2 Existing Conditions & Issues

2.1 OVERVIEW

2.1.1 Regional Overview

Located about 50 miles from Boston in southeastern Massachusetts in Bristol County, the New Bedford-Fairhaven Bridge provides a connection between New Bedford to Fairhaven across the New Bedford Harbor. The harbor is part of the Acushnet River estuary, which empties into Buzzards Bay. The area can be accessed via Interstate 195 (I-195), U.S. Route 6 (Route 6), and State Routes 18, 140, and 240.

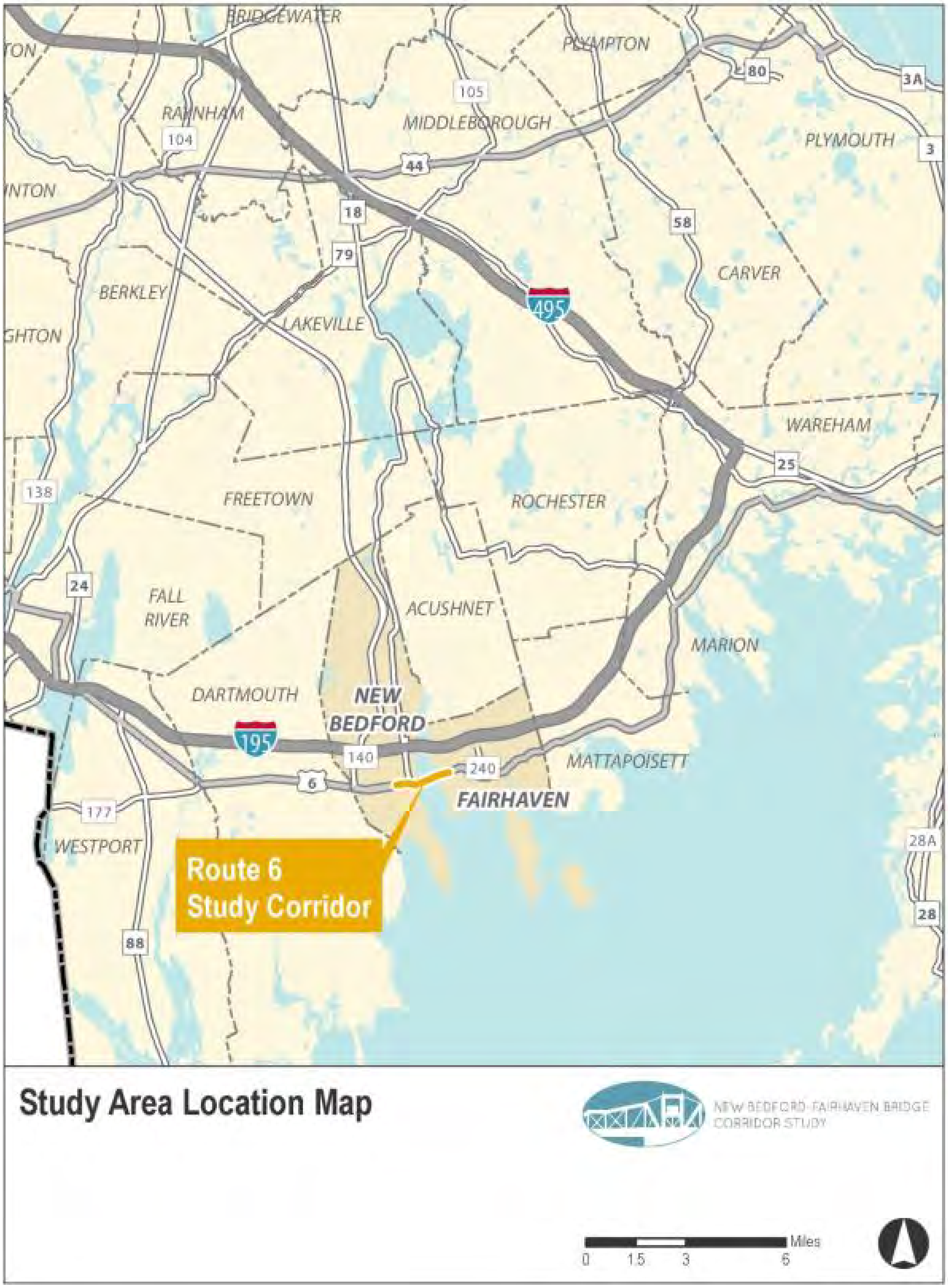
While the majority of the east-west interregional traffic is carried by I-195, Route 6, which crosses the New Bedford-Fairhaven Bridge, is the historic east-west highway in the region. Completed in the 1970s, I-195 now provides access between Providence, Rhode Island; Fall River, Massachusetts; and I-495/Route 25 in Wareham, Massachusetts. Route 140 provides primary north-south access from New Bedford to Taunton where a connection to Route 24 provides the quickest route to Boston. Route 18 provides secondary north-south access and serves as a connector between I-195 and downtown New Bedford. Route 240 is a short highway that serves as a north-south connector between I-195 and Route 6 in Fairhaven.

Route 6 is a four-lane highway that carries mostly local commuter and intra-regional traffic. I-195 and Coggeshall Street are both located approximately one mile north of the New Bedford-Fairhaven Bridge and provide alternative bridge routes. Through New Bedford, Route 6 splits into one-way paired roadways aligned along Mill Street (westbound traffic) and Kempton Street (eastbound traffic). In Fairhaven, Route 6 is aligned along Huttleston Avenue.

The City of New Bedford and Town of Fairhaven are located on Buzzards Bay and connect to the Towns of Acushnet and Freetown to the north, the Town of Mattapoisett to the east, and the Town of Dartmouth to the west. The two municipalities are part of the Providence metropolitan area. New Bedford is the sixth largest city in Massachusetts. The population has declined since a peak in the early part of the twentieth century, but has remained relatively stable for the past several decades with New Bedford and Fairhaven's 2012 populations at 94,952 and 15,893 respectively.

The area's economic history is largely dependent on marine industry. The first economic boom occurred in the 1830's as the whaling industry became the dominant driver of the local industrial economy. As the whaling industry declined during the latter half of the 19th Century, the area's textile industry grew and was able to sustain the area's economy. Beginning in the 1930's, the textile industries moved to the American South and a long period of unemployment, population loss, and economic stagnation began. In the past fifty years, the area's economic base has diversified and the local economy has stabilized. Today, fishing and manufacturing are the area's primary economic drivers, but the healthcare and tourism industries are growing according to a

Figure 2.1. Study Area Regional Map



2008 market and economic analysis conducted for Mass Development and the City of New Bedford. Driven by the scallop market, the Port of New Bedford is a leading commercial fishing port and is the highest-valued fishing port in the nation.

2.1.2 Section Summary

The replacement of the New Bedford-Fairhaven Bridge has been discussed and studied since the 1960s, with several reports, studies, and plans having been completed. These past studies were consulted for the preparation of this existing conditions data, along with new field investigations and data collection efforts. In addition to reviewing these past planning efforts, existing data from various sources was collected and reviewed. Details about the data collection and methodology are included throughout this section.

This section contains an overview of the existing conditions within the Local and Regional Study Areas. The following topics are included:

- Bridge conditions and operations;
- Socio-economic conditions and projections and a review of Environmental Justice (EJ) populations within the study areas;
- Existing land use, zoning, and economic development potential;
- Natural, historic and cultural resources;
- Maritime traffic conditions and projections;
- Vehicular traffic conditions and projections;
- Existing transit service and proposed improvements; and
- Bicycle and pedestrian conditions.

This section also includes a comprehensive inventory and definition of issues based on the existing and future conditions analysis. A set of project constraints related environmental impacts, engineering/design feasibility, business and residential impacts, cost, and other factors were also identified and are included at the conclusion of this section.

2.2 BRIDGE CONDITIONS & OPERATIONS

2.2.1 New Bedford Harbor

Once the center of the world's whaling industry, the New Bedford Harbor is today the busiest port between Boston and Providence, RI and remains one of the country's leading commercial fishing ports. The long history and vitality of the port are demonstrated by the maritime and commercial areas adjacent to the harbor and the proximity and strong ties with the New Bedford Historic District and the historic town center in Fairhaven.

As shown in Figure 2.2, the New Bedford-Fairhaven Bridge divides the harbor into two primary areas. The northern limit of the north harbor is the I-195 Bridge, which is a fixed bridge with an eight-foot navigational under clearance.

Figure 2.2. New Bedford Harbor Map

The hurricane barrier forms the southern limits of the south harbor. Constructed by the U.S. Army Corps of Engineers (USACE) in 1966, the earth-filled barrier was designed to protect the harbor and shorelands from tidal flooding and storm surge during hurricanes. The hurricane barrier has a 150-foot wide opening with gates that can be closed to secure the harbor during flood emergencies.

Between I-195 and the New Bedford-Fairhaven Bridge, the north harbor area is roughly one-mile long. It is approximately three-quarter-miles wide between New Bedford on the western shore and Fairhaven to the east. The south harbor is approximately the same size. The harbor contains numerous islands including Fish Island and Pope's Island, which are connected to each other, New Bedford, and Fairhaven by the New Bedford-Fairhaven Bridge.

A 350-wide federal shipping channel provides access from Buzzards Bay south of the hurricane barrier into the harbor. The USACE maintains the 30-foot deep channel, which extends three and one-half miles from Buzzards Bay to a turning basin just north of the New Bedford-Fairhaven Bridge. The shipping channel narrows from 350 feet to 150 feet at the hurricane barrier. The channel increases in width in the south harbor back to 350 feet and includes additional anchorage and maneuvering areas. At the New Bedford-Fairhaven Bridge, the channel narrows to 94 feet and 95 feet east and west, respectively, of the swing-span center pier. North of the bridge, the federal channel extends around Fish Island. The City of New Bedford maintains the deep-water channel north of the federal channel.

The New Bedford Harbor Development Commission (HDC) is the designated governing agency for the Port of New Bedford. The HDC is responsible for port planning and development, supporting tourism and economic development efforts, ensuring the safety and security of the port, environmental monitoring and management, and coordinating with other agencies and organizations. New Bedford Harbor Master officials act as agents of the HDC and are responsible for the enforcement of harbor regulations. Additionally, New Bedford is a designated U.S. Customs Port of Entry and a Foreign Trade Zone (FTZ).

2.2.2 Existing Bridge

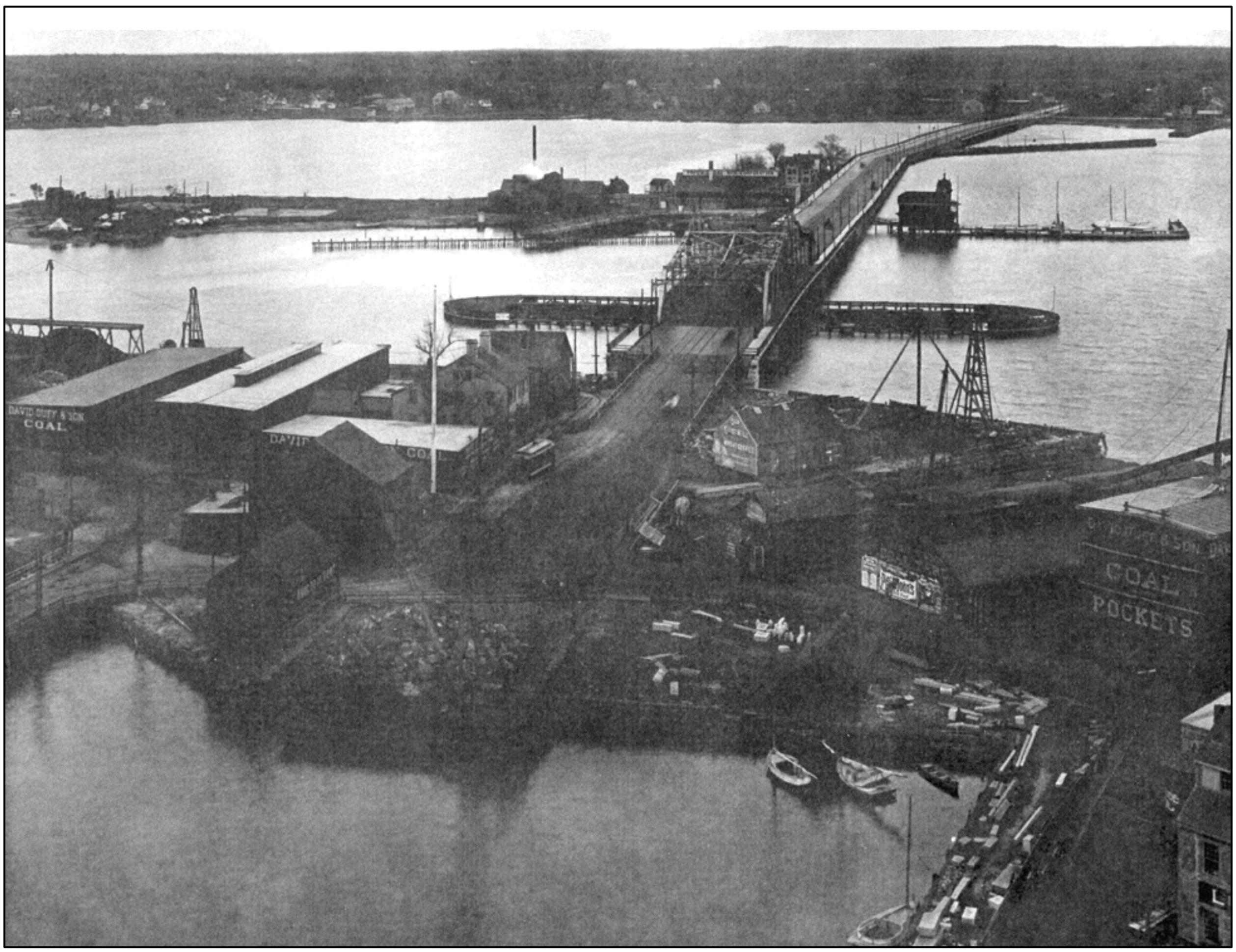
BRIDGE HISTORY

A bridge has connected New Bedford and Fairhaven in the current location for over the last 200 years. The original structure was a 24-foot-wide wooden toll bridge completed by private investors in 1800. This initial bridge was partially destroyed by a wind driven tidal inundation in 1807. The repaired bridge was destroyed in 1815 by a hurricane. A replacement wooden bridge was completed in 1819. This bridge was also a private bridge with two draw spans. By 1869, when the bridge was again severely damaged by a storm, the bridge had been updated with 60-foot wide drawbridge spans. These two drawbridge spans were located between the New Bedford shoreline and Fish Island and between Pope's Island and the Fairhaven shoreline to accommodate larger vessels.

After the 1869 storm, the bridge proprietors decided not to repair the bridge and the Bristol County Commissioners acquired the bridge through an act of the state legislature. The county repaired the bridge in 1870 as a public facility with no tolls. In 1876, the New Bedford and Fairhaven Street Railway Company installed trolley tracks on the bridge to provide horse-drawn passenger service between New Bedford and Fairhaven. The railway introduced electric streetcars in 1893.

By the 1890s, the bridge was experiencing heavier traffic and the condition of the bridge led local officials to begin planning to replace the bridge with a new structure (see Figure 2.3). Several phases of construction on the existing bridge began in 1896. The bridge was completed in 1903. The single swing span of the bridge was placed between Fish Island and Pope's Island, rather than in the two original locations between the New Bedford shoreline and Fish Island and between the Fairhaven shoreline and Pope's Island.

Figure 2.3. New Bedford-Fairhaven Bridge under construction, view from New Bedford



Prior to its first major overhaul in 1931, the Massachusetts Department of Public Works assumed operational responsibility of the bridge from Bristol County. The bridge received minor repairs over the next 30 years, including upgrades to the fender piers, lighting, operator's house, plank decking, and removal of the streetcar tracks.

Since the 1960s, bridge repairs have become more frequent and more significant as vehicular traffic over the bridge increased. In 1961, the deck and deck framing of the fixed spans were replaced. The state legislature authorized a special commission in 1965 to evaluate the feasibility to replace the swing bridge. At the time, and over the past fifty years, replacement of the bridge was deemed cost-prohibitive and rehabilitation projects were performed instead of replacement.

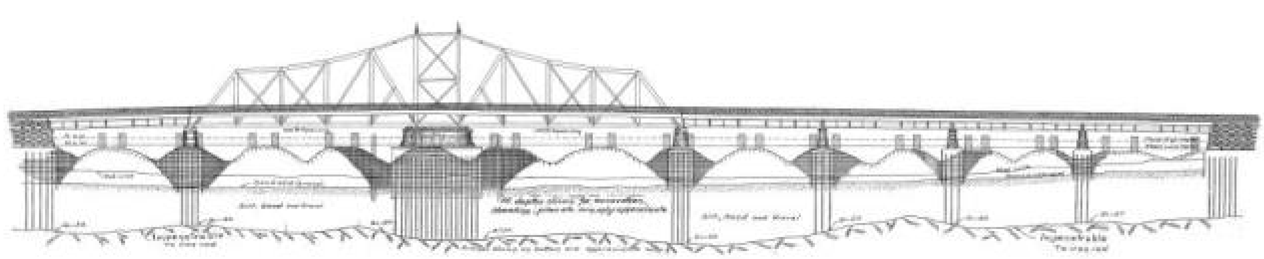
DESCRIPTION OF EXISTING BRIDGE STRUCTURE

The New Bedford-Fairhaven Bridge carries a four-lane highway across the 4,000-foot wide harbor. As previously shown on Figure 2.2, the bridge consists of highway segments on Fish Island and Pope's Island and three separate bridge structures.

The west bridge extends over MacArthur Drive in New Bedford, a single railroad track, and the westerly channel between the shoreline and Fish Island. In addition to carrying Route 6, it includes connecting ramps to Route 18. The west bridge consists of ten spans, six on land, and four over water. The two westerly spans over MacArthur Drive and the rail track are steel stringer construction and were replaced in 1972 when the Route 18 ramps were completed. The remaining eight spans are original steel girder construction. The entire bridge is approximately 580 feet long.

The middle bridge is the segment that contains the swing span. This bridge is composed of one fixed span approach to the west of the swing span and four to the east. All of the spans are the original steel girder construction. The swing span is a 289-foot long rim-bearing truss bridge that rests on a central granite masonry pier. This type of bridge is a load-bearing structure that is comprised of trusses or connected elements that form triangular elements. When in the closed position (closed to marine traffic), the swing span is supported by the center pier and the end abutments. When the bridge is open, the bridge structure is supported by the center pier alone and vessels are able to pass through the two channels (94 and 95 feet) on either side of the center pier. The entire middle bridge is approximately 680 feet long. The approach, the two fixed bridges, and the movable bridge span have four travel lanes and sidewalks on each side.

Figure 2.4.   Middle Bridge Cross-Section



Source: New Bedford-Fairhaven Bridge Design Plans, 1927

The east bridge connects Pope's Island to the Fairhaven shoreline. This bridge segment consists of nine spans of the original steel girder construction and is approximately 675 feet long.

2.2.3 Bridge Operations

Based on the 2010 Preliminary Structures Report prepared for the middle bridge, the mechanical and electrical systems for the movable bridge are in good condition. The bridge was closed to vehicular and pedestrian traffic in 2012 for three weeks for additional electrical repairs.

The opening sequence of the bridge follows the American Association of State Highway and Transportation Officials' recommendation and requires approximately four minutes to open and an additional four minutes to close. The average time to open and close the bridge varies and is based on the marine traffic transit time and the time requirement to clear pedestrians and vehicles from the movable span before it can open to marine traffic. As shown in Table 2.1, the average bridge operating cycle is between 12.5 and 22.5 minutes. This compares to 7.5 minutes if the bridge was just opened and closed without having to wait for vehicular, pedestrian, or marine traffic.

As shown in Table 2.2, the bridge operates on a fixed schedule during the daylight hours and on demand at all other times. This schedule results in 4,745 planned openings per year.

