5 Recommendations

5.1 SUMMARY OF RECOMMENDATIONS

The purpose of the New Bedford-Fairhaven Bridge Corridor Study is to evaluate multi-modal transportation and associated land use issues, develop potential solutions, and to recommend improvements along the Route 6 Corridor between County Street in New Bedford and Adams Street in the Town of Fairhaven. The focus of the study was on identifying and analyzing options to replace the swing span of the New Bedford-Fairhaven Bridge and comparing the impacts of these replacement build alternatives with a no build option. A set of goals and objectives, outlined in Chapter 1, provided the framework for the development of alternatives as part of this study. A set of evaluation criteria tied to the goals and objectives were established to assess the benefits and impacts of the alternatives.

Based on public comment and input from the SAG, a set of short-term, medium-term, and long-term recommendations were developed. Two of the eight long-term alternatives developed and analyzed as part of this study are recommended for further analysis and advancement into the MassDOT Project Initiation and Environmental, Permitting, and ROW Process. The two recommended alternatives offer the benefits of greater horizontal and navigational clearances and have the least impacts compared to the other alternatives:

- **Alternative 1T: Tall Vertical Lift Bridge (150 feet vertical clearance).** Construction of a new vertical lift bridge with 270 feet horizontal clearance in place of existing swing span. The estimated capital cost is $100 to $130 million and the construction duration is 37 months.
- **Alternative 3D: Double-leaf Dutch-style Bascule Bridge.** Construction of a new double-leaf Dutch-style bascule bridge with 200 feet horizontal clearance in place of existing swing span. The estimated capital cost is $100 to $125 million and the construction duration is 26 to 28 months.

Several intersection improvements, bicycle-pedestrian improvements, and ITS/signage improvements are recommended for the short- and medium-term.

- **Corridor intersection improvements.** Short-term signal changes at intersections including changes to cycle length, timing splits or phasing, and coordination offset modifications are recommended once ongoing roadway construction projects are completed in late 2015.
- **Bicycle and pedestrian improvements.** Bicycle or pedestrian improvements are recommended for implementation once the ongoing roadway construction projects are completed in late 2015:
    - Bicycle and pedestrian path along Route 6 from Pleasant Street to Route 18;
    - New pedestrian ramp/staircase between Route 6 and MacArthur Drive; and
    - Completion of sidewalk network along MacArthur Drive.

- **Variable message/ITS signage.** The addition of one or more of the following short- and medium-term alternatives is recommended to complement the existing ITS/signage system:
  - Complete Replacement of Existing System;
  - Expansion of ITS/Signage System; and/or
  - Upgrades to the ITS/Signage System.
- **Short-term signage and pavement marking evaluations.** – Original plans for signage and pavement markings to be installed upon the completion of the current construction activities will be evaluated. Items to be evaluated will include the restoration and configuration of the Pope's Island crosswalk and the potential for "no idling" signs along the swing bridge roadway approaches.

This chapter provides a summary of the long-term alternatives considered, the evaluation process, and a description of the process taken to identify the long-term recommended alternatives that were selected for advancement into the next stages of MassDOT's Project Development and Design Process. The development and proposed implementation of the short- and medium-term alternatives is also discussed. The chapter also highlights the environmental considerations, establishes the policy context, and outlines economic benefits of the recommended alternatives. Additional actions needed to advance the project, required coordination, and future considerations for alternative refinement are also discussed.

5.2 LONG-TERM ALTERNATIVES CONSIDERED

As described in Chapters 3 and 4, the study team developed a set of long-term alternatives based on an initial analysis and screening process. This process included a review of conclusions from a number of previous studies, physical limitations of the bridge approaches and clearance issues, and an assessment of the 2014 Existing Condition and the 2035 No Build Condition. The alternatives were then refined during the alternative development process using a Study Advisory Group and public input. Eight long-term alternatives were developed:

- **No Build Alternative:** Repair Existing Swing Bridge;
- **Alternative 1:** Vertical Lift Bridge (110-135 feet vertical clearance);
- **Alternative 1T**: Tall Vertical Lift Bridge (150 feet vertical clearance);
- **Alternative 2:** Double-leaf Bascule Bridge (Standard);
- **Alternative 2W:** Wide Double-leaf Bascule Bridge (Standard);
- **Alternative 3:** Single-leaf Rolling Bascule Bridge;
- **Alternative 3W:** Double-leaf Rolling Bascule Bridge; and
- **Alternative 3D:** Double-leaf Dutch-Style Bascule Bridge.

A brief summary of each alternative is provided below, along with an alternative comparison matrix that highlights the key differences between the alternatives. A full description and analysis of each long-term alternative based on the evaluation criteria established at the beginning of the study is provided in Chapter 4.

5.2.1 Summary of Long-Term Alternatives

The navigational clearance, vertical clearance, construction duration, and capital costs for each long-term alternative is described below. Implementation of the long-term alternatives is described in later sections of this chapter.

NO BUILD ALTERNATIVE: REPAIR EXISTING SWING BRIDGE

This alternative includes the continued maintenance of the existing swing bridge and repair of the bridge superstructure in the same configuration as currently exists. The construction phase of this project would be approximately 18 months. This alternative would allow for keeping two lanes open for most of the time to vehicular traffic. One of the two existing navigational channels would be open for most of the construction duration. The estimated cost for the No Build Alternative is $45 million. This capital cost would include bridge design and permitting, removal of the existing swing truss structure, and replacement with a newly constructed structure.

ALTERNATIVE 1: VERTICAL LIFT BRIDGE

This alternative constructs a new vertical lift bridge in place of the existing swing bridge. The bridge would include approximately 270 feet of navigational clearance and would allow for approximately 110-135 feet of vertical clearance. The bridge is aligned so that the new 170-foot-high pier towers are approximately in the same location as the east and west abutments of the existing swing bridge. The construction phase of this project would be approximately three years long, or 33 to 36 months. This alternative would allow two or three traffic lanes to remain open for most of the time to vehicular traffic. Both of the existing navigational channels would be open for most of the construction duration. The estimated cost for Alternative 1 is between $90 and $120 million. This capital cost includes the bridge design and permitting, removal and demolition of the existing swing span, and construction of the new bridge span.

ALTERNATIVE 1T: TALL VERTICAL LIFT BRIDGE

This alternative constructs a new vertical lift bridge in place of the existing swing bridge. The bridge would include approximately 270 feet of navigational clearance and would allow for approximately 150 feet of vertical clearance. The new 200-foot-high pier towers are approximately in the same location as the east and west abutments of the existing swing bridge. The construction phase of this project would be approximately three years long, or 33 to 36 months. This alternative would allow two or three traffic lanes to remain open for most of the time to vehicular traffic. Both of the existing navigational channels would be open for most of the construction duration. The estimated cost for Alternative 1T is between $100 and $130 million. This capital cost would include the bridge design and permitting, removal and demolition of the existing swing span and construction of the new bridge.

ALTERNATIVE 2: DOUBLE-LEAF BASCULE BRIDGE (STANDARD)

This alternative constructs a new double-leaf bascule bridge in place of the existing swing bridge. The bridge would include approximately 150 feet of navigational clearance and would

have no vertical clearance restrictions with the bridge in the open position. The bridge would be aligned with the east bascule pier in the same location as the existing eastern abutment of the swing bridge. The construction phase of this project would take approximately 37 months. This alternative would consist of closing the bridge to vehicular traffic for approximately two years during that period. One of the two existing navigational channels would be open for most of the construction duration. The estimated cost for Alternative 2 is between $85 and $100 million. This capital cost would include the bridge design and permitting, removal and demolition of the existing swing span and construction of the new bridge.

ALTERNATIVE 2W: WIDE DOUBLE-LEAF BASCULE BRIDGE (STANDARD)

This alternative constructs a new wide double-leaf bascule bridge in place of the existing swing bridge. The bridge would include approximately 220 feet of navigational clearance and would have no vertical clearance restrictions. The bridge would be aligned with the east bascule pier in the same location as the existing eastern abutment of the swing bridge. The construction phase of this project would take approximately 37 months. This alternative would consist of closing the bridge to vehicular traffic for approximately two years during that period. One of the two existing navigational channels would be open for most of the construction duration. The estimated cost for Alternative 2W is between $130 and $160 million. This capital cost would include the bridge design and permitting, removal and demolition of the existing swing span and construction of the new bridge.

ALTERNATIVE 3: SINGLE-LEAF ROLLING BASCULE BRIDGE

This alternative constructs a new single-leaf rolling bascule bridge in place of the existing swing bridge. Rolling bascule bridges are different from the standard bascule in that the counter-weights are located above the roadway surface and the spans segments are lifted by rolling the bridge into the up position along rails or plates located along the approaches. The bridge would include approximately 150 feet of navigational clearance and would not restrict vertical clearance. The bridge would be aligned with the east bascule pier in the same location as the existing eastern abutment of the swing bridge. The construction phase of this project would be a little over two years long, or approximately 26-28 months. This alternative allows two vehicular lanes to remain open for most of the construction phase. One of the two existing navigational channels would be open for most of the construction duration. The estimated cost for Alternative 3 is between $50 and $70 million. This capital cost would include the bridge design and permitting, removal and demolition of the existing swing bridge and construction of the new bridge.

ALTERNATIVE 3W: DOUBLE-LEAF ROLLING BASCULE BRIDGE

This alternative constructs a new double-leaf rolling bascule bridge in place of the existing swing bridge. Rolling bascule bridges are different from the standard bascule in that the counter-weights are located above the roadway surface. The bridge would include approximately 220 feet of navigational clearance and would not restrict vertical clearance when the bridge is in the open position. The bridge would be aligned with the east bascule pier in the same location as the existing eastern abutment of the swing bridge. The construction phase of this project would be a little over two years long, or approximately 26-28 months. This

alternative would allow for keeping two lanes open for most of the time to vehicular traffic. One of the two existing navigational channels would be open for most of the construction duration. The estimated cost for Alternative 3W is between $90 and $110 million. This capital cost would include the bridge design and permitting, removal and demolition of the existing swing bridge and construction of the new bridge.

