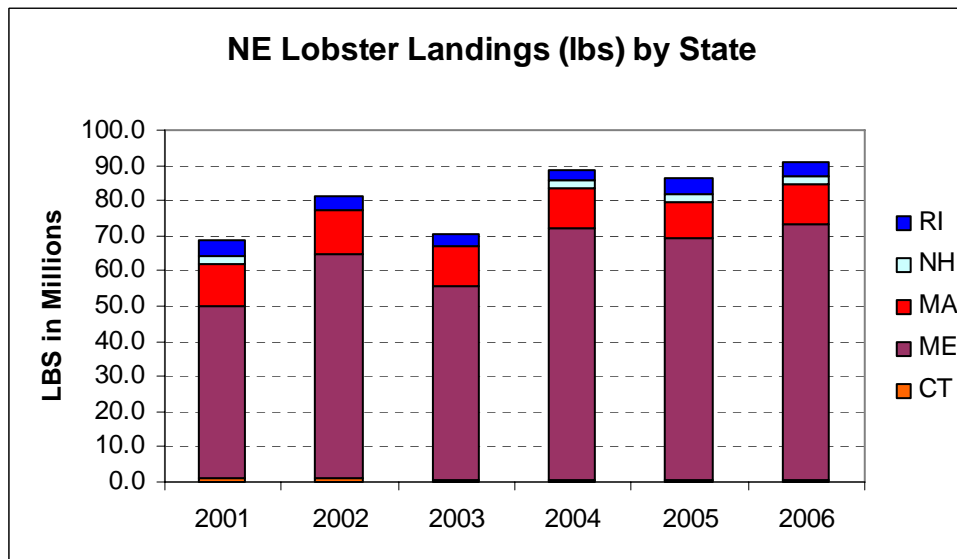
**RE:** SALEM PORT EXPANSION PROJECT – MARINE MARKETS – COMMERCIAL FISHING/LOBSTER;  
OTHER COMMERCIAL VESSELS; TRANSIENT VESSELS

### MARINE MARKETS – COMMERCIAL FISHING/LOBSTER; OTHER COMMERCIAL VESSELS; TRANSIENT VESSELS

#### Commercial Fishing/Lobster

Commercial lobster fishing is Massachusetts' most economically significant fishery conducted within state waters.<sup>1</sup> Massachusetts' landings of lobster from all waters, territorial and non-territorial, at 10.9 million pounds, was valued at \$52.4 million dollars in 2006, 11% higher than 2005, making the state the second leading producer in the country, after Maine. Maine and Massachusetts combined produced 90% of US landings.<sup>2</sup>

The two charts below<sup>3</sup> show the relative standing in commercial lobster landings in pounds and value among New England States from 2001-2006. While Maine has had a commanding lead consistently, Massachusetts has been second consistently.

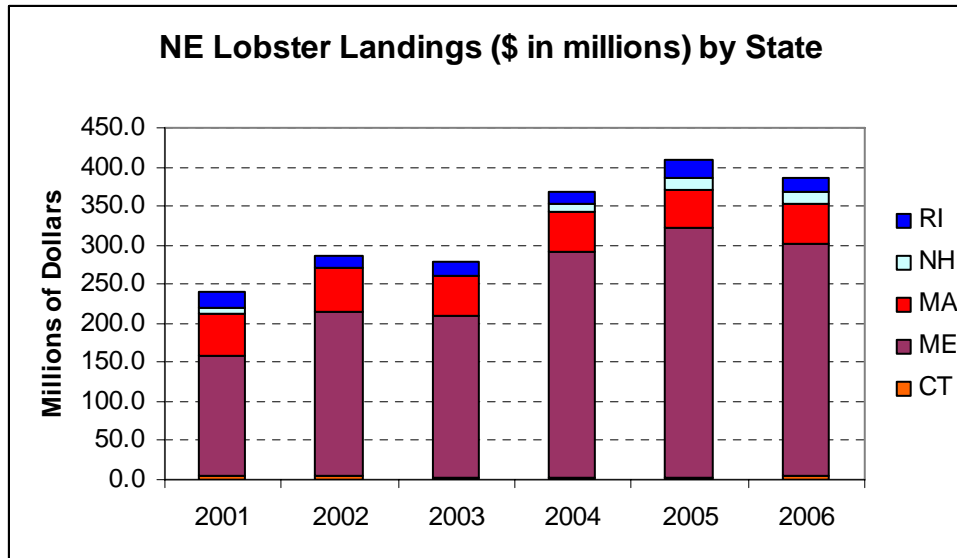


<sup>1</sup> 2005 Massachusetts Lobster Fishery Statistics, Dean, M.J., S.R. Reed, and T.B. Hoopes (TR31-2005), p. 1.

[http://www.mass.gov/dfwele/dmf/publications/tr31\\_2005\\_lobster\\_report.pdf](http://www.mass.gov/dfwele/dmf/publications/tr31_2005_lobster_report.pdf)

<sup>2</sup> Source: [http://www.st.nmfs.noaa.gov/st1/fus/fus06/01\\_intro2006.pdf](http://www.st.nmfs.noaa.gov/st1/fus/fus06/01_intro2006.pdf). Statistics compiled by Massachusetts differ, as indicated below.

<sup>3</sup> Source: [www.nmfs.gov](http://www.nmfs.gov). See Appendix A for data depicted in the graphs.



Within Massachusetts, Essex county, in which Salem is located, retained its position in 2005 as first in the state in number of pounds of lobster landed and in number of active fisherman. The statewide ex-vessel price for Essex County was \$4.85 in 2005, less than the statewide average of \$5.02.<sup>4</sup>

The following chart shows the number of active commercial lobstermen, lobster landings, and traps-fished by homeport for 2005 for Salem, other communities along Salem Sound and on the North Shore, and for important fishing ports of the state. Rankings in each of these measures are also shown.<sup>5</sup> (See Appendix B for this data on all communities of the state engaged in lobster fishing.) As the chart indicates, Gloucester is first in all performance measures. Beverly has top ranking in all categories among the communities along Salem Sound, followed by Marblehead. Salem ranks low in all categories, between 35<sup>th</sup> and 37<sup>th</sup> of the total of 46 communities covered.

Community	Fishermen		Catch (lbs)				Effort			
	#	Rank	Territorial	Non-Territorial	Total	%	Rank	Traps	%	Rank
Gloucester	194	1	815,170	751,975	1,567,145	14.01	1	61,988	14.58	1
Rockport	64	4	484,158	122,177	606,335	5.42	5	24,154	5.68	4
Beverly	39	8	416,817	148,307	565,124	5.05	7	21,143	4.97	6
Marblehead	31	12	274,153	24,805	298,958	2.67	13	14,619	3.44	9
Manchester	26	15	186,879	6,987	193,865	1.73	19	8,841	2.08	18
Danvers	8	30	51,375	0	51,375	.46	31	3,130	.74	30
Salem	6	37	26,389	0	26,389	0.24	38	2,110	0.50	35
Boston	51	6	292,038	519,024	811,062	7.25	2	18,988	4.47	7
New Bedford	120	2	51,670	423,997	475,666	4.25	9	5,782	1.36	23
Westport-Fall River	26	15	24,963	744,203	769,166	6.88	4	13,143	3.09	11
<b>State Total</b>	<b>1,222</b>	<b>46</b>	<b>6,462,788</b>	<b>4,721,940</b>	<b>11,184,728</b>	<b>100.00</b>	<b>46</b>	<b>425,020</b>	<b>100.00</b>	<b>46</b>

<sup>4</sup> 2005 Massachusetts Lobster Fishery Statistics, Dean, M.J., S.R. Reed, and T.B. Hoopes (TR31-2005), p. 5.  
[http://www.mass.gov/dfwele/dmf/publications/tr31\\_2005\\_lobster\\_report.pdf](http://www.mass.gov/dfwele/dmf/publications/tr31_2005_lobster_report.pdf). The ex-vessels price referred to is the landings-weighted average ex-vessel price as taken from the SAFIS dealer reporting database.

<sup>5</sup> Ibid., p. 7. Data does not include seasonal permits

## Opportunity

Factors affecting the level of opportunity there is in developing lobster fishing dockage fall into two categories:

- Those concerning the dockage itself -- its supply, and characteristics of its supply, its price, safety in terms of weather exposure, and service level provided
- Those concerning the lobster resource, its supply -- the status of the stock -- and its sustainability

## Dockage

In Salem Sound and the North Shore area, there is a shortage of year-round commercial fishing dockage space that is of a good price and safe in terms of protection from winter storms.

In Salem, itself, there are two facilities that have permanent berthing space for commercial fishing vessels, Winter Island, which is public, and Pickering Wharf Marina, which is private. At Winter Island, there is a pier, but it is unused for permanent berthing because of exposure to winter storms. At Pickering Wharf Marina, there is space buffered from winter storms; the space includes a 500-F wharf, 10 slips at 39 F each (accommodating boats on two sides), and 3 docks with a total length of 130 F. Slots are allocated on a 1<sup>st</sup>-come, 1<sup>st</sup>-serve basis. Fees for the summer are \$150/F/6-months (May –October) and \$51/F for the winter 6-months November through April. With this rate structure, pleasure craft generally fill the facility in the summer season, though one lobster vessel used the facility this past summer. Generally six+/- lobster vessels use it in the winter season<sup>6</sup>; currently there are 11 lobster vessels at the facility<sup>7</sup>. The Dock Master believes that demand for commercial lobster dockage is stronger than the supply, but could not say whether any requests for dockage at his facility in the winter season had not been met. He said the facility is generally full year-round though in the winter, there are fewer vessels, as larger pleasure craft tend to use the facility at this time of year; commercial sight-seeing vessels also use the facility. Other than Hawthorne Cove, which does not accommodate commercial vessels, Winter Island is the only facility in Salem with available mooring space with good access and depths; however, weather exposure is an issue in this location; moorings here are a flat \$500/yr and services are good. There are currently two lobster boats moored at Winter Island. With regard to potential new commercial lobster fishing space, a dredging project is proposed at an existing pier elsewhere in Salem in the vicinity of the new Beverly-Salem Bridge. The project is for a private facility that would accommodate 4-6 lobster vessels and would provide protection for these vessels from winter storms. The status of the project is unknown, but there are significant obstacles to it going forward, including conflict with existing plans for a park for the neighborhood. The existing park plans represent mitigation for the bridge construction project and would require City Council approval to change; there is also neighborhood objection to the change.

Nearby Marblehead has no slips; moorings have weather exposure and the wait at 12-15 years is long; however, commercial vessels of residents may be given preference, and dockage fees are quite low at \$3.50/F/yr, less than those for recreational boats; services include a conveyor for loading and off-loading lobster catch at the State St. Landing. According to Harbor Master's office records, dated 12/2007, there were mooring permits for 29 lobster boats in Marblehead. In the winter, some vessels are taken out of the water, some relocate to Gloucester, Beverly, and Pickering Wharf in Salem.

Beverly, the leading producer in lobster landings in Salem Sound and among the top ten statewide in all of the criteria ranked by the Massachusetts Division of Marine Fisheries (DMF; see Tables on p. 2 and in Appendix B), has what is considered by some the premium public commercial berthing space for the area at the public Beverly Harbor Center (BHC). Its fees and services reflect those of the Jodrey State Pier in Gloucester, which the Facilities Manager for the Harbor Center considered the model in the area for commercial dockage. Gloucester, as previously noted, is the top lobster producer in the state. Dockage fees for commercial vessels at BHC are \$76/F/yr. Dockage is protected from winter storms. Services include a hoist for loading/unloading, electricity, fuel and bait delivery, but no haul-out or launch. The facility has 17 commercial slip spaces; while one is currently available; there is a waiting list of 6-10, demand is said to have been less in the past.<sup>8</sup>

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<sup>6</sup> Source: Tom Moran, Dock Master, Pickering Wharf Marina.

<sup>7</sup> Site survey, 4/9/08.

<sup>8</sup> Source: Beverly Harbor Center Facilities Manager. The Facilities Manager reported that waiting list application fees might have an impact on the numbers applying for placement on the list.



Manchester also has mooring space only; however, no commercial vessels are allowed; while the topography offers winter storm-weather protection, there is icing over.

Rockport offers protected mooring space for commercial lobster vessels at \$7/F/yr; there are slips, for which fees are \$14/F/yr; however, as the maximum length vessel they will accommodate is 22 F, most lobster vessels are too large for them. Moorings are ample in number but nonetheless there is a long waiting list; a very small number of the total 408 currently on the waiting list are for fishing or lobster vessels. Lobster vessels on moorings are 150-180 in number.

Jodrey State Pier in Gloucester has space for 50 commercial vessels, 45 of which are filled by fishing boats used for lobstering 60% of the time and fishing of other species 40% of the time. There is a wait list of 50. Dockage fees are \$79.20/F/yr.

The key findings of reports on Gloucester's Commercial Fishing industry prepared in 2003 and 2005 are that there is a shortage of berthing space, and further that the shortage is understated in these reports as they focus on groundfish needs, not those of other species, including especially lobster. According to a member of a panel involved in the industry review, lobster boats '*...probably take up more docking space than the larger boats because there are so many of them . . .*'<sup>9</sup>

The report goes on to cite a number of conditions which put more and more pressure on commercial fishing dockage space:

- Gloucester's commercial permanent berthing serves not only Gloucester, but communities in driving proximity, including Beverly
- Smaller nearby harbors have been losing their commercial dockage, and their commercial fishing vessels have looked to Gloucester for space
- Limits on days-at-sea for fishing for many species mean vessels are tied up at docks longer
- The downturn in fishery landings, has led to deferred dock maintenance, and sometimes, as a result, docks that can no longer be used.<sup>10</sup>

Within the past year, the press has reported the migration of Maine fishermen to Gloucester because of regulations in the Maine which prohibit landing lobster by-catch, which is allowed in Massachusetts (see article in Appendix C).

#### Space Available for Commercial Lobster Fishing Boats

Location	Current # Lobster Vessels	Availability of Space
Salem		
Public: Winter Island	2	Ample mooring space, pier unused for permanent berthing space because of exposure to winter storms
Private: Pickering Wharf	11 (winter)	Berthing space at a 500-F wharf, 10 39-F slips(2 sides), and 130-F dock, allocated on a 1 <sup>st</sup> -come 1 <sup>st</sup> -serve; used mostly by pleasure craft in summer, 1 lobster vessel was said to use dockage this past summer
Marblehead	29	12-15 year wait for mooring Preference may be given to commercial fishing vessels of residents
Beverly	16	17 spaces, 6-10 on Waiting List
Gloucester <sup>a</sup>	45 <sup>b</sup>	50 spaces, none available, wait list of 50
Rockport	150-180	Moorings - long wait list for moorings Slips - Length will not accommodate most lobster vessels

<sup>a</sup> Jodrey State Pier only. <sup>b</sup> Vessels fish lobster 60% of time, other species 40% of time.

<sup>9</sup> *Commercial Fishing Industry Needs on Gloucester Harbor, Now and In the Future, 2005*, Supplement to a Study of Gloucester's Commercial Fishing Infrastructure: Interim Report October 15, 2003, p. 4.

<sup>10</sup> *Ibid.*, pp.14-18.

### **Dockage Fees for Commercial Fishing Boats<sup>11</sup>**

<b>Location</b>	<b>Fees</b>
Salem	
Public Winter Island	\$500/yr
Private Pickering Wharf	\$150/F/6-months (May-Oct); \$51/F/6-months Nov-Apr
Marblehead	\$3.50/F/yr for moorings
Beverly	\$76/F/yr for slips
Gloucester	
Public	
Jodrey State Pier	\$79.20/F/yr for slips
St. Peter's Marina	\$3.75/F/month for dockage
Harbor Cove	\$4/F/month for dockage
Private	
Marine Railways*	\$4/F/month+ \$100/month (covering dumpster and electric)
Rockport	\$7/F/yr for moorings; \$14/F/yr for slips (see above)

\* Must buy fuel and repairs from facility

### **Storm Protection for Commercial Fishing Boats**

<b>Location</b>	<b>Storm Protection</b>
Salem	
Public: Winter Island	Moorings and pier are exposed to winter storm weather
Private: Pickering Wharf	Dockage protected from winter storms
Marblehead	Moorings exposed to winter storm weather
Beverly	Dockage protected from winter storms
Gloucester	Dockage protected from winter storms
Rockport	
Pigeon Cove	Moorings protected from winter storms

### **Services Provided for Commercial Fishing Boats**

<b>Location</b>	<b>Services</b>
Salem	
Public: Winter Island	Hoist at pier, launch/haul service, seasonal dinghy rack storage, water, boat ramps, parking
Private Pickering Wharf	30+50 amp electrical service
Marblehead	Loading/unloading conveyor (at State St. Landing), launch ramps, floats, commercial fishing vessel float rings
Beverly	Hoist for loading/unloading, electricity, fuel and bait delivery, no haul-out or launch

### **Status of Lobster Stock**

There are short- and long-term threats to the Massachusetts lobster industry. Short-term threats are being appropriately attended to; long-term threats require more attention.

There has been an expansion of effort in the lobster fishery that has been significant and rapid. From the late 1940s through the early 1950s, landings were approximately 25 million pounds. More recently, from 1993-2005, lobster landings increased from 57 million to 88 million pounds, 80% of which were caught in the state's waters.<sup>12</sup> In Massachusetts, concern that expanding lobster fishing was threatening the stock's sustainability led to a prohibition as of 1988 on the issuance of any new coastal commercial lobster fishing permits.<sup>13</sup> The number of coastal permits, now at 1,428, has fallen for the past eighteen consecutive years. Authorizations for permit transfers in 2005, at 46, were few. The MA DMF report

<sup>11</sup> Which may cover additional services

<sup>12</sup> Species Profile: American Lobster Managers Face the Challenge of Rebuilding Depleted Southern New England Stock, Excerpted from ASMFC Fisheries Focus, Vol. 16, Issue 5, July 2007, p.2.