Table 2.1. Bridge Operating Cycle

Activity	Duration (minutes)	Variability / Impacts to Duration
Traffic light turns to red	0	
Warning gates close	1-5	Time for pedestrians and bicycles on bridge to clear
Barrier gates close	1	
Span opens	2.5	
Marine traffic passes	5-10	Number and speed of vessels
Span is closed and locked	2.5	
Gates are opened	0.5	
Traffic lights turns to green	0	
TOTAL	12.5-22.5	

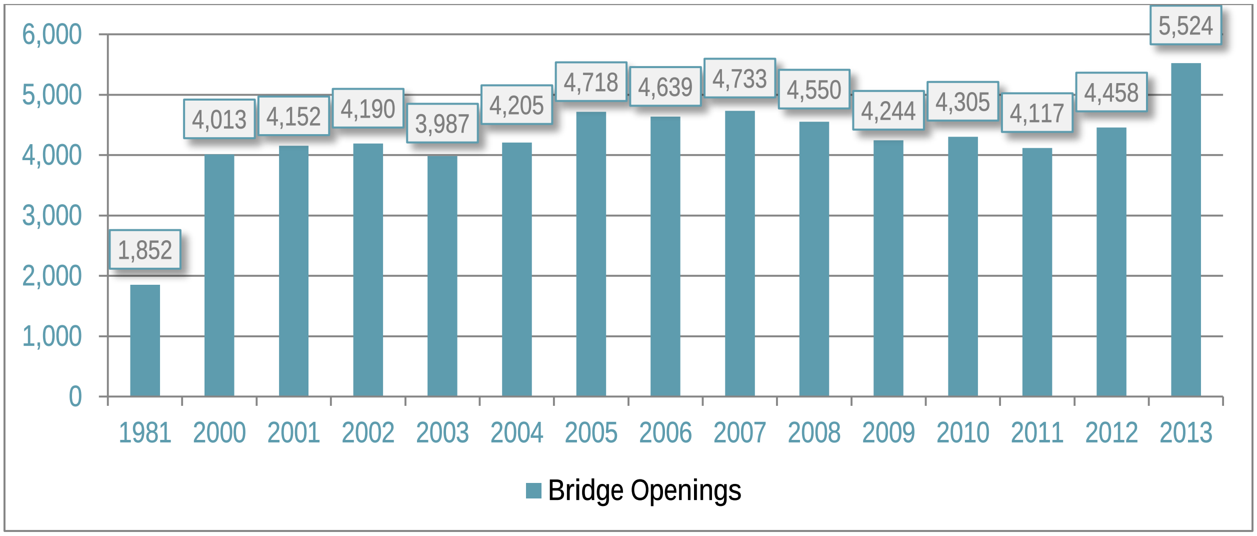
Table 2.2. Bridge Operation Schedule

Early AM	AM	PM	Late PM
On Demand	6:00	12:15	On Demand
	7:00	1:15	
	8:00	2:15	
	9:00	3:15	
	10:00	4:15	
	11:15	5:15	
		6:15	

Historic bridge opening data reveals that the bridge is opening significantly more often than 30 years ago. Figure 2.5 summarizes historic bridge opening data reported in the 1985 *Environmental*

Assessment (1985 EA) and recent bridge openings logs. As shown, the number of bridge openings has significantly increased. In 1981, the bridge opened 1,852 times compared to 5,524 openings in 2013. It is believed that the sharp increase in the number of bridge openings in 2013 is tied to the Environmental Protection Agency (EPA) harbor cleanup. Between 2000 and 2012 the annual number of openings averaged 4,300 (slightly less than the number of scheduled openings).

Figure 2.5. Bridge Openings, Selected Years, 1981 to 2013



Since a significant number of vessels that enter the north harbor are pleasure craft, including sailboats and other small motor boats, the number of bridge openings varies throughout the year. Table 2.3 compares the bridge openings and vessel traffic for four months in 2013, providing a representation of the anticipated patterns and level of vessel traffic in the coming years. Both the number of vessels and the number of openings peak in July. During this month, the bridge opened on average 20 times per day allowing an average of 63 vessels to pass through the bridge. The marine traffic and bridge openings were lowest in January, when an average of only 20 vessels passed through the bridge and only 11 openings.

The duration of the bridge openings is also longer in July. On average, 3.2 vessels passed through the bridge each time it opened during that month. As the number of vessels that pass through the bridge increases, the time required for vessels to pass through the opening increases, consequently increasing the delay for waiting vehicles.

Table 2.3. Bridge Openings and Vessels by Month, 2013

Vessels/Openings	January	April	July	October
Average Daily Vessels	20	23	63	48
Average Daily Openings	11	12	20	18
Average Vessels/Opening	1.9	1.9	3.2	2.7

An evaluation of bridge opening records from 2013 indicates that the bridge opens at all hours of the day. As shown in Table 2.4, bridge openings peak during the middle of the day. Based on the scheduled openings between 6 AM and 6:15 PM and the actual openings during that time period, the bridge opens less during the daytime than what is scheduled. Over one-third of the annual bridge openings occurred on demand between 7 PM and 6 AM.

Table 2.4. Annual Bridge Openings by Time of Day, 2013

Time Period	Bridge Openings	Scheduled Openings
Early AM (12-6am)	992	-
Peak AM (6-9am)	748	1,095
Late AM (9am-12pm)	923	1,095
Early PM (12pm-4pm)	1,181	1,460
Peak PM (4-7pm)	743	1,095
Late PM (7pm-12am)	944	-
TOTAL OPENINGS	5,531	4,745

2.2.4 Bridge Inspections

Over the past 50 years, the New Bedford-Fairhaven Bridge has been either repaired or rehabilitated approximately on a 12-year cycle. Based on similar bridges, this repair history is typical of movable bridges located over tidal waterways. Based upon the 2013 National Bridge Inspection Standards (NBIS) inspection report and the HDR cursory inspection (2014) the bridge can be maintained in a reliable operating state over the next 50 years. However, the costs will increase as more elements of the structure deteriorate. To achieve this state of reliable operation, the current level of maintenance currently performed needs to be maintained and specific structural, mechanical, and electrical repairs will need to be implemented. The superstructure truss is a pin and eye-bar design (obsolete) that will continue to require close monitoring and repair of the pin/eye-bar connections.

The 2013 NBIS inspection results indicated that the superstructure condition varies between seven (very good) and five (fair). NBIS inspection ratings can vary from nine, which means the bridge is in excellent condition to one, which means there is major deterioration and imminent failure and zero which is a bridge that is beyond repair and is typically out of service. The structure was painted in 1997 and has signs of minor paint failure and corrosion. Some web members, cover plates, and rivets show corrosion and section loss. These elements can be repaired and spot painting can be performed. Corrosion and pack rust at the upper tread plate is the most significant structural defect which is expensive to correct and will remove the bridge from operation over a one to two month period.

The mechanical system was rehabilitated and is in good condition (rated as a seven), with the exception of the tread plate, and selected rollers within the drum girder system. The electrical system was rehabilitated and is functioning well with the exception of limit switch failures. These nuisance maintenance issues could be reduced by installing redundant limit switches.

2.3 SOCIO-ECONOMIC CONDITIONS

2.3.1 Existing Demographics

Located about 30 miles southeast of Providence, RI in Bristol County, MA, the City of New Bedford and Town of Fairhaven are part of the greater Providence metropolitan area. The two municipalities are also located within Massachusetts' Southeastern Regional Planning and Economic Development (SRPEDD) region and the Providence-Warwick, RI Metropolitan Statistical Area.

Population in New Bedford peaked during the early part of the 20th century, but as textile industries relocated outside the city in the 1930s, population declined. Over the past several decades, the population has been relatively stable. According to the U.S. Census Bureau's 2008-2012 American Community Survey (ACS) Five-Year Estimates, the 2012 population for New Bedford was 94,952. The Town of Fairhaven is a much smaller municipality, with an economy tied to New Bedford across the harbor. Like its neighbor to the west, Fairhaven's population has also remained relatively stable for the past 40 years. In 2012, the population was 15,893. Within the Local Study Area, the population in 2012 was 17,654. The Regional Study Area population was 54,905 persons in 2012, roughly half of the New Bedford and Fairhaven combined population.

According to 2012 employment figures from the Massachusetts Executive Office of Labor and Workforce Development (EOLWD), the total number of jobs in the City of New Bedford was 36,899 compared to 7,200 in the Town of Fairhaven. Approximately 14 percent of the jobs in the two municipalities are located within the Local Study Area and 32 percent within the Regional Study Area. The primary industries for employment in New Bedford are health care and social assistance (21 percent), manufacturing (17 percent), and educational services (eight percent). In Fairhaven, the leading industries for employment were health care and social assistance (24 percent), retail trade (16 percent), and accommodation and food services (12 percent). Forestry, fishing, and hunting accounted for 1.9 percent of all jobs in Fairhaven and 2.6 percent of jobs in New Bedford.

The City of New Bedford has a higher rate of unemployment compared to other local municipalities, the region, and the state. According to the 2008-2012 ACS Five-Year Estimates, the unemployment rate in New Bedford was 11.7 percent in 2012. Comparatively, the unemployment rate in Fairhaven was 8.3 percent, 10.4 percent in Bristol County, and 8.5 percent in Massachusetts.

2.3.2 Environmental Justice Populations

BACKGROUND

Title VI of the Civil Rights Act of 1964 specifies that no person in the United States shall, on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.

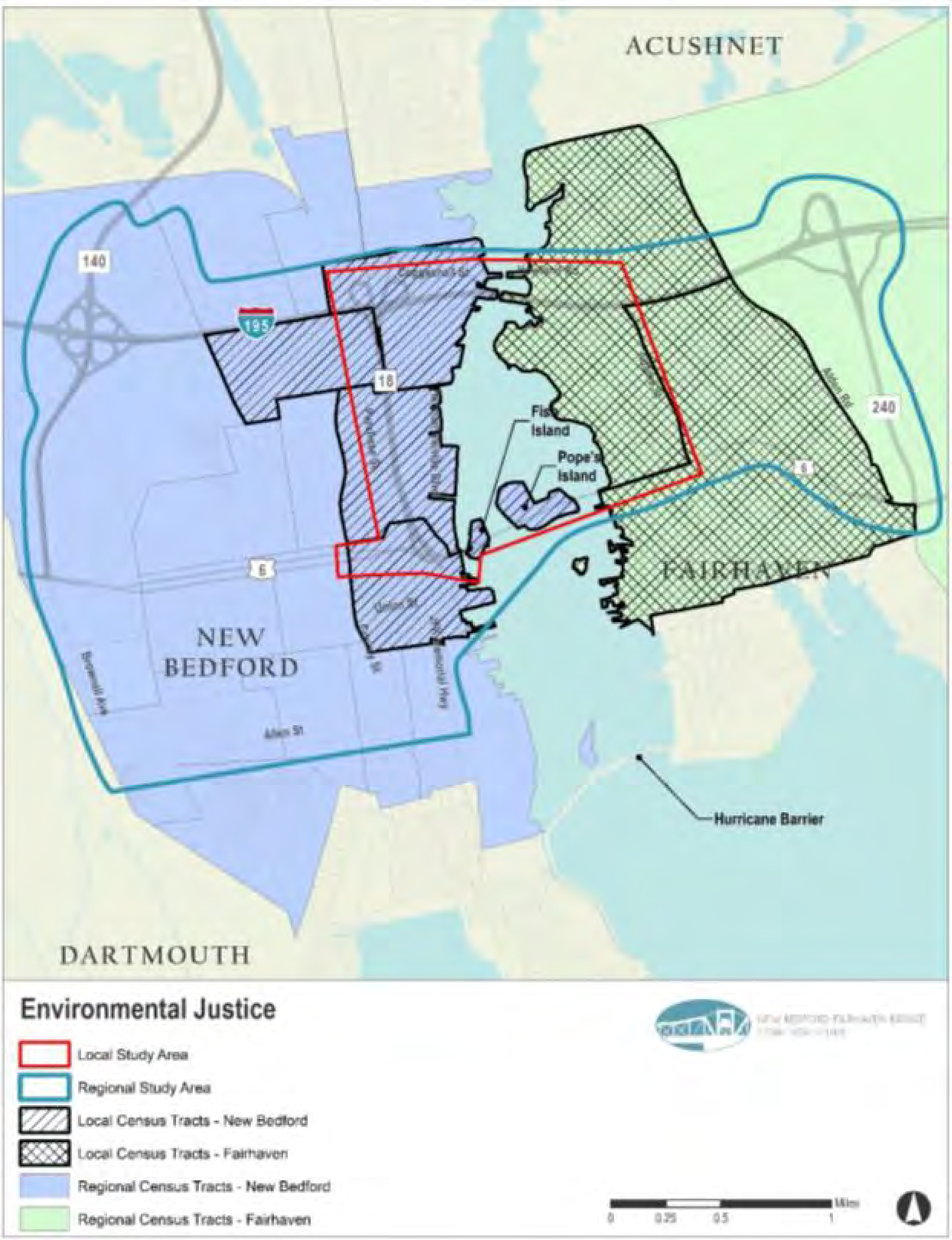
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, issued in 1998, states that each federal agency shall make achieving environmental justice (EJ) part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Executive Order 13166 was signed into law on August 11, 2000. It requires Federal agencies to examine the services they provide, identify any need for services to those with Limited English Proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them.

METHODOLOGY

To evaluate the study corridor for the purposes of EJ, 2008-2012 ACS Five-Year Estimates were used to determine the presence and locations of minority and low-income populations within the study corridor. The data collection effort focused on the census tracts (survey areas for the Census) that fall entirely or partially within the study areas. These are shown in Figure 2.6 below. The data analysis considered the two study areas as a whole as well as individual census tracts in each.

Two complementary methodologies were considered when identifying possible EJ populations in the study corridor. The first was the U.S. Council on Environmental Quality (CEQ) guidance. The CEQ identifies an EJ group where the proportion (percentage) of the minority or below-poverty population in an area is "meaningfully greater" than the percentage in the broader (larger) area. Under the CEQ methodology, minority populations are those that classify themselves as any race except white. The current U.S poverty level as determined by the U.S Department of Health and Human Services for a family of three is $19,790 per year. The median household size for the Regional Study Area is 2.6. Thus, the poverty threshold for this analysis was rounded to $20,000 per household (HH).

Figure 2.6. Study Area Census Tracts



The second method of identifying the locations of any EJ populations in the study area was to consider the thresholds for identifying EJ populations within the State of Massachusetts and the planning region, which encompasses New Bedford and Fairhaven. These include:

- Massachusetts Executive Office of Energy and Environmental Affairs (Mass EEA) EJ Criteria:
  - Income: 25 percent or more of households earn 65 percent or less of the Massachusetts median household income
  - Minority: 25 percent or more of residents identify as a race other than white
  - English Language Isolation: 25 percent or more of HH have no one over the age of 14 who speaks English only or very well
- Southeastern Massachusetts MPO (Southeastern Regional Planning and Economic Development District or SRPEDD) Title VI Plan
  - Minority and low income areas are evaluated by census tracts; if the category exceeds the average for the region then the tract is considered either a minority or low-income area
  - Limited English Proficiency (LEP): languages other than English are spoken by more than 1,000 people or five percent of the total population

For this study, an EJ population is therefore defined based on consideration of the above methodologies, and taking the more conservative approach, reflecting the Massachusetts state-level criteria. For this study, EJ populations include any of the following:

- Minority: 25 percent or more of residents identify as a race other than white;
- Low-Income: 25 percent or more of HH earn 65 percent or less of the MA median household income ($65,339); or $42,470 or less; or
- LEP: 25 percent or more of the HH have Limited English Proficiency as identified by ACS data.

ENVIRONMENTAL JUSTICE POPULATIONS IN STUDY AREA

Figure 2.6 below shows the location of EJ populations in the study area. Maps showing the total population, as well as concentrations of minority, low-income, and LEP populations for the two study areas, are included in Appendix D. Figure 2.6 indicates that:

- The area of New Bedford within the Local Study Area is home to EJ populations. All of the census tracts exceed the threshold for both minority and low-income percentages.
- The majority of the area of New Bedford within the Regional Study Area contains EJ populations. Eleven of 18 census tracts exceed one or more EJ thresholds.
- In Fairhaven, one EJ threshold is exceeded (at or below 65 percent of the MA median HH income) in both census tracts within the Local Study Area; the Regional Study Area in Fairhaven does not have any notable areas of EJ populations.

Some of the EJ populations in New Bedford and Fairhaven occur in neighborhoods along the shoreline of the Acushnet River and are in close proximity to the New Bedford-Fairhaven Bridge.

Environmental Justice is considered to be a concern for project impacts when the percentage of EJ populations in an area is "meaningfully greater" than that in a larger related geographic area. For this study, the concentration of EJ populations in the two study areas was compared to the following geographies: City of New Bedford, Town of Fairhaven, Bristol County, SPREDD Region, and State of Massachusetts. Table 2.5 summarizes the comparative EJ population data for these geographies.

The information in Table 2.5 is also shown and summarized in Figure 2.7 below. The information in the table and map suggests that EJ is a concern for the local and regional study areas in New Bedford based on the presence of concentrations of both minority and low-income populations. It is a concern for the Local Study Area in Fairhaven as well.

It is interesting to note that the percentage of LEP populations is substantially lower in the study areas as a whole than the percentage of minority populations. Yet, the LEP populations in all of the New Bedford study area census tracts exceed the Massachusetts EOEEA threshold of five percent or greater, while none of the Fairhaven census tracts in the study areas exceed the threshold. Yet, those census tracts which occur in New Bedford along the shoreline and adjacent to the bridge do not meet the second Massachusetts EOEEA threshold of LEP populations of 1,000 or more persons.

This finding informed the community outreach efforts for this study. Notably, under Title VI of the Civil Rights Act of 1964 and Commonwealth Executive Order 526, MassDOT must ensure that programs and activities do not discriminate based on race, color or national origin, age, disability and sex, among other protected categories. The agency's Accessible Meeting Policy provides guidance to ensure that MassDOT includes Title VI constituencies in transportation programs and activities. The method for determining whether and/or what non-English languages need to be translated, calls for an analysis of the number of limited English proficiency persons by language group where a meeting will be held, the frequency of contacts with the program, the importance of the program and cost factors. The largest non-white ethnic group identified in the ACS data for the study areas is Hispanic or Latino. An analysis conducted by SRPEDD in 2013 found that the predominant language spoken by LEP populations in the study area was Portuguese or Portuguese Creole (8.75 percent of those who are LEP the Regional Study Area). As such, Portuguese and Spanish language translation were provided at public meetings and for outreach materials for this study.

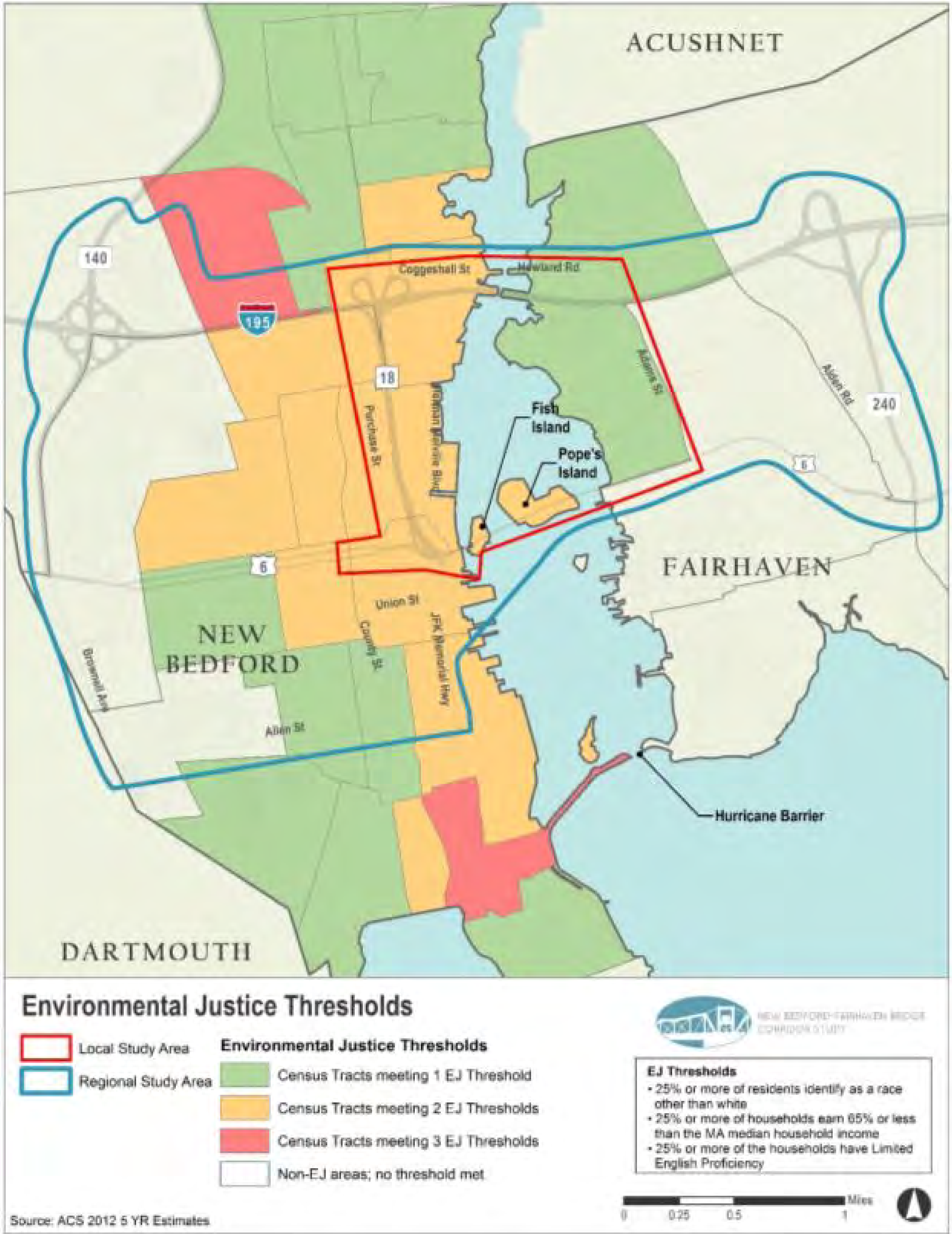
Table 2.5. Environmental Justice Population by Census Tract, 2012