ALTERNATIVE 3D: DOUBLE-LEAF DUTCH BASCULE BRIDGE

This alternative constructs a new double-leaf Dutch-style bascule bridge in place of the existing swing bridge. Dutch-style bascule bridges are different from the standard bascule in that the counter-weights are located above the roadway surface. As opposed to rolling bascule bridges, the bridge deck of a Dutch-style bascule bridge is lifted using a system that combines the counter-weight, an overhead beam and pivot points, or heel trunnions, for both the beam and the bridge deck. The bridge would include approximately 200 feet of navigational clearance and would not restrict vertical clearance. The bridge would be aligned with the east bascule pier in the same location as the existing eastern abutment of the swing bridge. The construction phase of this project would be a little over two years long, or approximately 26-28 months. This alternative would allow for keeping two lanes open for most of the time to vehicular traffic. One of the two existing navigational channels would be open for most of the construction duration. The estimated cost for Alternative 3D is between $100 and $125 million. This capital cost would include the bridge design and permitting, removal and demolition of the existing swing bridge and construction of the new bridge.

5.2.2 Evaluation Criteria Summary

As discussed in Chapters 1 and 4, a set of evaluation criteria were established at the study onset to help analyze the long-term alternatives. These evaluation criteria addressed the following topics:

- Bridge Operations (i.e., vertical clearance, number of openings);
- Transportation Impacts (i.e., vehicle delay, connectivity);
- Safety (i.e., emergency vehicle access, navigational safety);
- Economic Development (i.e., shipper cost savings);
- Environment (i.e., coastal or wetland resource impacts);
- Community (i.e., open space or cultural resource impacts); and
- Alternative Feasibility (i.e., costs, construction duration).

Each long-term alternative was evaluated using these criteria. In addition to the quantitative or qualitative information provided, a rating system was used to identify the significance of the impact or benefit. The following is the legend for the rating system utilized:

● = Minor Negative Impact or Most Positive Benefit

◒ = Moderate Impact or Minor/Moderate Positive Benefit

○ = Significant Negative Impact or Least Positive Benefit

The complete evaluation summary tables are presented in Chapter 4 for all eight long-term alternatives. Tables 5.1 and 5.2 provide a brief comparison matrix that identifies the "differentiators" that were used to identify the primary benefit or constraint of each long-term alternative. The red cells in the following tables identify the primary or most noteworthy difference among the alternatives. The yellow cells highlight the secondary difference among the alternatives.

Table 5.1. Alternative Comparison Matrix (Alternatives 1, 1T, 2, and 2W)

Evaluation Criteria	Alternative 1: Vertical Lift Bridge (Rating)	Alternative 1T: Vertical Lift Bridge (Rating)	Alternative 2: Double-Leaf Bascule Bridge (Rating)	Alternative 2W: Double-Leaf Bascule Bridge (Rating)
Feet of vertical clearance (vessel height)	110-135 feet ○	150 feet ○	Unlimited ●	Unlimited ●
Feet of horizontal clearance (vessel width)	270 feet ●	270 feet ●	150 feet ◒	220 feet ◒
Impact to safe navigation	Greatly Improved ●	Greatly Improved ●	Moderately Improved ◒	Greatly Improved ●
Visual impacts	Some Impact ○	Some Impact ○	No Impact ●	No Impact ●
Long-term reliability risk	Medium Risk ◒	Medium Risk ◒	Medium Risk ◒	Medium Risk ◒
Capital costs	$90-$120 Million ○	$100-$130 Million ○	$85-$100 Million ◒	$130-$160 Million ○
Annual operating and maintenance costs	$490,000 ◒	$490,000 ◒	$490,000 ◒	$490,000 ◒
Construction duration	33 months ○	33 months ○	37 months ○	37 months ○
Construction phase impacts to vehicular traffic	2 week road closure ●	2 week road closure ●	24 month road closure ○	24 month road closure ○
Construction phase indirect impacts to abutting businesses	Significant access impacts ○	Significant access impacts ○	Significant access impacts ○	Significant access impacts ○

Table 5.2. Alternative Comparison Matrix (Alternatives 3, 3W, 3D, and No Build)

Evaluation Criteria	No-Build: Repair Existing Swing Bridge	Alternative 3: Single-Leaf Rolling Bascule Bridge (Rating)	Alternative 3W: Double-Leaf Rolling Bascule Bridge (Rating)	Alternative 3D: Double-Leaf Dutch-Style Bascule Bridge (Rating)
Feet of vertical clearance (vessel height)	Unlimited ●	Unlimited ●	Unlimited ●	Unlimited ●
Feet of horizontal clearance (vessel width)	95 feet ○	150 feet ◒	220 feet ●	200 feet ●
Impact to safe navigation	N/A	Moderately Improved ◒	Greatly Improved ●	Greatly Improved ●
Visual impacts	N/A	Limited Impact ◒	Limited Impact ◒	Limited Impact ◒
Long-term reliability risk	Medium Risk ◒	High Risk ○	High Risk ○	TBD

Evaluation Criteria	No-Build: Repair Existing Swing Bridge	Alternative 3: Single-Leaf Rolling Bascule Bridge (Rating)	Alternative 3W: Double-Leaf Rolling Bascule Bridge (Rating)	Alternative 3D: Double-Leaf Dutch-Style Bascule Bridge (Rating)
Capital costs	$45 Million ●	$50-$70 Million ●	$90-$110 Million ◒	$100-$125 Million ◒
Annual operating and maintenance costs	$400,000 ●	$400,000 ●	$490,000 ◒	$490,000 ◒
Construction duration	18 months ●	26 months ◒	26 months ◒	26 months ◒
Construction phase impacts to vehicular traffic	2 week road closure ●	3 month road closure ◒	3 month road closure ◒	3 month road closure ◒
Construction phase indirect impacts to abutting businesses	Minor-Moderate access Impacts ●	Moderate access impacts ◒	Moderate access impacts ◒	Moderate access impacts ◒

As shown in the previous tables, the primary differentiators between the long-term alternatives are the issues regarding height or vertical clearance limitations, construction duration and lengthy roadway closures, long-term reliability concerns, and navigational width constraints.

- **Height/Vertical Clearance Limitations.** Unlike all the other alternatives, Alternative 1 and 1T are vertical lift bridges that have vertical underclearance constraints when the bridge is open to vessels.
- **Horizontal Clearance Limitations.** All of the build alternatives increase the horizontal clearance of the bridge opening. The No Build Alternative does not increase the horizontal navigational width from 95 feet. A wider navigational clearance is desired to reduce vessel delays and lower shipping costs. Two of the alternatives, Alternative 2 and 3, increase the width to 150 feet. The five other alternatives offer wider navigational widths, between 200 and 270 feet.
- **Construction Duration/Roadway Closures.** The construction duration varies greatly between alternatives, including the length of roadway closures. The construction duration for the No Build Alternative is 18 months while the two double-leaf bascule bridges (Alternatives 2 and 2W) require a three-year-plus construction period. These two standard bascule bridges require extensive in-water work that will also require a two-year complete roadway closure. This compares to the other alternatives that would require a two-week-long or three-month-long roadway closure.
- **Capital Costs.** Another primary differentiator is the capital costs, which range from a low of $45 million in the No Build Alternative to $130-160 million for Alternative 2W (Wide Double-leaf Bascule Bridge).
- **Long-term Reliability Risk.** The other primary difference between alternatives is the long-term reliability risk. Some moveable bridge types are at a greater risk of inoperability than other types due to the nature of their design and the climate that they operate within. Due to the span width and length required, Alternatives 3 and 3W (rolling bascule bridges) were determined to have higher risks for long-term reliability. The long-term reliability of Alternative 3D, the Double-leaf Dutch-style

Bascule Bridge, is unknown at this time due to the limited number of comparable bridges with similar span widths and lengths.

5.3 SHORT/MEDIUM-TERM ALTERNATIVES CONSIDERED

In addition to the long-term alternatives for the replacement of the New Bedford-Fairhaven Bridge, a number of short-term (less than five years) and medium-term (less than ten years) improvements have been considered and analyzed as part of the study. These improvements are divided into three areas: intersection improvements, bicycle-pedestrian improvements and ITS/signage improvements. More detailed analysis is provided in Chapter 4, including the potential impacts, benefits, and costs of each improvement.

5.3.1 Corridor Intersection Improvements

A number of short-term improvements were analyzed at intersections along the corridor. These changes would be relatively quick to implement with minor costs and could provide immediate benefits to operations along the corridor. The improvements are also expected to benefit the corridor if long-term closure of the bridge is required for construction. Analysis indicated that signal-related intersection improvements would be beneficial at nine corridor intersections between Cottage Street in New Bedford and Adams Street in Fairhaven:

- Mill Street and Cottage Street;
- Kempton Street and Cottage Street;
- Mill Street and County Street;
- Kempton Street and County Street;
- Kempton Street/Mill Street and Purchase Street ("Octopus Intersection");
- Huttleston Avenue and Middle Street;
- Huttleston Avenue and Main Street; and
- Huttleston Avenue and Adams Street.

The improvements would include changes to cycle length, timing splits or phasing, and coordination offset modifications. Since these improvements are all limited to signal timing, it is anticipated that the cost would be limited to the labor costs to make the changes. Implementation of these intersection improvements could commence as soon as the ongoing bridge construction and Kempton Street/Mill Street and Purchase Street improvements are completed in late 2015. Depending upon the procedures used to make the changes, costs would be less than $20,000 to complete changes at all intersections .

