Chapter 10 Summary and Conclusion

10.1 Summary

The 1936 Fore River Bridge, which carried Route 3A between Quincy and Weymouth, was found to be seriously deteriorated in the late 1990s. In 2002, it was replaced by a temporary movable bridge with a 15-year life span. The basic purpose of this project is to provide a permanent replacement for the 1936 Fore River Bridge, which was demolished in 2004.

The design goal for the new permanent bridge is to achieve the functional equivalence of the historic bridge (that is, the same vehicular capacity) with a reliable and maintainable movable structure that maximizes the vertical channel clearance to accommodate as many sloops as possible in the closed position and widens the horizontal channel clearance to meet navigational needs. The project further seeks to meet budget constraints, provide a reliable bridge that is economical to maintain, reduce the duration of bridge openings, and include acceptable bicycle and pedestrian accommodations in accordance with current standards.

The selection of a Preferred Alternative for the replacement bridge requires consideration of multiple interests, including: automobile, truck, pedestrian and bicycle users of the bridge; maritime users of the Weymouth Fore River navigation channel; and the interests of the Weymouth and Quincy neighborhoods abutting the bridge. Several design alternatives and construction options were developed to help achieve the project goals.

The permanent replacement bridge build alternatives evaluated in this Environmental Assessment (EA) are bascule and vertical lift movable bridge designs. Both bridge alternatives would:

- Provide the same functional capacity for vehicles as the 1936 bridge, with two-travel lanes in each direction and accommodations for pedestrians and bicyclists;
- Provide for a posted speed limit of 35 mile per hour;
- Have no more than a five percent maximum grade to comply with the Americans with Disabilities Act (ADA); and
- Avoid permanent impacts to the Quincy Rotary and takings of homes on the Weymouth side of the river adjacent to the state highway layout.

The two bridge types differ in the horizontal channel clearance width and height of the closed position elevation above Mean High Water (MHW).

No-Build Alternative

This alternative assumes that the existing temporary bridge remains in place until the end of its 15-year useful life. The bridge would continue to be maintained to keep it functioning as long as possible, until it could no longer support a traffic load. It would then be shut down and dismantled. The approximately 32,000 vehicles a day that currently cross the bridge on Route 3A would be forced to find a permanent detour route. Diverting all of the Fore River Bridge traffic to an alternate route through Weymouth Landing under a No-Build Alternative would result in significant, unacceptable traffic congestion and delays.

The No-Build Alternative does not satisfy the basic purpose and need of the project, as it would not provide a permanent replacement for the 1936 Fore River Bridge that was demolished. It would result in significant traffic congestion that would be disruptive to local communities and regional commuters. Therefore, the No-Build was eliminated as a viable alternative, but was used for comparison with the Build Alternatives.

Bascule Bridge Alternative

This Bascule Bridge Alternative would have a horizontal channel clearance of 225-feet and a vertical channel clearance above MHW of 41.5 feet at the span. The primary purpose of this project is to provide a permanent replacement for the 1936 Fore River Bridge, which was demolished in 2004.

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Ease of Navigation:

- The horizontal channel clearance is not as wide as the vertical lift option, resulting in a more constricted passageway for vessels compared with the higher vertical clearance of the vertical lift bridge.
- More vessels under 10,000 gross tons would be restricted from using the channel during commuting times. U.S. Coast Guard (USCG) regulation 117.621 states that, during commuting times, the bridge is only to open on signal for vessels greater than 10,000 gross tons. Consequently, sloops and other small vessels that require bridge openings to navigate the channel are restricted to passing through the channel at non-commuting times.

A critical hurdle for the project to clear is acceptance by the USCG which must consider present and future needs of navigation in their permitting process. A 300-foot wide channel was originally under consideration during the 2002 evaluation of alternatives for the replacement of the 1936 bridge. Subsequent coordination with the USCG indicated that alternate channel widths of 250 feet and 225 feet would be considered, but a final decision on the acceptable navigation clearance would not be made until such time as a formal bridge application was made. Representatives of the mariner community have expressed a clear preference for the 250-foot wide channel. The potential for delay to the project in the USCG approval process or even rejection of the application is significant with the bascule option, since the USCG must consider mariner concerns.
Ease of Vehicular Transit:

- More bridge openings are anticipated, leading to more disruption of roadway traffic.
- Major maintenance and repairs must be performed in the "up" position to access machinery in the pier pits, leading to greater impacts on vehicular traffic.