<sup>13</sup> Permits that allow lobster harvesting anywhere, including, most importantly, the state's coastal waters.

shows that in 2005, 316 offshore permits were issued, continuing a decline over the past three years of the five years shown.<sup>14</sup>

Level of effort is thought to be a function of not only the number of fisherman, but the number of traps. As a result, in addition to a moratorium on new licenses, trap limits have been set in some areas.<sup>15</sup>

There are additional controls as well. In the management of most fish species, a total allowable catch (TAC) is set, that is, a cap is established on the number or weight of animals that can be landed. In contrast, the lobster fishery is managed through controls to sustain lobster egg production.<sup>16</sup> Management controls to meet this egg production objective, control fish mortality, and reduce latent fishing effort<sup>17</sup>, set minimum (and in some areas maximum) legal sizes and prohibit the catching of egg bearing females.

Nonetheless assessments of the stock status indicate that there are problems: in the Southern Gulf of Maine, in Massachusetts Bay and Stellwagen Bank -- the area which borders the coast of Massachusetts from its North Shore to Provincetown and the Outer Cape<sup>18</sup>-- there is a low abundance of lobster, high lobster mortality, and low recruitment, and in Southern New England, there is overfishing and stock depletion. In Georges Bank (GBK) and most of the Gulf of Maine (GOM), while there is no overfishing and stocks are not depleted, in the case of the GOM, the high stock abundance is matched by high effort levels, making these levels probably unsupportable if abundance returns to historic median levels, and in the GBK, the high effort levels mean increases in effort are inadvisable.<sup>19</sup>

If lobster landings fall to the long-term average, they will be reduced by more than 50% of current landings.<sup>20</sup> This return to historical landings will have significant impact on the lobster fishing industry.<sup>21</sup> Average catch rates, that is, catch per trap-haul, for coastal lobstermen in 2005 was approximately 10% lower than in 2004 and 25% lower for offshore lobstermen<sup>22</sup>. Catch rates increase with amount of trap soak time up to a week; when this factor is taken into account the term 'pounds per trap-haul\*set-over-day' is used. The average catch per trap-haul\*set-over-day for offshore lobstermen for 2005 was the lowest reported catch rate for Offshore Lobstermen on record, 19% lower than 2004. While there has been variability year-to-year between 1994 and 2005, the trend line is one of decreasing catch rates for both Coastal and Offshore lobstermen. A comparison of catch rates for state territorial waters of Salem Sound, which fall in Area 3, and those of other coastal areas of the state are shown below.

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<sup>14</sup> 2005 Massachusetts Lobster Fishery Statistics, Dean, M.J., S.R. Reed, and T.B. Hoopes (TR31-2005), pp 1-4.  
[http://www.mass.gov/dfwle/dmf/publications/tr31\\_2005\\_lobster\\_report.pdf](http://www.mass.gov/dfwle/dmf/publications/tr31_2005_lobster_report.pdf)

<sup>15</sup> According to a New England Aquarium report on the lobster fishing industry, "...regulating the number of traps places no limit on the number of lobsters that can be harvested commercially."

<sup>16</sup> The Sustainability of the Massachusetts Lobster Fishing Industry Dr. Michael Tlusty Research Scientist New England Aquarium Boston MA 02110-3399 January 2003, p. 7. "The ASMFC is attempting to rebuild lobster populations to a point where egg production values are 10% that of an unfished population..." (p.19)

<sup>17</sup> This refers to "latent traps", that is, "... traps that are not currently being fished either because the fisherman is not using their full allotment (a fisherman with 420 traps in the water can still put in an additional 380 for their quota of 800), or because the license is unfished (*The Sustainability of the Massachusetts Lobster Fishing Industry Dr. Michael Tlusty Research Scientist New England Aquarium Boston MA 02110-3399 January 2003*, p. 10)."

<sup>18</sup> Area 514, of the North Western Atlantic Ocean National Marine Fisheries Service Statistical Reporting Areas; see Map in Appendix D.

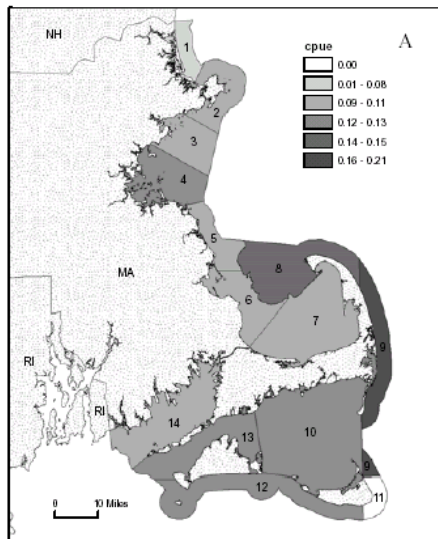
<sup>19</sup> Species Profile: American Lobster Managers Face the Challenge of Rebuilding Depleted Southern New England Stock, Excerpted from ASMFC Fisheries Focus, Vol. 16, Issue 5, July 2007, Fact Sources: Lobster Institute & RI Sea Grant, NMFS; and ASMFC Lobster Flyer, web, 2006.

<sup>20</sup> COASTAL FISHERY RESEARCH PRIORITIES AMERICAN LOBSTER (*Homarus americanus*) Prepared by the Gulf of Maine Aquarium January 10, 2001.

<sup>21</sup> Recent record landings led lobstermen to incur great debt. According to a report on the MA lobster industry: "Economics of the lobster industry are difficult, particularly for fishermen given the recent record landings. This has caused them to incur great debt that makes the appropriate investment unsustainable if landings return to their historical average. Given that the lobster fishery is not statically efficient (meaning that the industry could put in less effort to achieve the same yield, Herriges 2001) the appropriate investment will always be maximized, and any downturn in landings will significantly impact the lobstermen." *The Sustainability of the Massachusetts Lobster Fishing Industry Dr. Michael Tlusty Research Scientist New England Aquarium Boston MA 02110-3399 January 2003*.

<sup>22</sup> Source: 2005 Massachusetts Lobster Fishery Statistics, Dean, M.J., S.R. Reed, and T.B. Hoopes, pp. 11-12.  
[http://www.mass.gov/dfwle/dmf/publications/tr31\\_2005\\_lobster\\_report.pdf](http://www.mass.gov/dfwle/dmf/publications/tr31_2005_lobster_report.pdf).

**2005 median catch per unit of effort (CPUE- pounds per trap-haul \* set-over-day) for all license types by area fished (A - territorial areas)<sup>23</sup>**



Catch per unit effort (CPUE) is an index of fishing pressure. The numbers suggest lobsters are becoming more difficult to catch. Since current catch levels are significantly above the long-term average, there is reason for concern that lobsters are being overfished, threatening the sustainability of the lobster industry.<sup>24</sup>

According to a lobsterman who also does research for the Massachusetts Division of Marine Fisheries, fishery management is currently being done on a species-by-species basis, creating an eco-imbalance in which there are expanding predator fish populations that are diminishing the lobster stock.<sup>25</sup> Other researchers have reported that a long-time lobster disease that softens their shells, diminishing their quality, has been on the rise. Another threat to the lobster supply is a regulatory closure of the fishery because of the threat that lobster heavy trap gear and buoy lines pose to right whales, an endangered species.<sup>26</sup>

The above indicates the status of the Massachusetts lobster industry and some of the multiple factors affecting the status. These factors and others reportedly constitute short- and long-term threats to its sustainability. The industry is said to be taking appropriate measures to assure its sustainability in the short-term; long-term sustainability is at issue. Accurate predictions are difficult because of what is not known. What is said to be important to its long-term sustainability is the dedication of greater effort to improved scientific programs to fill the knowledge gap, as well as improved conservation, monitoring, and enforcement programs.<sup>27</sup>

### **Commercial Dockage Facility Needs**

Commercial dockage facilities needs are summarized below. They are largely based on interviews of two lobstermen, who reported on three vessels, in their or their families' use. Marblehead is homeport for these vessels. Currently, in the summer season (May–Oct) the three vessels are tied up at moorings in Marblehead and in the winter season (Nov–Apr) are moved to Pickering Wharf Marina in Salem.

**Safety – Weather Protection** -- The shift in location for the three vessels for the six-month winter season is made for safety reasons. Pickering Wharf offers protected winter dockage, while moorings in Marblehead are exposed to northeasterly storms in winter. A secure location with protection from

<sup>23</sup> Source: 2005 Massachusetts Lobster Fishery Statistics, Dean, M.J., S.R. Reed, and T.B. Hoopes, p. 13.  
[http://www.mass.gov/dmfele/dmf/publications/tr31\\_2005\\_lobster\\_report.pdf](http://www.mass.gov/dmfele/dmf/publications/tr31_2005_lobster_report.pdf)

<sup>24</sup> The Sustainability of the Massachusetts Lobster Fishing Industry, Dr. Michael Tlusty, Research Scientist, New England Aquarium, Boston MA, 02110-3399, January 2003, p.2.

<sup>25</sup> Interview with Jay Michaud, Lobster Fisherman, 3/6/08.

<sup>26</sup> The Sustainability of the Massachusetts Lobster Fishing Industry, Dr. Michael Tlusty, Research Scientist, New England Aquarium, Boston MA, 02110-3399, January 2003, p.10-12.

<sup>27</sup> The Sustainability of the Massachusetts Lobster Fishing Industry, Dr. Michael Tlusty Research Scientist New England Aquarium Boston MA 02110-3399, January 2003, p. 22.

weather exposure year-round, but particularly in the winter season, is viewed as a key need by the lobstermen interviewed.

The issue of weather exposure is a critical one, as can be seen from information posted on the web sites of Harbor Masters of Salem Sound and North Shore communities, as well as those of the communities themselves. These web sites often indicate whether the communities' harbors or areas of their harbors, are protected or exposed to winter storms. The issue is well-recognized in Salem Sound by those involved in harbor management. The Salem Harbor Master reports the following in red on his Web site<sup>28</sup>: All of Salem Waters, with the exception of Area S<sup>29</sup>, are exposed to a "Northeaster" to some degree. They occur rarely in summer but are common in early spring and late fall. The two long-time lobster fishermen, who were interviewed, stressed the problem of the winter weather exposure of moorings in Marblehead, their homeport, explaining, as noted above, that they move their vessels to in winter to a different location that provides storm buffering. The Beverly Harbor Center Facilities Manager emphasized the issue of weather exposure in Salem Sound in an interview and identified some of the areas of particular concern. The owner of Hawthorne Cove Marina confirmed the problem of strong wave action from winter storms affecting his marina, a facility which is located in close proximity to the Salem Port Expansion project site. Importantly, he noted, that just next to his facility within the project site, there is an area protected from NE and E storms (winter storms), which he identified on a project map (see map in Appendix E).

Berthing Dimensions -- While lobstermen tend to fish in boats less than 35 F in length<sup>30</sup>, boats range in size, on average, from 25-45 F. Two lobstermen who were interviewed indicated the dimensions of three vessels in their or their families' use: two vessels were 42F in length, and a third was 31 F. Average size lobster vessels were said to be perhaps a bit smaller in their homeport of Marblehead. Width of their vessels ranged from 11.5-13.5F and water depth requirements ranged from 3-5 F. For vessels of 42 F, ideal berth length along a wharf is 50 F, but 46 F would suffice, it was reported; slip lengths could be shorter -- 40 F.

Fishing Season -- The lobstermen interviewed fished lobster only, year-round, in daily trips, as often as the weather allowed, one reported; the average number of days they were at sea was between 150 and 200. Average number of crew is two for the 42 F vessels; and this was said to be the average crew size for commercial lobster fishing vessels moored in Marblehead. Both lobstermen had state and federal permits allowing fishing in state and non-territorial waters; for the 31 F boat, one permit, a state permit, was held; one lobsterman fished in Massachusetts Bay, mostly in federal waters (see Map in appendix); the other fished in Salem Sound and the area of the surrounding islands, within 5 miles of Salem 70% of the time for him and 100% of the time for his family member with the 31-F boat. All used traps, one reporting his number of traps to be the limit, 800. All sold their catch to a Salem retailer/wholesaler, Patriots Seafood, which they would generally have send a truck for pick-up at the dock. Price at the time of the interview was \$8/lb, but the average price during season is \$4+/-/lb. Much of the product was said to be shipped overseas to Europe and it was speculated that the value of the Euro may cause the price to increase.

Seasonal Harvest, Coastal & Non-Territorial -- The annual pattern in territorial and non-territorial landings for 2005 is shown below and reflects that of past years.<sup>31</sup>

<sup>28</sup> (<http://www.harbormasters.org/salem/moorings.shtml>)

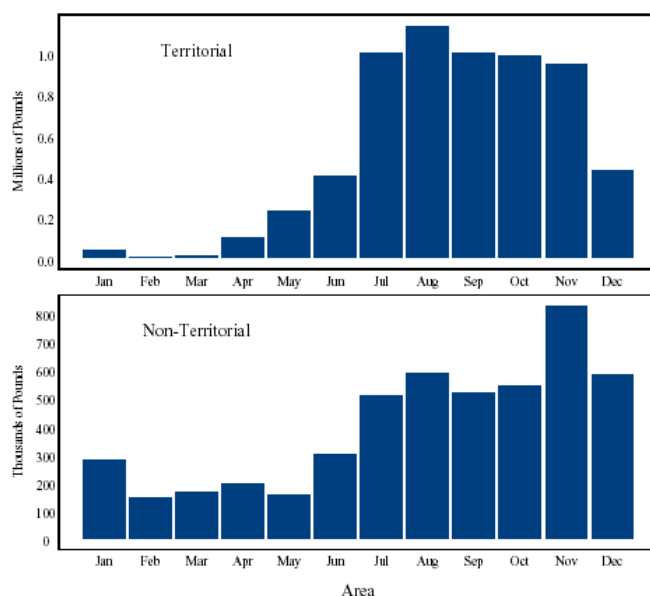
<sup>29</sup> Area "S" is from the Kernwood Bridge to the Beverly Bridge in the Danvers River is designated Area "S". There is a long waiting list and very little turnover.

<sup>30</sup> The Sustainability of the Massachusetts Lobster Fishing Industry, Dr. Michael Tlusty, Research Scientist, New England Aquarium, Boston MA 02110-3399 January 2003, p. 4.

<sup>31</sup> 2005 Massachusetts Lobster Fishery Statistics, Dean, M.J., S.R. Reed, and T.B. Hoopes, p. 8. [http://www.mass.gov/dfwele/dmf/publications/tr31\\_2005\\_lobster\\_report.pdf](http://www.mass.gov/dfwele/dmf/publications/tr31_2005_lobster_report.pdf).



**Figure 5.** 2005 commercial lobster landings by month for territorial and non-territorial areas



**Table 5.** 2005 commercial lobster landings (pounds) by month for territorial and non-territorial areas

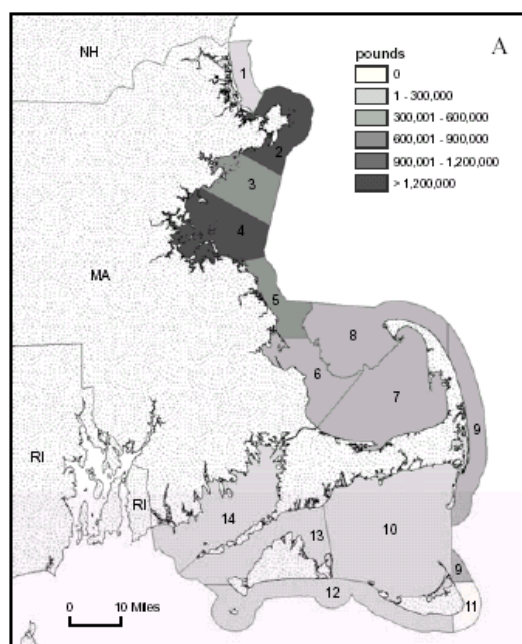
Month	Territorial	Non-Territorial
January	57,563	290,240
February	23,958	156,850
March	27,800	174,690
April	120,617	206,977
May	244,412	165,598
June	413,548	309,548
July	1,018,363	520,066
August	1,143,747	600,884
September	1,017,177	527,171
October	1,001,754	553,667
November	959,872	833,959
December	439,843	591,589
<b>Total</b>	<b>6,468,652</b>	<b>4,931,241</b>

**Table:** 2005 Commercial Lobster Landings (lbs) by Season for Territorial and Non-Territorial Areas

Season	Territorial	Non-Territorial
May – Oct	4,839,001	2,676,934
Nov -- Apr	1,629,653	2,254,305
<b>Total</b>	<b>6,468,654</b>	<b>4,931,239</b>

Among Statistical Reporting Areas (SRA) of state waters, the one including Salem Sound (SRA 3) had the third highest lobster harvest in territorial waters. The Cape Ann area (SRA 2) had the highest harvest of lobster (18%) in state waters. (See Figure below.)<sup>32</sup>

2005 total commercial lobster landings from all permit types by statistical reporting area—(A - territorial areas)



<sup>32</sup> Ibid., p.8.

The charts below summarize the berthing and additional commercial dockage facility needs, waterside and landside, (beyond that of protection from weather exposure), and the incentives for their relocation, reported by the interviewed lobstermen:

#### **Waterside**

Berthing	
Length	30-40 F slip length; 40-50 F, if along wharf
Duration	Year-Round
Navigational Access	Clear channel with 3-5 F water depths
Utilities	
Electricity	110-120v, 30 amp
Water	¾" Standard hose (nice, but not necessary according to one interviewee)

#### **Landside**

Access	Access for trucks that may come to site to pick up lobster, deliver fuel
Parking	1 space/vessel, year-round
Storage	Views: 1) 2000 SF/vessel for traps, buoys, lines on-site next to vessel, year-round, ideal but could live without 2) Temporary storage space only, no need for storage on waterfront, but do need storage space somewhere, ideally on other city-owned property, as yard storage of traps is prohibited in Salem
Fuel	Views: 1) Fuel delivery by truck to site is easiest 2) Not needed, as can obtain off-site, but allowing access to fuel source used by ferry would be beneficial
Loading/Unloading	Conveyor used to load and unload catch in Marblehead is a convenience
Bait storage	Small building, as in Saugus, would be ideal, space permitting, unless would increase cost to that of private marinas
Ice, food, vessel maintenance, repair service	Not necessary

#### **Incentives to Relocation**

Year-round dockage available at slip, wharf, or float that provides protection from winter storms, as exposure to winter storms "puts whole business on line", and moorings are harder to access and less economical, requiring a second boat to get to the mooring
Dockage fees more competitive than those of a private marina
Electricity, for vessel safety in providing power for pump-out if leaks develop; also for maintenance with power tools
Proximity to home

#### **Market**

When the following question was posed to the lobster fishermen who were interviewed, 'Assuming the facility were built per your comments on what would be needed, as well as those on price, if you were asked "If built, would they come?" how would you answer on a scale of 1-10, 10 being the strongest "yes, they will come? ", they answered, "10, they would come." One elaborated: "A weather protected and affordable facility in Salem would most likely attract at least fifteen year round commercial fishing boats. The vessel size would be in the 25 to 45 foot range."<sup>33</sup> In a follow-up interview, the second lobsterman echoed the first on the size of the market; he believed 15-20 vessels would be attracted to the facility.