Geography by Census Tract	Total Population	Percent Minority	Percent Below Poverty	Above or Below 65% of Median HH Income for MA	Percent LEP
Fairhaven Local Study Area Total	7,852	6.1	14.5		2.9
25005655200	4,410	9.4	18.7	Below	2.5
25005655300	3,442	2.9	10.2	Below	3.3
New Bedford Local Study Area Total	9,802	36.5	40.8		11.6
25005651100	3,838	42.2	41.1	Below	13
25005651300	2,203	27.9	30.4	Above	6.3
25005651200	2,165	46.3	49.5	Below	15.7
25005651800	1,596	29.4	42	Below	11.3
Fairhaven Regional Study Area Total	11,818	4.9	11.6		3.1
25005655200	4,410	9.4	18.7	Above	2.5
25005655100	3,966	2.4	6	Above	3.6
25005655300	3,442	2.9	10.2	Above	3.3
New Bedford Regional Study Area Total	51,419	29.2	27.4		13.7
25005651002	4,048	17.6	15.1	Above	7.3
25005651600	4,600	39.1	18.5	Above	11.9
25005652300	3,255	16.3	13.9	Above	20.4
25005652200	3,164	14.8	8.2	Above	6.9
25005651001	2,830	8.7	8.2	Above	8.7
25005652100	2,647	12.9	17.3	Above	6.6
25005650800	3,004	24.7	28.2	Below	19.9
25005651500	3,301	32.6	21.6	Above	11.7
25005651100	3,838	42.2	41.1	Below	13
25005652000	2,675	19.4	21.2	Above	21
25005651400	3,036	31.0	17	Above	12.5
25005650900	2,813	36.4	48.2	Below	27.6
25005651300	2,203	27.9	30.4	Above	6.3
25005650700	2,073	29.4	32.7	Above	19
25005651700	2,178	43.5	39.1	Below	10.7
25005651200	2,165	46.3	49.5	Below	15.7
25005651800	1,596	29.4	42	Below	11.3

Geography by Census Tract	Total Population	Percent Minority	Percent Below Poverty	Above or Below 65% of Median HH Income for MA	Percent LEP
25005651900	1,993	53.1	41.3	Below	15.7
Town-wide Totals					
Fairhaven	15,893	4.1	9.8	n/a	2.5
New Bedford	94,952	22.9	23.5	n/a	14.2
Regional Totals					
SRPEDD Region	110,845	19.2	7.4	n/a	12.9
Bristol County	548,739	10.5	12.4	n/a	7.9
State	6,560,595	19.0	11.4	n/a	6.7

Source: 2008-2012 ACS Five-Year Estimates

Figure 2.7. Environmental Justice Thresholds



2.3.3 Population/Employment Projections

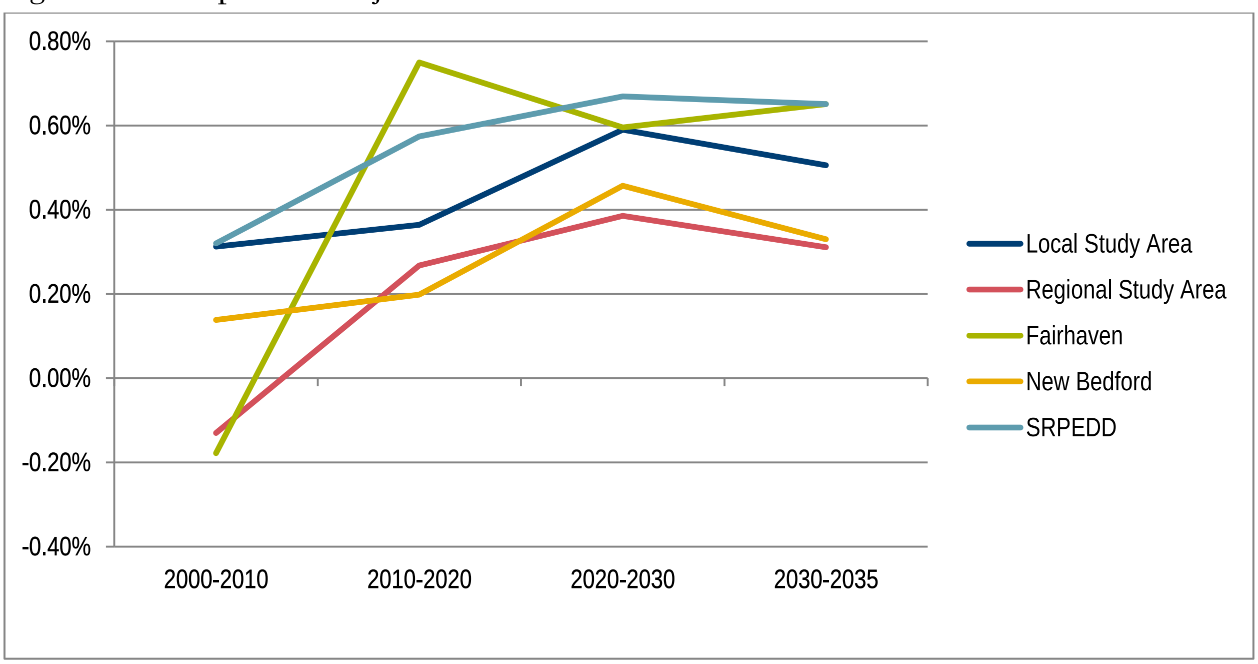
METHODOLOGY

To compare the future population and employment within the study areas, population and employment estimates for 2010 and projections for 2020, 2030, and 2035 from SRPEDD Regional Transportation Demand Model Traffic Analysis Zone (TAZ) data were obtained. The Local Study Area and Regional Study Area estimates and projections were determined by aggregating data for the TAZs that are located completely or mostly within each of the two study areas. For the Local Study Area, this included six TAZs (256, 257, 258, 266, 278, and 279) in New Bedford and three TAZs (259, 282, and 283) in Fairhaven. In addition to these nine TAZs, the Regional Study Area also included an additional 31 TAZs (217 to 223, 229 to 230, 234 to 249, 252, 260 to 262, and 264 to 265) in New Bedford and two additional TAZs (296 and 298) in Fairhaven.

POPULATION PROJECTIONS

Although population within the Regional Study Area and the Town of Fairhaven declined between 2000 and 2010, SRPEDD projections indicate a modest increase over the next twenty years in both of the study areas, New Bedford, Fairhaven, and the SRPEDD region in general. The Regional Study Area and New Bedford in general have the lowest annual rate of growth over the entire period. Figure 2.8 shows the projected population annual growth rate and Table 2.7 includes total population figures for each of the five areas.

Figure 2.8. Population Projected Annual Rate of Growth



Source: U.S. Census Bureau, 2000 and 2010 Census; SRPEDD, Regional Transportation Demand Model population projections

Table 2.6. Population Projections, 2020 to 2035

Area	Population 2000	Population 2010	Population 2020	Population 2030	Population 2035
Local Study Area	8,301	8,564	8,881	9,419	9,659
Regional Study Area	42,369	41,821	42,951	44,635	45,332
Fairhaven	16,159	15,873	17,103	18,148	18,746
New Bedford	93,768	95,072	96,971	101,490	103,175
SRPEDD	597,294	616,670	653,000	698,000	720,999

Source: U.S. Census Bureau, 2000 and 2010 Census; SRPEDD, Regional Transportation Demand Model population projections

EMPLOYMENT PROJECTIONS

Employment estimates for 2000 were not available on the TAZ level, so estimates could not be aggregated for the Local and Regional Study Areas. Employment projections for the Regional Study Area and New Bedford show a modest decline in employment between 2010 and 2020, but a similar annual rate of growth between 2020 and 2030. Employment growth in all areas is expected to slow between 2030 and 2035. Table 2.7 includes total employment figures for each of the five areas and the percent rate of growth.

Table 2.7. Employment Projections, 2020 to 2035

Area	Employment 2010	Employment 2020	Employment 2030	Employment 2035	Rate of Growth 2010-2020	Rate of Growth 2020-2030	Rate of Growth 2030-2035
Local Study Area	5,855	5,918	6,324	6,409	0.11%	0.67%	0.27%
Regional Study Area	13,331	13,243	14,134	14,247	-0.07%	0.65%	0.16%
Fairhaven	6,022	6,053	6,459	6,513	0.05%	0.65%	0.17%
New Bedford	36,147	35,829	38,241	38,467	-0.09%	0.65%	0.12%
SRPEDD	227,838	243,000	260,000	265,000	0.65%	0.68%	0.38%

Source: U.S. Census Bureau, 2000 and 2010 Census; SRPEDD, Regional Transportation Demand Model population projections

2.4 LAND USE/ECONOMIC DEVELOPMENT

2.4.1 Existing Land Use

LAND USE PATTERN

At the center of the Local Study Area is the New Bedford Harbor, which is fed by the Acushnet River to the north and empties into Buzzards Bay to the south.

As shown in Figure 2.9, the primary existing land uses in the New Bedford portion of the Local Study Area are industrial and commercial. Marine industries are concentrated along the waterfront and supporting uses are located on adjacent parcels. The proposed South Coast Rail Whale's Tooth Station is located near the maritime uses in New Bedford. The Hicks-Logan-Sawyer District is also located in the northwestern corner of the Local Study Area.

The two islands along Route 6 within the local study areas are both within the City of New Bedford. Pope's Island is a combination of commercial, industrial, open space, and marina uses, while Fish Island is completely occupied by industrial uses. In Fairhaven, the existing land use is predominantly residential in the local study area, but some, with some open space and marina uses adjacent to the waterfront.

Approximately 1,800 parcels are located within the Local Study Area, split almost equally between New Bedford and in Fairhaven. Twenty properties within the Local Study Area are adjacent to the bridge approaches and could potentially be affected by bridge replacement or other improvements. These properties are located in New Bedford along the waterfront and on Fish and Pope's Island. A summary of the ownership, size, and existing use of these properties is provided in Table 2.8. The parcels are shown on Figure 2.9.

ZONING

The zoning in both New Bedford and Fairhaven is consistent with the existing land uses and supports the continuation of waterfront industrial, industrial, and mixed-use business uses in New Bedford, and residential uses in Fairhaven. As shown in Figure 2.11 the waterfront parcels on the New Bedford shoreline and Fish Island are primarily Waterfront Industrial (WI). Parcels on Pope's Island are zoned Industrial A (IA) or Residential A (RA). The waterfront parcels are also within the Working Waterfront Overlay District.

Parcels between Herman Melville Boulevard and Route 18 are zoned Industrial A or Industrial B. The Industrial B zone is generally more restrictive in the diversity of permitted commercial uses in the district. The Wamsutta Mill Overlay District includes the parcels between Wamsutta Street, North Front Street, Acushnet Avenue, and Logan Street. West of Route 18 and south of Route 6, the parcels located within the Local Study Area are zoned Mixed Use Business (MUB), Residential A (RA), or Residential B (RB), with the Residential B zone allowing two family residential dwellings. The Downtown Business Overlay District (DBOD) extends into the southwest corner of the Local Study Area. The overlay districts are not shown on Figure 2.11.

Figure 2.9. Existing Land Use Map

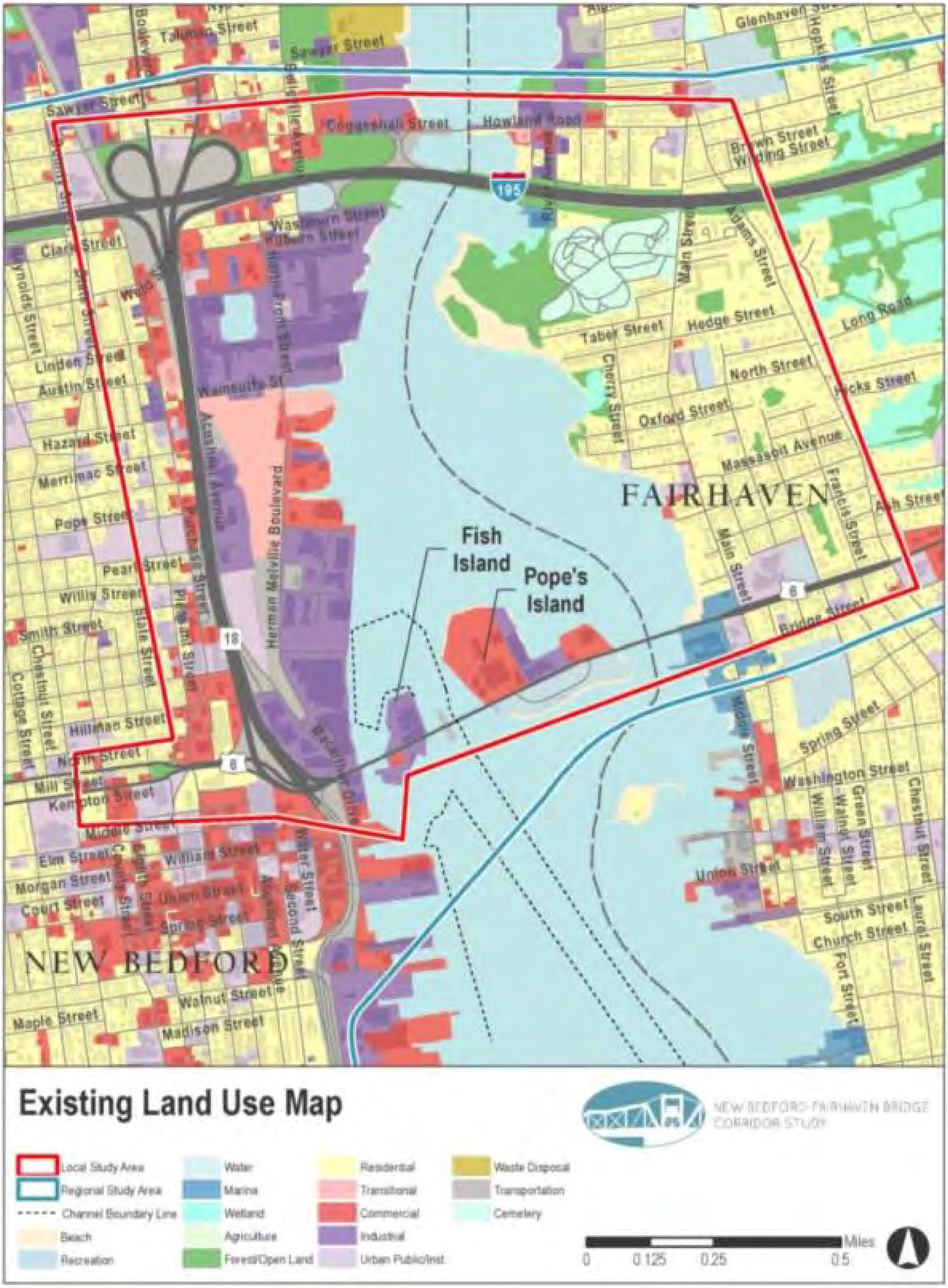
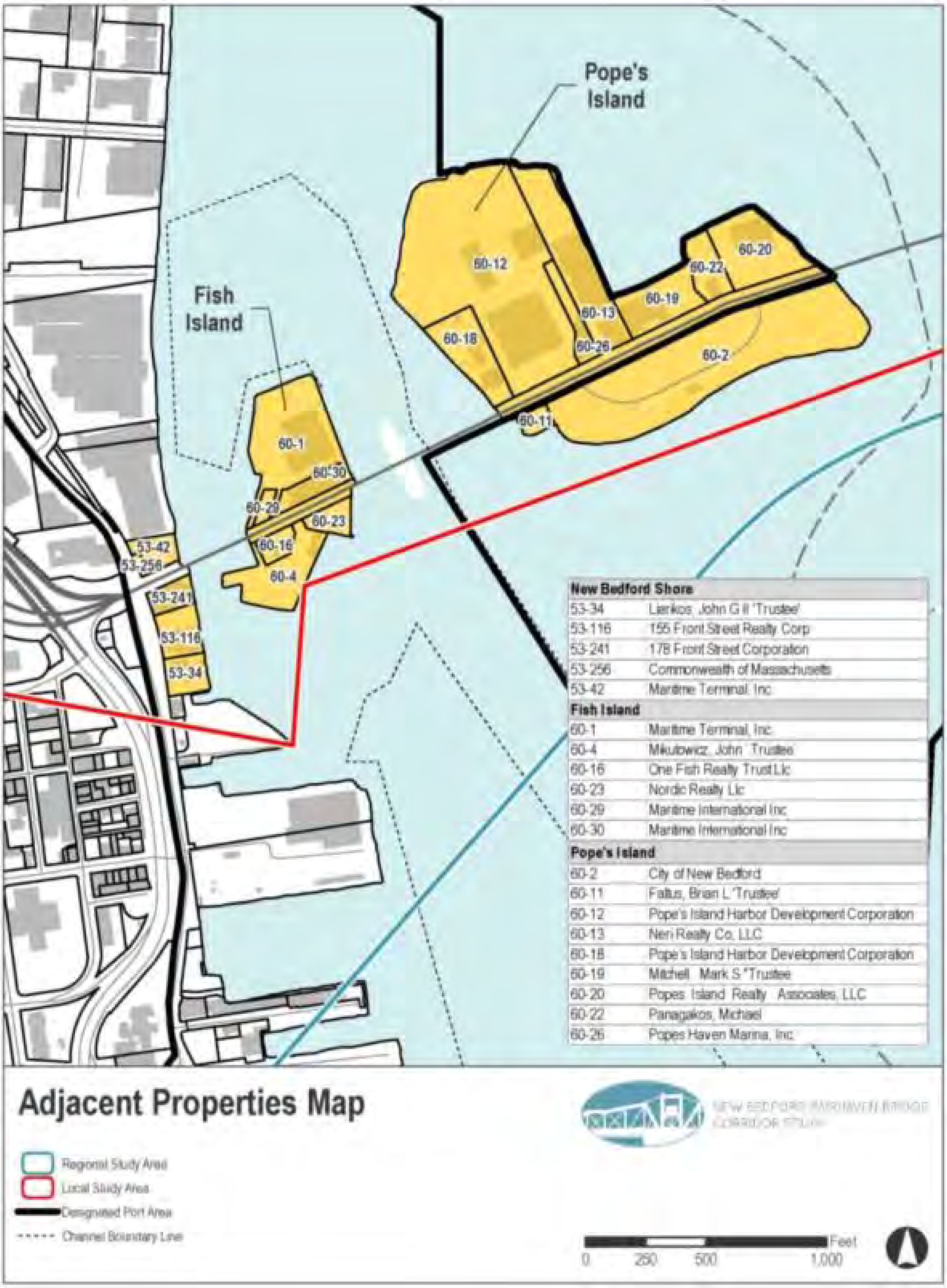


Table 2.8. Adjacent Properties

Parcel ID #	Owner	Occupant	Current Use	Acres
53-34	Liarikos, John G II 'Trustee'	Global Co-Op Wharf	Fuel Service Areas	0.667
53-116	155 Front Street Realty Corp	Crystal Ice	Buildings for manufacturing operations	0.852
53-241	178 Front Street Corporation	Crystal Ice	Buildings for manufacturing operations	0.526
53-256	Commonwealth of Massachusetts	Unoccupied	Massachusetts Highway Department	0.079
53-42	Maritime Terminal, Inc.	Maritime Terminal	Land - integral part of manufacturing operation	0.521
60-1	Maritime Terminal, Inc.	Maritime Terminal	Warehouses for storage of manufactured products	3.108
60-4	Mikutowicz, John `Trustee`	AGM Marine Contractors, Inc.	Office Building - part of manufacturing operation	1.600
60-16	One Fish Realty Trust LLC	Fish Island Gas	Gasoline Service Stations	0.401
60-23	Nordic Realty LLC	Tucker Roy Marine Towing & Salvage	Developable Industrial Land	0.464
60-29	Maritime International, Inc.	Maritime Terminal	Developable Industrial Land	0.169
60-30	Maritime International, Inc.	Maritime Terminal/Northern Pelangic Group LLC	Buildings for manufacturing operations	0.623
60-2	City of New Bedford	Marine Park	Improved, Selectmen or City Council (Municipal)	9.725
60-11	Faltus, Brian L 'Trustee'	Captain Leroy's	Marinas	0.211
60-12	Pope's Island Harbor Development Corporation	The Bridge Shoppes (Worleybeds Factory Outlet, Bob's Sea and Ski, Cape Cod Billiards & Dart Supply, Precision Orthotics)	Shopping Centers/Malls	10.570
60-13	Neri Realty Co, LLC	Unoccupied Building	Buildings for manufacturing operations	3.011
60-18	Pope's Island Harbor Development Corporation	Bridge Shoppes Marina (Niemiec Marine, CMS Fishing Tackle, Niemiec Yacht Sales, Fathoms)	Small Retail and Services stores (under 10,000 sq. ft.)	1.485
60-19	Mitchell Mark S "Trustee	Whaling City Marina, Rick's Outboard Marine, R.A. Mitchell Co.	Buildings for manufacturing operations	1.559
60-20	Popes Island Realty Associates, LLC	Fairhaven True Value Hardware	Facilities providing building materials, hardware , equip, etc.	1.980
60-22	Panagakos, Michael	Dunkin Donuts, Newsbreak	Eating and Drinking Establishment	0.775
60-26	Popes Haven Marina, Inc.	Temptation	Eating and Drinking Establishment	0.652

Source: MassGIS Level 3 Assessors' Parcel Data (October 2013)

Figure 2.10. Adjacent Properties Map



Parcels located within the Local Study Area in the Town of Fairhaven are primarily zoned Single Residence (RA). Marsh Island is zoned Agricultural (AG). There are some isolated pockets of Business (B) and Apartment/Multifamily (RC) within the Local Study Area.