Structural Considerations:

- The larger pier structures, necessary to accommodate the counterweight as it drops below the deck, would result in greater permanent impacts to the bed of the Weymouth Fore River.
- The massive and stiff pier structures for the bascule would have less favorable behavior under seismic load and would require very large foundation systems. The larger foundations would result in a more significant marine habitat/river bed impact.
- The larger pier structures would generate a greater impact on the hydraulic characteristics of the Weymouth Fore River, including a potential for greater scour depth.
- The bascule pits would need sump pumps and would tend to collect debris from roadway joint run-off, which will cause long term maintenance issues.
- Under certain circumstances, there is a potential for a Panama vessel to extend over the fender system and strike the bascule leaf, when the bridge is open.

Machinery Components:

- The large bascule leaves, having a solid deck system, will generate very large loads on the mechanical system when the bridge opens in high winds.
- To accommodate the large loading needed to operate the bridge, specialized machine components and materials will be needed, which are not covered by the standard codes.
- Procurement, maintenance, and eventual replacement of non-standard machinery components would present significant challenges.
- The size of the machinery needed for this bascule would generate great difficulty in fitting all components within the pier structure pits. Fitting all equipment within the pits, while providing minimal access for inspection and maintenance, would be problematic.
- In order to carry roadway traffic, the bascule leaves would have a high dependency on lock machinery at the transverse roadway joint between the leaves, which would require continual maintenance regardless of how conservatively designed.

Constructability:

- The construction of the bascule leaves, typically constructed in the horizontal (i.e. closed) position across the channel, would likely have a significant impact on the navigation channel and marine traffic. The construction is, in general, more complex than the vertical lift and is expected to cause more frequent construction challenges, potentially leading to additional delays and claims.

Aesthetics:

- The proposed bascule bridge, with its enclosed counterweight pits, would be considerably more massive than the 1936 bascule structure. Although still a bascule bridge, the proposed Bascule Bridge Alternative would not be similar in appearance to the 1936 bridge.

Vertical Lift Bridge Alternative (Preferred Alternative)

The Vertical Lift Bridge Alternative would have a horizontal channel clearance of 250 feet and a vertical clearance above MHW of 58.5 feet. The proposed vertical lift span of 320 feet is well within the standard application range for vertical lift bridges. A vertical lift bridge would have a shallower road deck, with most of the support structure above the deck, providing greater vertical clearance in the closed position. It could be built with either bare steel or steel-clad channel towers that would be less massive than the supports of the bascule bridge.

The vertical lift bridge is the Preferred Alternative because it provides the following advantages:

Ease of Navigation:

- The Weymouth Fore River estuary is classified as a “Designated Port Area” by the Massachusetts Office of Coastal Zone Management (CZM). Because of this designation, the proposed bridge cannot hinder the present use and future development of the port facilities. With the widening of the Panama Canal, larger vessels, both tankers and freighters, will be using port facilities along the U.S. east coast. The Fore River Bridge site is located at a sharp bend in the navigation channel. In addition, vessels navigating the site must contend with significant tidal currents because of the constriction in the river at the bridge site. The 250-foot navigation channel would better accommodate these larger vessels at this challenging navigational location.
- The vertical lift bridge would provide an additional 25 feet of horizontal navigation clearance for approximately the same construction cost.
- By providing a 250-foot navigation channel width, the project would optimize the potential of achieving an approved permit from the Coast Guard in a timely manner.
- The vertical lift, which maximizes vertical clearance when the movable span is in the closed position, minimizes this restriction.
• There will be a reduced potential of vessel allisions with the fender system for the vertical lift bridge.

**Ease of Vehicular Transit:**
• The vertical lift would provide an additional 17 feet of vertical clearance at the fender line when the movable span is in the closed position; that is, when the span is open to roadway traffic. Consequently, the number of bridge openings would be lessened. This equates to fewer delays for vehicles using the bridge and less frequent traffic queues in the adjacent neighborhoods of Quincy and Weymouth. The resulting improved vehicular traffic movement would reduce many ancillary impacts including air pollution, vehicle engine noise, and time wasted sitting in traffic when the bridge is open.

• Maintenance could be performed with the bridge in the “closed” position with little to no impact on vehicular traffic.

**Structural Considerations:**
• The vertical lift would require smaller and less costly foundations. The result would be a reduction to the permanent impact area within the bed of the Weymouth Fore River channel and also a reduction in the amount of sediment disturbance during construction.

• The vertical lift would have better seismic performance because the structure is “softer,” or more flexible, than the bascule.

• The vertical lift represents a lesser impact on the hydraulic characteristics of the Weymouth Fore River since the pier structures are smaller and would not occupy as much of the cross-sectional area of the river.

• The operations of a vertical lift bridge are less affected by high winds when compared to a bascule bridge of this magnitude. Consequently, the operation of the vertical lift is less likely to be disrupted during high winds than the bascule.

• The vertical lift bridge layout effectively eliminates the potential of a Panamax vessel alliding with the bridge structure itself. With the bascule alternative, there is a potential for vessel allisions with the bridge.