#### **Revenue Stream**

If dockage fees were those of existing public and private facilities in Salem Sound, the revenues generated by a 35-F vessel for 12 months would range between \$2660 and \$7037. For a 42-F vessel they would range between \$3192 and \$8442.

<sup>33</sup> Emails of 3/29/08.

#### Revenues Generated from Commercial Fishing Vessel Dockage Fees for a 35-F Vessel (average size)

Location	Fee	6-months summer	6 months winter	12 months
Salem - Pickering Wharf Marina	\$150/F/summer \$ 51/F/winter	\$5250	\$1785	\$7037
Beverly Harbor Center	\$ 76/F/yr			\$2660

#### Revenues Generated from Commercial Fishing Vessel Dockage Fees for a 42-F Vessel

Location	Fee	6-months summer	6 months winter	12 months
Salem - Pickering Wharf Marina	\$150/F/summer \$ 51/F/winter	\$6300	\$2142	\$8442
Beverly Harbor Center	\$ 76/F/yr			\$3192

The two lobster fishermen who were interviewed and moor their 42-F vessels in Marblehead for the 6-month summer period, and Pickering Wharf Marina in Salem for the 6-month winter period, pay approximately \$2336/yr<sup>34</sup> or \$56/F/yr. This amount is less than the fee for Beverly Harbor Center; this facility, while offering year-round dockage at a slip at a facility with winter storm protection, meeting the desired criteria, as well as good services, is considered expensive. While Beverly Harbor Center has a waiting list, this suggests that it may take a fee less than \$76/F/yr to attract these and other lobster fishermen, especially those who use Marblehead, to a new Salem facility for year-round use. The Pickering Wharf Marina fee of \$51/F/six-month winter, is the current benchmark for the winter November to April season; however, generally it is only 6-8 commercial lobster vessels which use this facility in this season.

### Impact on Lobster Fishermen Economics

Discussions with experienced, full-time commercial lobstermen indicate that establishing dedicated shoreline slips in Salem, will improve their bottom-line economics significantly. A conservative estimate of pre-tax earnings improvement for a single boat exceeds \$20,000 per annum. In isolated cases, pre-tax earnings improvement may approach double this figure. As with any owner-operator enterprise, individual results vary by each individual boat's current operating circumstances.

The majority of the earnings improvement results from increases in gross revenue. These increases in gross revenue are not accompanied by proportionate increases in either variable costs or in fixed overheads. In simplest terms, proper and dedicated Salem shoreside slips allow more time to actively fish, and require less time to burn time and fuel while traveling. Assuming that each boat saves enough time to fish for lobster at least one half hour per day, for five days a week, only four weeks per month, only six months a year, less than \$170 per day incremental gross revenue, will generate \$20,000 in annual revenue. Inasmuch as the fixed costs of mooring, ownership of the vessel and equipment and insurance, and variable costs, such as fuel and crew labor to travel to and from the fishing ground, are already expended, additional time spent fishing generates revenue that largely flows to the *pre-tax* bottom-line.

Furthermore, proper and dedicated shoreside mooring may result in reduced expenses, particularly for boats currently unable to find economic and efficient moorings. Areas of expense reduction include disposing of dinghies, fuel, reduction of insurance if shoreside moorings permit better risk-management practices; and reduction of weather-related casualty losses.

No estimate is made of benefits accruing to the larger community of Salem, although these may be significant. Benefits include increased tax revenues from lobster boat gross receipts taxes; increased employment at tourist-related enterprises – especially lodging and restaurant employment that rely on “authentic New England” themes to attract customers-, and diversification of Salem's economy.

Similarly, no estimate is made of benefits to the Commonwealth. Benefits to the Commonwealth may include increased income tax revenue from increased employment, increased income tax revenue from

<sup>34</sup> This number includes mooring fees as well as some small additional fees for the summer period.

lobster boatmen's increased earnings, and increased sales tax revenue from retail sales at tourist and travel enterprises.

## **Summary**

In Salem Sound and the North Shore area, there is a shortage of year-round commercial fishing dockage space that is of a good price and safe in terms of protection from winter storms. At the same time, overfishing of the lobster resource is a significant concern. It is important to keep this latter issue in perspective -- the industry is said to be taking appropriate measures to meet the short-term threat -- and to understand the threat. Recent harvests of lobster have been at record levels and have led to expansion of fishing effort and an accompanying expansion in investment that this takes. Catch rates, the index of fishing pressure, are in decline, indicating fishing is harder and overfishing is likely. Measures to ensure sustainability of the lobster stock include, among others, a moratorium on issuing new coastal commercial lobster fishing permits and the number of such permits has been declining. The decline indicates that circumstances have had an impact on the lobster fishing industry; other potential significant factors could lead to more impact. A return from record to long-term harvest levels will mean a 50% drop in harvests, and economic consequences for the industry, given its level of investment.

In 2005, there were a total of 76 lobster fishermen in Salem, Marblehead, and Beverly. Currently, there are at least about 49 commercial lobster vessels using facilities in these communities; approximately 17 vessels are using a wharf, slip, or dock on a year-round basis, and 11 vessels are using such dockage for six months in the winter; 1 for 6-months in the summer; the remainder are using moorings in the summer season. Among the factors that would influence a decision to relocate to a new facility, year-round, protected dockage is considered important. A dockage fee of as much as \$60/F/yr, but less than \$76/F/yr would appear to be competitive.

Establishing dedicated shoreline slips in Salem for commercial lobstermen could improve their bottom-line economics significantly. A conservative estimate of pre-tax earnings improvement for a single boat exceeds \$20,000 per annum. As noted, individual results vary by each individual boat's current operating circumstances. Such savings, if demonstrated and accepted by commercial lobstermen, could serve as a highly compelling argument increasing their willingness to pay higher fees.

The two interviewed lobstermen felt very strongly that there is a market for a weather-protected, affordable commercial lobster fishing facility in Salem -- that if built, the lobstermen would come. They estimated the market size to be at least 15-20 vessels.

Evidence of the interest may be suggested by the feedback elicited in the course of interviewing a number of sources in Salem, including individuals associated with public and private marina facilities; it was reported that there was excitement about the possibility of a commercial fishing facility.

Lobster fishing would be synergistic with other possible uses of the site. Cruise passengers and other tourists are said to find fishing vessels and the activities associated with them an attraction and promotions such as "Days of Wine and Lobster" can be built around this use, such as is done with the crab industry in Mendocino on the coast of Northern California.

## **Other Fishing, Yachts, Transient Vessels**

There is a shortage of mooring/dockage space, permanent and transient, for the full range of types of vessels, commercial fishing, as well as pleasure craft such as yachts. With regard to commercial fishing space, the same pressures that apply to lobster fishing facilities, noted above, apply to all types of commercial fishing facilities. There are differences in facilities requirements of different types of fishing vessels, however; berth-size, seasonality of use, storage, service and other needs can vary according to the species the vessel is used to fish. Given the changes that occur in the status of stocks and management controls for sustainability of the various fisheries, the flexibility to accommodate multiple types of fishing vessels can have value. As lobster vessels can be used to fish other species -- as they do in Gloucester currently 40% of the time, providing for these vessels has built-in a certain amount of flexibility.

Providing berthing for permanent or transient use of pleasure craft, especially yachts, while commanding higher dockage fees -- the figures below indicate these fees --, has the potential to create conflict when space is shared with commercial fishing vessels. Pleasure craft also have different space and service needs than commercial fishing vessels. Written common sense rules can mitigate some potential conflicts of shared recreational/fishing vessel space -- rules to ensure proper management of bait to reduce smells is an example --; nonetheless, segregation of these uses may be best. Some sources of conflict are inherent: commercial lobster fishermen often go out to sea at very early hours in the morning, producing noise from vessels engines and other activity at a time yacht users may be asleep onboard.

### Recreational Vessel Mooring/Dockage Fees

Location	Fees	
Salem		
Public Winter Island		
Moorings	\$500/yr	
Private Hawthorne Cove	<u>Length</u>	<u>Fee</u>
Moorings	up to 25'	\$1,335.00
	26' to 30'	\$1,450.00
	31' to 35'	\$1,575.00
Dockage	36' to 45'	\$1,650.00
	\$142/F/season 5/1-10/31	
Private Pickering Wharf		
Dockage	\$150/F/6 months summer	
	\$ 50/F/6 months winter	
Marblehead		
Public Moorings		
Main Harbor	\$6.50/F/yr	
West Shore	\$4.50/F/yr	
Beverly		
Public		
Beverly Harbor Center		
Slips	\$141/F/6 months (Summer, May-Oct)	
	\$ 41/F/6 months (Winter, Nov-Apr)	
Moorings harbor-wide	\$5.50 /F/yr (for permit)	

### Transient Vessels

Location	Fees
Salem	
Private	
Pickering Wharf	\$150/F/month – summer \$50/F/season -- winter
Hawthorne Cove (recreational)	
Moorings	\$25/day
Dockage	\$2/F/day + electric
Marblehead	
Tucker's Wharf	\$3.50/F/day with electric up to 10 days/stay
Moorings	N/A – Harbor Master's office refers requests to yacht clubs
Beverly	
Public	
Beverly Harbor Center	\$2/F/night



## Appendix A

### New England Lobster Landings by State 2001-2005

NE State	2006		2005		2004	
	Pounds	\$	Pounds	\$	Pounds	\$
CT	792,894	4,030,636	713,901	3,821,396	646,994	3,166,060
ME	72,666,935	297,164,762	68,729,813	317,948,122	71,574,344	289,078,847
MA	10,967,296	52,557,255	9,884,340	49,587,035	11,295,474	51,580,647
NH	2,666,344	13,915,298	2,556,187	14,375,191	2,097,396	10,199,038
RI	3,749,541	18,391,519	4,343,900	23,010,314	3,064,128	14,620,742
Total NE	90,843,010	386,059,470	86,228,141	408,742,058	88,678,336	368,645,334
Total All States	92,614,704	395,175,319	87,813,069	415,437,923	90,073,234	374,303,151

NE State	2003		2002		2001	
	Pounds	\$	Pounds	\$	Pounds	\$
CT	671,119	3,170,088	1,067,121	4,225,522	1,329,707	5,450,283
ME	54,970,948	205,715,329	63,625,745	210,950,030	48,617,693	153,982,266
MA	11,385,049	52,329,426	12,853,380	56,568,700	12,132,807	53,430,128
NH			391	1,511	2,027,725	8,071,915
RI	3,474,508	16,731,441	3,835,050	15,875,101	4,452,358	18,746,772
Total NE	70,501,624	277,946,284	81,381,687	287,620,864	68,560,290	239,681,364
Total All States	71,682,906	283,515,593	83,087,146	293,893,651	71,192,803	249,509,514

## Appendix B

### Number of active commercial lobstermen, lobster landings and traps-fished by homeport for 2005 (does not include seasonal permits).

**Table 4.** Number of active commercial lobstermen, lobster landings and traps-fished by homeport for 2005 (does not include seasonal permits). Homeport data is taken from vessel information on the permit applications. In cases where no vessel or homeport was specified, port of landing was used. Catch data includes all reported landings, regardless of gear type, while effort data represents only trap effort. Shaded rows denote towns which rank in the top 10 for either number of fishermen, total catch, or total effort. Some cities and towns are combined to protect the confidentiality of the data.

City / Town	Fishermen		Catch (Pounds)					Effort *		
	Number	Rank	Territorial	Non-Territorial	Total	Percent	Rank	Traps	Percent	Rank
Barnstable-Yarmouth	7	34	25,137	273,755	298,892	2.67%	14	3,870	0.91%	27
Beverly	39	8	416,817	148,307	565,124	5.05%	7	21,143	4.97%	6
Boston	51	6	292,038	519,024	811,062	7.25%	2	18,988	4.47%	7
Bourne	3	46	5,047	0	5,047	0.05%	48	560	0.13%	47
Chatham	39	8	188,980	317,166	506,146	4.53%	8	8,985	2.11%	16
Chilmark	12	25	21,167	13,920	35,087	0.31%	36	3,122	0.73%	31
Cohasset	28	13	259,566	47,454	307,020	2.74%	12	13,430	3.16%	10
Danvers	8	30	51,375	0	51,375	0.46%	31	3,130	0.74%	30
Dartmouth	8	30	20,724	0	20,724	0.19%	40	1,385	0.33%	40
Dennis	15	23	40,879	0	40,879	0.37%	33	4,723	1.11%	25
Duxbury-Kingston	8	30	30,431	15	30,446	0.27%	37	1,725	0.41%	38
Eastham	3	46	7,963	0	7,963	0.07%	44	369	0.09%	48
Edgartown-Oak Bluffs	3	46	1,032	0	1,032	0.01%	50	155	0.04%	50
Essex	3	46	7,290	0	7,290	0.07%	45	790	0.19%	44
Fairhaven	28	13	109,621	107,461	217,083	1.94%	18	9,980	2.35%	14
Falmouth	7	34	5,925	31,335	37,260	0.33%	35	650	0.15%	46
Gloucester	194	1	815,170	751,975	1,567,145	14.01%	1	61,988	14.58%	1
Gosnold	3	46	4,514	0	4,514	0.04%	49	340	0.08%	49
Harwich	5	39	8,031	31,748	39,779	0.36%	34	1,150	0.27%	41
Hingham	15	23	165,475	21,684	187,159	1.67%	21	7,929	1.87%	19
Hull	17	21	191,239	40,564	231,803	2.07%	17	8,845	2.08%	17
Ipswich-Rowley	12	25	12,444	0	12,444	0.11%	41	2,250	0.53%	33
Lynn	4	44	4,075	3,177	7,252	0.06%	46	865	0.20%	43
Manchester	26	15	186,879	6,987	193,865	1.73%	19	8,841	2.08%	18
Marblehead	31	12	274,153	24,805	298,958	2.67%	13	14,619	3.44%	9
Marion	4	44	5,536	42,872	48,408	0.43%	32	2,200	0.52%	34
Marshfield	62	5	364,125	91,133	455,258	4.07%	10	27,432	6.45%	3
Mattapoisett	9	28	81,503	22,893	104,396	0.93%	24	4,950	1.16%	24
Nahant	17	21	248,027	12,811	260,838	2.33%	15	10,735	2.53%	13
Nantucket	5	39	21,060	32,018	53,078	0.47%	30	1,793	0.42%	37
New Bedford	120	2	51,670	423,997	475,666	4.25%	9	5,782	1.36%	23
Newburyport-Amesbury	25	17	52,635	51,295	103,930	0.93%	25	5,952	1.40%	22
Orleans	20	19	188,357	4,028	192,385	1.72%	20	7,082	1.67%	21
Plymouth	77	3	542,368	28,381	570,749	5.10%	6	32,824	7.72%	2
Provincetown	36	11	230,078	8,988	239,066	2.14%	16	9,903	2.33%	15
Quincy	7	34	25,097	0	25,097	0.22%	39	1,499	0.35%	39
Rockport	64	4	484,158	122,177	606,335	5.42%	5	24,154	5.68%	4
Salem	6	37	26,389	0	26,389	0.24%	38	2,110	0.50%	35
Salisbury	8	30	10,342	1,020	11,362	0.10%	42	2,070	0.49%	36
Sandwich	37	10	249,510	542,744	792,254	7.08%	3	23,403	5.51%	5
Saugus	20	19	153,557	11,511	165,068	1.48%	22	10,826	2.55%	12
Scituate	49	7	199,159	166,150	365,309	3.27%	11	16,181	3.81%	8
Swampscott	21	18	117,126	17,411	134,537	1.20%	23	7,595	1.79%	20
Tisbury	5	39	4,128	1,924	6,052	0.05%	47	940	0.22%	42
Truro	9	28	64,651	2,899	67,550	0.60%	27	3,515	0.83%	29
Wareham	5	39	10,287	0	10,287	0.09%	43	780	0.18%	45
Wellfleet	5	39	66,563	0	66,563	0.60%	28	2,680	0.63%	32
Westport-Fall River	26	15	24,963	744,203	769,166	6.88%	4	13,143	3.09%	11
Weymouth	6	37	36,712	53,208	89,920	0.80%	26	4,104	0.97%	26
Winthrop	10	27	58,817	902	59,719	0.53%	29	3,535	0.83%	28
Statewide Total	1,222		6,462,788	4,721,940	11,184,728			425,020		
Out Of State	47		0	209,249	209,249			1,600		

\* The number of "Traps" for each city/town represents the sum of each individual's maximum traps fished for the year.

Source: 2005 Massachusetts Lobster Fishery Statistics, Dean, M.J., S.R. Reed, and T.B. Hoopes (TR31-2005), pp 1.  
[http://www.mass.gov/dfwle/dmf/publications/tr31\\_2005\\_lobster\\_report.pdf](http://www.mass.gov/dfwle/dmf/publications/tr31_2005_lobster_report.pdf)

## Appendix C

2/2008

### More Maine fishing boats moving south

By the Associated Press and the Times staff

[http://www.newburyportnews.com/punews/local\\_story\\_043064534.html](http://www.newburyportnews.com/punews/local_story_043064534.html)

Gloucester's fishing port is emerging as a prime beneficiary from a tide of changes that's being felt hard in the state of Maine.

Groundfishing boats are abandoning Portland and heading south, cutting the fish supply for seafood processors and the Portland Fish Exchange and costing businesses that serve the Maine fleet.