DESIGNATED PORT AREA

As shown on Figure 2.11, a portion of New Bedford-Fairhaven Designated Port Area (DPA) extends into the Local Study Area. The DPA includes waterfront parcels south of Wamsutta Street and east of Herman Melville Boulevard and MacArthur Drive, Fish Island, and the northern half of Pope's Island. Along with 10 other DPAs in Massachusetts, state policy seeks to "preserve and enhance the capacity of the DPAs to accommodate water-dependent industrial uses and prevent significant impairment by non-industrial or non-water-dependent types of development, which have a far greater range of siting options."

The Massachusetts Office of Coastal Zone Management (CZM) is responsible for supporting planning to promote maritime development, prevent user conflicts, and accommodate supporting industrial and commercial uses. The Massachusetts Department of Environmental Protection (DEP) is responsible for permitting uses, fill, and structures in DPAs.

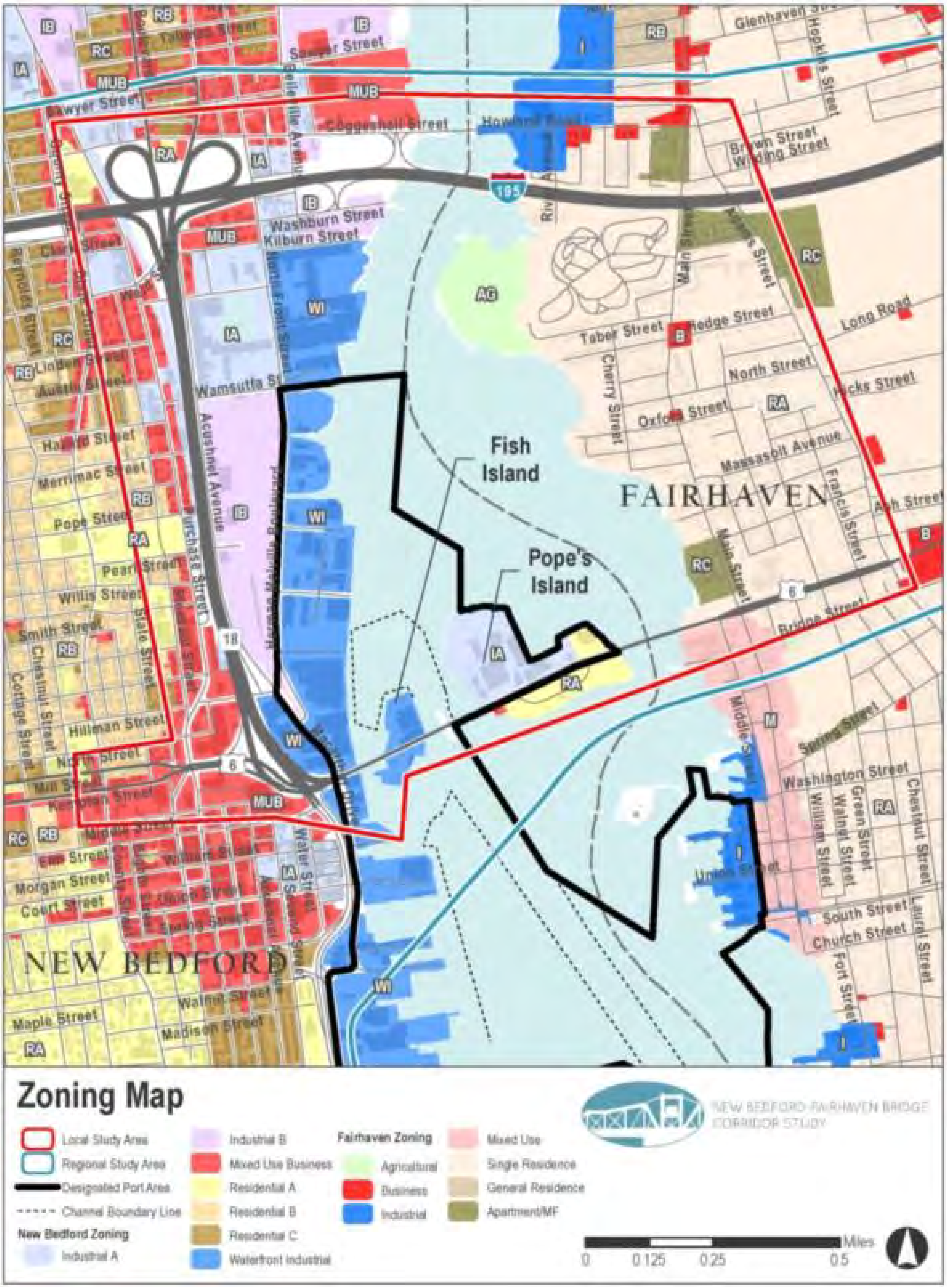
Completed in 2010, the *New Bedford/Fairhaven Municipal Harbor Plan* (Harbor Plan) is the state-approved plan for New Bedford Harbor. The plan includes the DPA master plan and outlines the ongoing dredging process established through the State Enhanced Remedy (SER) and the location of the Confined Aquatic Disposal (CAD) sites in the harbor. The 2010 plan differs from the previous 2002 plan that supported the removal of the middle bridge and the construction of a new bridge from Wamsutta Street to Pope's Island. The 2010 plan proposes a double bascule bridge in the current alignment to increase the bridge opening from the current effective width of 90 feet to a new width of 150 feet.

ACCESS AND CIRCULATION

In addition to the New Bedford-Fairhaven Bridge and Route 6, the primary east-west corridors in the Local Study Area are I-195 and Coggeshall Road/Howland Road. Route 18 is the principal north-south roadway in New Bedford. Within the Local Study Area, Herman Melville Boulevard and MacArthur Drive provide access to the waterfront parcels in New Bedford and Main Street and Adams Street provide north-south access in Fairhaven.

As shown in the 2006 *SRPEDD Hurricane Evacuation Route Evaluation*, several roadways within the Local Study Area are designated hurricane evacuation routes. The New Bedford-Fairhaven Bridge is not a designated hurricane route, but Route 6 east and west of the harbor is a designated route. The plan identified that, as of the date of the plan, 2006, the west and east bridges were structurally deficient. In Fairhaven, Route 240, Main Street, and Adams Street are designated hurricane routes. JFK Memorial Highway, Rt. 18, County Street, MacArthur Drive, Herman Melville Boulevard, Acushnet Avenue, and Rt. 140 are designated hurricane routes in New Bedford. I-195 is the principal east-west evacuation route.

Figure 2.11. Zoning Map



Both New Bedford and Fairhaven provide fire and emergency services to their respective municipalities. In case of bridge closure, Pope's Island could receive service from Fairhaven via the east bridge. St. Luke's Hospital in New Bedford is the only facility in the two municipalities that provides emergency services. Bridge closures could affect Emergency Medical Services (EMS) access to the hospital from Fairhaven.

In case of emergency in the north harbor area, the New Bedford-Fairhaven Bridge impedes emergency boat access. The bridge must open to allow municipal police, fire and rescue, harbormaster, or other emergency response vessels to transit the bridge.

PUBLIC OFF-STREET PARKING FACILITIES

As described in the 2010 Harbor Plan, public parking to serve waterfront uses is provided on city-owned land on and adjacent to the Gifford Street Boat Ramp, the Pease Park Boat Ramp, the Pope's Island Marina, Fisherman's Wharf, Homer's Wharf, Leonard's Wharf and at State Pier. In addition, the HDC operates a remote parking facility (the Whale's Tooth Parking Lot in the Hicks-Logan-Sawyer District) and runs a shuttle bus between parking and the Fast-Ferry terminal at State Pier. These parking areas currently provide adequate parking associated with vessels, seafood processors, various marine industrial uses, and other waterfront uses including the Bourne Counting House and Wharfinger Building. The Elm Street Garage also provides public parking in the general waterfront area and is located right next to the New Bedford Whaling National Park. As additional development occurs, it is critical to balance parking needs with the development of this area. In the long term, the Harbor Plan recommends a structured parking lot so that parking needs can continue to be met in the future.

MAJOR UTILITIES

The following utilities are located along the New Bedford-Fairhaven Bridge:

- **Water**. A 12-inch water main runs from the New Bedford mainland to Fish Island, Pope's Island, and finally to the Town of Fairhaven. The water main is attached to the west and east bridges, but runs under water between Fish Island and Pope's Island. The underwater portion of the pipeline runs south of the swing bridge and is about three feet below the harbor bottom.
- **Gas**. NSTAR provides gas service to Pope's Island from the Fairhaven mainland. The service is provided via a 4-inch intermediate-pressure main. Fish Island does not have gas service.
- **Electricity**. Electric service is provided to Pope's and Fish islands by NSTAR through underground conduits and mains attached to the west and east bridges. Pope's Island is provided service from Fairhaven and Fish Island is provided service from New Bedford. No electric lines run between the islands.
- **Telecommunications.** Nine major telephone cables that provide service to the towns east of New Bedford and to the Cape Cod area cross the harbor between New Bedford and Fairhaven. Five cables cross to Fish Island on the west bridge, run along the harbor bottom south of the middle bridge to Pope's Island, and cross to Fairhaven

over the east bridge. Four other submarine cables begin at the New Bedford mainland just south of Fish Island and run either to Pope's Island (one cable) or to Fairhaven (three cables).

2.4.2 Economic Development

The City of New Bedford has long held global significance in the fishing industry, and its port has been the nation's most profitable port by catch value for over a decade straight. The Port of New Bedford drives New Bedford's economy as a whole. Improvements to the New Bedford-Fairhaven Bridge to support the strengthening of the local fishing industry could also provide opportunities for more diverse economic development within the port and the surrounding area.

EXISTING PLANS & GUIDING DOCUMENTS

Future development of the Port of New Bedford, including the area around the New Bedford-Fairhaven Bridge, is guided by several existing plans and documents. Figuring prominently in the guidance of this study, the City of New Bedford and Town of Fairhaven's 2010 *New Bedford/Fairhaven Municipal Harbor Plan* (Harbor Plan) aims to promote and implement the community's planning vision for its waterfront area. The plan also provides information to guide state agency decisions needed to place the plan into action. The four overriding community goals that guided this plan's development are: 1) to support traditional harbor industries, 2) to rebuild and add to the harbor infrastructure, 3) to capture new opportunities for the expansion of marine and related supporting industries, and 4) to enhance the harbor environment.

The MassDOT's *Ports of Massachusetts Strategic Plan* (Ports Strategic Plan) is intended to enhance coordination between relevant regulatory agencies in order to bring a "collaborative approach to the planning, design, funding, construction, operation, and maintenance of the Commonwealth's water-based transportation and waterfront port facilities." The Strategic Plan, which was under development in 2013, seeks to organize the Commonwealth's port system in a way that provides better, interconnected service to meet the differing needs of port customers and a regional economy. Details about existing port conditions from the Ports Strategic Plan Tech Memo 4: Analysis of the Massachusetts Ports System was considered as part of this section.

Completed in 2008 by the City of New Bedford, the *Hicks-Logan-Sawyer Master Plan* was also taken into consideration. This plan guides the development for this important mixed-use waterfront neighborhood in New Bedford located adjacent to the North Harbor and within the Local Study Area. The plan identifies existing conditions, strengths, weaknesses, and opportunities to help this neighborhood to reach its development potential.

Lastly, MassDOT's 2010 *Massachusetts Freight Plan* (Freight Plan) was developed in accordance with the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which was the federal surface transportation authorization act governing federal transportation spending at the time it was developed. The plan is multi-modal and intermodal in scope, and provides a comprehensive evaluation of the Commonwealth's freight transportation system, its operations, and its effect on economic development and quality of life. The Freight Plan prescribes several scenarios for investment in key infrastructure areas, one of which, the "South Coast Multimodal Freight Improvements" scenario, ties in strongly with the proposed improvements for the New Bedford-Fairhaven Bridge. This scenario calls for bridge improvements for better truck access to the Ports of New Bedford and Fall River, expanded harbor dredging, enhanced railway capacity, improvements and expansions of existing marine terminals, and expanded inland transload and distribution center operations to handle, warehouse and exchange goods between rail and truck. Viewed as a complete package, the South Coast Multimodal Freight Improvements are expected to increase cargo traffic in the region by 7,370 tons annually per $1 million of investment, with a positive overall return on investment.

COMMERCIAL FISHING & SUPPORTING INDUSTRIES

The Port of New Bedford reports that over 4,400 people are employed within the commercial port. In 2011, per the National Oceanic and Atmospheric Administration (NOAA), the New Bedford fishing fleet landed over 117 million pounds of products, with $369 million in direct sales, making it the top port in the U.S. for total sales for twelve consecutive years. Scallops are a particularly valuable catch in which the Port of New Bedford specializes. While fishing has been extremely important to the New Bedford area, it is also an industry that fluctuates with both the regulatory environment of the time, and with the existing local fish stock.

The Freight Plan estimates that, on average, each incoming vessel load at the port creates $100,000-150,000 in direct economic impact, including an average of 30 longshoremen for off-loading, and 20 teamsters for warehouse transit. Each shipment brings approximately 100-150 truckloads of product.

In addition to direct commercial fishing activity, the Port has extensive refrigeration and processing/handling facilities available to support both the fishing industry and cargo shipments, with 4.5 million cubic feet of cold storage and excellent distribution and warehousing facilities. As noted in the 2010 Massachusetts Freight Plan The harbor is host to an already substantial seafood processing industry, with 25 wholesale and 35 processing operations, and is poised to continue to grow. By improving port access, the demand for seafood processing operations will undoubtedly increase; the Port of New Bedford has the expertise, equipment, and available space to accommodate continued growth in this highly important complementary industry. Increasing the port's ability to accept incoming fish creates a direct local economic impact by increasing demand for employment in the processing industry.

CARGO OPERATIONS

The Port of New Bedford traffics a significant amount of cargo. The majority of outbound domestic commercial vessels ship sand and gravel, with 240,429 short tons leaving from the Port in 2008. This particular commodity accounts for approximately 70 percent of total freight volume that moves through the port. Most freight traffic comes or goes to other US ports, accounting for about 90 percent of the total freight moved through the Port of New Bedford (*MA Freight Plan*).

The majority of foreign inbound freight originates in Canada. This freight is primarily petroleum and non-metallic minerals, and usually constitutes between 50,000 and 100,000 short tons of freight for the Port in a given year. Other imports that arrive through the port are mainly perishable agricultural commodities, such as fruits and nuts. These loads are brought in" break-bulk" form and primarily originate from Morocco. Packaged cargo, such as those in crates or barrels and put on pallets (but not containerized) is typically called "break-bulk" cargo. Break-bulk cargo is the only type that can currently be supported at the existing North Harbor terminal facilities.

The port also handles a small but notable amount of international export tonnage per year. This tonnage is primarily break-bulk cargo and consists mainly of fresh and frozen fish destined for northern Europe, and household goods bound for Africa and Cape Verde (*MA Freight Plan*).

EXISTING PORT ADVANTAGES

New Bedford already has the infrastructure setup to expand its cargo operations. The harbor itself is well protected from surges by its hurricane barrier. The port enjoys unencumbered deep-water access, and widespread refrigeration and warehouse capacity. Extensive navigational dredging has recently taken place in the harbor, improving water quality and allowing the port to continue to accept larger vessels that cannot be accommodated by most other ports in New England. The port has a Foreign Trade Zone (FTZ), which is particularly important for sustaining freight operations and provides an incentive for future growth. Goods in the FTZ can be assembled, manufactured, or processed, and final products re-exported, without paying Customs duties. The Port of New Bedford also notes that commercial use of the port is also exempt from the Harbor Maintenance Tax, a federal tax imposed on shippers based on the value of imported goods being shipped through a particular port. These factors provide the port with a considerable competitive advantage, offering a potential cost advantage for foreign businesses considering trade in U.S. markets.

The Port of New Bedford also benefits from great access to a diverse and growing transportation network. Trucking rates are significantly lower in New Bedford as compared to other major regional ports like Boston, New York, and Philadelphia (*MA Freight Plan*). According to the Port of New Bedford, the port offers a shorter distance to many end-destinations, provides access to New England, the greater Northeast, and southern Canada markets, and offers an alternative that avoids major bottlenecking intersections along the I-95 Corridor.

Significant area for redevelopment exists within the entire Port of New Bedford. Within the North Harbor area, improving the bridge could encourage business development throughout the entire harbor. North of the bridge, there are approximately 65 acres of land within the Designated Port Area. The majority of this area is currently used for marine industrial uses, including fish and seafood processing facilities, warehouses, and marine terminals. Existing businesses include:

- Maritime Terminals (8.1 acres including parcels on Fish Island),
- American Seafoods International (8.9 acres),
- Eastern Fisheries (6.8 acres),
- Big G Seafoods (0.9 acres),
- JC Fisheries (0.7 acres),
- Atlantic Red Crab Company
- M&B Sea Products (1.5 acres),
- SeaWatch International (4.8 acres) and,
- PPC Packaging (1.7 acres).

Other uses include a holding area for sand and other materials that are shipping via barge, electrical and welding businesses that support the fishing industry, and a restaurant.

This area also includes the North Terminal area, a 10-acre facility with a range of existing uses. The North Terminal Area could accommodate a laydown and open storage area. Part of the area is owned by the City of New Bedford and the HDC has plans to rehabilitate and add five additional acres of usable land. Plans include dredging and fill, addition of a new pier, and adding rail spurs allowing for additional vessel/rail connections.

2.5 NATURAL/CULTURAL/HISTORIC RESOURCES

2.5.1 Natural Resources

The following sections provide a description of the existing natural resources found within the New Bedford-Fairhaven Bridge Corridor Local Study Area. Existing natural resources were evaluated using Massachusetts Geographic Information Systems (MASSGIS) data. The boundaries of the Local Study Area and the location of the existing natural resources, relative to the New Bedford-Fairhaven Bridge are presented on Figures 2.12 and 2.13.

WETLANDS

The Massachusetts Wetlands Protection Act (WPA) (M.G.L. c. 131, § 40) serves to identify eight "public interest" functions that wetland areas provide, and it establishes regulations and performance standards to protect these functions. Any activity that will potentially affect a wetland area is to be regulated in order to contribute to the following interests:

- Protection of public and private water supply
- Protection of groundwater supply
- Flood control
- Storm damage prevention
- Prevention of pollution
- Protection of land containing shellfish
- Protection of fisheries
- Protection of wildlife habitat

On coastal lands subject to the WPA (land under the ocean, coastal banks, coastal beaches and tidal flats, coastal dunes, barrier beaches, rocky intertidal, salt marshes, land under salt ponds, Designated Port Areas, land containing shellfish, and land on the banks of fish runs) activities are approved, prohibited, or conditioned based on their effects on wetland functions and the public interests listed above. Review is required for any activity that will remove, fill, dredge or alter any wetland resource area—with "alter" being defined to include (among other things) the changing of certain habitat-related conditions, such as vegetation, water flow patterns or flushing characteristics, and/or the physical, biological, or chemical characteristics of receiving waters (e.g., temperature, salinity, and biological oxygen demand).

MASSGIS data were used to evaluate the presence of wetlands within the study area. There are several areas of Massachusetts Department of Environmental Protection (DEP)-designated wetlands throughout the Local Study Area. In the northern portion of the study area, close to the I-195 bridge, coastal bank bluff/sea cliff wetlands are located on the eastern shores of New Bedford Harbor, while rocky intertidal shore can be found for a considerable length of the western shores of the harbor. Additionally, several areas of salt marsh wetlands are located on the eastern shores of New Bedford Harbor, towards the mid- and northern-portions of the Local Study Area. Open water and tidal wetlands are also located within the study area. A large area of coastal dune borders the Riverside Cemetery and New Bedford Harbor; this area is located in the northern portion of the study area, and not within close proximity to the New Bedford-Fairhaven Bridge.