5.3.2 Bicycle/Pedestrian Improvements

As described in more detail in Chapter 4, three bicycle and pedestrian improvements have been identified for the corridor. Implementation of these improvements could commence as soon as the ongoing bridge construction and Kempton Street/Mill Street and Purchase Street improvements are completed in late 2015. Timing of the following improvements would depend on funding availability:

- **Bicycle and pedestrian path along Route 6 from Pleasant Street to Route 18.** A pedestrian path that provides a more direct path for pedestrians between the Kempton Street/Mill Street and Purchase Street and the Route 18/Elm Street intersection is recommended for the corridor. The recommended 10- to 12-foot-wide path would be located on the south side of the Route 6 within the existing right-of-way (ROW). A four- to six-foot-high fence would be installed to provide separation between the new path and the eastbound Route 6 travel lanes. The estimated cost for this 0.25-mile long multi-use path is $350,000. To ensure that safety is maintained along the corridor, design of the path would require appropriate roadway separation, fencing, and lighting.
- **New pedestrian ramp and staircase between Route 6 and MacArthur Drive.** A new ramp for pedestrians and bicyclists is recommended to replace an existing staircase that connects the end of the sidewalk on the north side of the Route 6 to MacArthur Drive. The new ADA-compliant ramp would provide a safe and direct connection for bicyclists and pedestrians on the north side of the roadway. The estimated cost for the ramp structure is $450,000.
- **Completion of sidewalk network along MacArthur Drive**. A new sidewalk is recommended along an 85-foot-long segment on the west side of MacArthur Drive just north of Route 6. By adding this one sidewalk segment, a gap in the local pedestrian network would be closed. It is anticipated that MacArthur Drive will become the primary pedestrian route from downtown New Bedford and Route 6 to the proposed Whale's Tooth Commuter Rail Station located north of the corridor. The estimated construction cost of the sidewalk is $15,000, but it is anticipated that funding will be needed for the required additional property rights needed for its construction.

Additionally, all of the long-term build alternatives would allow for a wider bridge with a 64-foot-wide ROW. As part of this additional bridge width, four 11-foot-wide vehicular travel lanes, two five-foot-wide bike lanes, and two five-foot-wide sidewalks would be constructed. The addition of bike lanes across the New Bedford-Fairhaven Bridge would provide a key link in the proposed 50-mile continuous South Coast Bikeway proposed between Swansea and Wareham, Massachusetts. As described in more detail in Chapter 2, the South Coast Bikeway is part of the larger Bay State Greenway and the East Coast Greenway.

5.3.3 Variable Message/ITS Signage

As previously discussed in Chapter 4, none of the long-term alternatives would reduce the number of daily bridge openings or the delay times for motorists due to the openings. Consequently, providing sufficient notifications about bridge openings would allow motorists to make appropriate detour route selections. The existing ITS/signage system located in close proximity to the bridge approaches is helpful (see locations in Figure 4.10), but is not sufficient to allow for appropriate route selection for many local and regional travelers.

The existing ITS/signage system would result in increased benefits by implementing one or more of the following short- and medium-term alternatives:

- **Complete replacement of existing system.** This short-term alternative includes the complete replacement of the existing signage with signs that allow changeable messages. This information would benefit area travelers by providing additional information regarding the status of the bridge. The system information would be schedule-based or provided (through a semi-automated system) from the bridge operator. The estimated cost for this type of system is estimated to be approximately $750,000 to $1,000,000 and would depend upon the specific sign type and the design for the associated communications system. The replacement system is in the planning stages with MassDOT.
- **Expansion of ITS/signage system**. In addition to replacement of the existing signs, this medium-term alternative includes the expansion of the system to provide additional information to travelers at locations where they could make diversion decisions. Additional signs would be provided on I-195 and at three intersections along Route 6 (Route 240, Middle Street, and Adams Street) in Fairhaven. The estimated cost for the expansion of the system is $400,000.
- **Upgrades to the ITS/signage system.** This medium-term alternative includes upgrades to the replacement system with more advanced technology that would allow signs to provide additional information regarding travel time to the bridge and the bridge status. This system is similar to the MassDOT "GO Time" System that relies on Bluetooth-based real time traveler information to provide travel times. These types of signage are relevant for select sign locations, including along I-195 and the Route 240/Route 6 intersection. Assuming the other ITS/changeable signs noted above have already been installed, the cost to integrate bridge signs into the "GO Time" system is estimated to cost approximately $100,000.

5.4 ALTERNATIVES RECOMMENDED FOR ADVANCEMENT

Taken as a whole, the recommended short-, medium-, and long-term actions comprise a comprehensive set of transportation improvements and policies to meet the needs of the New Bedford-Fairhaven Bridge corridor. The recommendations were selected based on input from the SAG and public comments received during study meetings and in response to the draft study report. A complete list of comments received and responses given are included in Appendix G.

Each of the recommended actions serves an independent function and can be implemented separately as resources allow. They include relatively low-cost and easy to implement actions, such as new sidewalk connections and intersection signal changes. They also include some actions that require no new ROW and have no expected environmental impacts, such the new pedestrian and bicycle ramp and new variable message or ITS signage. Finally, they also include a major infrastructure improvement that has significant capital costs and design and permitting requirements (i.e., the recommended long-term build alternative to replace the existing swing span of the New Bedford-Fairhaven Bridge).

As described later in this chapter, implementation of the recommendations described in the next section will require coordination between a number of agencies. Given transportation funding constraints, the recommended improvements, especially major infrastructure projects, would need to be integrated into other local and regional transportation planning programs.

5.4.1 Recommended Long-Term Alternatives

As documented in Chapter 3, a broad range of alternatives was developed to address the long-term options for the New Bedford-Fairhaven Bridge. The alternatives were evaluated and reviewed by MassDOT, the Study Advisory Group, and community and public stakeholders through a series of meetings to identify feasible solutions.

Based on this review, it was determined that of the eight long-term alternatives considered, two build alternatives have the potential to provide the most effective long-term option. These two options were recommended for advancement because they would result in the least impacts as compared to the other alternatives, while offering the benefits of greater horizontal and navigational clearances. However, additional information, design, and analysis are needed before determining a preferred alternative. The two alternatives recommended for advancement into the project development phase are:

- **Alternative 1T: Tall Vertical Lift Bridge, and**
- **Alternative 3D: Double-leaf Dutch Bascule Bridge.**

Described in more detail in the implementation section of this chapter, the Preliminary Design phase is the first phase of Step 4: Environmental Permitting, Design, and Right-of-Way Process in MassDOT's Project Development and Design Process. Two additional studies should be undertaken as part of the Preliminary Design phase, which is done concurrently with the National Environmental Policy Act (NEPA) permitting process. These additional studies are required to more fully understand site-specific details and navigational issues before a specific bridge type could be identified as the preferred alternative:

- **Bridge Type Study.** After collecting site-specific details (site survey, geotechnical data, force, and load criteria), MassDOT would undertake a study during the Preliminary Design phase to assess the design feasibility of each bridge type and respective costs.
- **U.S. Coast Guard Navigational Evaluation.** As part of the NEPA permitting process, this evaluation would be conducted to determine the ability of the recommended bridge alternatives to meet current and future navigational needs concerning horizontal and vertical clearances.

5.4.2 Short- and Medium-Term Recommendations

The short- and medium-term recommendations include:

- **Corridor intersection improvements.** A number of short-term improvements including changes to signal cycle length, timing splits or phasing, and coordination offset modifications are recommended once ongoing roadway construction projects are completed in late 2015.
- **Bicycle and pedestrian improvements.** The following bicycle or pedestrian improvements could commence as soon as the ongoing roadway construction projects are completed in late 2015:

  - Bicycle and pedestrian path along Route 6 from Pleasant Street to Route 18;
  - New pedestrian ramp and staircase between Route 6 and MacArthur Drive; and
  - Completion of sidewalk network along MacArthur Drive.
- **Variable message/ITS signage.** Additions of one or more of the following short- and medium-term alternatives is recommended to complement the existing ITS/signage system:
  - Complete replacement of existing system;
  - Expansion of ITS/signage system; and/or
  - Upgrades to the ITS/signage system.

As part of the study public comment process, it was identified that the signage and pavement marking plans for the completion of the current construction may warrant reconsideration. Since the importance of the pedestrian environment within the corridor has been highlighted as part of this study, another evaluation of the planned locations and configurations of crosswalks appears warranted. Additionally, it was noted that "no-idling" signs along the swing bridge roadway approaches may improve local air quality. Further evaluation of the legal and safety considerations would be required before signage directing motorists to turn-off their engines within the traveled is recommended.

- **Short-term signage and pavement marking evaluations.** – Evaluate restoration and configuration of the Pope's Island crosswalk and the potential for "no idling" signs along the swing bridge roadway approaches.

5.5 POLICY CONTEXT

The New Bedford-Fairhaven Bridge Corridor Study has been conducted in the context of national and state transportation policy and planning principles. These planning principles and policy positions seek to balance the transportation needs of all facility users and provide a forum to any interested party to provide input to the decision-making process. For this study, the Goals, Objectives, and Evaluation Criteria were developed at the beginning of the study process to take into account transportation needs, economic development, and potential impacts. These Goals, Objectives, and Evaluation Criteria were also developed to support the following state and federal policies and regulations:

- MassDOT's GreenDOT Policy and the GreenDOT Implementation Plan, which embraces the goals that will include the design of a multi-modal transportation system, promote healthy transportation and livable communities, and to triple the share of travel demand by bicycling, transit, and walking.
- The Massachusetts Healthy Transportation Compact and MassDOT's Healthy Transportation Policy Directive requires that all MassDOT projects not only accommodate, but also actively promote healthy transportation modes. The Healthy Transportation Policy Directive is an agreement between MassDOT, the Executive Office of Health and Human Services, the Secretary of Energy and Environmental Affairs, and the Massachusetts Department of Public Health. This legislation is designed to facilitate transportation decisions that balance the needs of all users,

expands mobility, improves public health, and supports a cleaner environment. The Healthy Transportation Policy Directive provides specific guidance on Complete Streets Design Guidelines. MassDOT's Complete Streets approach requires balancing the use of the public right-of-way for all transportation modes, requires that MassDOT projects provide safe and accessible options for all travel modes for all ages and abilities, and emphasizes a multi-modal philosophy.