More and more of the harbor's medium and large boats are now bringing their catches to Gloucester — primarily because they can earn extra money by selling lobsters they catch in their nets, a practice outlawed in Maine.

Maine's city-owned Portland Fish Exchange seafood auction is now staffed by a skeleton crew and has cut the number of auctions from five a week to just two. It has been selling about 60,000 pounds of fish a week, just 12 percent of its volume in the early 1990s, and is trying to lease out a portion of its largely empty refrigerated warehouse.

Fewer boats mean fewer customers for Gowen Marine, which repairs boats and gear and sells supplies, and Vessel Services, the harbor's lone remaining company selling ice and fuel to commercial boats. Cozy Harbor Seafood, one of Portland's four larger seafood processors, now imports 95 percent of its groundfish from Canada or Massachusetts, said President John Norton.

It's hard for Maine processors to compete with companies that have access to local fish, said Angelo Ciocca of Nova Seafood. He expects his company and other shore businesses to close after their owners retire.

"We are living the end of the groundfish-harvesting side of the industry in the state of Maine," Ciocca said. "It's done. It's finished."

That's hardly the sentiment in Gloucester, where the arrival of the Maine boats is good news in what has otherwise been a difficult era, said Peter Prybot, the longtime Gloucester lobsterman who writes a commercial fishing column for the Times.

Prybot's column this past Saturday, in fact, noted the growth in such jobs as graders and buyers at the Gloucester Seafood Auction.

"The port of Gloucester, for God's sake, loves to see the Maine boats," Prybot said. "They are top fishermen and top producers. Gloucester not only benefits from the fish landings, they benefit from what is spent on those boats, such as fuel and food."

Statistics show that the New England fishing industry as a whole continues to shrink in the middle of a long-range plan to rebuild stocks of haddock, cod and yellowtail flounder through regulatory measures that include reducing the amount of time fishermen can spend at sea. **In the past year, 20 percent of the active boats in New England have quit groundfishing, said Stephen Ouellette, a Maine maritime lawyer who specializes in fisheries issues.**

Portland has been particularly hard hit, with fish volumes going down nearly 50 percent from 2004 to 2007 — but fish catches brought to Gloucester have been stable, helped in part by Maine fishermen.

Allyson Jordan, of Scarborough, Maine, said she mailed her Maine fishing license back to the state after the Marine Patrol — at the urging of the lobster industry — began enforcing a long-standing but rarely enforced law that bans Maine-licensed boats from possessing lobsters in state or federal waters. Jordan,

whose family has been fishing in Maine for three generations, moved her family's two draggers and shore operations to Gloucester and found an apartment in nearby Rockport.

"It was our family's way of life, and it kind of stinks we had to leave," she said.

Sam Viola, a Portland-based fisherman who has been working out of Gloucester this winter, said he and other boat owners believe they have exhausted all options and are now justified in moving to the Bay State.

"Portland is done," Viola said. "Portland is out of business right now."

**1/19/07**

[http://www.gloucestertimes.com/punews/local\\_story\\_019120552](http://www.gloucestertimes.com/punews/local_story_019120552)

## **Maine fishermen landing catch in Massachusetts at Maine's expense**

**By Douglas A. Moser , Staff writer  
Gloucester Daily Times**

Maine fishermen are landing more of their fish in Massachusetts to take advantage of more lenient lobster rules here at the expense of Maine's seafood auction.

Massachusetts law allows fishermen to sell lobsters accidentally caught in their nets; Maine law does not.

In the recent past, many Maine fishermen would just bring their lobsters to Gloucester and Boston and take the fish back to the Portland Fish Exchange. Now, after the prodding of local fishing advocates, they sell their fish here as well.

"I always thought it was too restrictive for them," said Vito Calomo, executive director of the Massachusetts Fishery Recovery Commission. "I used to tell them to come to Gloucester."

Calomo said Maine fishermen would stop to sell their lobsters, then steam back to Maine to sell their fish. Within the last year, they have been landing their entire catch here.

"We pay a higher price in Gloucester for quality fish," he said. "When they're fishing off our area or in the Georges Bank, it's quicker for them to come to Gloucester to drop the lobsters and get a higher price for the fish. They buy fuel here, they buy groceries, they get some repairs done. It's better for our economy."

Maine fishing regulations prohibit fishermen from selling the accidental lobsters, called bycatch, when they are not the fishermen's permitted catch. Massachusetts allows fishermen from any state to sell a bycatch of 100 lobsters per day and up to 500 lobsters per trip.

At about \$4 per pound, which is currently the average price, fishermen can reap an extra \$8,000 from 500 lobsters averaging about four pounds apiece. Calomo said the price rises to between \$6 and \$8 a pound during the summer.

Maine lobstermen also insist that operators of boats that catch fish in nets come to Massachusetts not only because they can sell their lobsters here. They say fishermen also get higher prices for their catches here, while paying out less in fuel costs.

From 2004 to 2005, the number of trips by Maine-based trawlers to Massachusetts to sell fish and lobsters grew from 76 to 160, and the amount of seafood sold grew from \$1.6 million to \$3.8 million, according to a new analysis.

In 2005, Maine fishermen sold 20,000 pounds of lobster in Massachusetts, a tiny fraction of Maine's total harvest of 67.3 million pounds.

"For the sake of these few lobsters, we're losing whole boatloads of fish," said Tom Valleau, president of the Portland Fish Exchange.

Maine's lobster industry opposes changing the rules, fearing too much effort is already being put on the lobster population.

Fishermen know the odds are long that Maine, the nation's leading lobster state, will change its landing law for lobsters. After all, there are more than 6,000 licensed lobstermen in Maine, the industry has a politically powerful voice, and lobstering by far is the state's No. 1 fishery, worth more than \$300 million in 2005.

The new numbers came from fishermen's log books and seafood dealer records that are collected by the National Oceanic and Atmospheric Administration, the federal agency that regulates commercial fishing. The numbers were crunched by an economist at NOAA's Northeast Fisheries Science Center at Woods Hole.

According to the analysis, Maine lost \$9.6 million in seafood revenues to Massachusetts from 2000 to 2005 because of the law outlawing lobster landings.

The Portland Fish Exchange last year handled 9.5 million pounds of product, down from 17.1 million pounds in 2005. In the early 1990s, the auction handled more than 30 million pounds a year.

One of those Maine boats going to Massachusetts, the 70-foot Olympia, is owned by Maggie Raymond, who's the executive director of the Associated Fisheries of Maine.

Last year, her boat stopped going to Portland. Instead, it brought about 400,000 pounds of fish to Gloucester and to Boston, she said.

By going to Massachusetts, her boat also brought in about \$50,000 from lobster that were caught in her fishing nets, Raymond said. She also saved nearly \$9,000 in sales taxes that Maine charges on diesel fuel which Massachusetts does not.

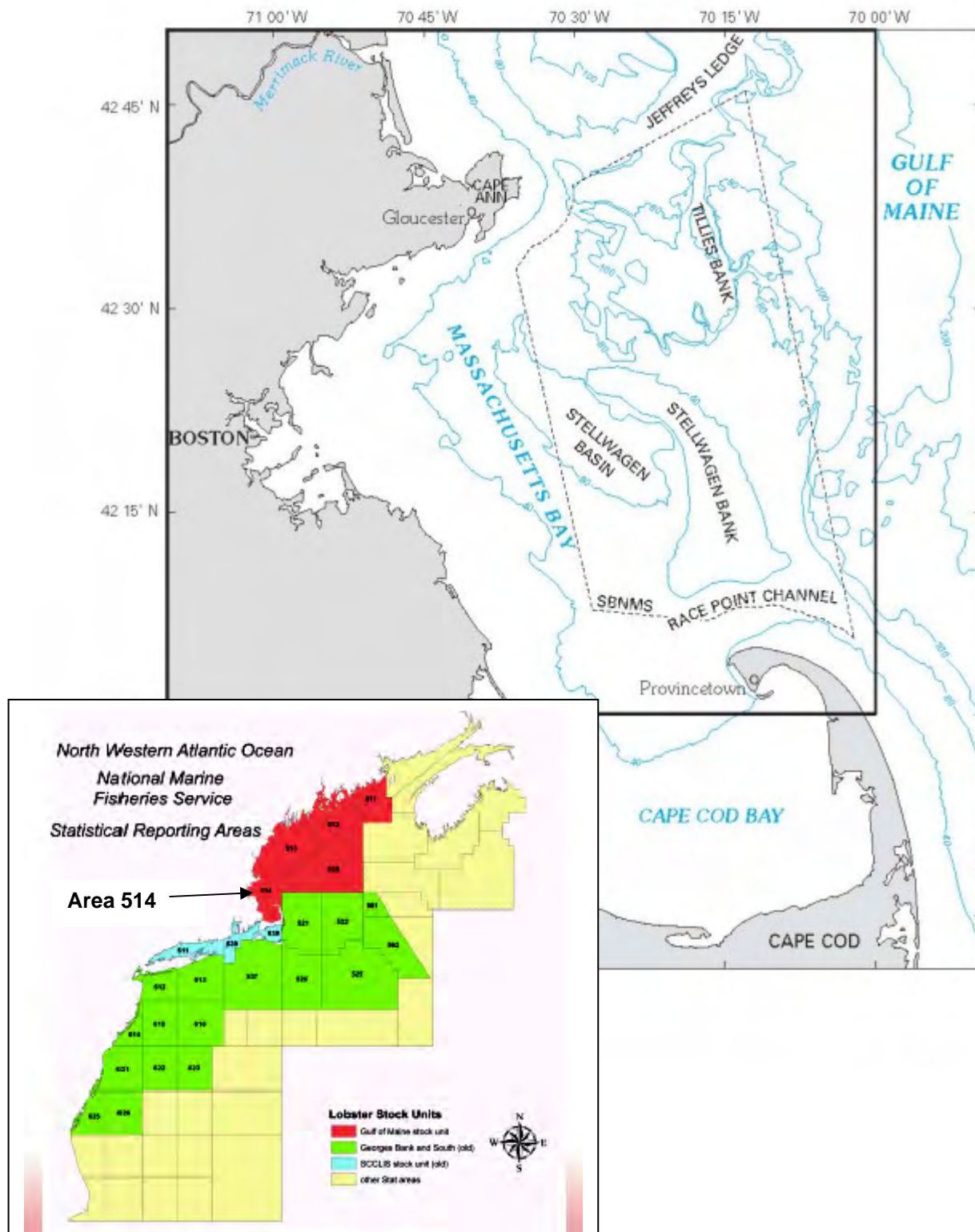
Raymond said she would bring her catch to Portland if Maine law allowed her to bring the lobsters there.

"These lobsters are being landed anyway. They're just being landed in other states," Raymond said. "If there is any hope of preserving what's left of the groundfishing infrastructure in Maine, which is the Portland Fish Exchange, something has to be done."

*The Associated Press contributed to this report*

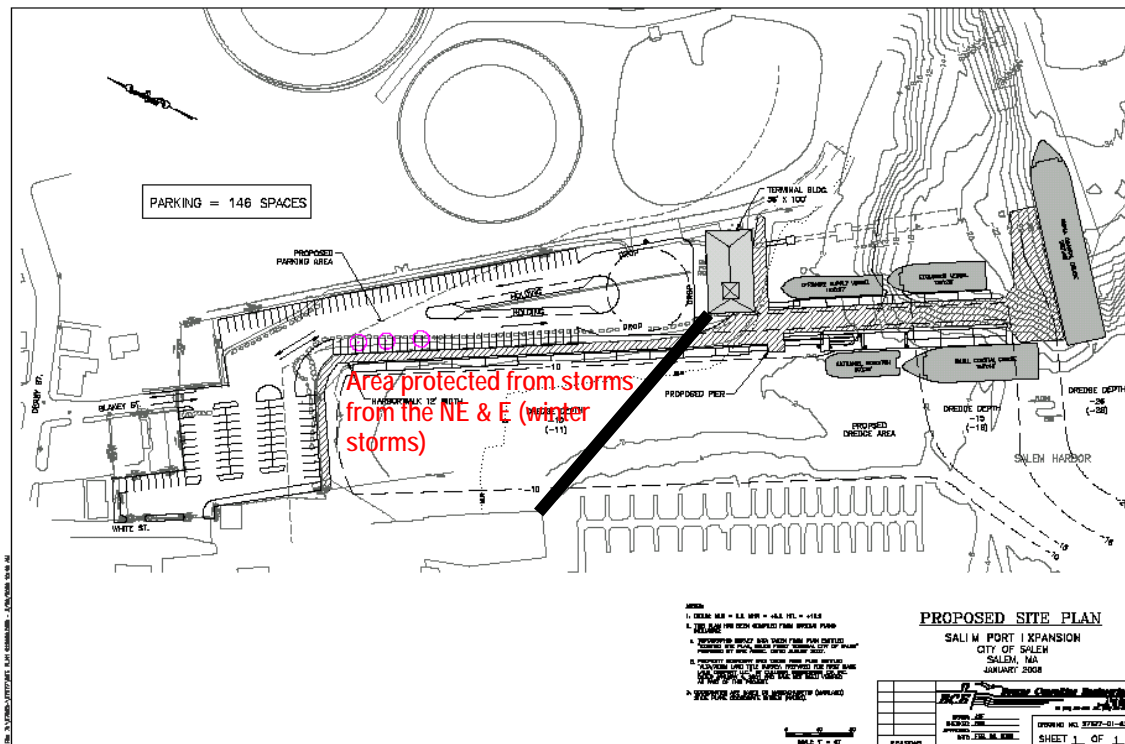
## Appendix D

Boundary of 1:125,000 scale map of Massachusetts Bay.





## Appendix E



## **Appendix F**

### **List of Individuals Interviewed**

Michael Sosnowski, Lobster Fisherman, 3/5/08  
Jay Michaud, Lobster Fisherman, 3/8/08  
Peter Gifford, Salem Harbor Master, 3/12/08  
Elaine Cook, Salem Harbor Master's Office  
Louis Bochynski, Beverly Harbor Center, Facilities Manager, 3/12-13/08  
Ray Shaw, Jodrey State Pier, Gloucester, Facilities Manager, 3/20/08  
Shirley Edmunds, Gloucester Harbor Master's Office, 4/2/08  
Joe Pelczerski, Massachusetts Coastal Zone Management, 3/6/08  
Rockport Harbor Masters, Rosemary Lesch and Scott Story, 3/18/08  
Russ Vickers and Ben Copp, Hawthorne Cove Marina, 3/19/08  
Tom Moran, Dock master, Pickering Wharf Marina, 3/19&23/08  
Michael Costello, Executive Director, Cape Ann Chamber of Commerce  
Scott Cavanaugh, U.S. Navy Commander NE Fleet Support, 4/2/08  
Malia Griffen, Public Relations, Dominion Energy, Salem 3/28/08  
Kevin Cornacchio, Dominion Energy, Salem, 3/28/08  
Marine Railways, Gloucester  
Captain Jeffery Monroe, Director, Ports and Transportation Department, Portland, ME

## **Exhibit B**

### **Site Development and Building Footprint and Location**

#### **Site Context Description**

The proposed Port of Salem project is to be located on a 2.2 acre parcel of property known as the Blaney Street site and is entirely located within a Designated Port Area. The City of Salem currently leases the site from the adjacent Dominion power plant with the intention to purchase the site. The existing site has an irregular footprint which presents challenges for an efficient layout of upland support needs and the multi-purpose terminal building proposed for the south end of the site next to the pier and floating landings. The current site conditions are shown on Sheet 1 of 2 in Exhibit D. The following describes the two phases of alternative layouts considered and the proposed plan for the upland components of the site and building as they relate to the existing bulkhead and high water line.

#### **Maritime Use Landside Site Requirements**

The program of landside support uses for the site was determined through a process of interviews with existing and prospective users, as described in the document, *Analysis of Existing Port Plans*, prepared by Bourne Consulting Engineering, November 2007. The upland use requirements can be divided into two categories: upland site layout needs and building program and footprint needs.

Upland Site Needs: Site users include the Salem Ferry, LNG crewboat operations, whale watch and excursion ferry, fishing fleet, cruise vessel visits, visiting vessels and general commercial vessels. The user needs identified included clear and easy circulation for vehicles through the site, parking for employees and patrons, site utilities, pedestrian harborwalk separated from vehicular traffic, and direct pier access for service vehicles. A summary of the combined needs for these uses includes the following:

- 100 foot turning radius at terminal area for bus/trolley queuing, service vehicles, auto and taxi drop-off, and emergency vehicles
- Blaney Street as the two way vehicular access road
- 12 foot public access harborwalk from terminal and pier along cove shoreline to White Street at the north western corner connecting to Derby Street
- Provide curbside for bus/trolley queuing
- Provide for clear truck access from the Blaney Street to the new fixed pier
- On site parking for 150 cars.
- Utility services for water, electrical and sewer from Blaney Street to terminal and new pier.
- Landscaping, benches, lighting, and shade trees to create a park-like setting

**Building Program and Footprint Needs:** The multi-purpose terminal building will provide space in immediate proximity to the pier for some site users including the Salem Ferry, the LNG crewboat, port of call cruise vessels, and other visiting vessels. The building footprint for a two storey structure was determined to be approximately 5,000 square feet, and located as close as possible to the landing locations and gangways for the passengers of the ferries and small cruise vessels.

- Ferry Terminal including shared passenger waiting, operators' office and ticketing and a workshop and supply storage area
- Public visitor information and restroom facilities
- LNG supply vessel office, crew waiting, workshop and storage facilities
- Allow for flexibility and expansion of the initial structure.
- Outdoor waiting area
- Separation of perimeter pedestrian circulation and vehicular circulation

### **Optional Site Layout and Building Footprint Plans**

Based on the upland site and terminal building needs a series of optional site plans were developed in conjunction with pier layout options to determine the preferred site plan. The plans responded to several important site characteristics which limited the options.

- The long tapering site made it difficult to provide an efficient parking and traffic plan, particularly from the head of Hawthorne Cove to the south end of the site.
- The narrow width of the site makes a 100 foot traffic turning radius very difficult even at the wider southern or outshore end without widening the site with a pile- supported harborwalk.
- The narrow width of the site watersheet requires that a double loaded pier be located at or near the southwest corner of the land area.
- The rough rubble rip rap bulkhead from the head of the cove around to the Dominion property on the south east corner should not be disturbed or altered any more than necessary, suggesting use of pile supported piers where pedestrian access or widening is needed.
- The terminal building needs to be sited to allow a single type foundation which would either be footings and slab entirely over upland or entirely over pile supported pier to provide a stable cost-effective foundation. The existing site is stone filled making upland pile driving extremely difficult.