Closer to the New Bedford-Fairhaven Bridge tidal flat wetlands lay north of the bridge on the Fairhaven side. On Pope's Island, rocky intertidal shore can be found north of the bridge while coastal bank bluff/sea cliff wetlands are located south of the bridge, along the southern border of the island.

COASTAL ZONE

The Coastal Zone Management (CZM) Act of 1972 (16 U.S.C. 1451), as amended, and its implementing regulations (15 CFR 930), require all projects located within the designated coastal zone of a state to be consistent with the state's federally approved CZM plan. Section 307 of that act instructs federal agencies not to take action until they have received written certification from the applicant and the state CZM agency, signifying that the proposed project is consistent with the state's coastal zone management plan.

The Massachusetts Office of Coastal Zone Management is the lead policy and planning agency on coastal and ocean issues within the Executive Office of Energy and Environmental Affairs (EEA). CZM receives annual federal grant funds from the National Oceanic and Atmospheric Administration (NOAA) as authorized by the Coastal Zone Management Act. The current *Massachusetts Office of Coastal Zone Management Policy Guide - October 2011* (Policy Guide) is the official statement of the Massachusetts coastal program policies and legal authorities, especially as they relate to the process of federal consistency review. The Policy Guide provides the official program policies of the Massachusetts coastal program—as administered by the Massachusetts Office of CZM—and includes information on the federal Coastal Zone Management Act, the history and operation of the Massachusetts coastal program, federal consistency review, and the application of coastal policy in other state regulatory programs.

Figure 2.12. Natural Resources Map

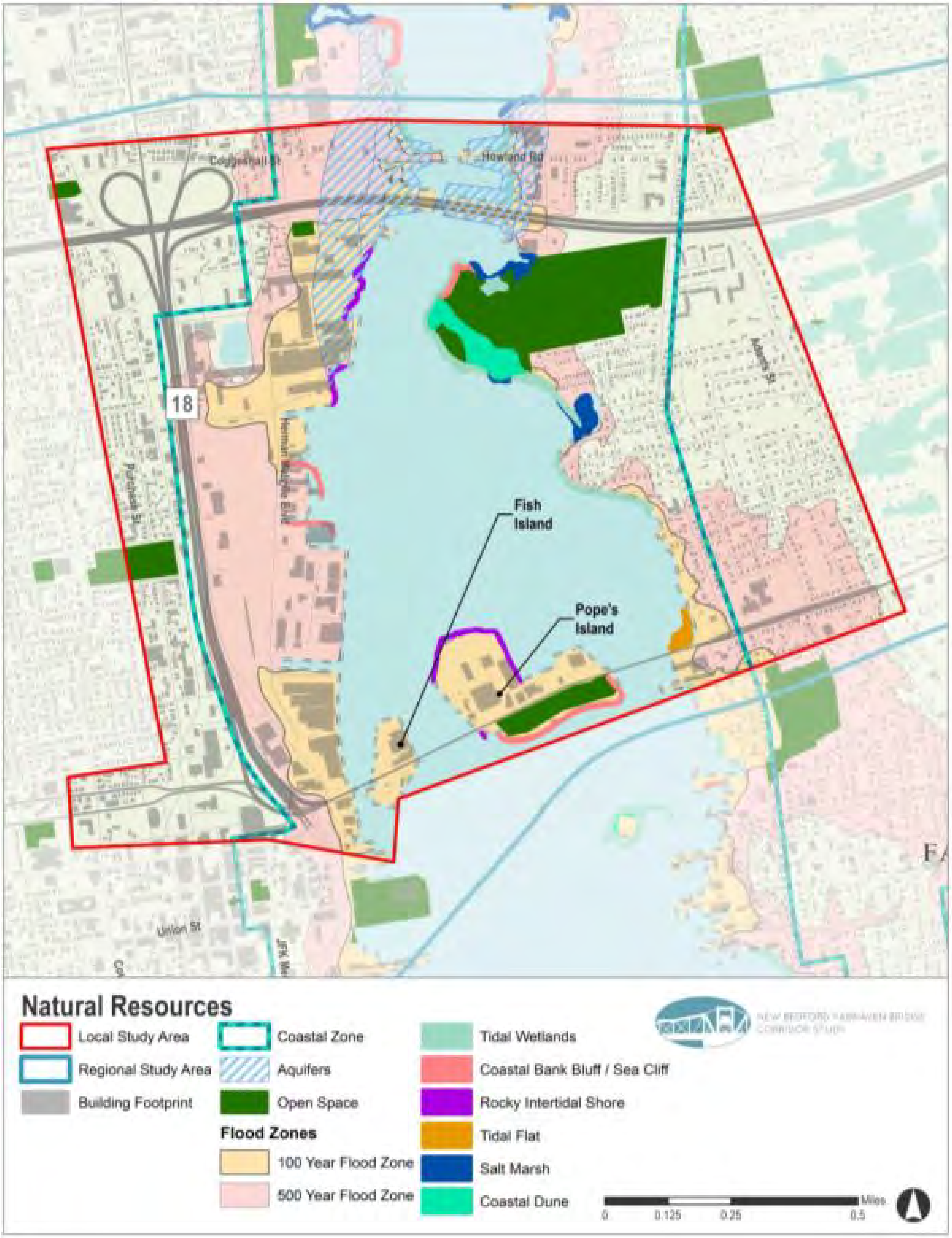


Figure 2.13. Coastal Resources Map

The New Bedford-Fairhaven Bridge falls within Massachusetts' coastal zone and contains the following coastal resources:

- Tidal flats wetlands;
- Rocky intertidal shores wetlands;
- Coastal bank bluff/sea cliff wetlands;
- Open water wetlands;
- Tidal wetlands;
- Salt marsh wetlands;
- Coastal dune;
- Designated Port Area (DPA); and
- Massachusetts Department of Environmental Protection (MassDEP) Chapter 91 Jurisdiction Tidelands.

Per the 2011 Policy Guide, New Bedford Harbor has been identified as a DPA. This definition is used to identify areas that have particular physical and operational features important for water-dependent industrial uses—such as commercial fishing, shipping, and other vessel-related marine commercial activities—and/or for manufacturing, processing, and production activities that require marine transportation or need large volumes of water for withdrawal or discharge. The boundary of the New Bedford-Fairhaven DPA is shown on Figure 2.13. The 2010 Harbor Plan was prepared in accordance with Municipal Harbor Planning (MHP) regulations (301 CMR 23.00) to provide comprehensive planning for the New Bedford-Fairhaven DPA. The plan was approved in 2010.

The Commonwealth's primary tool for protection and promotion of public use of its tidelands and other waterways is Massachusetts General Law Chapter 91, the waterways licensing program of the Public Waterfront Act. Chapter 91 regulates activities on both coastal and inland waterways, including construction, dredging and filling in tidelands, great ponds and certain rivers and streams.

Through Chapter 91 (c.91), the Commonwealth seeks to preserve and protect the rights of the public, and to guarantee that private uses of tidelands and waterways serve a proper public purpose. While other agencies, including the Department of Environmental Management, Massachusetts Office of Coastal Zone Management and the Division of Fisheries and Wildlife, play a role in preserving public rights in public trust lands, the Waterways Regulation Program, the section of MassDEP that oversees Chapter 91, is the primary division charged with implementing the "public trust doctrine." Specifically, the MassDEP Waterways Regulation Program:

- Preserves pedestrian access along the water's edge for fishing, fowling and navigation and, in return for permission to develop non-water dependent projects on Commonwealth tidelands, provides facilities to enhance public use and enjoyment of the water.

- Seeks to protect and extend public strolling rights, as well as public navigation rights.
- Protects and promotes tidelands as a workplace for commercial fishing, shipping, passenger transportation, boat building and repair, marinas and other activities for which proximity to the water is either essential or highly advantageous.
- Protects Areas of Critical Environmental Concern, ocean sanctuaries and other ecologically sensitive areas from unnecessary encroachment by fill and structures.
- Protects the rights of waterfront property owners to approach their property from the water.
- Encourages the development of city and town harbor plans to dovetail local waterfront land use interests with the Commonwealth's statewide concerns.
- Assures removal or repair of unsafe or hazardous structures.

The MassDEP Waterways Regulations (310 CMR 9.02) define tidelands as "present and former submerged lands and tidal flats lying between the present or historical high water mark, whichever is farther landward, and the seaward limit of state jurisdiction." Sites located seaward of the contiguous line are presumed to be in c. 91 jurisdiction. The approximate c. 91 Tidelands Jurisdiction is shown on Figure 2.13.

COASTAL STORM PROTECTION AND SEA LEVEL RISE

In 1966 a system of improvements were made in New Bedford to provide protection against hurricanes. The system's main feature is the barrier extending across New Bedford Harbor which consists of a 4,500-ft-long earthfill dike with stone slope protection. According to a report titled *Hurricane Barriers in New England and New Jersey – History and Status After Four Decades* prepared by the USACE in 2007, the barrier has a maximum elevation of 20 feet and a 150-foot wide gated opening to accommodate commercial and recreational navigation.

The design of the project was based on a hurricane modeled after the September 1944 hurricane which, at the time, had the greatest energy of any known hurricane along the Atlantic coast. The impacts of a storm of that size was transposed along the Atlantic Coast to model a "direct hit" to New Bedford. The transposed storm was moved northerly with a forward speed of about 40 knots along a critical track creating sustained winds of 100 miles per hour (mph) from due south at New Bedford Harbor. Within New Bedford Harbor, a tide surge associated with this design hurricane was computed to be 13.3 feet. This surge was added to the mean spring high water elevation of 2.7 feet-National Geodetic Vertical Datum (NGVD), resulting in a 16 feet-NGVD elevation above conditions if there were no storm waves present. It was further determined that wave heights associated with this storm would be on the order of about 9 feet for all south facing structures. Therefore, the top of barrier elevation of the navigation gates was set to 20 feet-NGVD. A 16 feet-NGVD elevation is slightly greater than the 500-year tide level. This design also included coincident Standard Project Flood occurrence along the Acushnet River behind the barrier, which has a drainage area of 29.4 square miles.

More recently, in June 2014, the Buzzards Bay National Estuary Program completed a *Climate Change Vulnerability Assessment and Adaptation Planning Study for Water Quality Infrastructure in New*

Bedford, Fairhaven, and Acushnet to document the risks and impacts that may associated with sea level rise and a failure of the hurricane barrier. The study modeled hypothetical worst-case inundation scenarios using a combination of hurricane parameters and sea level rise scenarios, and used the model results to conduct a vulnerability analysis of water quality infrastructure, public property and populations, in particular Environmental Justice populations.

The results of the vulnerability analysis showed that hurricane barriers around New Bedford Harbor began to be compromised by Category 2 hurricanes with 4-foot sea level rise and Category 3 hurricanes at current mean higher high water (MHHW), or the average of the highest high tides. According to the 2014 National Climate Assessment, prepared by the U.S. Global Change Research Program a 1 to 4 foot sea level rise is projected by 2100. At a Category 3 storm with 4-foot sea level rise, maximum inundation depths in the area would reach 32 feet. This scenario would also result in inundation at the project site along with 100 percent of the Designated Port Area, 36 percent of publically owned structures in the area, 26 pump stations, and one wastewater treatment facility. It would also affect more than 30,000 residents of environmental justice communities. Damage quantification analyses were estimated at $3.5 billion in economic damages to buildings and substantial damage to 1,399 buildings.

FLOODPLAINS

As shown on Figure 2.12, the span of the New Bedford-Fairhaven Bridge is located entirely within a 100-year flood zone; this area is also inclusive of Pope's Island, Fish Island, and the New Bedford Harbor to the northern edge of the study area. Portions of the study area are also located within the 500-year flood zone including:

- a large area on the east side of the New Bedford Harbor between and including the southern Local Study Area boundary and the Route 6 approach to the bridge; and
- a large area on the west side of the New Bedford Harbor between the southern Local Study Area boundary and Route 18 to the northern Local Study Area boundary.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

No known Areas of Critical Environmental Concern (ACEC) are located within the Local Study Area. ACECs are places in Massachusetts that receive special recognition because of the quality, uniqueness and significance of their natural and cultural resources. These areas are identified and nominated at the community level and are reviewed and designated by the state's Secretary of Energy and Environmental Affairs. ACEC designation creates a framework for local and regional stewardship of critical resources and ecosystems.

HAZARDOUS AND CONTAMINATED MATERIALS

New Bedford Harbor has been designated by the U.S. Environmental Protection Agency (EPA) as a Superfund Site and is currently undergoing clean up. According to EPA's web site, New Bedford Harbor is an 18,000-acre urban estuary with sediment highly contaminated with polychlorinated biphenyls (PCBs) and heavy metals; the contamination includes the harbor bottom for about six miles from the New Bedford Harbor into Buzzards Bay. The harbor was placed on EPA's National Priorities List in 1982, and continues to require significant time and funding to clean up.

To date, EPA has removed more than 230,000 cubic yards of contaminated materials from New Bedford Harbor through the hydraulic dredging and filtering process. The contaminated sediments are being placed in Confined Aquatic Disposal (CAD) cells. These man-made CAD cells are created by digging into the harbor floor. Contaminated sediments from the harbor are deposited within the CAD cell, which is then capped once the sediment has time to consolidate. The contaminated sediment is held in place by existing clean sediments on the sides and bottom of the cell and the cap on the top. EPA estimates that clean-up efforts will continue for another five to seven years.

AQUIFERS

Four aquifers are located in the northern portion of the Local Study Area near the I-195 bridge and bordering the New Bedford Harbor on the east and west sides. The aquifers have been classified by MASSGIS as high- and medium-yield aquifers, conducting greater than 300 and between 100 and 300 gallons per minute (gpm), respectively. There are no known aquifers in the immediate vicinity of the New Bedford-Fairhaven Bridge.

SHELLFISH AND FISH HABITAT

According to the MASSGIS data, the waters and flats of the New Bedford Inner Harbor of the New Bedford Harbor, including all waters surrounding the New Bedford-Fairhaven Bridge, have been designated as shellfish growing areas. However, due to the continued clean-up of New Bedford Harbor from extensive PCB contamination, the Massachusetts Department of Public Health (MDPH) prohibits the consumption of any fish or shellfish caught within the New Bedford Inner Harbor area. As part of the continued clean-up efforts in New Bedford Harbor, EPA monitors PCB levels in locally caught fish and shellfish on an annual basis.

PRIORITY HABITATS

No known priority habitats are located within the Local Study Area.

SOILS

The soils surrounding the New Bedford-Fairhaven Bridge, including Pope's Island and Fish Island, are characterized by MASSGIS as Urban Land where much of the land has been disturbed and is covered by structures or pavement; these soils are not considered prime farmland soils.

NOISE

As shown in Figure 2.9 earlier in this section, land uses within the Local Study Area vary within each community, but can be characterized as mostly residential, commercial, and industrial. Noise sensitive receptors are considered to include homes, schools, public parks, and places intended for quiet such as churches and cemeteries. Potential sensitive noise receptors, or those land uses that may be more sensitive to fluctuations in noise levels, have not been identified through a formal noise study. However, potential sensitive noise receptors within close proximity to the bridge, as observed from Google mapping and shown on Figure 2.14, include the following:

- In Fairhaven:
  - Fairhaven High School and associated play fields on Route 6;
  - Older, residential neighborhoods to the north and south of Route 6;
  - A Veterans of Foreign Wars (VFW) Hall; and
  - Seaport Inn and Marina.
- In New Bedford:
  - Pope's Island Park and Marina;
  - Bethel African Methodist Episcopal (AME) Church;
  - Haven Baptist Church;
  - St. Lawrence Church; and
  - Dense single- and multi-family housing between Route 18 and the western Local Study Area boundary.

AIR QUALITY

The EPA established National Ambient Air Quality Standards (NAAQS) pursuant to Section 109 of the Clean Air Act and 1990 Clean Air Act Amendments for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen oxide (NOx), ozone (O_3), particulate matter (PM_{10}), and sulfur dioxide (SO_2).

Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings. With the exception of sulfur dioxide, all criteria pollutants have secondary standards that are equal to the primary standards.

When air pollutant levels do not exceed the standard for each pollutant, a region is considered in attainment of the standards. If a monitor shows an exceedance to a pollutant's standard, the region is then classified as nonattainment for that pollutant and must develop a State Implementation Plan to bring the region back to attainment status.

Previously, all of Massachusetts had been designated as nonattainment for ozone. However, on May 21, 2012, EPA designated all of the Commonwealth, except for Dukes County on Martha's Vineyard, as "unclassifiable/attainment" for the latest 8-hour ozone standard (2008). Therefore, a conformity analysis determination for ozone for the 2014-17 Massachusetts State Transportation Improvement Program is not required.

Figure 2.14. Noise Sensitive Locations

2.5.2 Community Resources

The following sections provide a description of the existing community resources found within the Local Study Area. Existing community resources were evaluated using MASSGIS data. The boundaries of the Local Study Area and the location of the existing community resources relative to the New Bedford-Fairhaven Bridge are presented in Figure 2.15.

Several open spaces/parks are located within the Local Study Area. In New Bedford, parks or recreational facilities include Clasky Common Park located west of Route 18, between Purchase and County Streets, as well as a single basketball court near I-195. Closer to the New Bedford-Fairhaven Bridge, Marine Park on Pope's Island is located south of Route 6 and is owned and operated by the City of New Bedford. In addition to the Pope's Island Marina, several smaller marinas are also located on the island. In Fairhaven, the Riverside Cemetery is located just to the south of I-195; there are no parks or open space areas located within close proximity to the bridge within the Town of Fairhaven.

2.5.3 Cultural/Historic/Archeological Resources

METHODOLOGY

For the purposes of this planning level analysis, cultural resources were identified through the National Register of Historic Places Geographic Information System, MASSGIS, and through coordination with the New Bedford Historical Commission. In addition, historical data on the bridge was obtained from the Massachusetts Cultural Resources Information System (MACRIS), including the Historic American Engineering Record documentation for the middle bridge.

Bordered by major rights-of-way, the study area for historic resources was broadly defined based on the potential for the replacement of the bridge to be visible from points on both the east and west sides of the harbor. The properties discussed below include those listed in the National Register of Historic Places as well as at the local level. As the project advances, additional properties that are eligible for the National Register, as well as potential areas of archaeological sensitivity, may be identified through consultation with the Massachusetts Historical Commission (MHC).

HISTORIC PROPERTIES

Constructed on the site of a series of earlier privately owned and operated wooden bridges that first connected New Bedford with Fairhaven in the late 1790s, the current New Bedford-Fairhaven Bridge was completed between 1896 and 1903. Although referred to in its entirety as the New Bedford-Fairhaven Bridge, it is in fact three distinct structures. The middle bridge swing span was completed c.1899.

Figure 2.15. Community Services and Key Destinations

The three bridge structures have undergone significant repairs over the last century. The West Bridge is comprised of ten simple spans. The original portion of the bridge is supported by steel column bents over the land and stone piers over the water. The western end of the west bridge was replaced in 1972 when ramps were constructed connecting the bridge to Route 18. The middle bridge, which crosses the center channel of the harbor, is made up of five plate girder spans and a through truss swing span, all supported on stone piers. Mechanical elements of the East Bridge consist of nine plate girder spans held by stone piers. The roadway stringers and deck portion of the girder spans were replaced on each of the three structures in 1961.

A formal Determination of Eligibility for the middle bridge was undertaken in 1980. In the same year, the MHC found that the West Bridge was not eligible for the National Register, but that the East Bridge did meet National Register eligibility criteria and recommended a formal Determination of Eligibility. When the bridge was initially identified as eligible, MHC stated that they would support demolition of the middle bridge due to the bridge's deteriorated condition, but that the project would be subject to review under Section 106 of the National Historic Preservation Act (NHPA). In addition, they requested that documentation be completed in accordance with Historic American Engineering Record (HAER) standards. This documentation has since been completed.

In a 2002 National Register Eligibility Opinion, the MHC stated, "all three components were built in similar materials and type, at the same time, and by the same engineers and builders." As such, the MHC found that the bridge as a whole is eligible for the National Register. Properties eligible for listing in the National Register, such as the New Bedford-Fairhaven Bridge, are afforded the same protections as those formally listed. Due to federal funding, the replacement of the middle bridge of the New Bedford-Fairhaven Bridge will be subject to the requirements of Section 106 of the NHPA. Under Section 106, federal agencies must take into consideration the effects of their actions on properties listed in, or eligible for listing in, the National Register of Historic Places. As the project advances, the Federal Highway Administration (FHWA), as the lead federal agency, will need to enter into consultation with the MHC to address any effects to historic properties.