- Federal regulations including the Federal Highway Administration's (FHWA) oversight of Route 6 as part of the National Highway System. All highways on the NHS, must comply with applicable federal regulations. These requirements include design standards, contract administration, State-FHWA oversight procedures, Highway Performance Monitoring System reporting, National Bridge Inventory reporting, national performance measures data collection, and outdoor advertisement/junkyard control.

All of these policies reflect the fact that roadways are part of an infrastructure that must serve all users, while being an integral part of surrounding neighborhoods. Providing access for all modes and travelers, considering vulnerable roadway users, enhancing transportation choices, fostering community connectivity and economic development, and ensuring the public health of adjoining residents are important considerations that are recognized through the policies and initiatives described above.

The recommended improvements along the New Bedford-Fairhaven Bridge corridor will implement these goals, themes, policies, and regulations by:

- Improving corridor facilities for bicyclists and pedestrians and provide safe facilities that encourage walking and biking. These improvements will support increased pedestrian and bicycle trips and further the goals set forth in the Massachusetts Healthy Transportation Compact and MassDOT's Healthy Transportation Policy Directive.
- Improving harbor accessibility to some marine users (under 14 feet air draft). A new bridge with an increased vertical clearance would accommodate a more balanced use of the corridor and bridge by pedestrians, bicyclists, motorists, and vessels.
- Allowing for continued and improved access to the waterfront, Marina Park, and the Pope's Island Marina, home of the New Bedford Rowing Center.

5.5.1 MassDOT's GreenDOT Policy & GreenDOT Implementation Plan

Under current conditions, the bicycle and pedestrian conditions along the bridge are less than sufficient to provide safe movement along the corridor. The addition of bicycle and pedestrian facilities would make the area much more accessible. As stated in the GreenDOT Implementation Plan, MassDOT has a "strong commitment to improving networks and connectivity for pedestrians and bicyclists in all communities." This commitment is central to MassDOT's transportation vision as described in the GreenDOT Policy. The GreenDOT Implementation Plan seeks to provide customers with services that increase transportation choices, reduce congestion, and improve air quality. As stated in the plan, "this goal is built around the idea of providing more access to these modes for our customers, having these modes

absorb as much future travel demand as possible, and thus leveling off growth of automobile usage." With a more complete multi-modal network provided by this project, pedestrian and bicycling usage would increase along the corridor and potentially reduce the demand for motor vehicles.

5.5.2 Massachusetts Healthy Transportation Compact & MassDOT's Healthy Transportation Policy Directive

The MassDOT Healthy Transportation Policy Directive was issued to "ensure that all MassDOT projects are designed and implemented in a way that all our customers have access to safe and comfortable healthy transportation options." To increase and encourage more pedestrian and bicycle trips, the Healthy Transportation Policy Directive outlines the statewide mode shift goal that seeks to triple the distance travelled by walking, bicycling, and public transit by 2030. According to the directive, MassDOT construction projects "shall include provisions of off-road accommodations (shared-use path, or bridge-side path) or clearly designate safe travel routes for pedestrians, bicyclists, and transit users along existing facilities, including customers that fall under the protection of the Americans with Disabilities Act." The implementation of separate bicycle and pedestrian paths will fulfill these directives as well as encourage overall healthy transportation.

As discussed in more detail in Chapter 2 of this document, the South Coast Bikeway is a 50-mile-long bike or multi-use path proposed between the Rhode Island-Massachusetts border and the Cape Cod Canal. This regional route would connect a number of existing and proposed bicycle paths and on-road bike routes. This route would include an on-road connection over the New Bedford-Fairhaven Bridge with connections to the east and west. The bridge is a critical link between existing segments of the bikeway. It is recommended that improvements to bicycle access and facilities include close coordination with stakeholders, including Southeastern Regional Planning and Economic Development District (SRPEDD), as the project moves through the project development phases. Such coordination will help ensure that the proposed connectivity for bicycles is consistent with other regional plans such as the South Coast Bikeway.

5.5.3 FHWA & National Highway System

The National Highway System (NHS) consists of roadways essential to national economics, defense, and mobility. The NHS includes interstates, principal arterials, and intermodal connectors. Route 6 is functionally classified as an Urban Principal Arterial and is part of the NHS. FHWA has oversight responsibility for the NHS and would be required to review design changes as they relate to the functional classification of the roadway. Although recommended changes are not anticipated to affect the functional classification of Route 6, MassDOT will need to continue to coordinate with a number of local, regional, state, and federal agencies throughout the project development phases. This includes the FHWA, the City of New Bedford, the Town of Fairhaven, SRPEDD, and the Southeastern Massachusetts Metropolitan Planning Organization (SMMPO). This coordination will include roadway changes, such as the potential elimination of the Route 18 off-ramp, and incorporation of non-auto uses along the highway, such as the contemplated bike lanes.

5.5.4 Southeastern Massachusetts Metropolitan Planning Organization

The SMMPO is a transportation policy-making organization made up of representatives from local government and transportation authorities. MPOs were created to ensure that existing and future expenditures for transportation projects and programs were based on a continuing, cooperative and comprehensive (3-C) planning process. SRPEDD serves as the primary technical and support staff to the SMMPO.

Federal funding for transportation projects and programs is channeled through this 3-C process. As this project moves through the project development phases, coordination with the SMMPO will be required to request and allocate funding and to ensure that the project is consistent with other regional and local transportation programs and projects. This includes working with SRPEDD/SMMPO as they prepare an update to the 2012 *Regional Transportation Plan* (RTP). Updated every five years, a RTP is the "needs assessments" of the region's transportation infrastructure. Inclusion within the RTP is necessary for the project to be listed in region's Transportation Improvement Program (TIP) and receive funding.

5.5.5 South Coast Rail

The project will improve access to the South Coast Rail Whale's Tooth Station, which is within the project limits. The *South Coast Rail Economic Development and Land Use Corridor Plan* (June 2009) prepared by SRPEDD and others, updated areas within the South Coast Rail Corridor where communities would like to see growth (Priority Development Areas, or PDA) and areas that communities would like to preserve (Priority Protection Areas, or PPA). The purpose of identifying these priority areas was to target public investments, focus planning activities, and catalyze private development within a coordinated framework. Within the Study Area, Whale's Tooth Station was cited as a community priority area of regional significance.

5.6 ECONOMIC BENEFITS

Increasing the bridge opening could increase the attractiveness of the Port of New Bedford as a destination for large cargo vessels. The existing swing span has been cited as an issue that may be limiting port activity, particularly in the North Harbor. Mitigating the issues surrounding the existing structure would be an important first step to improving the overall harbor.

A portion of the study area is within the New Bedford-Fairhaven Designated Port Area (DPA), one of only eleven DPAs in the state. State policy regarding DPA supports the preservation and enhancement of water-dependent industrial uses." The Massachusetts Office of Coastal Zone Management (CZM) supports proactive planning within DPAs to promote maritime uses and ensure conflicts with other users are minimized since the areas that can support this type of industry are limited given the numerous siting requirements.

Improvements to the bridge could result in increased port economic development potential. The port could not only accept an increased number of commercial fishing vessels, but could also be able to accept new types of cargo from vessels that are currently too large to transit through the

New Bedford-Fairhaven Bridge into the North Harbor. With the expansion of fishing and cargo activity, supporting marine industries would continue to thrive. These industries include cargo-handling, warehousing, refrigeration, seafood processing, welding, ship repair, and fishing supply services. The Port of New Bedford has a number of vacant or underutilized properties that are available to support expansion of these services.

Bridge improvements could also have a uniquely positive impact on costs of business within the Port of New Bedford. A widened bridge opening for vessels to pass through would result in lowered costs associated with reduced weather-related delays. This would result in shipper cost savings for vessels serving the port, an improvement that is important for the continued health or growth of the local and regional marine industry.

A number of existing factors and in-progress developments could work in concert with bridge improvements to create a cohesive and cost-effective regional intermodal freight network centered on the Port of New Bedford. An out-of-use Mass Coastal Railroad rail spur along MacArthur Drive between Herman Melville Boulevard and the State Pier was rehabilitated in 2013. This rail connection provides direct rail access to the State Pier and docks in the North Harbor. This connection would provide a greater range of options for the inland shipping of cargo received by the port. New Bedford has a number of existing competitive advantages for the expansion of its cargo services including its exemption from the Harbor Maintenance Tax, foreign trade zone (FTZ) status, trucking rates, and unique, far-reaching multi-modal transportation network. It also has sufficient area to develop new docks and supporting landside development.

These factors give the Port of New Bedford excellent potential to increase its cargo operations and diversify maritime development. These advantages currently serve the port's vibrant fishing industry, but could also attract investments by other port-related industries. Promoting the advantages of the Port of New Bedford and making key infrastructure investments could support a growth in non-fishing companies interested in expanding their cargo operations or changing port destinations.

Specific development opportunities are described in the following sections.

5.6.1 North Terminal

The New Bedford Harbor Development Commission (HDC) is also interested in planning and designing a terminal to the north of the bridge, as part of their longer-term vision for the harbor's development. According to HDC, the North Terminal has the following ideal characteristics for developing water dependent industrial uses in the harbor:

- Adjacent rail for the entire parcel with on-dock rail at the EPA facility;
- The presence of Route 18, which serves as a natural buffer between the North Terminal and housing west of Route 18; and
- Immediate access to an uncongested portion of the interstate system with ready access to New York, Providence, Boston and points west via Route 18.

The North Terminal Extension Phase One (NTE1) entails the construction of a 400-600 foot sheet pile, heavy-load bulkhead in the northern area of New Bedford Harbor. The project will build on existing EPA clean-up efforts, as well as other dredging activities in the harbor, which were included in the 2014 Massachusetts Environmental Bond Bill. The project involves using fill material taken from navigational dredge spoils and, when complete, it will utilize approximately 143,600 cubic yards of clean dredge material as fill to create 4.68 acres of new land. HDC feels strongly that the addition of new bulkhead would increase the competitiveness of the port in a number of ways.