The site and building analysis options were studied in two sequential steps; 1) a broad set of options considering different building locations and pier layouts, and 2) a refined set of options around the preferred building and pier option from the first set.

### **Concept Options (A through F)**

Initially six options concept plans were considered with concept plan layouts of different building locations, vehicular turnaround plans and different pier and float layouts. The intention was to determine

the preferred general site layout and then prepare more detailed variations. The six plans labeled Alternative A through F are shown on the following pages.

Alternative A: The plan includes the building sited parallel to the south face of the Blaney Street site with a fixed “L” shaped pier and floats extending south from the western face of the site. A pile supported harborwalk extends 12 feet over the rip rap bulkhead around the perimeter of the site. The building siting provides the optimum orientation to the pier for ferry passengers, cruise visitors and crew boat users of the terminal building. The 100 foot wide traffic circle is located immediately north of the building site leaving a maximum amount of the site open for parking and circulation

Alternative B: The plan includes the building sited parallel to the east property line of the Blaney Street site with a fixed “L” shaped pier and floats extending south from the western face of the site. as in Alternative A, a pile supported harborwalk extends 12 feet over the rip rap bulkhead around the perimeter of the site. The building siting provides a more remote relationship to the pier for ferry passengers, cruise visitors and crew boat users of the terminal building. The 100 foot wide traffic circle is located immediately south of the building site at the south edge of the site, requiring all terminal users to walk around the circle. The building location and pedestrian/vehicular circulation conflicts are problems in this plan. The site layout reduces the amount of site available for parking and circulation

Alternative C: The plan includes the building sited parallel to the east property line of the Blaney Street site with a fixed “L” shaped pier and floats extending the middle of the south face of the site. However, in this case the building is located on the water side of the traffic circle, leaving a large open area on the southwest corner of the site. As in Alternative A, a pile supported harborwalk extends 12 feet over the rip rap bulkhead around the perimeter of the site. The building siting provides a more remote relationship to the pier for ferry passengers, cruise visitors and crew boat users of the terminal building. In Alternative C, the 100 foot wide traffic circle location works for terminal passengers, but cuts down substantially on available parking. The traffic circle location and subsequent reduced upland parking and circulation are problems in this plan. The site layout further reduces the amount of site available for parking and circulation.

Alternative D: As in Alternative A, the plan includes the building sited parallel to the south face of the Blaney Street site with a fixed “L” shaped pier and floats extending south from the western face of the site. A pile supported harborwalk extends 12 feet over the rip rap bulkhead around the perimeter of the site stopping at the terminal building. While the building siting provides the optimum orientation to the pier, as in Alternative A, the siting requires that building footprint is half on pile supported pier and half on exiting upland, making for a poor foundation condition. As in Alternative A, the 100 foot wide traffic circle is located immediately north of the building site leaving an even greater amount of the site open for parking and circulation than in A. While the greater parking is an advantage, the primary problem with this plan is the terminal building straddling the upland and pile supported pier.

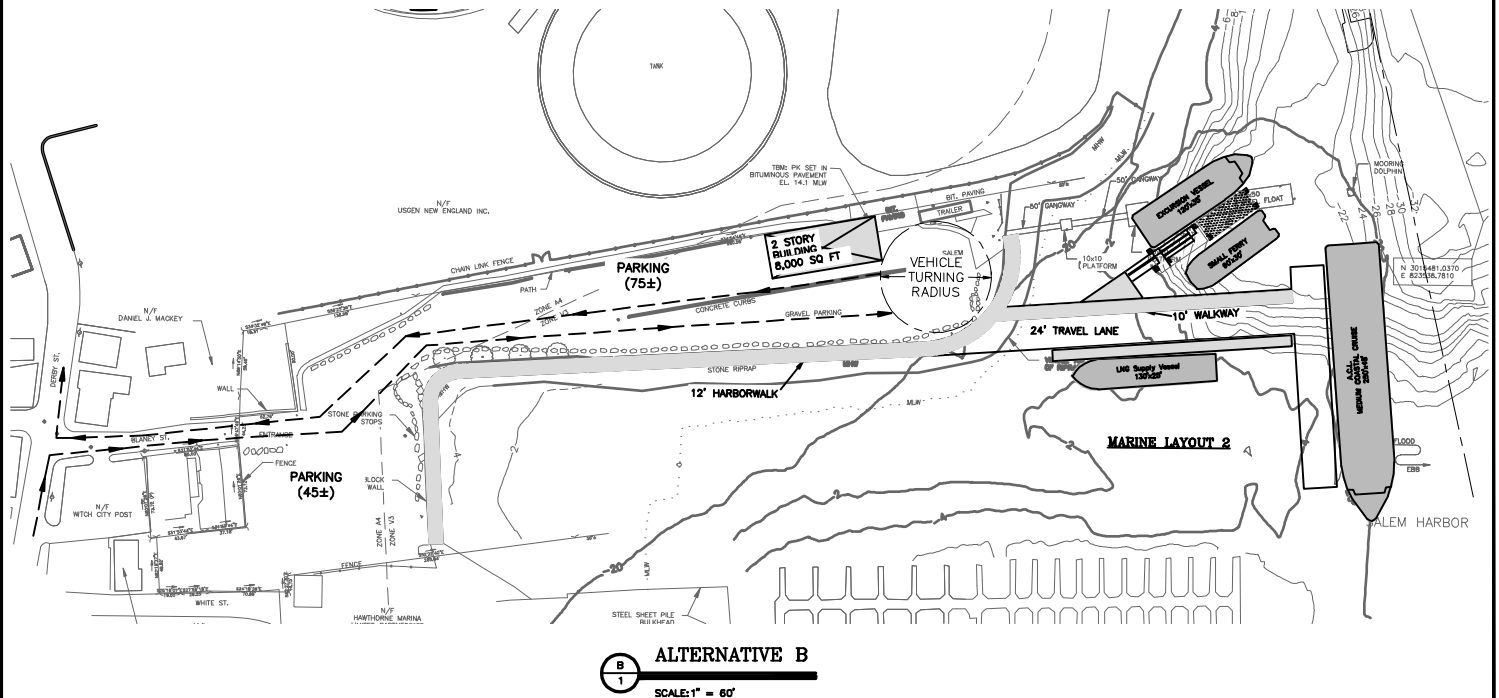
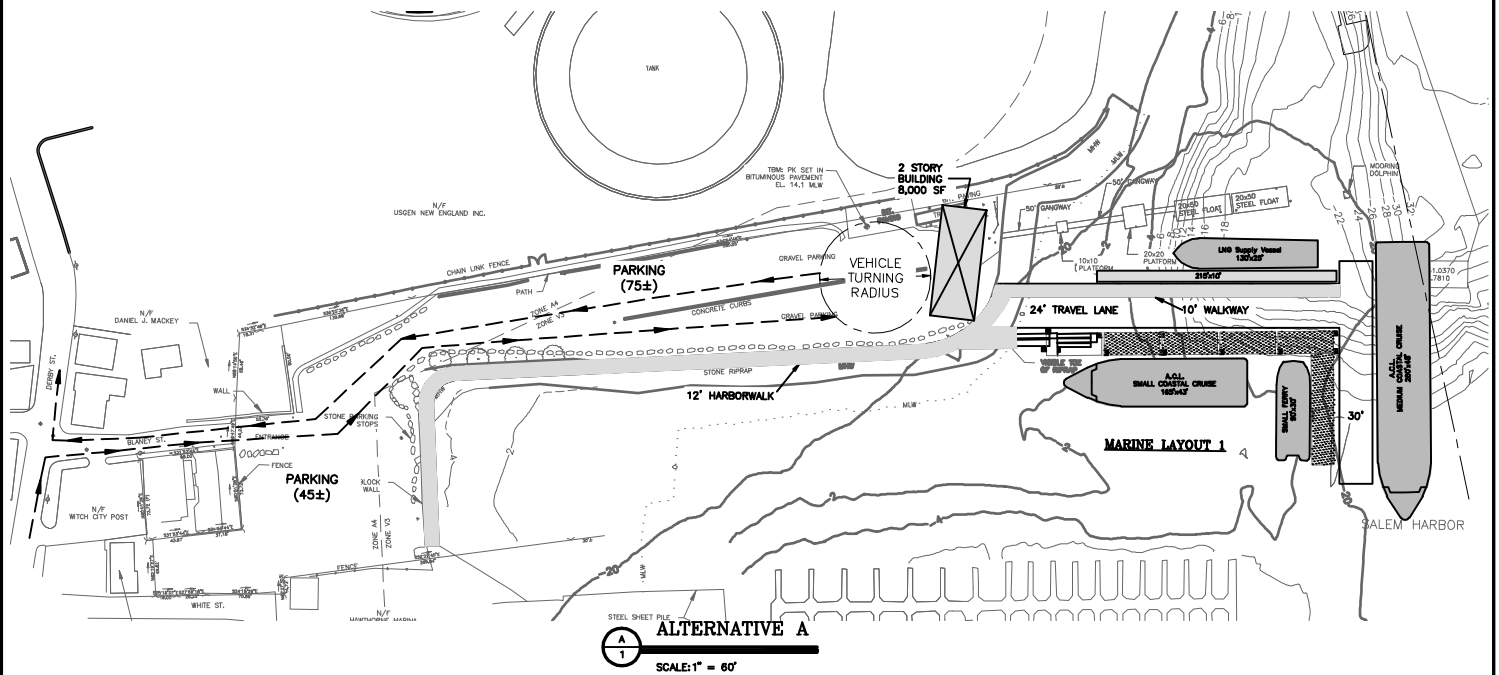
Alternative E: Similar in layout to Alternative C, the plan includes the building sited parallel to the east property line of the Blaney Street site with a fixed “L” shaped pier and floats extending out from the west edge of the site. As in Alternative A, a pile supported harborwalk extends 12 feet over the rip rap

bulkhead around the perimeter of the site. In this case, the traffic circle is located west of the building, requiring a 120 x 25 foot pile supported pier extension into Hawthorne Cove beyond the harborwalk to accommodate the circle width. The building siting provides a more remote relationship to the pier for ferry passengers, cruise visitors and crew boat users of the terminal building. In Alternative C, the 100 foot wide “cantilevered” traffic circle location works for terminal passengers, and gains back some of the upland parking capacity. The pier extension for the traffic circle and the awkward construction of combined upland and pile supported traffic circle are problems in this plan, as well as the somewhat less functional relationship of the terminal building to the pier and floats.

Alternative F: In this plan the terminal building is sited on a pile supported pier extension of approximately 120 x 50 feet at the southwest corner of the site with the traffic circle immediately to the east at the south face of the site. The 12 foot harborwalk extends around the perimeter of the site including around the terminal building. The pier projects form the center of the south face of the site. The large pile supported area required for the terminal allows for more parking on site, but covers more watersheet area to allow for the terminal building and substantially impacts navigation and pier layout options in Hawthorne Cove. In addition the terminal site is more removed from the pier and passenger circulation than in Alternatives A and D.

Preferred Concept Plan – Alternative A: Plan A appears to provide the best balance between the functional relationships of the terminal building to the piers and traffic circle, while also allowing enough upland parking. The linear fixed pier extending south from the west edge of Hawthorne Cove was found to allow for better navigation, as well as providing more flexibility for berthing northward into Hawthorne Cove. In addition the terminal layout remains on upland and does not require building on an additional area of pile supported pier. In terms of balancing upland passenger and vehicular circulation needs and the primary terminal functions and construction, Alternative A was selected for study of more detailed plan layouts.

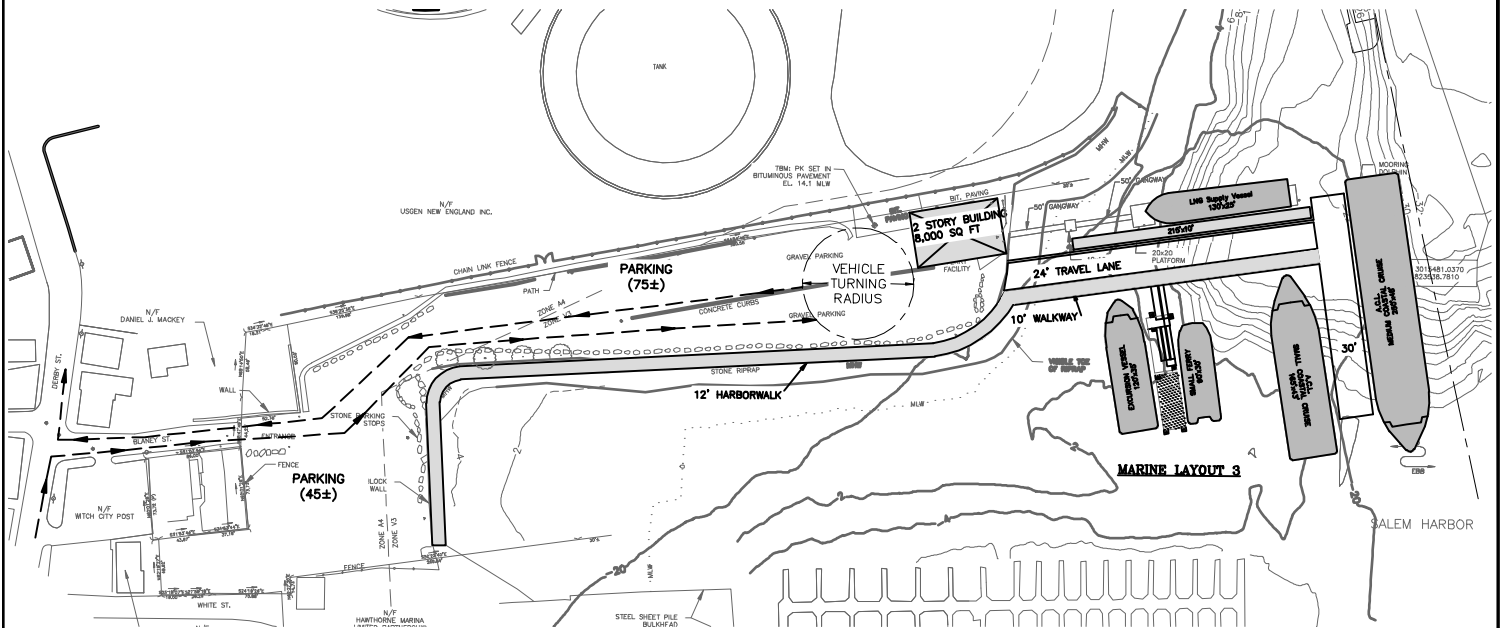




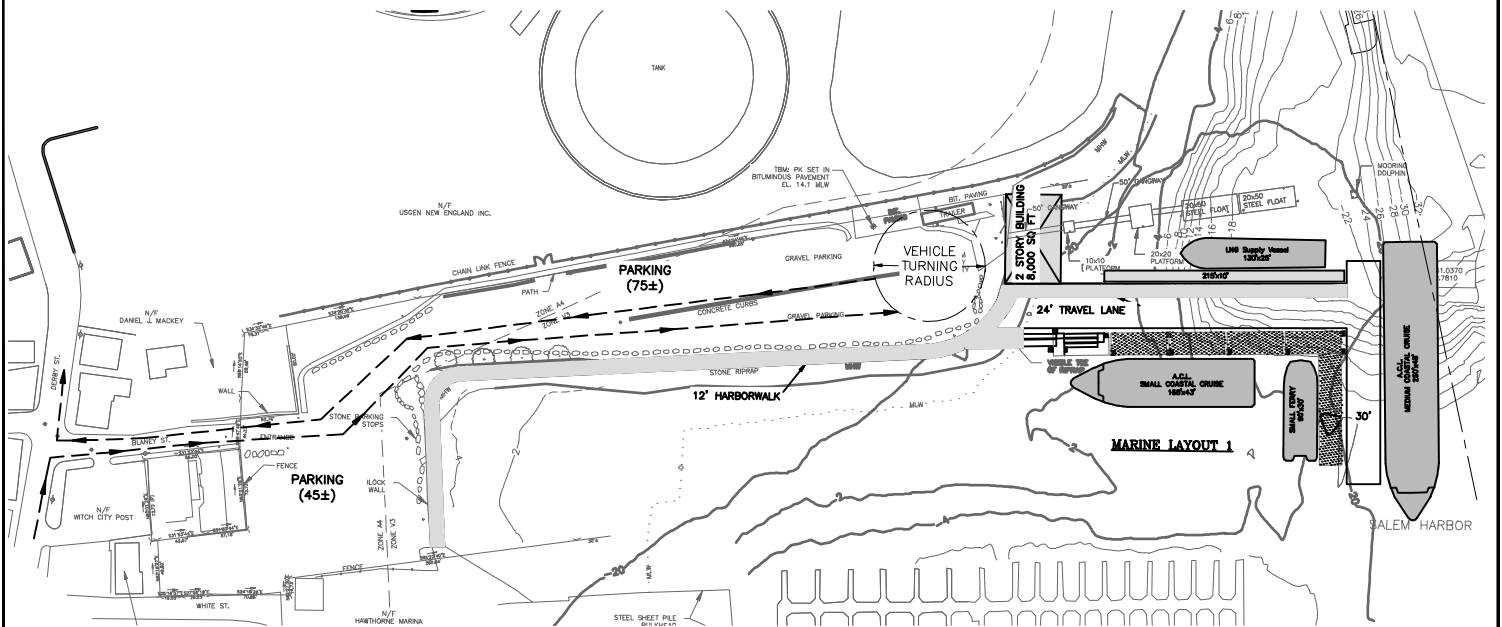
## CONCEPTUAL LAYOUTS

SALEM PORT EXPANSION  
CITY OF SALEM  
SALEM, MA  
SEPTEMBER 2007

0 60 120  
SCALE: 1" = 60'-0"