A study area for historic resources was defined based on the potential visibility of the middle bridge from the surrounding area. Figure 2.16 shows the boundary of this study area. On the east side, the area encompasses the buildings on the west end of Popes Island east to the Fairhaven waterfront and south to Union Wharf. On the west side of the harbor, the area boundary generally follows MacArthur Drive and Herman Melville Boulevard from the New Bedford-Cuttyhunk Ferry pier in the south to a point just south of Hervey Tichon Avenue in the north. The area also includes those buildings on the west side of Front Street between Union Street and Rodman Street and a small area north of William Street between Water and Bethel streets.

In addition to the bridge itself, a portion of the New Bedford Historic District (the Bedford Landing-Waterfront Historic District) and the Schooner Ernestina, both National Historic Landmarks, lie within the study area, southwest of the New Bedford-Fairhaven Bridge. The Bedford Landing-Waterfront Historic District is also a local historic district within the city of New Bedford. The locations of these areas, along with the historic resources study area are shown in Figure 2.16.

Figure 2.16. Historic Properties and Districts

2.6 MARITIME CONDITIONS

2.6.1 Existing Conditions/Issues

Marine traffic has increased dramatically in the New Bedford Harbor over the past 50 years, including traffic through the New Bedford-Fairhaven Bridge. The characteristics of navigational traffic, including the size and type of vessels, have also changed over time. As discussed previously, this increased traffic has resulted in more frequent and longer bridge openings.

The New Bedford Harbor has a set of restrictions in place regarding the navigation of the channel. Some restrictions are physical and some are based on navigational expertise. The most significant barriers are the hurricane barrier and the New Bedford-Fairhaven Bridge east and west navigational channels. Vessel type and size are the primary consideration in how to plan and manage a transit through the bridge. Other considerations include wind and visibility. Due the hurricane barrier, strong currents are not a significant issue in the harbor. Allisions between vessels and the bridge are infrequent, but have occurred.

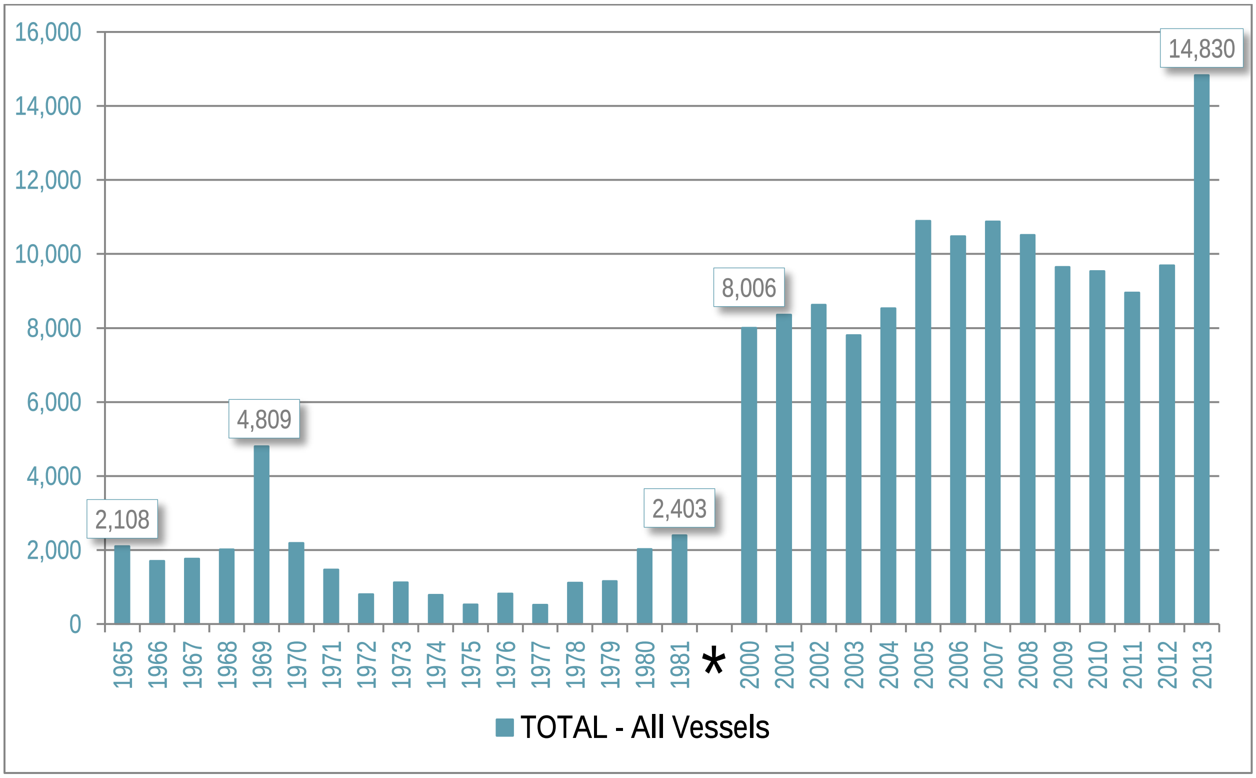
Drawbridge operations are governed by the Federal government, and federal regulations include specific provisions for the New Bedford-Fairhaven Bridge. For vessels with over 15 feet in draft marine traffic has priority over vehicular traffic, but the bridge typically opens per the schedule discussed previously.

CHARACTERISTICS OF EXISTING NAVIGATIONAL TRAFFIC

The New Bedford-Fairhaven Bridge tender records the number and type of all vessels that pass through the bridge. As shown in Figure 2.17, the volume of navigational traffic through the bridge has substantially increased over the past 50 years. In 1965, approximately 2,100 vessels passed through the bridge. The number has grown steadily over the years, but peaked in 2013 when over 14,800 vessels passed through the bridge. Between 2012 and 2013, the number of vessels increased by over 5,000 vessels per year, or almost 250 percent in just a single year. It is anticipated that this increased level of vessel traffic will continue in the coming years.

Each vessel that passes through or "transits" the bridge is assigned to one of five different categories: steamers-motor ships (cargo ships/tankers or large fishing vessels), fishing vessels (commercial), pleasure craft (recreational boats, sailboats), tow boats (tugs), and towed crafts (barges). Table 2.9 provides the physical characteristics of each type of vessel, including the typical beam (width) and height. The table also lists the number of vessels by type in 2013.

Figure 2.17. Annual Navigational Traffic, 1965 to 2013



**Note: Data not available for 1982 to 1999*
Source: 1985 Environmental Assessment, 2000-2013 MassDOT Monthly Drawbridge Reports

Table 2.9. Vessel Characteristics, 2013

Vessel Type	Typical Beam (feet)	Typical Height (feet)	Annual Navigational Traffic (2013)
Cargo Ships (tankers) / Large Fishing Vessels	70-90	90-110	452
Fishing Vessels (commercial)	20-35	40-60	4,991
Pleasure Crafts (sail boats, recreational)	6-18	8-80	3,002
Tow Boats (tugs)	12	12	3,425
Towed Crafts (barges)	30-40	40-60	2,960

Source: 2013 MassDOT Monthly Drawbridge Report

Over the past 30 years as the total navigational volume has increased, the number of vessels by type has also changed. While the number of commercial fishing vessels more than tripled between 1981 and 2013, as a percent of total vessels, fishing vessels declined as more tow boats and barges passed through the bridge. The number of cargo ships/large fishing vessels and recreational vessels has also increased, but as a percent of the total vessels, they have remained the same. Table 2.10 summarizes the change in vessel type between 1981 and 2013.

Table 2.10. Marine Traffic by Vessel Type, 1981 to 2013

Vessel Type	1981 Vessels	1981 % of Total	2000 Vessels	2000 % of Total	2013 Vessels	2013 % of Total
Cargo Ships (tankers) / Large Fishing Vessels	81	3%	174	2%	452	3%
Fishing Vessels (commercial)	1,249	52%	3,838	48%	4,991	34%
Pleasure Crafts (sail boats, recreational)	522	22%	1,441	18%	3,002	20%
Tow Boats (tugs)	276	11%	1,448	18%	3,425	23%
Towed Crafts (barges)	275	11%	1,105	14%	2,960	20%
TOTAL – ALL VESSELS	2,403		8,006		14,830	

Source: 1985 Environmental Assessment, 2000 and 2013 MassDOT Monthly Drawbridge Reports

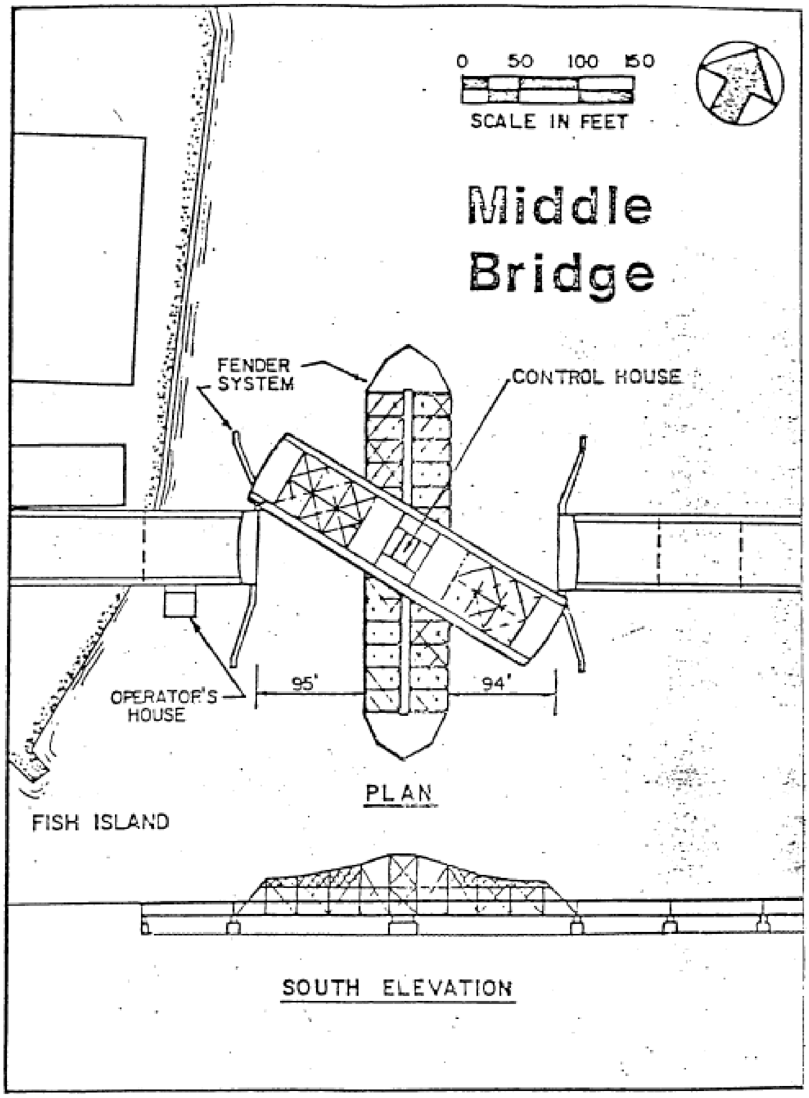
HARBOR NAVIGATIONAL CONSTRAINTS

The harbor presents several constraints or considerations to navigational traffic, including vessel size, vessel speed, wind and visibility issues, and required pilotage and tug fees. To navigate these various port constraints, a pilot is employed by the larger vessel to serve as an advisor to the vessel's master. To optimize vessel safety and transit, the International Maritime Organization provides direction to pilots, including a set of criteria that the pilot and vessel master should agree upon prior to navigation through the harbor. In November of 2009, the pilots revised and distributed their harbor transit parameters for New Bedford Harbor. This section details those parameters and limitations to marine traffic in the harbor.

All ports assess pilotage fees based on vessel size and distance of transit. For commercial vessels of 350 gross tons or over, pilotage in New Bedford Harbor, including passage through the bridge, is compulsory. This excludes most commercial fishing boats and recreation vessels. Pilotage applies to all foreign vessels and to U.S. vessels under registry. Northeast Marine Pilots, Inc. of Newport, RI, provides experienced pilots for transiting the harbor. In New Bedford, pilots charge for cargo ships transiting the harbor on a round trip basis. A surcharge is assessed for vessels that transit the bridge. The cost for larger boats to pass through the bridge is higher than vessels that do not need to get north of the bridge.

The hurricane barrier and New Bedford-Fairhaven Bridge present the largest physical constraint to marine traffic, due to the width limitations. The federal shipping channel narrows from 350 feet to 150 feet at the harbor's hurricane barrier. The east and west navigational channels at the New Bedford-Fairhaven Bridge further limit the vessels that can pass, with a navigational width of only 92 feet on either side of the bridge's central pier (see Figure 2.18).

Figure 2.18. New Bedford-Fairhaven Bridge Width and Clearance



Source: 1985 Environmental Assessment

The vertical clearance of the New Bedford-Fairhaven Bridge also presents a constraint to vessels that can pass without the bridge opening. The vertical clearance under the bridge is six feet. Most vessels are not able to pass underneath the bridge without opening the bridge. This includes small recreational boats. Comparatively, the I-195 highway bridge located north of the New Bedford-Fairhaven Bridge has a six-foot vertical clearance and the Coggeshall Street Bridge has a six-foot clearance. Both of these bridges are fixed and effectively create a northern barrier for vessels in the New Bedford Harbor.

The shipping channel and bridge also present limitations to vessel depth and speed. While the federal shipping channel is 30 feet deep, under keel clearance requirements results in an effective transit draft of 26 feet for vessels. New Bedford Harbor requires a slow speed transit. The speed limit in the harbor is 5 mph.

Wind speed is the primary concern that limits vessels ability to pass through the bridge. In all cases, if the wind exceeds 25 knots, no vessel under pilotage will transit the bridge due to the difficulty of safe transit in high winds. If the vessel is over 400 feet in length, this may be reduced to as little as 12 knots given the direction and based on the pilot's discretion. Current is not an issue at the bridge, but as noted, visibility and the amount of daylight is. Ships tend to use the 95-foot-wide west channel rather than the east channel that is 94 feet in width. There is also a concern with the amount of moored vessels above the bridge because it reduces maneuvering room. Boats moored at the east side marina are not always moored tightly to piers. This loose mooring further reduces the horizontal clearance through the channel where every foot of clearance is needed for many vessels to safety navigate.

According to procedures established by the tug boat pilots, which are based on their extensive experience with transiting the hurricane barrier opening, no vessel will transit through the hurricane barrier, harbor, or bridge if the visibility is less than one nautical mile. Vessels greater than 500 feet in length or over 80 feet in beam transit through the hurricane barrier in daylight only. Ships with poor visibility or large freeboard may also require daylight transit as a clear view of the two red lights on each side is critical for a night transit of the barrier. Proper operation of the aforementioned red lights is also a requirement for night transit.

Tidal currents within the harbor, including the areas around the New Bedford-Fairhaven Bridge, are generally considered weak. At the hurricane barrier, the maximum-recorded flood and ebb velocity average approximately 2.4 knots. Slack water occurs 30 minutes before the time of low or high water, with maximum current occurring at the same time when the greatest change of tidal height takes place. Tidal current is generally less of a consideration for transiting than wind and visibility.

Climate data for New Bedford shows that during summer months, the prevailing winds are from the south to the southwest. In the winter, the prevailing winds are from the north to the west. Limitations in visibility can occur rapidly in the harbor due to fog or heavy precipitation. The channels, anchorage and bridge passages are generally ice-free during the winter months except when periods of extreme cold are observed.

Large commercial vessels will generally employ harbor tugs for ship assist when maneuvering through the harbor and the bridge. While the maximum available tug for ship assist is listed at 2200 brake horsepower (BHP), available ship assist tugs have HP ratings between 800 and 1000 BHP.

When transiting the bridge, there is limited room to maneuver. Vessels approach slowly and then increase speed as they enter the bridge opening to insure they can exercise better control of the vessel in the passage. When northbound, there is not a lot of room north of the bridge, on the basin side, for stopping or maneuvering. Generally, two tugs are employed; one at the bow and one at the stern, but only one can assist once the vessel is in the bridge opening. The forward tug goes through the bridge first and can come back alongside once the bow clears.

Proceeding northbound, once the vessel passes through the bridge and enters the basin, it must slow and stop. On most diesel-propelled vessels without variable pitch propellers, the vessel must stop and reverse its engine. If there is an engine failure, the stern tug, which has a line up on the vessel, can be used to stop the forward motion of the ship. Once the vessel reaches a point where it can be lined up with the approach to the terminal, it is backed into the Maritime Terminals berth. The harbor pilots, or tug operators, noted that vessel engine failures can create difficult situations regarding vessel control and stopping distance since vessels transiting the bridge may be moving along at 6 knots through the opening.

Generally, vessels do not require tugs on transiting outbound. When departing outbound, the vessel leaves the berth and turns in the basin in a manner that allows it to line up with the west channel, which is used most of the time. Once lined up, it transits the opening and maintains its alignment with the Federal deep-water channel. The bridge central pivot point, associated piers and fendering system are located approximately in the center of the channel reducing the available passage space to less than half that of the authorized channel width. This makes the bridge, in the perspective of the pilots, the most vulnerable navigation safety area in the harbor. The opening is too narrow and the safety concern increases because there is not enough room for a tug to stay alongside the vessel to assist in transit and to control the vessel's movement as is common in most other harbors. During interviews for this study, harbor pilots noted that a 500-foot-long vessel with a 75-foot-wide beam is probably the biggest vessel that has transited the bridge in the past few decades.

The harbor pilots interviewed also expressed concern that vessels approaching the bridge opening do so on an angle. This is due to ships operating at slow maneuvering speeds. To the pilot and master, this makes it appear like there is less width than is actually present. Visibility from the bridge or bridge wings varies with each vessel, as well as how the bridge affects sight lines when maneuvering.

According to Maritime Terminals, two tugs are typically used which cost approximately $300 to $400 per hour based on horsepower. Average total cost for two tugs including maneuvering through the bridge and docking and undocking is around $7,200. Recently, a third tug was required for a specific vessel, which increased the cost for the three tugs to nearly $18,000.

Harbor pilots acknowledged that their restrictions are considered tight but are in place primarily for safety reasons, which are considered paramount. Restrictions can delay arrivals and departures at Maritime Terminals' berths. In some cases, ships have to divert to the State Pier, which is located south of the bridge. Cargo is then trucked to the refrigeration area at Maritime Terminals, which results in added costs for the shippers.

Allisions are infrequent but they do occur. No significant allisions have occurred in recent years. The majority of vessels that transit through the bridge are fishing vessels that do not require pilotage. Allisions with the bridge are more significant when a vessel under pilotage touches the bridge structure because of their size. Pilots take the ships and barges through the bridge and are required to report any allisions with bridge or fender structures.

At the north side of the bridge, the channel abuts the piers on the east side. The west navigational channel at the bridge provides more maneuvering room and is more frequently used. As previously discussed, the bridge opening width is a constraint and maneuvering is made more difficult by the vessels moored on Fish Island near the opening on the north side of the bridge. There have been no reported issues regarding vessels running aground in the basin beyond the bridge or collisions in the basin area.

U.S. Coast Guard representatives noted that a bridge with a single, wider channel would be preferable to the current bridge with two channel openings. Additionally, a bridge that offers additional vertical and horizontal clearance and a reinforced fendering system to protect the bridge structure would add an additional safety factor for ships and the bridge. The alignment with the shipping channel is not a problem with the current bridge. Additional channel depth north of the bridge could help the vessel maneuverability.

FEDERAL SAFETY ISSUES

Draw bridge openings are regulated by the Federal government with regulations contained in Title 33 (Navigation and Navigable Waters), Part 117 (Drawbridge Operation Regulations), Sections 117.1 to 117.59 (General Regulations and Specific Regulations) and 117.585 (New Bedford Harbor). The Sector Commander for Southeast New England has the authority to impose additional navigation requirements or restrictions depending on safety factors related to the prevention of marine accidents. Currently, there are no Coast Guard regulatory constraints related to the bridge. The Coast Guard acknowledges the restrictions that the New Bedford harbor pilots have put in place, including additional restrictions related to bridge transits. Section 117.585 lists the specific following regulations for the Acushnet River/New Bedford Harbor:

> The New Bedford-Fairhaven Bridge, mile 0.0, will open promptly, provided proper signal is given, on the following schedule:
>
> (a) The draw will be opened at any time for vessels whose draft exceeds 15 feet, for vessels owned or operated by the U.S. Government, the State of Massachusetts, or by local authorities.
>
> (b) Each opening of the draw, from the time vehicular traffic flow is stopped until the flow resumes, shall not exceed 15 minutes except for vessels whose draft exceeds 15 feet or in extraordinary circumstances.
>
> (c) From 6 p.m. on December 24 to midnight on December 25 and from 6 p.m. on December 31 to midnight on January 1, the draw shall open on signal if at least a two-hour notice is given by calling the number posted at the bridge.

PORT OF NEW BEDFORD MARINE FACILITIES

The Port of New Bedford includes several terminals on the New Bedford side of the harbor. The State Pier, Sprague Terminal, and the Marine Commerce Terminal (formerly South Terminal) located south of the bridge. The Maritime Terminal, Bridge Terminal, and the North Terminal are located north of the bridge.