First, the facility would provide a secondary deployment site for offshore wind energy related activity. When the bridge restrictions are addressed, the North Terminal would be well positioned to handle over-sized project cargo, such as wind turbine components. HDC is interested in initiating a planning and design effort now, to position the port to be competitive as wind energy activity grows in and around New Bedford.

Second, fishing vessels and fish processors are increasingly using New Bedford as a base for their operation. The North Terminal facility would create room for 24-30 additional fishing vessels, meeting a well-documented need for new dockage. According to HDC's Commercial Fishing Fleet Berthing Plan prepared in March 18, 2008, the port has public berths for only 160 vessels. The port currently has 470 commercial fishing vessels. Space for the existing New Bedford-based fleet is already limited, with multiple vessels often "rafting" to secure pier access. Between two and four vessels typically raft abreast at each berth, with up to six or more vessels rafted together during storms. Overcrowding of the berthing facilities creates safety concerns for vessels, crew, and landside facilities.

Third, NTE1 will be able to handle additional conventional cargo opportunities. The site already features on-dock rail access at the adjacent EPA Dewatering Facility, making the port more competitive for project cargoes and other products that utilize the rail. This facility will also be able to handle freight service to the islands of Martha's Vineyard and Nantucket. Currently, all of that cargo is trucked on state roads through Woods Hole and Hyannis. Establishing further cargo service from New Bedford to the islands would result in significant emissions reductions, less traffic congestion, and fewer trucks on seasonally busy local roads on Cape Cod and the islands.

Fourth, the project would increase the return on a range of recent Commonwealth and federal government investments in New Bedford. The North Terminal facility would complement the New Bedford Marine Commerce Terminal and provide shippers with direct access to the nation's freight railroad network over the significant rail investments MassDOT has already made, including new railroad ties on the New Bedford line and a new Wamsutta Bridge. It would also take advantage of the rail siding at the EPA's Dewatering Facility, built in 2003.

The recommended bridge alternative, in combination with the planned dredging near the proposed North Terminal, would support HDC's economic development plans by resolving many of the navigational issues cited throughout this alternatives analysis. It is recommended, depending on the navigational width provided as part of a future bridge project, that a fendering

system be considered. This system would further mitigate pilot concerns related to vessel navigation in the North Harbor.

HDC is also studying options for modifying the State Pier to improve functionality of the facility and reefer storage. Completing local and regional rail system improvements and advancing discussions regarding local facility management are also key HDC initiatives. Resolving the constraints associated with the current bridge is a critical first step to the greater economic development vision of the HDC.

5.6.2 Wind Industry

One industry with significant economic potential in New Bedford is the development of the wind industry. There are a number of sites with redevelopment potential available along the harbor for industrial use. New Bedford Harbor would be an ideal site for the manufacturing and assembling of industrial components for offshore wind facilities. New Bedford is the largest and closest port to the potential offshore wind sites in Nantucket Sound. The ability to manufacture these large-scale components at the site of transit would offer a significant cost savings for initial construction and long-term maintenance costs for the operators, while also benefiting the study area with long-term ongoing economic participation in wind operations and maintenance (Ports of MA Strategic Plan). According to the *Port and Infrastructure Analysis for Offshore Wind Energy Development* report prepared by the Massachusetts Clean Energy Center in 2010, a bridge with a vertical clearance of at least 150 feet and a horizontal clearance of at least 150 feet would likely allow this unique manufacturing opportunity to be feasible in the North Harbor. It could also encourage new development in the North Harbor. Moreover, a stable manufacturing site could help to reduce the impact of seasonality on employment in the Port, and the city of New Bedford as a whole.

5.6.3 Hicks-Logan-Sawyer District

The Hicks-Logan-Sawyer District is a waterfront neighborhood on the northwest corner of the North Harbor, directly south of the I-195 bridge. This neighborhood has great redevelopment potential that would be bolstered by investment in the New Bedford-Fairhaven Bridge. The district is a true mixed-use area, containing industrial, commercial, and residential sites. Current industrial use includes three major mill buildings, a tire recycling facility, seafood-processing sites, and several light manufacturing sites.

The district is well connected to the local transportation network, including direct access to I-195. It is a 30-minute ride to the I-95 corridor, a key advantage for residents as well as commercial and industrial interests. A considerable amount of both vacant buildings and undeveloped free space currently exists within the neighborhood. The City of New Bedford's designation of the Wamsutta Mill Overlay District, at the southern end of the district and adjacent to the North Port marine terminal, encourages new construction within existing facilities, and the rehabilitation of other existing structures to promote economic and cultural redevelopment through residential and commercial use. The area is ripe for the development of supporting industries that would be needed as the port grows. It also has the capacity and free space to host future wind industry sites. Finally, owing to its proximity to downtown New

Bedford, this district has significant potential to capture retail spillover resulting from new downtown development.

5.6.4 Fairhaven

The Fairhaven side of the harbor also stands to benefit from any bridge improvements. Currently, six marinas that primarily serve recreational vessels are located on the east side of the harbor. These marinas have over 580 total individual boat slips (Harbor Plan). Two of these marinas are north of the New Bedford-Fairhaven Bridge. If the vertical clearance was increased to 14 feet, many of these recreational vessels may not have to wait for the bridge to open. This could improve the potential for these recreational marinas to expand. This side of the harbor also features a resilient and growing marine service and vessel repair industry, including the only full-service yacht yard in New England. There are existing commercial and industrial zones along the Fairhaven waterfront. As a result of increased port traffic and overall local revitalization, these boat-servicing facilities can expect to see increased business, and have room to further expand these services.

5.6.5 Tourism and Waterfront Access

Reconstruction of the New Bedford-Fairhaven Bridge could also help to make this historically marine industrial area into an attractive recreational destination. Already offering great views of the ocean and the city, improving the aesthetics of the bridge could bring new recreational visitors, and work together with larger downtown revitalization projects to beautify the area and provide public access to the waterfront. Improved pedestrian and bicycle access to and across the bridge could encourage recreational uses along the waterfront and on Pope's Island. On-road bicycle amenities and signage on the bridge would significantly upgrade bike access. It would also connect the bridge to the greater South Coast Bikeway, which provides a scenic bike route throughout the South Coast region.

5.7 HARBOR PLANNING

5.7.1 Harbor Master Plan

As the alternatives are developed further, it is also recommended that the City of New Bedford initiate a master planning process for the development of the harbor and New Bedford-Fairhaven Bridge study area. The master plan would build on the 2002 New Bedford Harbor Plan. This plan should be prepared in advance of or concurrently with the environmental process for the New Bedford-Fairhaven Bridge project. The plan should ensure that the future needs and plans for the North Harbor are taken into account as the preliminary assessment of the final bridge options and designs are being developed. This master plan would include strategic waterside and landside plans for the North Terminal area and the visions for utilization of other New Bedford waterfront areas, such as the New Bedford State Pier and the Hicks-Logan-Sawyer District. As the City develops a state-approved Harbor Master Plan in accordance with 301 CMR 23.00, coordination with the Massachusetts CZM and Massachusetts Department of Environmental Protection (MassDEP) would be required. Massachusetts CZM is responsible for supporting planning to promote maritime development,

prevent user conflicts, and accommodate supporting industrial and commercial uses. The Massachusetts DEP is responsible for permitting uses, fill, and structures in DPAs in accordance with the Harbor Master Plan.

5.7.2 New Bedford Harbor Superfund Site/State Enhanced Remedy

The New Bedford-Fairhaven Bridge is located within the New Bedford Harbor Superfund Site that extends from the shallow northern reaches of the Acushnet River estuary, south through the commercial harbor of the City of New Bedford and the Town of Fairhaven, and into 17,000 acres in Buzzards Bay. The site was listed as a Superfund Site on September 8, 1983 and is contaminated by Polychlorinated biphenyls (PCBs) and heavy metals in underwater subtidal sediment and intertidal sediment.

In 1998, the EPA selected the cleanup plan for the upper and lower harbor by issuing the Operable Unit 1 Record of Decision (OU1 ROD), including dredging of contaminated sediment and disposal in on-site Confined Disposal Facilities (CDFs) to be constructed along the New Bedford shoreline. The EPA has modified the site cleanup plan four times to address new information obtained through additional site investigations. Among the modifications, EPA eliminated the largest CDF in favor of off-site disposal for a portion of sediment and added on-site disposal for the remaining portion of sediment slated for CDF D in a Lower Harbor Confined Aquatic Disposal (CAD) Cell.

In association of the EPA harbor clean-up activities, the Commonwealth of Massachusetts requested that EPA integrate navigational dredging, on-site disposal, and construction of the South Terminal Project into EPA's cleanup plan. These State Enhanced Remedy (SER) activities are integrated into the cleanup plan for the Upper and Lower Harbors and are completely funded by the Commonwealth of Massachusetts. As described in an EPA technical memo "New Bedford Harbor Superfund Site – Brief Summary" issued on September 29, 2014, this SER process has allowed improvements to be made to the harbor while also addressing disposal of sediments with lower levels of PCB-contamination that were not planned to be addressed in the original 1998 plan.

The CAD Cell that is possible through the SER process allows for a way to efficiently dispose of the PCB-contaminated soils. It was determined that this disposal approach reduced both the permitting schedule and the sediment disposal costs dramatically for both the navigational dredging and South Terminal projects. Although sediment disposal costs would not be a substantial part of the New Bedford-Fairhaven Bridge costs for either of the alternatives under consideration, any opportunity to reduce construction costs and the permitting schedule should be explored.

In September 2013, the U.S. District Court approved a landmark $366.25 million cash-out settlement with the company whose predecessor held much of the liability of the contamination of New Bedford Harbor. Due to prior limitations in Superfund funding (which had typically been $15 million per year for the New Bedford Harbor site), the project was expected to take another 40 years. With this 2013 settlement, the harbor project will be accelerated to be substantially completed within five to seven years, or by 2020. The schedules of the harbor clean up and any bridge improvements will need to be evaluated for possible coordination as part of

the determination of whether the CAD Cell and SER process could be utilized in advancing bridge improvements.