**ALTERNATIVE C**  
SCALE: 1" = 60'

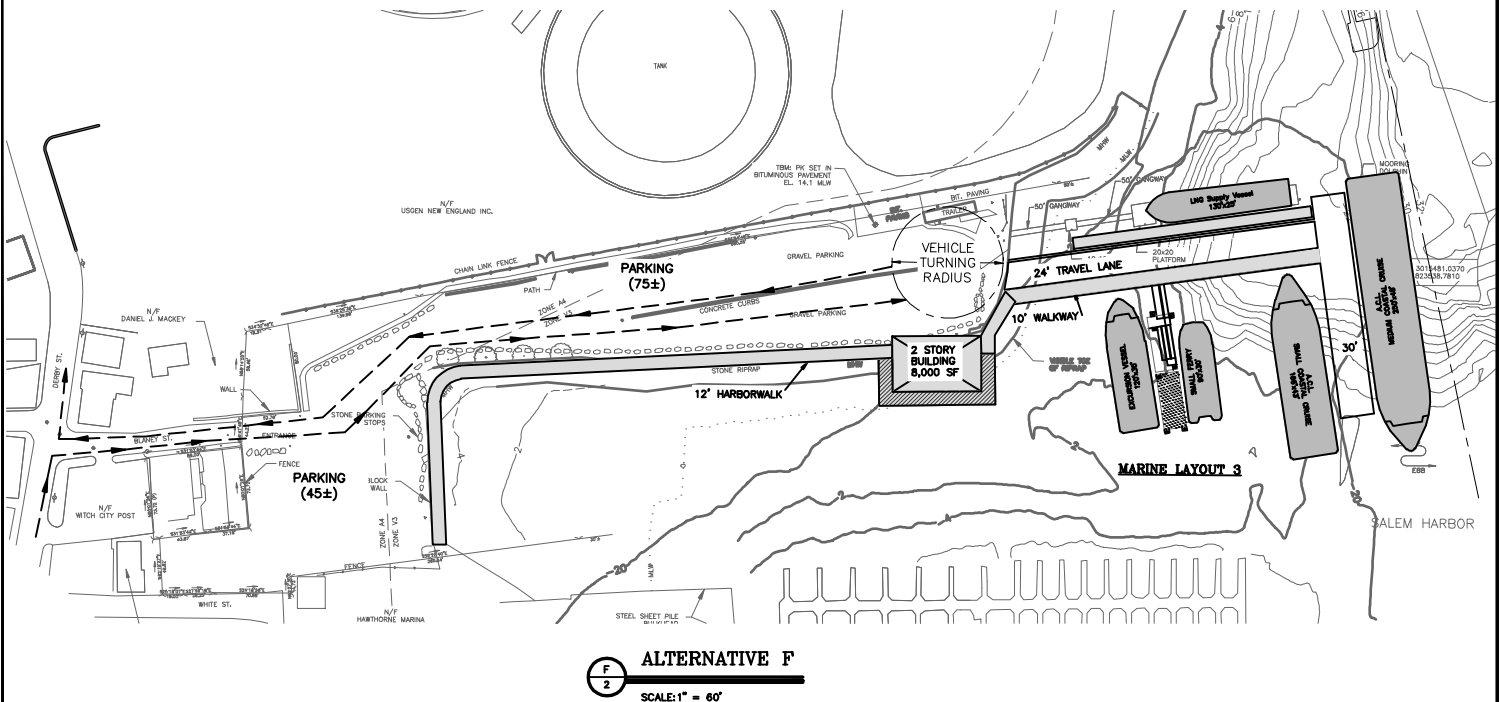
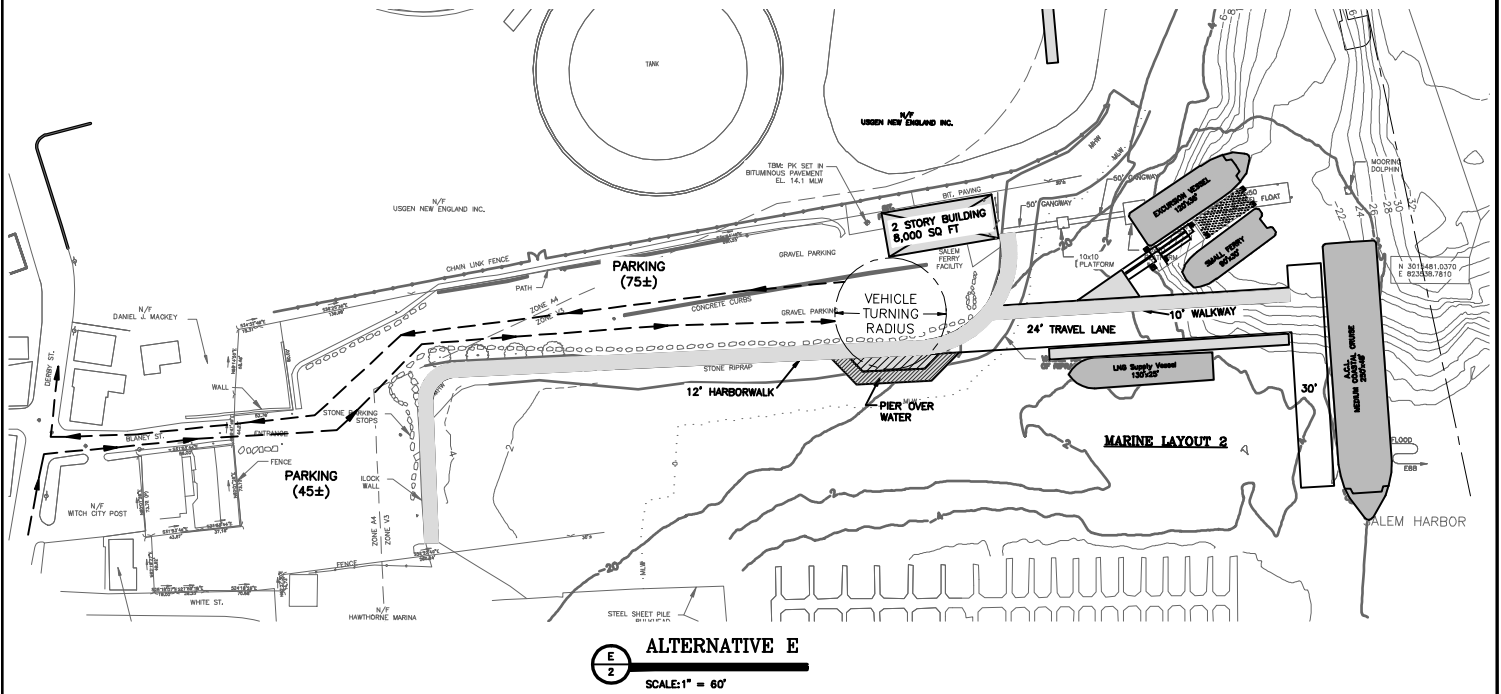


**ALTERNATIVE D**  
SCALE: 1" = 60'

## CONCEPTUAL LAYOUTS

SALEM PORT EXPANSION  
CITY OF SALEM  
SALEM, MA  
SEPTEMBER 2007

0 60 120  
SCALE: 1" = 60'-0"



## CONCEPTUAL LAYOUTS

SALEM PORT EXPANSION  
CITY OF SALEM  
SALEM, MA  
SEPTEMBER 2007

0 60 120  
SCALE: 1" = 60'-0"

## Detailed Options - Phase 2 Evaluations: Five Plans

The five detailed site plans, presented in the April 2008 initial ENF filing (under Project Description), assumed a preferred location of the fixed pier extending in a line from the current western edge of the site along Hawthorne Cove. The site layouts and terminal footprint then explored different combinations of building location with traffic, parking and pedestrian circulation. Each plan impacts the site bulkhead edge in a different way, with greater or lesser bulkhead alteration. It should be noted that, while all uses on the site are DPA commercial marine operations and support, all concept plans sought to minimize watersheet coverage with pile supported deck and the limiting of fill to behind bulkheads inshore of the High Tide Line.

There are four optional plans presented here labeled A, B, C, and E and shown at the end of this Exhibit. These more detailed plans tested different combinations of vehicular infrastructure, parking, perimeter harborwalk, pier and floats, and terminal building siting. (Option D is not shown since the site and building layouts are duplicates to those shown). The plan characteristics with respect to site and terminal layouts, as well as advantages and disadvantages of each option, are described as follows.

**Site Plan A:** The 12 foot pile supported harborwalk extends fully around Hawthorne cove and the south end of the site, covering most of the rip rap bulkhead between high and low water around the perimeter. The building is sited on an angle to follow the existing south edge of the site and remain fully in shore of the top of mean high water line and the existing bulkhead. However, the building shape creates an odd geometry at the ends in order to achieve the desired footprint square footage of 5,000 square feet (for cost, construction purposes and interior layout, the building works far better if the ends were square). The traffic circle can fit within the harborwalk widened end of the site. The parking of 146 vehicles comes close to meeting the proposed site minimum of 150 spaces. The accessible ferry floats and ADA ramps are placed on the eastern face of the fixed pier (these floats can be located on either side of each alternative and are therefore not a significant variable).

### Advantages:

- Terminal footprint stays within the existing bulkhead and high water line.
- No filling required and minimal bulkhead alteration
- Parking for 146 cars
- Separation of pedestrian and vehicular traffic
- Comfortable location for the traffic circle.
- Direct access from ferry landings to terminal waiting area.

### Disadvantages:

- Terminal Building shape is more costly and awkward for interior layout and construction
- Ferry terminal landings are exposed to easterly storms and winds.

**Site Plan B:** As in A, the 12 foot pile supported harborwalk extends fully around Hawthorne cove and the south end of the site, covering most of the rip rap bulkhead between high and low water around the perimeter. The end of the site is squared off with a pile supported pier and altered south west corner of

bulkhead. The terminal building is sited square to the deck and fixed pier, but requires some filling to allow for the whole footprint to be on upland. However, the building shape is optimum for the desired footprint square footage of 5,000 square feet, for construction purposes and interior layout. As in Option A, the traffic circle can fit within the harborwalk widened end of the site. Plan B also provides parking of 146 vehicles and comes close to meeting the proposed site minimum of 150 spaces. The accessible ferry floats and ADA ramps are placed on the eastern face of the fixed pier.

Advantages:

- The building footprint is optimum for interior layout, construction and proximity to the ferry landings.
- Parking for 146 cars
- Separation of pedestrian and vehicular traffic.
- Comfortable location for the traffic circle
- The squared end deck works better with the new pier layout and access ramps.
- Direct access from ferry landings to terminal waiting area.

Disadvantages:

- Terminal footprint is slightly outside the existing bulkhead and high water line. And requires bulkhead modification and some filling.
- Ferry terminal landings are exposed to easterly storms and winds.

**Site Plan C:** The 12 foot wide pile supported harborwalk is all located inside the mean low water line and extends from the head of Hawthorne Cove around the south end of the site, leaving the existing vertical bulkhead at the end of the Cove. The building is sited perpendicular to the south edge of the site and is rectilinear in shape. The perpendicular siting allows for expansion of the Terminal at a later date to the east. However in order to allow for the turning radius and preserve parking capacity, the building projects out beyond the low water line. The Building footprint is half on the upland and half over tidelands requiring a new rectangular extension of the bulkhead with filling behind to allow the foundation to be on upland. The perpendicular alignment also requires a greater amount of pile supported deck beyond the south face of the site by eliminating the harborwalk extension at the north end of the Cove, the parking is reduced to 136 spaces and does not meet the proposed site minimum of 150 spaces. The accessible ferry floats and ADA ramps are placed on the more protected western face of the fixed pier.

Advantages:

- Separation of pedestrian and vehicular traffic
- Terminal building site allows for future addition to the east.
- Comfortable location for the traffic circle.
- Ferry landing is more protected from easterly storms and wind.

Disadvantages:

- Terminal footprint projects beyond the existing bulkhead and low water line and requires greater alteration and fill below high water line than option B.
- South pile supported deck is larger because of perpendicular building.
- 10 fewer parking spaces than options A or B.

- Ferry access is separated from terminal waiting by width of the pier.

(Plan D omitted due to duplication – See initial ENF filing for copy)

**Site Plan E:** The narrower 6 foot wide pile supported harborwalk is all located inside the mean high water line and extends from the head of Hawthorne Cove around the south end of the site, leaving the existing vertical bulkhead at the end of the Cove. As in option A, the building is sited on an angle to follow the existing south edge of the site and remain fully in shore of the top of mean high water line and the existing bulkhead. Like A, the building shape needs to be an odd geometry at the ends in order to achieve the desired footprint square footage of 5,000 square feet. The traffic circle barely fits within the existing end of the site. The parking is reduced to 115 vehicles and is far from meeting the proposed site minimum of 150 spaces. The spaces are lost by not building the pile supported harborwalk at the head of the cove, and by forcing parallel parking along the narrower west edge of the Cove. The accessible ferry floats and ADA ramps are placed on the eastern face of the fixed pier. A small harborwalk extension is need to the west of the building to provide ramp access to the western floats.

Advantages:

- Terminal footprint and harborwalk stays within the existing bulkhead and high water line and reduces impact on intertidal area (except for small extensions west and south of the building footprint).
- No filling required and minimal bulkhead alteration
- Separation of pedestrian and vehicular traffic
- Comfortable location for the traffic circle.
- Direct access from ferry landings to terminal waiting area.

Disadvantages:

- Terminal Building shape is awkward for interior layout and construction
- Parking is reduced to 115 spaces because of narrower site width along the Cove.
- Ferry terminal landings are exposed to easterly storms and winds.

### **Preferred Upland Site and Building Plan**

The final proposed plan is a synthesis of preferred features of the 4 detailed options described above, incorporating the best features to achieve a workable site program for commercial maritime uses, and moderating the impacts of harborwalk construction and fill on intertidal areas.

**Proposed Site Plan:** The proposed site plan is similar in layout and building footprint to Option B. The 12 foot pile supported harborwalk extends fully around Hawthorne Cove and the south end of the site, covering most of the rip rap bulkhead between high and low water around the perimeter. The south end of the site is squared off with a pile supported pier. A small portion of the inner end of an existing pile supported access pier is retained as a fish pier and overlook feature of the public harbor walk. The terminal building is sited square to the deck and fixed pier, but requires some filling and alteration of the south west corner of bulkhead to allow for the whole building footprint to be on upland. Approximately



1,580 square feet of the building footprint is in the intertidal zone currently occupied by sloping rip rap bulkhead. The rectangular building shape parallel to the south face and perpendicular to the fixed pier and access road is optimum for the desired footprint square footage of 5,000 square feet, for construction on solid ground and for efficient interior layouts. The traffic circle can fit within the harborwalk-widened end of the site. Plan B also provides parking of 146 vehicles and comes close to meeting the proposed site minimum of 150 spaces. This amount of parking is considered to be essential to a workable plan, in order to minimally accommodate the peak use demands for combined Salem ferry, excursion/whale watch, and commercial fishing and LNG crewboat operations. Even with this maximum amount of parking, offsite parking is likely to be needed at peak use periods. The accessible ferry floats and ADA ramps are placed on the more protected western face of the fixed pier. An open waiting shelter is added to provide protection for ferry and cruise vessel passengers on the western side of the pier at the gangway locations.

**Building Foundation Considerations:** The site is an historic fill with rip rap stone edges. This creates a significant problem both in terms of cost and actual ability to drive piles for the building foundation. The foundation proposed is with footings and slab which results in the building foundation extending slightly beyond the existing Mean High Water line in the southwest corner. The project proposes to extend the foundation wall to provide the full building support resulting in the filling of 1,580 sf of intertidal area within the existing rip rap slope.

Advantages:

- The building footprint is optimum for interior layout, construction.
- Proximity to the new pier which is critical for passenger vessel terminal facilities.
- Parking spaces for 146 vehicles
- Separation of pedestrian and vehicular traffic.
- Comfortable location and adequate size for the traffic circle
- The squared end deck works better with the new pier layout and access ramps.
- Ferry landing is located on the western side of the new pier, with a shelter at the top of the gangway.

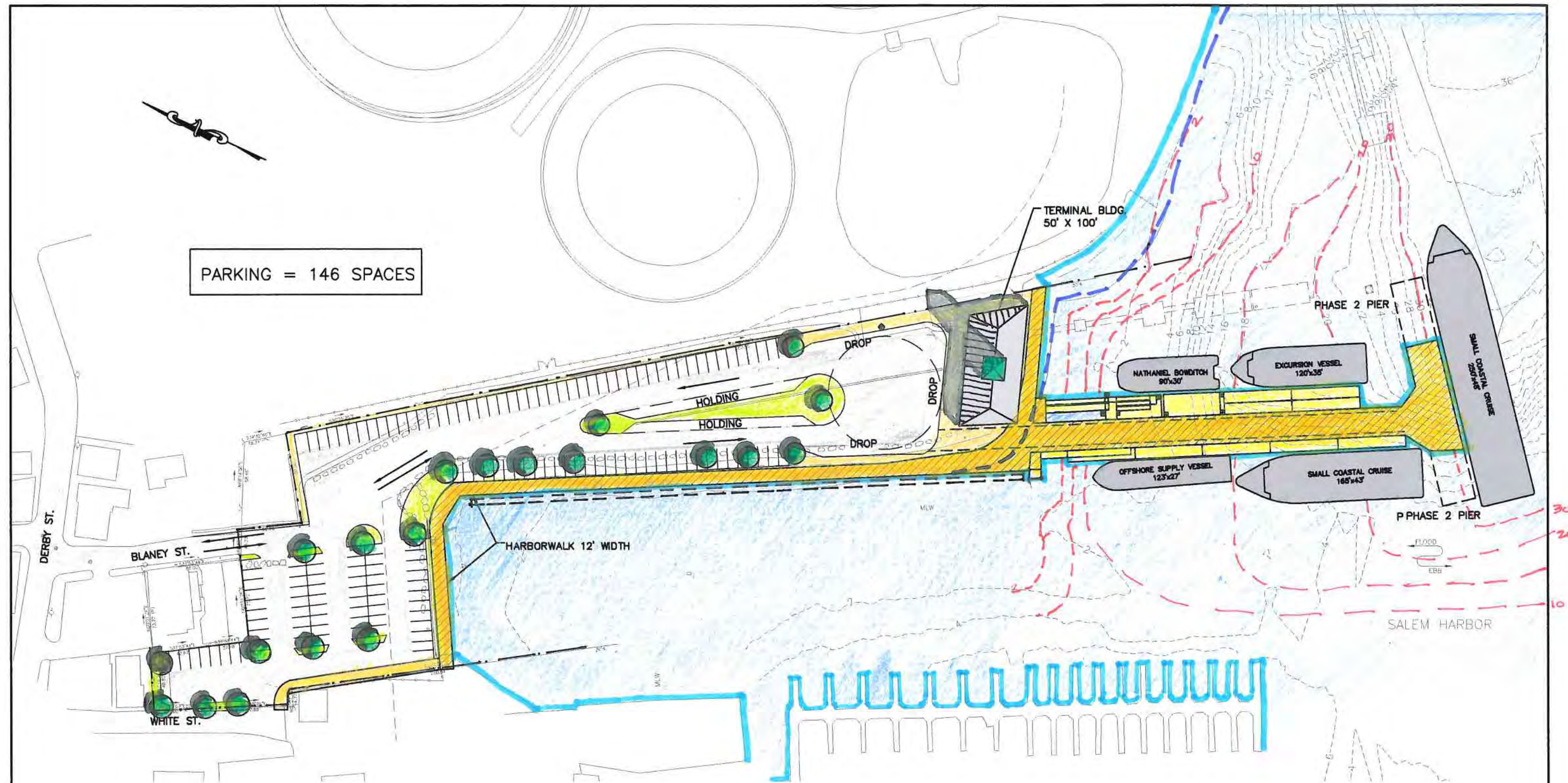
Disadvantages:

- Terminal footprint is slightly outside the existing bulkhead and high water line. And requires bulkhead modification and some filling of the intertidal zone
- Ferry landing shelter and ramp access requires an additional 10 foot wide section of pile supported Harborwalk opposite the west end of the terminal.