Key components of the northern part of the harbor, known as the North Pier Area, are the direct highway connections to I-195 and Route 6 and the New Bedford Rail Yard. Connecting to the north and into the national railroad network, the 33.5-acre rail facility has 12 acres available for rail car staging and can accommodate 100 rail cars in its present configuration. These critical intermodal connections, along with a large amount of industrial land and potential for expanded berthing, provide the port with a viable and realistic seaport development zone. This includes further development of deep water berthing constrained only potentially by the existing bridge. Currently, the New Bedford-Fairhaven Bridge limits the size of vessels that can enter the north harbor area and limits the expansion potential of existing maritime uses within the Designated Port Area north of the bridge.

The majority berthing of the vessels north of the New Bedford-Fairhaven Bridge is generally occupied by commercial fishing vessels. There are, however, several deep-water commercial wharves and facilities for handling of cargo above the bridge. The following wharves and facilities handle vessels that transit the bridge:

- **Maritime Terminal.** The Maritime Terminal wharf is 600 feet long with 31 feet of berth depth and a 30-foot-wide cargo-handling apron. Direct ship to warehouse transfer is most efficient for their cargo handling activities. Ship's gear, if available, or a crane is used for ship to wharf transfer. The landing weights on the pier are sufficient to handle a crane and cargo. The facility on the New Bedford mainland has 3 million cubic feet of refrigerated storage. The facility handles frozen fish, food products and chilled agricultural products as well as break-bulk (general) cargo. The facility is owned by Maritime Terminal, Inc.
- **Bridge Terminal**. This wharf is 450 feet long with 28 feet of berth depth. The facility has 500,000 cubic feet of reefer (refrigerated) storage space. The facility handles frozen and chilled agricultural food products. Located on the northeast side of Fish Island, the facility is owned by Maritime Terminal, Inc.
- **Frionor Wharf (name possibly in transition)**. This wharf is 580 feet long, and averages 25 to 28 feet of berth depth. Operated as a processing and distribution center, the facility has 120,900 square feet of reefer and freeze space and 34,700 square feet of warehouse space. The facility handles frozen fish and is owned by Highliner, Inc.
- **North Terminal.** This 10-acre facility is located 400 yards northwest of Fish Island, and was built as the USEPA dredge spoils transfer site. The facility has 300 feet of bulkhead with an alongside draft of 15 feet. The facility has on dock rail with a roll-on/roll-off ramp (Ro-Ro) for barge transfer. The current long-term plan includes an expansion of the bulkhead to 1,200 feet and berth dredging. The facility is managed by the HDC.
- **Packer Marine Facility.** This two-acre facility is located adjacent to the New Bedford Rail Yard. The facility has a Roll-on/Roll-off (Ro-Ro) ramp and 200 feet of berthing space with 23 feet alongside. The facility is owned by R.M. Packer Co.
- **Marlees Seafood Facility.** This 2.9-acre facility with open storage and loading/unloading area. It also has a rail spur and 263 feet of bulkhead with an alongside draft of 20 feet. The facility is owned by Marlees Seafood, Inc. of New Bedford.
- **Revere Copper Facility.** This 12.5-acre facility has 3.6 acres of open storage and an 8.9-acre building. The facility is located at the north end of the basin and has a 520-foot bulkhead with 20 feet of water alongside. The site is owned by Revere Copper Products, Inc.

- **Kilburn Street Site.** This parcel consists of 4.8 acres of open storage and is currently northernmost of the facilities. The site has the potential capability to have a 550 foot bulkhead installed with an alongside draft of 30 feet. It is owned by Revere Copper Products, Inc.

Located south of the New Bedford-Fairhaven Bridge, the other main commercial facility available in New Bedford is the State Pier. This facility is frequently used to off-load cargo, but it is weight limited and has no crane. The new Marine Commerce Terminal at the southern end of the harbor is currently under construction, but its business model is designed for heavy lift and project cargo, not for fruit or agricultural products. Use of these facilities require a truck dray from their location to the Maritime Terminals facility located north of the bridge, which creates an additional expense to the handling cost.

2.6.2 Planned Improvements

The City of New Bedford currently has no plans to change the zoning from industrial activities north of the bridge or alter the uses within the DPA. Currently Marine industrial activities are the primary business along the west side of the north harbor. HDC officials noted that discussions about use of these properties for other purposes occurs occasionally, but that future non-industrial uses are unlikely. The HDC indicated that State Pier is the only area with potential for some mixed maritime and tourism activities. The new Marine Commerce Terminal area and the area north of the bridge are more appropriate for industrial activities. The HDC has expressed interest in developing some of the north properties of the basin into another offshore wind farm support area, north of the current EPA facility.

The new Marine Commerce Terminal is the primary facility for port expansion at this point. The project will be complete in mid-2015. Dredging is already underway and there is some discussion about potentially widening the planned access channel because of difficulties regarding the movement of ships down the new channel and docking of vessels. The landside area will be the last portion developed. The Marine Commerce Terminal is a $113 million project, comprised of approximately 21 acres designed for heavy weight cargo handling such as project components.

2.7 VEHICULAR TRANSPORTATION

2.7.1 Data Collection & Methodology

TRAFFIC COUNTS

To review traffic patterns within the Regional Study Area, traffic volume data was collected in the form of Video Turning Movement Counts (VTMCs), Automatic Traffic Recorders (ATR) Counts, and pedestrian counts. MassDOT closed the New Bedford-Fairhaven Bridge to vehicular traffic for necessary structural repairs in April 2014. The traffic counts were conducted twice at the same locations during April 2014; once during a period when the New Bedford-Fairhaven Bridge was closed (April 8, 2014) and once when the bridge was open (April 17, 2014).

When the bridge was closed, VTMCs and ATR counts were performed in the Regional Study Area. These counts were reviewed to note the change in traffic flow patterns and potential detour routes that drivers may travel during the bridge closure. The following detour plan was posted for drivers by MassDOT:

- Route 6 westbound traffic - travel north along Main Street, left onto Howland Road until Coggeshall Street, and left onto Route 18 southbound.
- Route 6 eastbound traffic - travel along Route 18 northbound onto I-195 eastbound at Exit 15 to Exit 18 and onto Route 240 southbound.

The VTMC locations are listed in Table 2.11. The VTMCs included the following vehicle classifications: cars, trucks, buses, pedestrians, and bicycles. Each were counted in 15-minute intervals for the following peak periods:

- Weekday AM Peak Period: 6:30 AM – 9:30 AM
- Weekday PM Peak Period: 3:30 PM – 6:30 PM

Table 2.11. VTMC Locations during Bridge Closure

No.	Traffic Control	Intersection
1	Signal	Coggeshall Street and Belleville Avenue
2	Signal	Hillman Street and Purchase Street
3	Signal	Kempton Street and Purchase Street
4	Signal	Bridge Street and Alden Road
5	Signal	Bridge Street and Route 240

Table 2.12 shows the locations where ATR counts were collected during the bridge closure.

Table 2.12. ATR Locations during Bridge Closure

No.	Location Name
1	Route 18 SB off-ramp
2	Route 18 NB off-ramp
3	EB ramp from I-195 to SB Route 240
4	NB ramp from Route 240 to EB I-195
5	NB Route 240 to WB I195
6	Mt Pleasant Street at EB I-195
7	County Street at Parker Street
8	Route 140 North of Route 6
9	Coggeshall Street Bridge
10	Adams Street (Linden Avenue to Elm Street)
11	Main Street (North Street to Oxford Street)

To analyze traffic patterns when the bridge is open to vehicular traffic, MassDOT provided historical and recent traffic counts (hourly and daily) on select roadways in the Regional Study Area. VTMCs were conducted at 36 locations within the Regional Study Area on April 17, 2014 (Thursday). Although the bridge was open to vehicular traffic during this period, the number of lanes across the bridge was restricted due to the on-going construction activities. It is assumed that this restriction has resulted in decreased vehicle volumes through out the local study area and that the vehicle counts do not represent the full demand for vehicular travel. It is assumed that upon completion of construction activities, vehicle volumes will increase.

The VTMCs were collected for cars, trucks, buses, pedestrians, and bicycles for the following peak periods:

- Weekday AM Peak Period: 6:30 AM – 9:30 AM
- Weekday PM Peak Period: 3:30 PM – 6:30 PM

VTMCs were collected in 15-minute intervals and were used to develop peak-hour traffic volume. The 36 locations where the VTMCs were collected are listed in Table 2.13.

Table 2.13. VTMC Locations, No Bridge Closure for Construction

No.	Traffic Control	Intersection
1	Signal	Route 6 (Kempton Street) and Route 140 (Brownell Ave)
2	Signal	Kempton Street and Cornell Street
3	Signal	Kempton Street and Rockdale Avenue
4	Signal	Mill Street and Rockdale Avenue
5	Signal	Mill Street and Cottage Street
6	Signal	Kempton Street and Cottage Street
7	Signal	Mill Street and County Street
8	Signal	Kempton Street and County Street
9	Signal	Kempton Street/Mill St and Purchase Street/Pleasant Street
10	Signal	Route 6 (Huttleston Ave) and Middle Street
11	Signal	Route 6 (Huttleston Ave) and Main Street
12	Signal	Route 6 (Huttleston Ave) and Green Street
13	Signal	Route 6 (Huttleston Ave) and Adams Street
14	Signal	Route 6 (Huttleston Ave) and Holcomb Street
15	Signal	Route 6 (Huttleston Ave) and Bridge Street
16	Signal	Route 6 (Huttleston Ave) and Alden Road
17	Signal	Route 6 (Huttleston Ave) and Route 240 (Sconticut Neck
18	Signal	Bridge Street and Alden Road
19	Signal	Bridge Street and Route 240
20*	Signal	Union Street and Route 18 (JFK Memorial Hwy)
21	Signal	Hillman Street and Purchase Street
22	Stop	Hillman Street and Northbound JFK Memorial Hwy on-ramp
23	Stop	Purchase Street and southbound JFK Memorial Hwy off-
24	Stop	Linden Street and County Street
25	Stop	Washburn Street and Belleville Avenue
26	Stop	Coggeshall Street and Mount Pleasant Street
27	Signal	Coggeshall Street and County Street
28	Signal	Coggeshall Street and Purchase Street
29	Signal	Coggeshall Street and Ashley Boulevard
30	Signal	Coggeshall Street and Acushnet Avenue
31	Stop	Coggeshall Street and N Front Street
32	Signal	Coggeshall Street and Belleville Avenue
33	Signal	Coggeshall Street and WB I-195 off-ramp
34	Signal	Howland Road and Main Street
35	Signal	Howland Road and Adams Street
36	Stop	Howland Road and Alden Road

**Almost no vehicular volumes were counted on Union Street potentially due to street closure.*

Automated Traffic Recorder (ATR) counts were provided by MassDOT for 24 locations. A list of the locations is shown in Table 2.14. The counts for locations numbered 4 to 10, 12 to 15, and 20 were collected in 15-minute increments for a seven-day period in April 2014. ATR counts for locations numbered 1-3, 11, 16 to 19, and 21-24 were collected from previous MassDOT projects.

Table 2.14. ATR Locations, No Bridge Closure for Construction

No.	Year	Location Name
1	2012	Route 6 west of RT 140/Brownell Ave
2	2013	Route 6 west of Watson Street – Eastbound and Westbound
3	2011	Rockdale Avenue between Kempton Street and Mill Street – Northbound and Southbound
4	2014	Mill Street and Hill Street
5	2014	Kempton Street and County Street
6	2014	Route 6 east of Pleasant Street – Eastbound and Westbound
7	2014	Southbound JFK Memorial Highway ramp to Eastbound Route 6
8	2014	Route 6 on Bridge at Fish Island – Eastbound and Westbound
9	2014	Route 6 (Huttleston Ave) on east end of Bridge – Eastbound and Westbound
10	2014	Huttleston Ave and Holcomb Street – Eastbound and Westbound
11	2011	Route 240 south of I-195 – northbound and southbound
12	2014	Eastbound ramp from I-195 to southbound Route 240
13	2014	Northbound ramp from Rt. 240 to Eastbound I-195
14	2014	Westbound off-ramp to southbound Rt. 240
15	2014	Northbound Route 240 to WB I-195
16	2012	Coggeshall Street Bridge
17	2012	Coggeshall Street and Ashley Boulevard – Eastbound and Westbound
18	2012	I-195 east of Route 140
19	2012	Northbound Route 140 ramp to Eastbound I-195
20	2014	Eastbound I-195 ramp to southbound Rt. 140
21	2012	Route 140 North of Route 6 – Northbound and Southbound
22	2012	Mt Pleasant Street at I-195 – Northbound and Southbound
23	2012	County Street and Parker Street – Northbound and Southbound
24	2012	Union Street west of County Street –Eastbound and Westbound

**2014 counts were conducted during Bridge Open.*

FIELD OBSERVATIONS

As part of the data collection effort, field visits were conducted to obtain current intersection geometries, traffic control, signal timing and phasing information and traffic operating conditions. The intersection geometries included information such as lane configurations, lane widths, turning bays, crosswalk and sidewalks, bus stop locations, channelized right-turns and bike or bus lanes. The traffic control information collected includes location of stop/yield signs, signal heads, pedestrian push buttons and turn restrictions. The signal timing and phasing information and the type of signal operation was also noted for all signalized intersections. The operating conditions at each intersection are noted in the form of average queue lengths on each approach. The queue lengths were measured for about two to three cycle lengths to determine typical existing peak hour operating conditions. Any unusual conditions such as illegal traffic maneuvers and vehicles experiencing significant delays were noted. A summary of field observations is included as part of Section 2.7.2.

SIGNAL TIMING PLANS

Twenty-nine out of the 36 intersections are signal controlled while the remaining intersections are stop controlled. The signal timing splits, phasing, offsets, actuation, and coordination information for each intersection provided by MassDOT were used where available and were supplemented by observed signal timing collected in the field. The signal timing plans provided by MassDOT were compared against the observed signal timing collected in the field. The signal timing that most accurately reflects the existing operating conditions were used in the capacity analysis.

Table 2.15 indicates the intersections for which signal-timing plans provided by MassDOT were used in the capacity analysis. Table 2.15 also indicates the intersections for which observed signal timing collected in the field were used in the capacity analysis.

Table 2.15. Intersections with Signal Timing Plans Provided by MassDOT

Intersections with Timing Plans
Route 6 (Kempton Street) and Route 140 (Brownell Ave)
Kempton Street and Cornell Street
Kempton Street and Rockdale Avenue
Mill Street and Rockdale Avenue
Mill Street and Cottage Street
Kempton Street and Cottage Street
Mill Street and County Street
Kempton Street and County Street
Route 6 (Huttleston Ave) and Middle Street
Route 6 (Huttleston Ave) and Main Street
Route 6 (Huttleston Ave) and Green Street
Route 6 (Huttleston Ave) and Adams Street

Intersections with Timing Plans
Route 6 (Huttleston Ave) and Holcomb Street
Route 6 (Huttleston Ave) and Alden Road
Route 6 (Huttleston Ave) and Route 240 (Sconticut Neck Road)
Bridge Street and Alden Road
Bridge Street and Route 240
Union Street and Route 18 (JFK Memorial Highway)
Coggeshall Street and WB I-195 off-ramp
Howland Road and Main Street
Howland Road and Adams Street
Kempton Street/Mill Street and Purchase Street/Pleasant Street
Route 6 (Huttleston Ave) and Bridge Street
Hillman Street and Purchase Street
Coggeshall Street and County Street
Coggeshall Street and Purchase Street
Coggeshall Street and Ashley Boulevard
Coggeshall Street and Acushnet Avenue
Coggeshall Street and Belleville Avenue

TRAVEL TIME SURVEYS

Travel times and delay runs were conducted on April 17, 2014 and May 7, 2014 during AM and PM peak periods. The data collection hours were 6:30 AM to 9:30 AM and 3:30 PM to 6:30 PM. The data was collected using the floating car method.[1] Holux M-241 Global Positioning System (GPS) devices were placed in each car to collect detailed time and distance measurements.

The travel time and delay runs were recorded along the following roadways:

- Route 6 corridor between Route 140 and Route 240;
- Coggeshall Street corridor between Purchase Street and Main Street;
- I-195 section between Route 140 and Route 240;
- Route 140 corridor between I-195 and Route 6;
- Route 240 corridor between I-195 and Route 6;
- Purchase Street corridor between Coggeshall Street and Route 6; and
- Main Street corridor between Coggeshall Street and Route 6.

[11] The floating car method involves driving a specific corridor between pre-determined points at the prevailing speed of traffic on the roadway (essentially passing as many cars as pass the data collection vehicle). The vehicle location is then recorded over time to allow for the calculation of a mean speed.

Detailed time and distances were analyzed using iTREC, a stand-alone software package developed by HDR. It uses GPS logger data to calculate speed along a corridor, delay experienced by the vehicle, and the number of stops during travel.

Table 2.16 shows average speed and travel time along the following segments (see Figure 2.19):

1. Coggeshall Street between Purchase Street and Main Street;
2. Route 6 corridor between Route 140 and Purchase Street;
3. Route 6 between Purchase Street and Main Street (New Bedford-Fairhaven Bridge);
4. Route 6 corridor between Main Street and Route 240;
5. I-195 between Route 140 and Route 240;
6. Main Street between Huttleston Avenue and Howland Road;
7. Purchase Street between Route 6 (Kempton Street) and Coggeshall Street;
8. Route 240 corridor between I-195 and Route 6; and
9. Route 140 corridor between I-195 and Route 6.

Figure 2.19. Travel Time Run Routes

Table 2.16. Average Speed and Travel Time Summary

Segment	Direction	Peak Period	Average Speeds (mph)	Average Travel Time
1. Coggeshall Street between Purchase Street and Main Street	Eastbound	AM	23.65	3min 46sec
	Eastbound	PM	21.57	3min 52sec
	Westbound	AM	29.19	3min 12sec
	Westbound	PM	17.03	4min 05sec
2. Route 6 between Route 140 and Purchase Street	Eastbound	AM	25.09	3min 43sec
	Eastbound	PM	24.2	3min 38sec
	Westbound	AM	26.17	3min 17sec
	Westbound	PM	25.17	3min 23sec
3a. Route 6 between Purchase Street and Main Street (New Bedford-Fairhaven Bridge open)	Eastbound	AM	30.52	2min 28sec
	Eastbound	PM	32.7	2min 13sec
	Westbound	AM	28.01	2min 39sec
	Westbound	PM	28.11	2min 36sec
3b. Route 6 between Purchase Street and Main Street (New Bedford-Fairhaven Bridge closed)	Eastbound	AM	8.08	8min 37sec
	Eastbound	PM	5.7	12min 17sec
	Westbound	AM	8.26	8min 31sec
	Westbound	PM	5.03	14min 07sec
4. Route 6 between Main Street and Route 240	Eastbound	AM	15.31	6min 09sec
	Southbound	PM	16.01	5min 52sec
	Westbound	AM	12.64	7min 26sec
	Westbound	PM	13.02	7min 12sec
5. I -195 between Route 140 and Route 240	Eastbound	AM	60.26	2min 44sec
	Southbound	PM	63.38	2min 37sec
	Westbound	AM	61.82	3min 02sec
	Westbound	PM	55.92	3min 21sec
6. Main St between Huttleston Avenue and Howland Road	Northbound	AM	32.85	1min 51sec
	Northbound	PM	29.7	2min 00sec
	Southbound	AM	33.95	1min 47sec
	Southbound	PM	32.33	1min 56sec
7. Purchase Street between Kempton Street and Coggeshall Street	Northbound	AM	21.8	4min 09sec
	Northbound	PM	22.3	4min 04sec
	Southbound	AM	28.78	2min 42sec
	Southbound	PM	25.48	3min 22sec
8. Route 240 between I-195 and Route 6	Northbound	AM	34.79	3min 22sec

Segment	Direction	Peak Period	Average Speeds (mph)	Average Travel Time
	Northbound	PM	45.49	2min 34sec
	Southbound	AM	42.54	2min 13sec
	Southbound	PM	36.25	2min 37sec
9. Route 140 between I-195 and Route 6	Northbound	AM	49.59	1min 39sec
	Northbound	PM	51.18	1min 36sec
	Southbound	AM	43.61	2min 37sec
	Southbound	PM	22.81	5min 31sec

CRASH DATA COLLECTION

The most recent three-year available crash database (2009-2011) for New Bedford and Fairhaven was obtained from MassDOT. This database includes information such as crash location, number of vehicles, number of injuries or fatalities, type of collision, vehicle direction, and weather and road surface conditions.

The crash data was plotted in GIS to spatially represent the crashes within the Regional Study Area. All the crashes within 75 feet radius from each count intersection were included and plotted by year on the maps provided in Appendix B. The crash data was analyzed to identify high crash locations along Route 6 and potential detour routes. A detailed discussion of the crashes involving fatalities, bicycles, and pedestrians is provided in Section 2.7.4.