5.8 IMPLEMENTATION

Transportation decision-making is complex and can be influenced by legislative mandates, environmental regulations, financial limitations, agency programmatic commitments, and collaborating opportunities. Project development is the process that takes a transportation improvement from conception through construction. Decision-makers and reviewing agencies, when consulted early and often throughout the project development process, can ensure that all participants understand the potential impact these factors may have on project implementation.

This section describes how the implementation of the recommended improvements would be coordinated through the MassDOT Project Development and Design Process. The section concludes with an implementation summary table and discussion of the agencies or organizations responsible for implementation for each recommendation.

5.8.1 MassDOT Project Development and Design Process

The MassDOT Highway Division has developed a comprehensive project development process, which is contained in Chapter 2 of the *MassDOT Highway Division's Project Development and Design Guide*. The eight-step process covers a range of activities extending from identification of a project need, completion of a set of finished contract plans, and on through construction of the project. The sequence of decisions made through the project development process progressively narrows the project focus, while developing greater design details, and ultimately leads to a project that addresses the identified needs in the most cost-effective and publicly acceptable way. The New Bedford-Fairhaven Bridge Corridor Study has been structured to meet the first two steps of the project development process: 1) Needs Identification and 2) Planning. The more-detailed descriptions provided in the following sections are focused on the process for a roadway project, but the same basic process will need to be followed for non-roadway projects as well.

STEP 1: NEEDS IDENTIFICATION

For each of the locations at which an improvement is to be implemented, MassDOT leads an effort to define the problem, establishes project goals and objectives, and defines the scope of the planning needed for implementation. To that end, it has to complete a Project Need Form (PNF), which states in general terms the deficiencies or needs related to the transportation facility or location. The PNF documents the problems and explains why corrective action is needed. For this corridor, the information defining the need for the project will be drawn from the present report and the most recent bridge inspections. At this point in the process, MassDOT also meets with potential participants, such as the MPO and community members, to allow for an informal review of the project. The PNF is reviewed by the MassDOT Highway Division office whose jurisdiction includes the location of the proposed project. For this project, it is District 5. MassDOT also sends the PNF to the MPO for informational purposes. The outcome of this step determines whether the project requires further planning, whether it is

already well supported by prior planning studies, whether it is ready to move forward into the design phase, or whether it should be dismissed from further consideration.

STEP 2: PLANNING

This phase will likely not be required for the implementation of the improvements proposed in this planning study, as this planning report should constitute the outcome of this step. However, in general, the purpose of this implementation step is for the project proponent to identify issues, impacts, and approvals that may need to be obtained, so that the subsequent design and permitting processes are understood. The level of planning needed will vary widely, based on the complexity of the project. Typical tasks include: define the existing context, confirm the project need, establish goals and objectives, initiate public outreach, define the project, collect data, develop and analyze alternatives, make recommendations, and provide report documentation. Likely outcomes include consensus on the project definition to enable it to move forward into environmental documentation (if needed) and design, or a recommendation to delay the project or dismiss it from further consideration.

STEP 3: PROJECT INITIATION

Upon completion of this study, the project would be ready to proceed into the Project Initiation phase. As the project proponent, MassDOT Highway Division would need to complete a Project Initiation Form (PIF) for each improvement. A Project Review Committee (PRC) and the MPO, in this case SMMPO, then review the PIF. The PRC is composed of the Chief Engineer, each of the six District Highway Directors, and representatives of the MassDOT Project Management, Environmental, Planning, Right-of-Way, Traffic, and Bridge departments, and the Federal Aid Program Office (FAPO). The PIF documents the project type and description, summarizes the project planning process, identifies likely funding and project management responsibilities, and defines a plan for interagency and public participation. First, the PRC reviews and evaluates the proposed project based on MassDOT's statewide priorities and criteria. If the result is positive, MassDOT Highway Division moves the project forward to the design phase and to programming review by the MPO. The PRC may provide a Project Management Plan to define roles and responsibilities for subsequent steps. The MPO review includes project evaluation based on the MPO's regional priorities and criteria. The MPO may assign a project evaluation criteria score, a Transportation Improvement Program (TIP) year, a tentative project category, and a tentative funding category.

Given transportation funding constraints, prioritization of the recommendations for implementation will need to be established regionally by the SMMPO/SRPEDD in partnership with their member communities and MassDOT, particularly for major infrastructure investments. As part of the ongoing 2016 update to SMMPO's 2012 RTP, recommendations from this study should be evaluated for inclusion into the regional plan. This process will require continued coordination among the transportation agencies, planning organizations, municipalities, and stakeholders represented in the Study Advisory Group.

STEP 4: ENVIRONMENTAL PERMITTING, DESIGN, AND RIGHT-OF-WAY PROCESS

This step has four distinct but closely integrated elements: Public Outreach, Environmental Documentation and Permitting (varying levels, if required), Design, and Right-of-Way Acquisition (if required). The outcome of this step is a fully designed and permitted project ready for construction. The sections below provide more detailed information on the four elements of this step of the project development process.

Public Outreach
Continued public outreach in the design and environmental process is essential to maintain varying levels of public support for the project and to seek meaningful input on the design elements. The public outreach is often in the form of required public hearings (conducted at the 25 percent and 100 percent design milestones), but can also include less formal dialogue with those interested in and affected by a proposed project.

Environmental Documentation and Permitting
The project proponent, in coordination with the Environmental Services section of the MassDOT Highway Division, will be responsible for identifying and complying with all applicable federal, state, and local environmental laws and requirements. This includes determining the appropriate project category for both the Massachusetts Environmental Protection Act (MEPA) and the National Environmental Protection Act (NEPA). Environmental documentation and permitting is often completed in conjunction with the Preliminary Design phase described below.

Design
There are three major phases of design. The first is Preliminary Design, also referred to as the 25 percent submission. The major components of this phase include a full survey of the project area, preparation of base plans, development of basic geometric layout, development of preliminary cost estimates, and submission of a functional design report. Preliminary Design, although not required to, is often completed in conjunction with Environmental Documentation and Permitting.

For the New Bedford-Fairhaven Bridge, the Preliminary Design phase will include a Bridge Type Study to perform a detailed investigation into whether a vertical lift bridge or a double-leaf Dutch-style bascule bridge should be selected for the site. The Bridge Type Study is the process to determine the most appropriate structure type. The study will include a survey of site conditions, hydraulic and geotechnical conditions, environmental considerations. It will also include a preliminary assessment of bridge forces and loads and their functional and cost implications on the two bridge types under consideration.

The recommended alternative identified through the Bridge Type Study would be submitted to the FHWA for concurrence through a NEPA-compliant Environmental Assessment (EA).

In addition to FHWA review, the U.S. Coast Guard will require a Navigational Evaluation. The purpose of this evaluation is to identify and evaluate the ability of the recommended bridge to meet current and future navigational needs concerning horizontal and vertical clearances. When the clearance requirements are not evident, the Navigational Evaluation is produced

through an interactive process that includes the bridge owner, the U.S. Coast Guard, and the mariners who frequent the bridge channel to determine the most reasonable clearances for the bridge.

The next phase is Final Design, also referred to as the 75 percent and 100 percent submissions. The major components of this phase include preparation of a subsurface exploratory plan (if required), coordination of utility relocations, development of temporary traffic control plans through construction zones, development of final cost estimates, and refinement and finalization of the construction plans. Once Final Design is complete, a full set of Plans, Specifications, and Estimates (PS&E) is developed for the project.

Right-of-Way Acquisition
A separate set of Right-of-Way plans is required for any project that requires land acquisition or easements. The plans must identify the existing and proposed layout lines, easements, property lines, names of property owners, and the dimensions and areas of estimated takings and easements.

STEP 5: PROGRAMMING (IDENTIFICATION OF FUNDING)

Programming, which typically begins during the design phase, can actually occur at any time during the process, from planning to design. In this step, which is distinct from project initiation, the project proponent requests that the MPO include a project from the Regional Transportation Plan in the region's annual Transportation Improvement Program (TIP) development process. The proponent requesting the project's listing on the TIP can be the community or one of the MPO member agencies (the Regional Planning Agency, MassDOT, or the Regional Transit Authority). The MPO considers the project in terms of state and regional needs, funding availability, project readiness, evaluation criteria, and compliance with the Regional Transportation Plan. If the MPO decides to include the project in the TIP, it is first included in the Draft TIP for public review and then in the Final TIP. A project does not have to be fully designed for the MPO to program it in the TIP, but generally, a project has reached 75 percent design to be programmed in the year-one element of the four-year TIP.

STEP 6: PROCUREMENT

Following project design and programming of a highway project, the MassDOT Highway Division publishes a request for proposals, also referred to as being "advertised" for construction. MassDOT then reviews the bids, and awards the contract to the qualified bidder with the lowest bid.

STEP 7: CONSTRUCTION

After a construction contract is awarded, MassDOT Highway Division and the contractor develop a public participation plan and a temporary traffic control plan for the construction process.

STEP 8: PROJECT ASSESSMENT

The purpose of this step is to receive constituents' comments on the project development process and the project's design elements. MassDOT Highway Division can apply what is learned in this process to future projects.

Table 5.3 contains the summary of these steps along with their effect on the project schedule and lists approximate duration ranges associated with each step.