**Project Team Findings:** We believe that for the terminal building to function properly and effectively in support of the site DPA and water dependant uses, it needs to be close to the activities it supports at the outer end of the site. Given the restrictions of the site and the need for siting the vehicular turnaround for fire and safety as well as for operations, we also found that these conditions force the building to the outshore end. We have presented the range of alternatives investigated for various building locations and configurations to minimize the buildings impact beyond the MHW limit.

In addition, the proposed plan is intended to improve and stabilize the existing rip rap bulkhead slope and eliminate the erosion of edge conditions into the adjacent resource areas, while at the same time providing a harborwalk with major improvements to public access and use. Such improvements are deemed not only necessary but beneficial for a successful project.

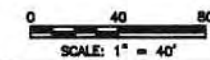




# **UPLAND/PIER LAYOUT A**

**SALEM PORT EXPANSION  
CITY OF SALEM  
SALEM, MA  
NOVEMBER 2007**

**A**



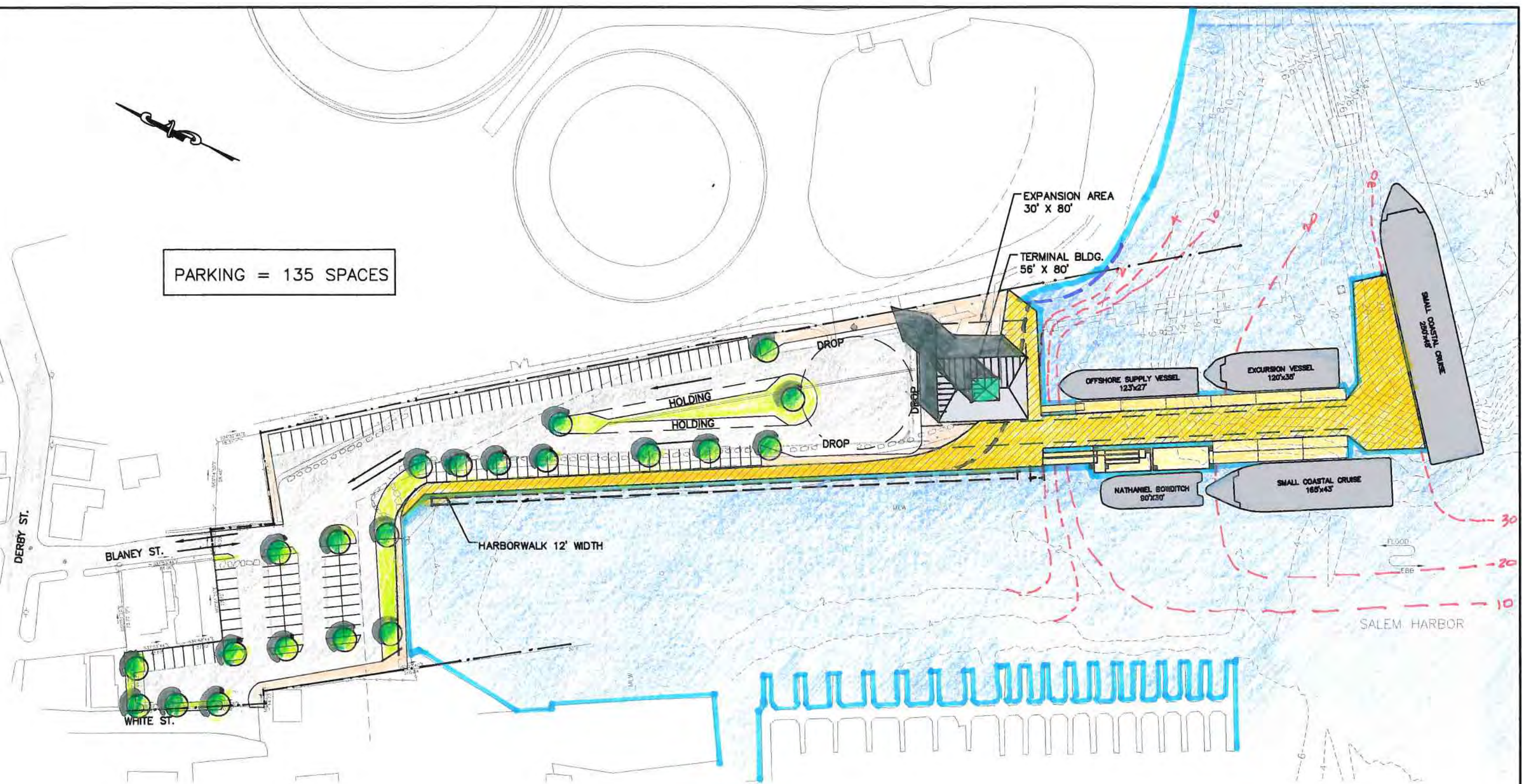
<div> <div>REVISIONS</div> <div> <div></div> <div></div> <div></div> <div></div> </div> </div>	<div> <div> <div>BCE</div> <div>Bourne Consulting Engineering</div> <div>100 West County Street Salem, MA 01970 TEL (508) 888-8100 FAX (508) 888-8071</div> </div> </div>	
	<div> <div>DRAWN: JSF</div> <div>CHECKED: BBS</div> <div>APPROVED: [Signature]</div> <div>DATE: NOV. 19, 2007</div> </div>	







PARKING = 135 SPACES



# UPLAND/PIER LAYOUT C

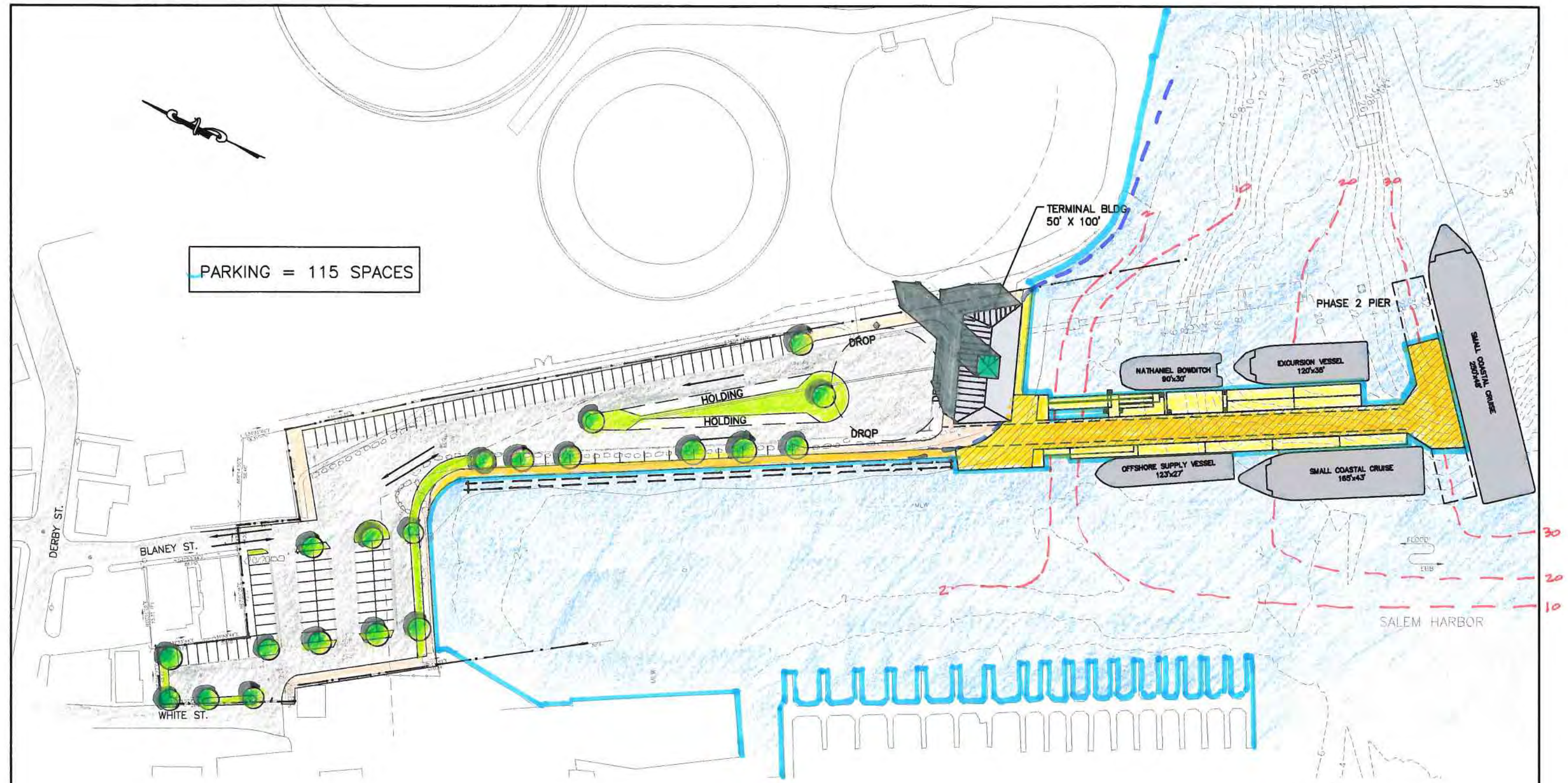
SALEM PORT EXPANSION  
CITY OF SALEM  
SALEM, MA  
NOVEMBER 2007



<b>BCE</b> Bourne Consulting Engineering <small>100 West Colonial Street Salem, MA 01970 TEL (978) 582-0200 FAX (978) 582-0271</small>	
DRAWN: JSE CHECKED: BGG APPROVED: _____ DATE: NOV. 18, 2007	
REVISIONS	

0 40 80  
SCALE: 1" = 40'





# UPLAND/PIER LAYOUT E

SALEM PORT EXPANSION  
CITY OF SALEM  
SALEM, MA  
NOVEMBER 2007

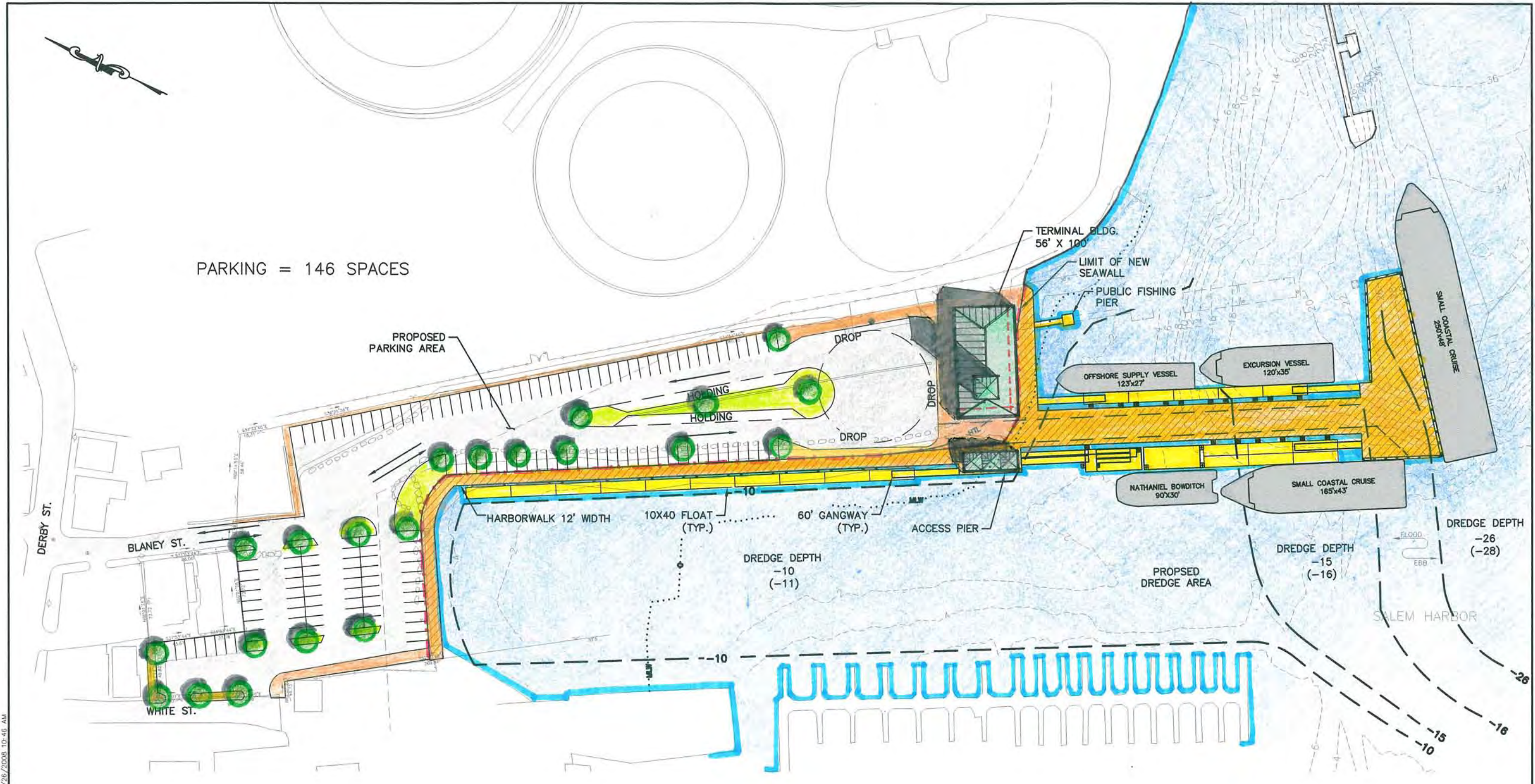


<b>BCE</b> Bourne Consulting Engineering <small>300 West Central Street          Bourne, MA 01909          TEL: (508) 866-6666 FAX: (508) 866-6667</small>		DRAWN: JSE CHECKED: RBB APPROVED: _____ DATE: NOV. 18, 2007
REVISIONS		

0 40 80  
SCALE: 1" = 40'



File: X:\27677-1\27677-1\PROPOSED PLAN 030708 JC.DWG - 2/26/2008 10:45 AM



- NOTES:
1. DATUM: MLW = 0.0, MHW = +8.9, HTL = +11.0
  2. THIS PLAN HAS BEEN COMPILED FROM VARIOUS PLANS INCLUDING:
    - A. TOPOGRAPHIC SURVEY DATA TAKEN FROM PLAN ENTITLED "EXISTING SITE PLAN, SALEM FERRY TERMINAL CITY OF SALEM" PREPARED BY VINE ASSOC. DATED AUGUST 2007.
    - B. PROPERTY BOUNDARY DATA TAKEN FROM PLAN ENTITLED "ALTA/ACSM LAND TITLE SURVEY, PREPARED FOR FIRST MASS LAND COMPANY LLC," BY CULLINAN ENGINEERING CO., INC. DATED JANUARY 4, 2001 AND HAVE NOT BEEN VERIFIED AS PART OF THIS PROJECT.
  3. COORDINATES ARE BASED ON MASSACHUSETTS (MAINLAND) STATE PLANE COORDINATE SYSTEM (NAD83).

DATUM: MSL NGVD 1929


HTL	+11.0
MHW	+9.37
MHW	+8.93
NGVD	+4.20
MLW	0.0
MLLW	-0.32

0 40 80

SCALE: 1" = 40'

**PROPOSED SITE PLAN**

**SALEM PORT EXPANSION**  
CITY OF SALEM  
SALEM, MA  
JANUARY 2008

DRAWN: JSF	 <b>Bourne Consulting Engineering</b> 3 Reed Street Framingham, MA 01020 TEL (508) 835-0000 FAX (508) 835-0000
CHECKED: RBB	
APPROVED: [Signature]	
DATE: FEB. 26, 2008	DRAWING NO. 27677-01-05
REVISIONS	SHEET 1 OF 1



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**Exhibit C**

**U.S. Army Corps of Engineers Dredge Sediment Disposal Suitability Determination  
Memorandum dated 29 February 2008ing and Testing**

29 February 2008

**MEMORANDUM THRU:**

*RML*  
Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch

**FOR:** Brian Valiton, Project Manager, CENAE-R-PEA**SUBJECT:** Suitability Determination for Salem Wharf, Salem Harbor, Salem, MA, Application Number NAE-2005-1095.**1. References Cited**

- a. US EPA Region I/USACE-NAE. 2007. Reference Memorandum for Evaluating Testing and Non-Testing Requirements of 40 C.F.R 227.6 and 227.27 Federal Navigation Dredging or Non-federal Dredging Projects, for Open Ocean Disposal at the Massachusetts Bay Disposal Site (MBDS).
- b. USEPA Region I/USACE-NAE. 2004. Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters. Environmental Protection Agency, Region 1, Boston, MA/US Army Corps of Engineers, New England District, Concord, MA. 54 pp.
- c. USACE-NAE. 2007. Environmental Assessment/ Finding of No Significant Impact Salem Wharf, Salem Harbor, Salem, MA, Application Number NAE-2005-1095. US Army Corps of Engineers (USACE), New England District, Concord, MA.