**Machinery Components:**
• The vertical lift would require only two sets of machinery, instead of the four sets needed for the bascule.

• Vertical lift machinery sizes would be well within the parameters of industry standards.

• Adequate access around the machinery for inspection and maintenance would be assured.

• The vertical lift would have smaller machinery and, as a consequence, would have lower electrical requirements, operational costs, and less impact on the environment.

**Constructability:**
• The vertical lift span could be constructed off-site, floated into place, and installed with minimal disruption to the navigation traffic. The construction could more easily be accelerated for the vertical lift.

According to the opinions volunteered at the public information sessions and in written comments, the following is seen as a disadvantage of the Vertical Lift Bridge Alternative:

**Aesthetics:**
• The vertical lift would result in a taller structure that is not consistent with the architectural form of the 1936 bridge. In terms of aesthetics, this is not the preferred bridge type for the adjacent residential communities.

Table 10.1-1 offers a summary comparison of the two bridge options.

10.2 Conclusion
The Fore River Bridge Replacement Project would construct a permanent bridge on the same alignment as the 1936 bridge and remove the temporary bridge that is now carrying Route 3A over the Weymouth Fore River between Weymouth and Quincy. As presented in the preceding chapters of this EA, construction of the Preferred Alternative, consisting of a vertical lift bridge with a 250-foot horizontal channel clearance and a vertical clearance above MHW of 58.5 feet, is the only alternative that meets the project Purpose and Need while minimizing environmental effects. This alternative, when compared against all other project alternatives, would provide the greatest net benefits with impacts that are manageable and can be mitigated.

The Preferred Alternative meets the Project Purpose and Need by:
• Providing the most vertical clearance above MHW, thereby minimizing the number and duration of bridge openings, which reduces traffic delays and queues affecting the abutting neighborhoods.

• Providing the widest channel clearance and ease of navigation, thereby meeting mariners’ needs and reducing vessel allisions. By doing so it best meets the requirements for approval by the U.S. Coast Guard and the Massachusetts Office of CZM.

• Being well within the standards of application for vertical lift bridges, providing greater assurance of a reliable bridge that is economical to maintain.
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Bascule</th>
<th>Vertical Lift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Travel Lanes</td>
<td>Two in each direction</td>
<td>Two in each direction</td>
</tr>
<tr>
<td>Pedestrian/Bike Accommodations</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Horizontal Channel Clearance</td>
<td>225 feet</td>
<td>250 feet</td>
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<tr>
<td>Height above MHW at Fender Line</td>
<td>41.5</td>
<td>58.5</td>
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<tr>
<td>Number of Projected Bridge Openings per Year</td>
<td>633</td>
<td>475</td>
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<tr>
<td>Estimated Opening Duration</td>
<td>13 minutes</td>
<td>13 minutes</td>
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<tr>
<td>Motor Size</td>
<td>800-hp</td>
<td>250-hp</td>
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<tr>
<td>Foundation Footprint</td>
<td>18,000 square feet</td>
<td>10,000 square feet</td>
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<tr>
<td>Approximate Dredging Volume</td>
<td>23,000 cubic yards</td>
<td>15,000 cubic yards</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$136 million</td>
<td>$136 million</td>
</tr>
<tr>
<td>Fabrication/Installation of Machinery</td>
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<td></td>
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<tr>
<td>Ease of Maintenance</td>
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<tr>
<td>Life Cycle Annual Cost</td>
<td>$8.4 million</td>
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<td>Air Quality (emissions)</td>
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<tr>
<td>Ease of Navigation</td>
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<tr>
<td>Protection of Structure from Vessel Impacts</td>
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<tr>
<td>Constructability</td>
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<tr>
<td>Ride over Roadway Joints</td>
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<td></td>
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<tr>
<td>Ability to meet Purpose and Need</td>
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<td></td>
</tr>
</tbody>
</table>


Notes: 1. “✔” indicates the advantageous alternative.
2. Approximate Dredging Volume includes dredging required for submarine cable, channel widening, dolphins, and temporary channel.

- Eliminating the potential for structure damage due to vessel collisions.
- Providing the best opportunity for the use of accelerated construction techniques as the vertical lift span could be constructed off-site, floated into place, and installed with minimal disruption to the navigation traffic.

The Preferred Alternative would not result in any significant long-term environmental impacts. Short term impacts due to construction activities would be mitigated to the greatest extent practicable using industry best management practices. The Preferred Alternative would replace a temporary bridge structure that is unattractive and noisy, have a positive impact on vehicular and marine traffic, and ensure continued multi-modal use of an important transportation facility on a major Boston metropolitan commuter corridor for the future.