Table 5.3. MassDOT Highway Division Project Development & Design Guide Process

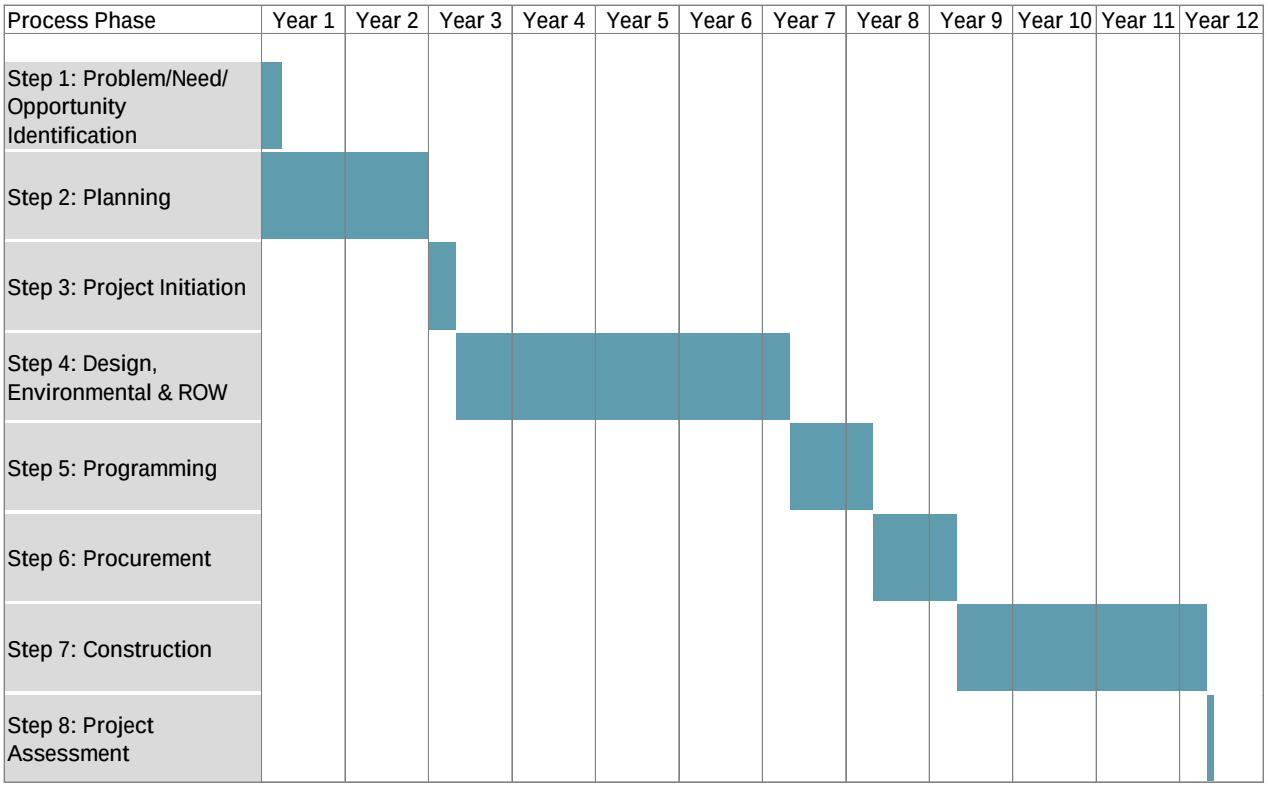
Description	Schedule Influence	Typical Duration
Step 1: Problem/Need/Opportunity Identification The proponent completes a Project Need Form (PNF). This form is then reviewed by the MassDOT District office, which provides guidance to the proponent on the subsequent steps of the process.	The PNF has been developed so that it can be prepared quickly by the proponent, including any supporting data that is readily available. The District office shall return comments to the proponent within one month of PNF submission.	1 to 3 months
Step 2: Planning Project planning can range from agreement that the problem should be addressed through a clear solution to a more detailed analysis of alternatives and their impacts.	For some projects, no planning beyond preparation of the PNF is required. Other projects may require a planning study centered on specific project issues associated with the proposed solution or a narrow family of alternatives. More complex projects will likely require a detailed alternatives analysis.	Project Planning Report: 3 to 24+ months
Step 3: Project Initiation The proponent prepares and submits a Project Initiation Form (PIF) and a Transportation Evaluation Criteria (TEC) form in this step. The PIF and TEC are informally reviewed by the MPO and MassDOT District office, and formally reviewed by the Project Review Committee (PRC).	The PIF includes refinement of the preliminary information contained in the PNF. Additional information summarizing the results of the planning process, such as the Project Planning Report, is included with the PIF and TEC. The schedule is determined by PRC staff review (dependent on project complexity) and meeting schedules.	1 to 4 months
Step 4: Design, Environmental, and Right-of-way The proponent completes the project design. Concurrently, the proponent completes necessary environmental permitting analyses and files applications for permits. Any right of way needed for the project is identified and the acquisition process begins.	The schedule for this step is dependent upon the size of the project and the complexity of the design, permitting, and right-of-way issues. Design review by the MassDOT District and appropriate sections is completed in this step.	48+ months
Step 5: Programming The MPO considers the project in terms of its regional priorities and determines whether to include the project in its Draft Transportation Improvement Program (TIP), which is then made available for public comment. The TIP includes a project description and funding source.	The schedule for this step is subject to each MPO's programming cycle and meeting schedule. It is also possible that the MPO will not include a project in its Draft TIP based on its review and approval procedures.	3 to 12+ months
Step 6: Procurement The project is advertised for construction and a contract awarded.	Administration of competing projects can influence the advertising schedule.	6 to 12 months
Step 7: Construction The construction process is initiated including public notification and any anticipated public involvement. Construction continues to project completion.	The duration for this step is entirely dependent upon project complexity and phasing.	3 to 60+ months

Description	Schedule Influence	Typical Duration
Step 8: Project Assessment The construction period is complete and project elements and processes are evaluated on a voluntary basis.	The duration for this step is dependent upon the proponent's approach to this step and any follow-up required.	1 month

Source: MassDOT Highway Division Project Development and Design Guide

The project development process described previously is based on a conventional project delivery method, commonly referred to as "Design-Bid-Build" (D-B-B). The essence of the D-B-B process is that project is designed to the PS&E level and then advertised for construction (i.e., the design and construction are carried out sequentially). Under this scenario, the engineer of record (designer) and the construction contractor are two separate contracting entities. A schematic timeline illustrating this process is shown in Figure 5.1. For the purpose of this discussion, the timeline assumes aggressive durations and that construction funding would be available at the end of the design phase.

Figure 5.1 Process Schedule



5.8.2 Environmental Considerations

As part of the Environmental Permitting and Design phase, a complete assessment of impacts of the project on the natural and human environment is required. This includes conducting the assessment of impacts and potential avoidance or mitigation measures in a manner consistent with NEPA and MEPA, as well as other federal and state permitting and review requirements.

The following provides a summary of the environmental processes and issues that will need to be assessed in advancement of any bridge replacement.

ENVIRONMENTAL POLICY ACTS

The project proponent, in coordination with the Environmental Services section of the MassDOT Highway Division, will be responsible for identifying and complying with all applicable federal, state, and local environmental laws and requirements. This includes determining the appropriate project category for the NEPA and MEPA processes.

Environmental documentation and permitting is often completed in conjunction with the Preliminary Design phase. NEPA does not establish any quantitative thresholds for the environmental classification of a transportation improvement project. Transportation projects vary in type, size, complexity, and the potential to affect the environment. The impacts of such projects can vary from minor to significant impacts on the human environment. To account for the variability of project impacts, three basic "classes of action" are allowed and determine how compliance with NEPA is carried out and documented:

- An Environmental Impact Statement (EIS) is prepared for projects where it is known that the action will have a significant effect on the environment.
- An EA is prepared for actions in which the significance of the environmental impact is not clearly established. Should environmental analysis and interagency review during the EA process find a project to have no significant impacts on the quality of the environment, a Finding of No Significant Impact (FONSI) is issued.
- Categorical Exclusions (CEs) are issued for actions that do not individually or cumulatively have a significant effect on the environment.

The MEPA process includes eleven review thresholds that identify categories for projects that are likely to cause damage to the environment. These review thresholds determine whether MEPA review is required. MEPA review is required when one or more review thresholds are met or exceeded, and the subject matter of at least one review threshold is within MEPA jurisdiction. A review threshold that is met or exceeded also specifies whether MEPA review shall consist of an Environmental Notification Form (ENF) with a mandatory Environmental Impact Report (EIR) or an ENF and other MEPA review as required by the Massachusetts Secretary of the Executive Office of Energy & Environmental Affairs (EEA).

The project could require preparation and filing of an ENF and an EIR if the EEA Secretary so requires. This will likely be required in this instance since the bridge contains over 2,000 square feet of base area. In addition, depending on the in-water work required related to the removal of the existing center pier and resulting navigational dredging, the ENF criteria may be triggered by dredging and/or disposal of material. Additionally, depending upon the status of the review of the bridge by the Massachusetts Historical Commission (MHC) conducted as a part of the NEPA review, an ENF may be triggered due to the historical status of the existing bridge.

For the New Bedford-Fairhaven Bridge project, the following are the MEPA review thresholds that may require an ENF or an EIR:

Wetlands, Waterways, and Tidelands.

- *ENF Required*
  - *Dredging of 10,000 or more cubic yards (cy) of material.*
  - *Disposal of 10,000 or more cy of dredged material, unless at a designated in-water disposal site.*
  - *Construction, reconstruction or expansion of a pile-supported or bottom-anchored structure of 2,000 or more sf base area,*

Historical and Archaeological Resources.

- *ENF Required - Unless the Project is consistent with a Memorandum of Agreement with the MHC that has been the subject of public notice and comment:*
  - *Demolition of all or any exterior part of any Historic Structure listed in or located in any Historic District listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth.*

A preliminary review of several other MEPA thresholds categories indicates that many are not applicable to this project. These categories are Land, Endangered Species, Water, Wastewater, Transportation, Energy, Air, Solid and Hazardous Waste, Areas of Critical Environmental Concern, and Regulations.

Pursuant to NEPA and MEPA, an analysis of natural and community resources and the impacts to these resources that would occur from the recommended alternatives must be prepared. As part of these analyses, a FHWA-compliant noise analysis, a programmatic Section 4(f) evaluation in compliance with the U.S. Department of Transportation Act of 1966, and a mesoscale and/or microscale air quality analyses would be completed.