**2. Summary**

This memorandum addresses compliance with the regulatory evaluation and testing requirements of the Marine Protection, Research and Sanctuary Act (MPRSA, or Ocean Dumping Act) regulations at 40 CFR 227 as well as the issues outlined in the MBDS Reference memo (USEPA Region 1/USACE-NAE 2007) for unconfined open water disposal at an ocean disposal site. Based upon this review, the proposed dredged material from Salem Harbor is suitable for unrestricted ocean disposal at MBDS. Detailed information pertaining to the regulatory issues associated with the evaluation of this project as well as the technical background of the analytical tests summarized herein is found in the MBDS Reference Memo (EPA 2007). A copy of this memo can be obtained upon request from the EPA or USACE.

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MAR 17 2008

REGULATORY DIVISION

### **3. Project Description**

The applicant is proposing to dredge three areas in Salem Harbor in Salem, MA. The inner section has an area of approximately 145,000 sq. ft and would be dredged to a depth of -10' MLW with an overdredge to -11' MLW. The outer section would have an area of 189,000 sq. ft. and be dredged to -26' MLW with an overdredge to -28' MLW. The transition section between the two would have an area of 42,000 sq. ft. and be dredged to a depth of -15' MLW with an overdredge to -16' MLW. In total, a volume of approximately 210,000 cu. yds. would be produced. The applicant proposes to mechanically dredge this material and dispose of it at the Massachusetts Bay Disposal Site (MBDS). This proposed project represents improvement dredging.

### **4. Sampling Plan:**

A sampling plan was developed on 27 June 2005 for the analysis of physical, biological and chemical characteristics of the sediment proposed to be dredged. The federal agencies concurred with this plan.

#### **a. Compositing plan**

Following sample collection, the samples were analyzed for physical characteristics (grain size and water content). After a review of the resulting data, a compositing plan was developed on 18 October 2005. The plan called for four composited samples for use in a bioassay with amphipods and mysids; a suspended particulate bioassay with fish, mysid shrimp, and pelagic larvae; and a bioaccumulation assay using bivalves and polychaetes. Composite 1 was composed of core samples SW-1, SW-2, SW-4 and SW-5. Composite 2 consisted of core SW-3 and SW-6. Composite 3 consisted of the upper strata of cores SW-7, SW-8 and SW-9. Composite 4 consisted of the lower strata of cores SW-7, SW-8 and SW-9. The federal agencies concurred with this plan.

#### **b. Toxicity test**

A 10-day bioassay test was conducted on the composite samples. As the results indicated no toxic response, the suspended particulate and the bioaccumulation tests were conducted to completion.

#### **c. Determining contaminants of concern**

The composites were then analyzed for bulk sediment chemistry according to the contaminants outlined in the sampling plan of 27 June 2005 for this project. This sampling plan was written in accordance with the USEPA Region 1/USACE-NAE Regional Implementation Manual guidelines (USEPA Region 1/USACE-NAE. 2004). As a result of the bulk chemistry, we

determined on 24 April 2006 which contaminants would be tested for in the bioaccumulation test. The contaminants of concern were determined to be all metals; all the PCBs; all PAHs except for acenaphthylene, acenaphthene and fluorene; and of the pesticides only heptachlor, aldrin and lindane,

#### **4. Testing Results**

##### **a. 10-day bioassay and elutriate results**

In the amphipod bioassay test, the mean survivorship for the amphipods exposed to sediment from the control site was 90% with a mortality of 10%. As the mortality in the control was less than 20%, this test was valid. The mean survivorship for the amphipods exposed to sediment from the reference site was 92% with a mortality of 8%. The mean survivorship for the amphipods exposed to sediment from Composite 1 was 88% with a mortality of 12%. The mean survivorship for the amphipods exposed to sediment from Composite 2 was 88% with a mortality of 12%. The mean survivorship for the amphipods exposed to sediment from Composite 3 was 95% with a mortality of 5%. Statistical analysis indicates that there is no significant difference between the survivorships of the amphipods exposed to the reference sediment and the amphipods exposed to the sediments represented by Composites 1 - 3. The mean survivorship for the amphipods exposed to sediment from Composite 4 was 83% with a mortality of 17%. For Composite 4, a second control and MBDS reference site sample were run. The lab control had a survivorship of 91% with a mortality of 9%. The reference site had a survivorship of 81% with a mortality of 19%. There was a statistically significant difference between the survivorships of the amphipods exposed to the reference sediment and the amphipods exposed to the Composite 4 sediments. However, the difference between the mean survivorship of the amphipods exposed to the reference and the Composite 4 sediments is 2%, no higher than the 20% threshold allowed in the testing protocol. Therefore, the materials proposed to be dredged are not considered acutely toxic to the amphipods used in the testing.

In the mysid bioassay test, the mean survivorship for the mysids exposed to sediment from the control site was 91% with a mortality of 9%. As the mortality in the control was less than 10%, this test was valid. The mean survivorship for the mysids exposed to sediment from the reference site was 89% with a mortality of 11%. The mean survivorship for the mysids exposed to sediment from Composite 1 was 95% with a mortality of 5%. The mean survivorship for the mysids exposed to sediment from Composite 2 was 87% with a mortality of 13%. The mean survivorship for the mysids exposed to sediment from Composite 3 was 86% with a mortality of 14%. Statistical analysis indicates that there is no significant difference between the

survivorships of the amphipods exposed to the reference sediment and the mysids exposed to the sediments represented by Composites 1 - 3. For Composite 4, a second control and MBDS reference site sample were run as had been done for the amphipods. The lab control had a survivorship of 91% with a mortality of 9%. The reference site had a survivorship of 91% with a mortality of 9%. Statistical analysis indicates that there is no significant difference between the survivorships of the mysids exposed to the reference sediment and the mysids exposed to the Composite 4 sediments. The mean survivorship of the mysids exposed to sediment from Composite 4 sediments was 87%. Statistical analysis indicates that there is no significant difference between the survivorships of the mysids exposed to the reference sediment and the mysids exposed to the Composite 4 sediments. Therefore, based on the results of tests on these two species, the materials proposed to be dredged are not likely to be acutely toxic to benthic organisms.

In the Suspended Phase Acute Toxicity Tests, the mysid shrimp (*Americamysis bahia*) showed a  $LC_{50}$  of >100% when exposed to elutriate from each of the composite samples. The inland silverside minnow (*Menidia beryllina*) showed a  $LC_{50}$  of >100% when exposed to elutriate from each of the project samples. The sea urchin larvae (*Arbacia punctulata*) showed a  $LC_{50}$  of >100% when exposed to elutriate from each of the project samples.

#### b. STFATE Water Quality Evaluation

As no  $LC_{50}$  was less than 100%, the ADDAMS model was not run.

#### c. Bioaccumulation results

In the bioaccumulation tests, both the bent-nosed clam (*Macoma nasuta*) and the clam worm (*Nereis virens*) significantly accumulated contaminants. The clam worm showed significant accumulation of arsenic and cadmium in Composite 3 and arsenic in Composite 4. The bent-nosed clam showed significant accumulation of pyrene and each of the PCBs in Composite 2, pyrene in Composite 3 and fluoranthene and each of the PCBs in Composite 4.

In total, there were 6 contaminants of concern which were bioaccumulated at a level greater than reference. Because of the presence of significant bioaccumulation, the EPA ran a risk-assessment model of the bioaccumulation results. For these compounds, the toxicological significance of bioaccumulation from the sediment into benthic organisms was evaluated. It was determined that the disposal of the material as proposed will not cause any significant undesirable effects (see Tables 1 and 2).



## 5. Disposal Alternatives Analysis

According to Subsection C, 40 CFR 227.14, 227.15 and 227.16, the need for ocean disposal of the dredged material from this project has to be demonstrated and alternatives to the disposal have to be evaluated. Factors considered in determining need will include: evaluation of the degree of treatment that is useful and feasible; whether the material could be reduced or eliminated by using other processes; the relative environmental risks, impact and cost for other alternatives; and any irreversible consequences of the use of alternatives. In addition, the CENAE and/or EPA Region 1 must determine that there are no practical improvements in processing or treatment to reduce the impacts of the sediment, and that there are no practical alternatives with less adverse environmental impact.

Six disposal alternatives, outlined by the applicants' agent, were considered for the dredged sediments which included:

- Upland disposal at an approved landfill
- Beneficial reuse as
  - Beach nourishment
  - Brownfield capping
  - Construction
- Confined Aquatic Disposal (CAD)
- Unconfined Offshore Disposal at the MBDS

The applicant eliminated from consideration two options: upland disposal at an approved landfill and beneficial re-use alternatives. The detailed description by which the applicant selected unconfined offshore disposal as the preferred alternative is found in the Environmental Assessment and is based on the factors described below. All information for this alternatives analysis has been supplied by the applicant's agent.

### a. Upland Disposal

Upland Disposal at an approved landfill was found to be prohibitively expensive and would require additional logistics as compared to offshore unconfined disposal. The costs for such disposal are estimated at \$100/cubic yard as compared to \$16/cubic yard for offshore disposal which equates to a cost differential of \$168.8 million which would render the project economically infeasible. Additionally, the dredged material would need to be stockpiled and dewatered prior to transfer to an upland disposal site. The time required for dewatering is dependent upon such variables as the physical composition of sediments, weather conditions, and contractor operations; however, it is

anticipated that sediments would be suitable for removal and off-site disposal over periods of no less than 1 to 2 years. Such stockpiling would consume a large portion of the project site upland which is currently used for parking for the Salem Ferry from April through November.

b. Beneficial Re-use

The applicant's agent believes that none of the three beneficial re-use options were feasible. Based on the sediment test results, the material is too silty for beach nourishment. Similarly, the organics and salt content in the dredged material, in the opinion of the applicant, renders it inappropriate for construction use. Local or regional site investigations did not result in locating active Brownfield sites that would accept this material.

c. Confined Aquatic Disposal (CAD)

The City is investigating the ability to create a CAD cell for material unsuitable for unconfined offshore disposal as a part of its Harbor Development Plan. Placement of this material in a CAD cell would require additional dredging for creating volume for Project material, which would still require unconfined offshore disposal.

d. Unconfined Offshore Disposal at MBDS

The proposed dredged material has been tested and has been determined to be suitable for unconfined offshore disposal. The total construction cost for this alternative is estimated to be approximately \$3,200,000. This is currently the most viable, as well as cost-effective, alternative for the project and is the preferred alternative by City of Salem. There are no practical alternatives, as determined in the Environmental Assessment for this project (USACE-NAE 2007).

CENAE-R-PT

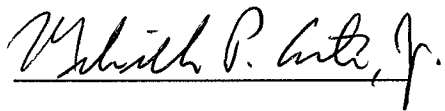
SUBJECT: Suitability Determination for Salem Wharf, Salem Harbor, Salem, MA,  
Application Number NAE-2005-1095.

6. If you have any questions or want further details on the procedure of project evaluation, please contact the MAS Project Manager at (978) 318-8336 or charles.n.farris@usace.army.mil.

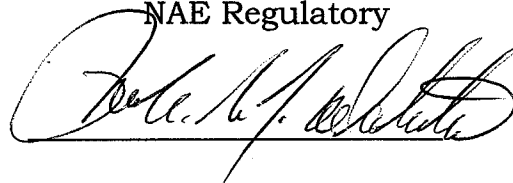
CHARLES N. FARRIS



Project Manager,  
Marine Analysis Section  
NAE Regulatory



Melville P. Coté, Jr., Manager  
Water Quality Unit  
EPA Region 1 – New England



Robert J. DeSista, Chief  
Regulatory Division  
New England District  
U.S. Army Corps of Engineers

Concur

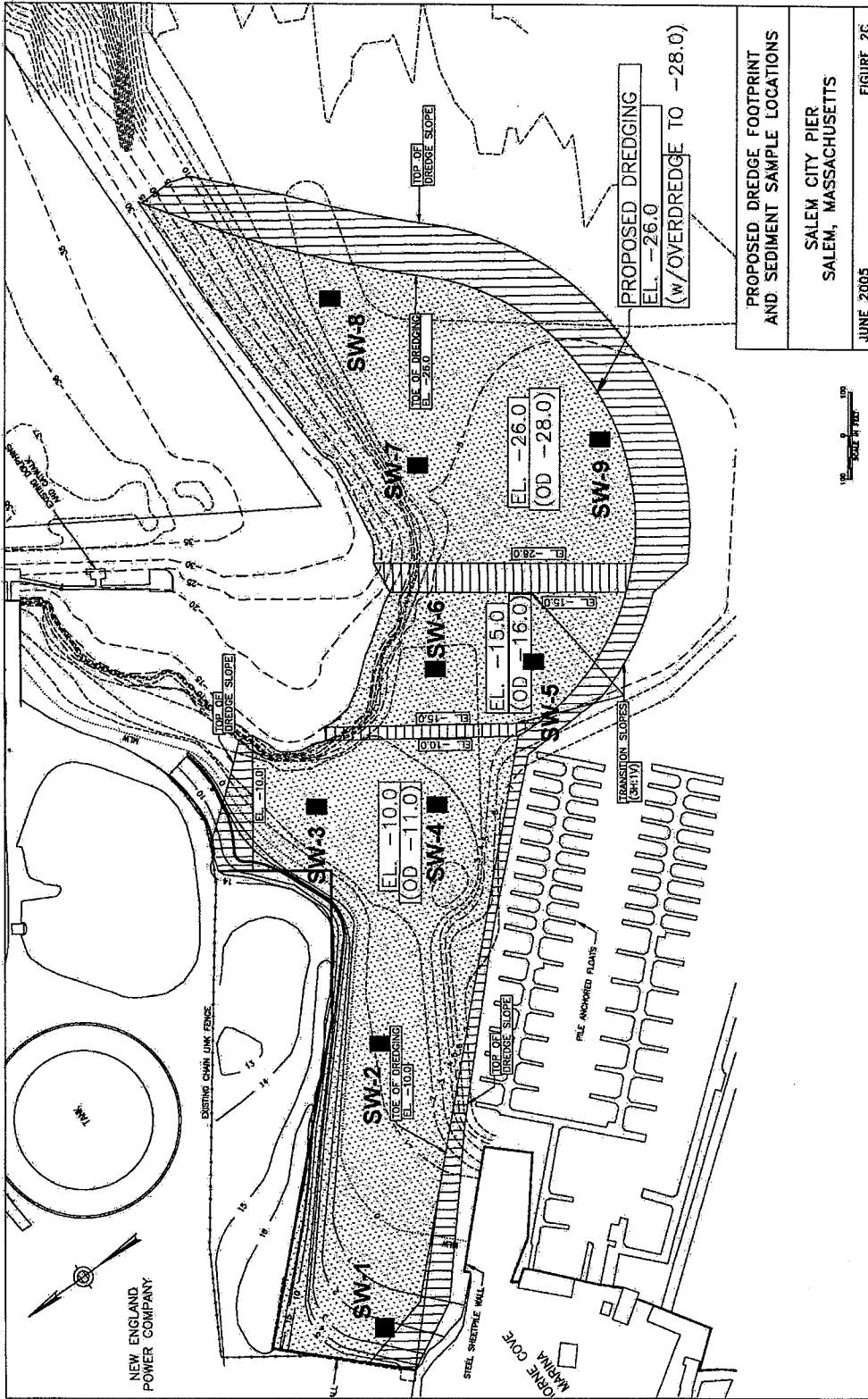
Do not concur

Date 3/14/08

Concur

Do not concur

Date



DAVE ASSOCIATES, INC. NEWBURYPORT, MASSACHUSETTS

CENAE-R-PT

SUBJECT: Suitability Determination for Salem Wharf, Salem Harbor, Salem, MA, Application Number NAE-2005-1095.

Table X-a Risk Summary of all Composites  
Project Site: Salem Harbor  
Organism: *Macoma nasuta*

Sampling Point	CARCINOGENIC RISK			NON-CARCINOGENIC RISK		
	Column A	Column B	Column C	Column D	Column E	Column F
	Total Estimated Lobster Risk	Total Estimated Fish Risk	Total Estimated Molluscan Shellfish Risk	Total Estimated Lobster Risk	Total Estimated Fish Risk	Total Estimated Molluscan Shellfish Risk
SW-1,2,4,5	1.20E-05	2.32E-06	4.03E-06	2.99E-01	5.80E-02	1.01E-01
SW-3,6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SW-7,8,9 Lower	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SW-7,8,9 Upper	2.70E-05	5.23E-06	9.14E-06	5.51E-01	1.07E-01	1.86E-01
Reference (ABDS Reference)	1.18E-05	2.28E-06	3.97E-06	2.56E-01	4.97E-02	8.64E-02

Table 1

CENAE-R-PT

SUBJECT: Suitability Determination for Salem Wharf, Salem Harbor, Salem, MA, Application Number NAE-2005-1095.

Table X-b Risk Summary of all Composites  
Project Site: Salem Harbor  
Organisms: Nereis Virens

Sampling Point	CARCINOGENIC RISK			NON-CARCINOGENIC RISK		
	Column A	Column B	Column C	Column D	Column E	Column F
	Total Estimated Lobster Risk	Total Estimated Fish Risk	Total Estimated Molluscan Shellfish Risk	Total Estimated Lobster Risk	Total Estimated Fish Risk	Total Estimated Molluscan Shellfish Risk
SW-1,2,4,5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SW-3,6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SW-7,8,9 Lower	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SW-7,8,9 Upper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Reference (AEDS Reference)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 2 Page No: 1

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**Exhibit D**  
**Existing Conditions and Proposed Site Plans**