ENVIRONMENTAL REVIEWS/PERMITS

In addition to development of the environmental impact assessments conducted as part of the NEPA and MEPA processes, other environmental review processes will be required. The following consultations and assessments may be required as the project moves through the Environmental Permitting, Design, and Right-of-Way development stage:

- Consultation with the MHC in accordance with Section 106 of the National Historic Preservation Act.
- Consultation with the New Bedford and Fairhaven Historical Commissions regarding the potential for impacts to historic resources.
- Coordination with the Massachusetts Office of Coastal Zone Management (CZM) regarding the following:
  - Chapter 91 Waterways Authorization, and
  - Construction within the 100-year floodplain and the applicability of CZM's Coastal Hazard Policies.
- Coordination with the U.S. Environmental Protection Agency (EPA) and MassDEP regarding the disturbance of contaminated soils and sediments within New Bedford Harbor. This includes construction-related disturbance and the appropriate

measures that would be required to minimize and/or mitigate potential impacts to water quality and fish and shellfish habitats from contamination.
- Coordination with the National Oceanographic Atmospheric Administration's National Marine Fisheries Service regarding the presence of essential fish habitats within New Bedford Harbor.

5.8.3 Alternative Refinement Considerations

In addition to the alternatives recommended for advancement, a number of other issues evolved or have been brought up by various stakeholders during the planning process for this study. As part of future project development process or other planning efforts, the following critical issues warrant further consideration:

- Coordination with U. S. Army Corps of Engineers on future plans for hurricane barrier.
- Coordination with FEMA and other local, state, and federal agencies to incorporate hazard mitigation and resiliency plans into capital improvement projects. The majority of the bridge corridor is located within the flood hazard area and climate adaptation will need to be considered during the design of any significant future investments.
- Coordination with South Coast Rail project on pedestrian and bicycle access needs in the station area.
- Continuous work with abutters to determine any access benefits and/or impacts.
- Traffic impacts from other development in area that were not previously considered.
- Conduct additional analysis to analyze potential benefits and impacts of closing southbound Route 18 ramp to westbound Route 6.

5.8.4 Implementation Summary

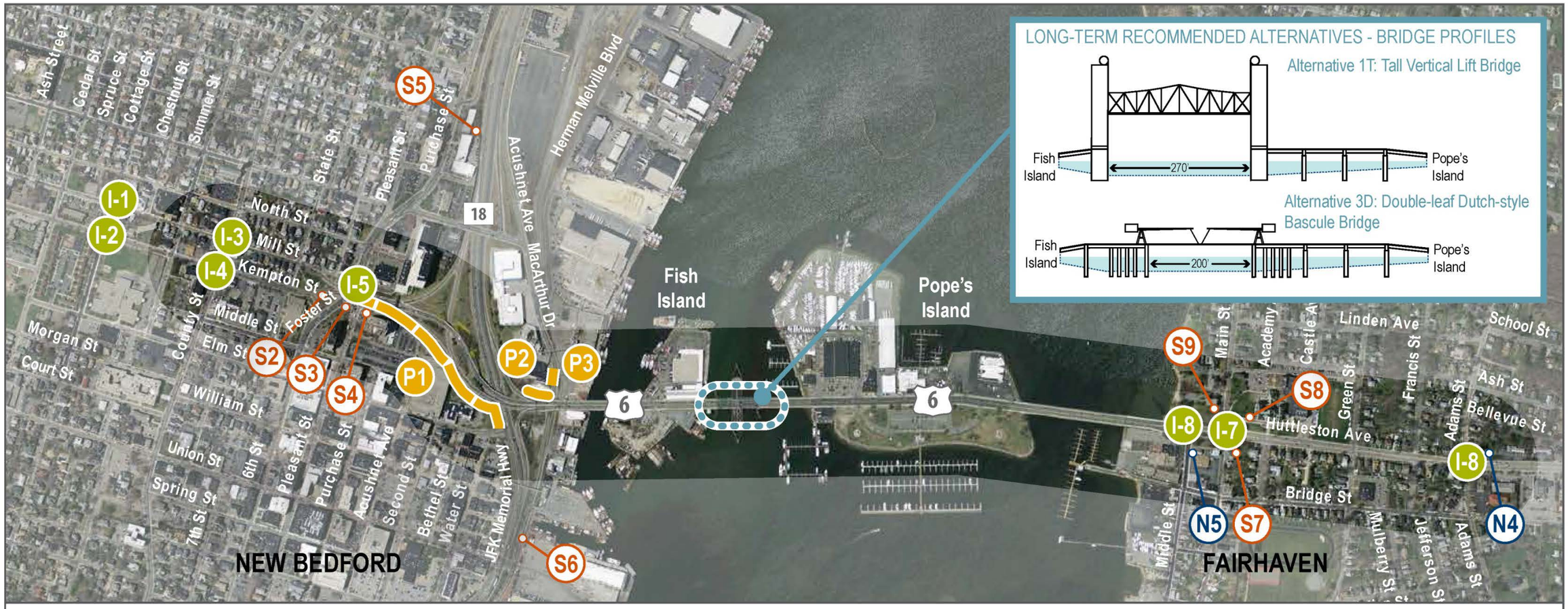
To assist in the completion of the recommended short-, medium-, and long-term recommendations, an implementation summary table was prepared to outline the future actions that various agencies or organizations would need to take. Table 5.4 outlines the recommended studies, actions, or projects. The timeframe, lead agency responsible for implementation, and coordinating agencies are also described. The short-, medium-, and long-term recommendations are shown on Figure 5.2.

Table 5.4. Recommendations Implementation Summary Table

Study/ Action/ Project	Description	Timeframe	Lead Agency	Coordinating Agencies
Long-Term Recommendations				
Advance Project into Project Initiation	Completion of Project Initiation Form (PIF) and review by Project Review Committee.	Short-term	MassDOT	SMMPO, Project Review Committee

Study/ Action/ Project	Description	Timeframe	Lead Agency	Coordinating Agencies
Evaluate projects for inclusion on MPO's RTP/TIP	Evaluation and prioritization of study recommendations as part of the RTP update and TIP.	Short-term	SMMPO	Municipalities, MassDOT
Advance Project into Environmental Permitting, Design and Right-of-Way Process	Following PIF review and inclusion into RTP and TIP, complete NEPA permitting and preliminary design phase.	Short- to Medium-term	MassDOT	SMMPO
Conduct Bridge Type Study	During preliminary design phase, study feasibility of vertical lift bridge or double-leaf Dutch-style bascule bridge.	Short- to Medium-term	MassDOT, design team	SMMPO, municipalities
Conduct U.S. Coast Guard Navigational Evaluation	During NEPA permitting process, detailed evaluation to determine ability of recommended bridge alternatives to meet navigational needs concerning horizontal and vertical clearances.	Short- to Medium-term	MassDOT, U.S. Coast Guard	Southeastern Massachusetts Metropolitan Planning Organization, municipalities
Short- & Medium-Term Recommendations				
Corridor intersection improvements	Implementation of improvements including changes to signal cycle length, timing splits or phasing, and coordination offset modifications at several corridor intersections.	Short-term	MassDOT	Municipalities
Bicycle and pedestrian path along Route 6 from Pleasant Street to Route 18	Design and construction of new 10- to 12-foot-wide multi-use path in existing ROW.	Short- to Medium-term dependent on funding availability.	MassDOT	SMMPO, municipalities
New pedestrian ramp and staircase between Route 6 and MacArthur Drive	Design and construction of new ADA-compliant pedestrian ramp and staircase in existing ROW.	Short- to Medium-term dependent on funding availability.	MassDOT	City of New Bedford
Completion of sidewalk network along MacArthur Drive	Design and construction of 85-foot-long sidewalk. May require easement or property acquisition.	Short- to Medium-term dependent on funding availability.	City of New Bedford	-
Variable message/ITS signage	Evaluation of options, design, and construction of new and replacement variable message/ITS signage in existing and additional locations.	Short- to Medium-term	MassDOT	-
Evaluate signage and pavement markings	Evaluate signage and pavement markings to be installed after current construction project.	Short-term	MassDOT	-

Figure 5.2 Short-, Medium- & Long-term Recommendations



SHORT- & MEDIUM-TERM RECOMMENDATIONS

Replacement Variable Message/ITS Signage
S1: I-195 EB (inoperable)*
S2: Kempton Street EB at Pleasant Street
S3: Pleasant Street SB at Route 6
S4: Purchase Street NB at Route 6
S5: Route 18 SB (after Pleasant Street exit)
S6: JFK Highway NB at Union Street
S7: Huttleston Avenue/Main Street (SW corner)
S8: Huttleston Avenue/Main Street (NW corner)
S9: Huttleston Ave/Main Street (WB signal arm)

New Variable Message/ITS Signage
N1: Route 6 WB at Route 240*
N2: Route 240 NB at Route 6*
N3: I-195 WB*
N4: Huttleson Avenue WB at Adams Street
N5: Middle Street NB at Huttleson Avenue

Corridor Intersection Improvements
I-1: Mill Street/Cottage Street
I-2: Kempton Street/Cottage Street
I-3: Mill Street/County Street
I-4: Kempton Street/County Street
I-5: Mill Street/Kempton Street/Pleasant Street
I-6: Huttleston Avenue/Main Street
I-7: Huttleston Avenue/Middle Street
I-8: Huttleston Avenue/Adams Street

Bicycle/Pedestrian Improvements
P1: Bike/pedestrian path along Route 6 (Pleasant Street to Route 18)
P2: New bike/pedestrian ramp (Route 6 to MacArthur Drive)
P3: MacArthur Drive sidewalk connection

LONG-TERM RECOMMENDATION

Advance Alternatives through Project Initiation & Environmental Permitting, Design & ROW Process

*Not Shown on this Graphic

NEW BEDFORD-FAIRHAVEN BRIDGE CORRIDOR STUDY

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