PEAK HOUR DETERMINATION

The peak hours used in the capacity analysis were calculated based on the VTMC data collected during the three-hour AM and PM peak hour periods. The VTMC data, which is organized in 15-minute intervals, was analyzed by calculating the peak hour for each intersection and then for all intersections combined. The peak hours for the weekday AM and PM peak hour analyses were determined to be as follows:

- Weekday AM Peak hour: 7:30 AM – 8:30 AM
- Weekday PM Peak hour: 4:00 PM – 5:00 PM

CAPACITY ANALYSIS

A capacity analysis was conducted for the study locations to identify existing and future traffic conditions within the Local Study Area. Capacity analysis is a method by which traffic volumes are compared to the calculated roadway and intersection capacities to evaluate estimated future traffic conditions. The Transportation Research Board describes the methodology used in the 2000 Highway Capacity Manual (HCM). In general, the terminology “Level of Service” (LOS) is used to provide a “qualitative” evaluation based on certain “quantitative” calculations related to empirical values.

As described in the 2000 HCM, LOS ranges from A to F. In general, LOS A represents the best traffic operating condition and LOS F represents the worst condition (typically associated with congestion and long delays). The LOS values for unsignalized and signalized intersections are defined in terms of average delay (seconds delay/vehicle). Delay is used as a measure of driver discomfort, frustration, and efficiency. See Table 2.17 for the LOS criteria for signalized and unsignalized intersections.

Table 2.17. 2000 HCM LOS Criteria for Signalized and Unsignalized Intersections

LOS	Average Control Delay (seconds/vehicle) Signalized	Average Control Delay (seconds/vehicle) Unsignalized
A	Less than or equal to 10.0	Less than or equal to 10.0
B	10.0 to 20.0	10.0 to 15.0
C	20.0 to 35.0	15.0 to 25.0
D	35.0 to 55.0	25.0 to 35.0
E	55.0 to 80.0	35.0 to 50.0
F	Greater than 80.0	Greater than 50.0

Source: HCM 2000

TRAFFIC ANALYSIS TOOL

The balanced existing traffic volume data and other supporting data (geometrics, official signal timing, and detailed field inventory information) were used to develop preliminary existing peak hour Synchro analysis. A capacity analysis was conducted for 36 intersections in the Regional Study Area to determine the existing traffic operating conditions. This study used the Synchro (Version 8) intersection analysis software to calculate vehicular delay at the study intersections. Synchro follows the HCM 2000 methodologies for evaluating signalized and unsignalized intersection operations.

2.7.2 Existing Traffic Conditions & Volumes

MAJOR ROADWAYS

Several major roadways are located within the Regional Study Area. An overview of each roadway, including number of travel lanes, FHWA National Highway System designation, and existing traffic volumes, is provided below.

Route 6 is a major cross-country U.S. highway that runs east to west connecting the New Bedford and Fairhaven regions via the New Bedford-Fairhaven Bridge. East of the bridge in Fairhaven, Route 6 becomes Huttleston Avenue. Route 6 divides at Rockdale Avenue into Kempton Street as the eastbound section and Mill Street as the westbound section. Parking is allowed on Mill Street and Kempton Street. Between Rockdale Avenue and Cottage Street along Route 6 there are pavement markings designating the portion of the roadway for preferential use by bicyclists. Route 6 west of the bridge in New Bedford has a posted speed limit of 25 mph and

Route 6 east of the bridge has a posted limit of 35 mph. Route 6 is a Principal Arterial between Route 18 and Route 240. Between Route 140 and Rockdale Avenue and Purchase Street and Route 18, Route 6 is designated as an Urban Principal Arterial. Kempton Street and Mill Street are designated as a Urban Minor Arterials between Rockdale Avenue and Purchase Street.

Route 140 is a major state highway that runs north to south in New Bedford. Route 140 has two 12-foot wide lanes and a 10-foot wide shoulder in each direction. Northbound and southbound are separated by a median barrier. It connects Route 6 and I-195 in the western portion of the Local Study Area. The northbound section of Route 140 has a posted speed limit of 65 mph and the southbound section has a posted speed limit of 45 mph. Route 140 is a Principal Arterial north of Route 6.

Route 240 is a major state highway that runs north to south in Fairhaven. Route 240 has two 12-foot wide lanes and a 10-foot wide shoulder in each direction. Northbound and southbound are separated by a grass median. It connects Huttleston Avenue and I-195. The posted speed limit on the northbound section is 50 mph and 40 mph along the southbound section. Route 240 is a Principal Arterial north of Route 6.

Interstate 195 (I-195) is an interstate highway that runs east to west through New Bedford and Fairhaven. I-195 has two 12-foot wide lanes and a 10-foot wide shoulder in each direction. A median barrier divides eastbound and westbound lanes. I-195 connects Route 140 with Route 240. Route 18 also connects with I-195 near Coggeshall Street. The posted speed limit along I-195 is 55 mph.

Route 18 is a major state highway that runs north to south in New Bedford. Route 18 has three 11-foot wide lanes and a 10-foot wide shoulder in each direction. A median barrier separates northbound and southbound lanes. Route 18 connects Union Street and I-195 and passes through Route 6. The posted speed limit along Route 18 is 50 mph. Route 18 between Route 6 and I-195 is a Principal Arterial.

Main Street is a major arterial road that runs north to south in the Town of Fairhaven. Main Street has one 15-foot wide lane in each direction and it connects with Huttleston Avenue and Howland Road. Parking is allowed on most sections of Main Street between Huttleston Avenue and Howland Road. The posted speed limit along Main Street is 30 mph. Main Street is an Urban Minor Arterial.

Purchase Street is a major arterial road that runs north to south in the City of New Bedford. Purchase Street has one 16-foot wide lane in each direction, which splits into two lanes near Route 6 and Coggeshall Street. Purchase Street connects Route 6 (Kempton Street) and Coggeshall Street, and also connects with Route 18. The posted speed limit along Purchase Street is 25 mph. Purchase Street is an Urban Minor Arterial between Union Street and I-195.

Figure 2.20. Regional Study Area Intersections

EXISTING INTERSECTION GEOMETRY

Field inventories were conducted for all 36 intersections within the Regional Study Area to determine street geometry including lane widths, lane use configurations, traffic control devices, curbside regulations, parking, bus pick up and drop off locations, and permitted movements at each intersection (see Figure 2.20). The following text describes the existing intersection geometries based on field observations, Google Earth aerial imagery, and traffic signal plans provided by MassDOT. Each intersection has been given a unique identification number that is used throughout this section for consistency. Photographs and aerials of each intersection are provided throughout this section (see Figures 2.21 to 2.35).

1. **Route 6 (Kempton Street) and Route 140 (Brownell Avenue).** This is a four-legged signalized intersection with two-way Route 6 (Kempton Street) forming the eastbound and westbound approaches, Brownell Ave as the northbound approach, and Route 140 as the southbound approach. Kempton Street eastbound has one 11-foot-wide left-turn bay, 12-foot-wide through lane and 15-foot-wide through/right-turn lane. Kempton Street westbound has one 10-foot-wide left-turn bay, two 11-foot-wide through lanes and one 11-foot-wide channelized right turn lane. Brownell Avenue northbound has one 18-foot-wide left/through/right-turn lane. Route 140 southbound has one 11-foot-wide left/through lane, one 11-foot-wide through lane and one 16-foot-wide channelized right-turn lane. Kempton Street has sidewalks and raised medians on both the approaches.
2. **Route 6 (Kempton Street) and Cornell Street.** This is a three-legged signalized intersection with two-way Kempton Street forming the eastbound and westbound approaches and two-way Cornell Street forming the southbound approach. Kempton Street eastbound has one 10-foot-wide left-turn bay and two 12-foot-wide through lanes. Kempton Street westbound has one 12-foot-wide through lane and one 12-foot-wide through/right-turn lane. Cornell Street southbound has one 15-foot-wide left/right-turn lane. Kempton Street eastbound approach and Cornell Street southbound approach has a 10-foot-wide pedestrian crosswalk. Kempton Street has a raised median and a two-foot-wide shoulder on both the approaches. Both Cornell Street and Kempton Street have sidewalks. A nearside bus stop is located 50 feet from the intersection on the Kempton Street eastbound approach.

Figure 2.21. Regional Study Area Intersections 1 and 2

3. **Kempton Street and Rockdale Avenue.** This is a four-legged signalized intersection with two-way Kempton Street being the eastbound and westbound approaches and Rockdale Avenue forming the northbound and southbound approaches. Kempton Street eastbound has a 12-foot-wide left-turn bay, one 12-foot-wide through lane and a 12-foot-wide right turn lane. Kempton Street westbound has one 21-foot-wide left/through/right-turn lane. Rockdale Avenue northbound has one 12-foot-wide left-turn lane and one 12-foot-wide through/right-turn lane. Rockdale Avenue southbound has one 13-foot-wide left-turn/through/right-turn lane. All the approaches have 10-foot-wide pedestrian crosswalks, sidewalks, and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. Southbound Rockdale Avenue has a 15-foot-wide angular parking lane. All the approaches have a "No Turn on Red" sign. There is a nearside bus stop on Rockdale Avenue northbound approach 80 feet away from the intersection, a far-side bus stop on Rockdale Avenue southbound 80 feet away from the intersection and a far-side bus stop on eastbound Kempton Street 110 feet away from the intersection approach.
4. **Mill Street and Rockdale Avenue.** This is a four-legged signalized intersection with one-way Mill Street forming the westbound approach and two-way Rockdale Avenue forming the northbound and southbound approaches. Mill Street westbound approach has one 12-foot-wide left/through/right-turn lane. Rockdale Avenue northbound approach has one 10-foot-wide left-turn bay and 11-foot-wide through lane. Rockdale Avenue southbound approach has one 11-foot-wide through lane and 10-foot-wide right-turn bay. All of the approaches have 10-foot-wide pedestrian crosswalks, sidewalks, and bicycle symbols on the intersection approaches intending the actuation of bicycle green signal. Southbound Rockdale Avenue has a 15-foot-wide angular parking lane after the intersection. Westbound Mill Street has a 7-foot-wide parking lane and parking is not allowed between the corner and 33 feet before the intersection. On the other side of the intersection, on westbound Mill Street, there is a 15-foot-wide striped parking lane. A nearside bus stop is located on westbound Mill Street 25 feet away from the intersection and on southbound Rockdale Avenue, 50 feet away from the intersection approach.

Figure 2.22. Regional Study Area Intersections 3 and 4

5. **Mill Street and Cottage Street.** This is a four-legged signalized intersection with one way Mill Street forming the westbound approach and two way Cottage Street forming the northbound and southbound approaches. Mill Street westbound approach has one 12-foot-wide left/through/right-turn lane. Cottage Street northbound has one 13-foot-wide left/through lane. Cottage Street southbound has one 13-foot-wide through/right-turn lane. All the approaches have 10-foot-wide pedestrian crosswalks, sidewalks, and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. Westbound Mill Street has a 7-foot-wide parking lane and a 5-foot-wide shoulder. There is a nearside bus stop on westbound Mill Street approach 25 feet away from the intersection approach.
6. **Kempton Street and Cottage Street.** This is a four-legged signalized intersection with one way Kempton Street forming the eastbound approach and two way Cottage Street forming the northbound and southbound approaches. Kempton Street eastbound approach has one 10-foot-wide left-turn lane, one 11-foot-wide through lane and one 10-foot-wide right-turn lane. Cottage Street northbound approach has one 13-foot-wide through/right-turn lane. Cottage Street southbound approach has one 13-foot-wide left/through lane. All the approaches except southbound Cottage Street have 8-foot-wide pedestrian crosswalks. All the approaches have sidewalks and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. Eastbound Kempton Street has a 10-foot-wide parking lane on the far side of the intersection. A nearside bus stop is located on the eastbound Kempton Street 40 feet away from the intersection approach and on the southbound Cottage Street 25 feet away from the intersection approach.
7. **Mill Street and County Street.** This is a four-legged signalized intersection with one-way Mill Street westbound approach and two way County Street northbound and southbound approaches. Mill Street westbound approach has one 12-foot-wide left/through/right-turn lane with a 5-foot-wide shoulder. County Street northbound approach has one 11-foot-wide left-turn bay and one 13-foot-wide through lane. County Street southbound approach has one 12-foot-wide through/right-turn lane. All the approaches have 10-foot-wide crosswalks, sidewalks, and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. Westbound Mill Street has a 7-foot-wide parking lane on the approach as well as the receiving lane. A nearside bus stop is located on the westbound Mill Street 50 feet away from the intersection approach.
8. **Kempton Street and County Street.** This is a four-legged signalized intersection with one way Kempton Street forming the eastbound approach and two-way County Street forming the northbound and southbound approaches. Kempton Street eastbound approach has one 10-foot-wide left-turn lane, one 11-foot-wide through lane and one 10-foot-wide right-turn lane. County Street northbound approach has one 14-foot-wide through/right-turn lane. County Street southbound approach has one 14-foot-wide left/through lane. All three approaches have pedestrian crosswalks, sidewalks, and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. Parking is allowed on the receiving southbound County Street and eastbound Kempton Street. A nearside bus stop is located 35 feet away from the intersection on the County Street southbound approach.

Figure 2.23. Regional Study Area Intersections 5 to 8

9. **Kempton Street/Route 6 and Purchase Street/Pleasant Street**. Locally known as the "Octopus Intersection," this is a four-legged signalized intersection with two-way Kempton Street and Route 6 forming the eastbound and westbound approaches and two-way Pleasant Street forming the northbound and Purchase Street forming the southbound approach respectively. Foster Street forms the receiving southbound approach. Kempton Street eastbound approach has one 12-foot-wide left-turn lane, one 18-foot-wide through lane and 18-foot-wide channelized right turn joining in to Foster Street. Mill Street westbound approach has one 12-foot-wide left-turn lane, one 12-foot-wide through lane and one 12-foot-wide right-turn lane. Pleasant Street northbound approach has one 15-foot-wide left-turn lane, two 15-foot-wide through lanes and one 18-foot-wide channelized right-turn lane. Purchase Street southbound approach has one 18-foot-wide left/through lane and one 15-foot-wide through/right-turn lane. Westbound and eastbound approach have raised median. All of the approaches have 8-foot-wide pedestrian crosswalks.

Figure 2.24. Regional Study Area Intersections 9, 21 and 22

10. **Route 6 (Huttleston Avenue) and Middle Street**. This is a three-legged signalized intersection with two-way Huttleston Avenue forming the eastbound and westbound approaches with raised medians and one way Middle Street forming the northbound approach. The Huttleston Avenue eastbound approach has one 12-foot-wide through lane and one 12-foot-wide through/right-turn lane. The Huttleston Avenue westbound approach has one 11-foot-wide left/through lane and one 11-foot-wide through lane. Middle Street northbound approach has one 15-foot-wide left/right-turn lane. The Huttleston Avenue eastbound approach and Middle Street northbound approach has 8-foot-wide pedestrian crosswalks. Both of the approaches to Huttleston Avenue have bicycle symbols on the intersection approach intending the actuation of bicycle green signal. There is a bus stop on westbound approach of Huttleston Avenue in the middle of the intersection.
11. **Route 6 (Huttleston Avenue) and Main Street.** This is a four-legged signalized intersection with two-way Huttleston Avenue forming the eastbound and westbound approaches and two-way Main Street forming the northbound and southbound approaches. Huttleston Avenue eastbound approach has one 10-foot-wide left-turn lane, one 11-foot-wide through lane and one 11-foot-wide through/right-turn lane. Huttleston Avenue westbound approach has one 10-foot-wide wide left-turn bay, one 11-foot-wide through lane, and one 11-foot-wide through/right-turn lane. Main Street northbound and southbound approaches have one 15-foot-wide left/through/right-turn lane each. All the approaches have 8-foot-wide pedestrian crosswalks, sidewalks, and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. Raised medians are located on the eastbound and westbound Huttleston Avenue approaches and there is a far-side bus stop on the eastbound Huttleston Avenue 60 feet away from the intersection approach.
12. **Route 6 (Huttleston Avenue) and Green Street.** This is a four-legged signalized intersection with two-way Huttleston Avenue forming the eastbound and westbound approaches and two way Green Street forming the northbound and southbound approaches. Huttleston Avenue eastbound and westbound approaches have one 11-foot-wide left/through lane and one 11-foot-wide through/right-turn lane each. Green Street northbound and southbound approaches have one 13-foot-wide left/through/right-turn lane each. Huttleston Avenue has raised medians on both the approaches. All the four approaches have 8-foot-wide pedestrian crosswalks, sidewalks, and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. A nearside bus stop is located 50 feet away from the intersection on the Huttleston Avenue eastbound approach and 15 feet away from the intersection on the Huttleston Avenue westbound approach.
13. **Route 6 (Huttleston Avenue) and Adams Street.** This is a four-legged signalized intersection with two-way Huttleston Avenue forming the eastbound and westbound approaches and two-way Adams Street forming the northbound and southbound approaches. Huttleston Avenue eastbound approach has one 11-foot-wide left/through lane and one 11-foot-wide through/right-turn lane and westbound approach has one 12-foot-wide left/through lane and one 12-foot-wide through/right-turn lane. The Adams Street northbound approaches have one 13-foot-wide left/through/right-turn lane and Adams Street southbound has one 15-foot-wide left/through/right-turn lane. Huttleston Avenue eastbound approach has a raised median until the intersection. All the four approaches have eight-foot-wide pedestrian crosswalks, sidewalks, and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. There is a four-foot-wide shoulder on the westbound approach of the Huttleston Avenue and a one-foot-wide shoulder on the

eastbound approach on both sides. There is a nearside bus stop 50 feet away from the intersection on each of the eastbound and westbound approaches of the Huttleston Avenue.

Figure 2.25. Regional Study Area Intersections 10 to 13

14. **Route 6 (Huttleston Avenue) and Holcomb Street.** This is a four-legged signalized intersection where the southbound approach is driveway to a parking lot. Huttleston Avenue forms the eastbound and westbound approaches and Holcomb Street forms the northbound and approach. Huttleston Avenue eastbound and westbound approach has one 12-foot-wide left/through lane and one 12-foot-wide through/right-turn lane each. Holcomb Street northbound approach has one 15-foot-wide left/through/right-turn lane. Holcomb Street southbound approach has one 20-foot-wide left/through/right-turn lane. All the approaches except westbound Holcomb Street have 8-foot-wide pedestrian crosswalks. All the approaches have sidewalks. There is a nearside bus stop 80 feet away from the intersection on the eastbound approach of Huttleston Avenue and a far-side bus stop 120 feet away from the intersection on the westbound Huttleston Avenue.
15. **Route 6 (Huttleston Avenue) and Bridge Street.** This is a four-legged signalized intersection with two-way Huttleston Avenue forming the eastbound and westbound approaches and two way Bridge Street forming the northbound and southbound approaches. Huttleston Avenue eastbound and westbound approaches have one 12-foot-wide left/through lane and one 12-foot-wide through/right-turn lane each. Bridge Street northbound approach is unmarked with approximately 20-foot-wide left/through/right-turn lane and southbound approach has one 13-foot-wide left/through/right-turn lane. There are pedestrian crosswalks on the northbound and southbound approaches of the Bridge Street. There is a seven-foot-wide shoulder on the westbound approach of the Huttleston Avenue and two-foot-wide shoulder on the eastbound approach of the Huttleston Avenue. There is a far-side bus stop 120 feet away from the intersection on northbound Bridge Street.

Figure 2.26. Regional Study Area Intersections 14 and 15

16. **Route 6 (Huttleston Avenue) and Alden Road.** This is a four-legged signalized intersection with two-way Huttleston Avenue forming the eastbound and westbound approaches and two way Alden Street forming the northbound and southbound approaches. Huttleston Avenue eastbound approach has one 10-foot-wide left-turn bay, one 12-foot-wide through lane and one 12-foot-wide through/right-turn lane. Huttleston Avenue westbound approach has one 11-foot-wide left-turn bay, one 11-foot-wide through lane, and one 12-foot-wide through/right-turn lane. Alden Road northbound and southbound approaches have one 12-foot-wide left/through lane and one 12-foot-wide through/right-turn lane each. All the approaches have 8-foot-wide pedestrian crosswalks and sidewalks. Huttleston Avenue eastbound and westbound approaches have raised medians. There is a four-foot-wide shoulder on the westbound approach of the Huttleston Avenue and a two-foot-wide shoulder on the eastbound approach of the Huttleston Avenue. There is a two-foot-wide shoulder on the northbound approach of the Alden Road. There is a nearside bus stop 150 feet away from the intersection on the southbound Alden Street.
17. **Route 6 (Huttleston Avenue) and Route 240 (Sconticut Neck Road).** This is a four-legged signalized intersection with two-way Huttleston Avenue forming the eastbound and westbound approaches and two-way Sconticut Neck Road forming the northbound approach and Route 240 forming the southbound approaches. Huttleston Avenue eastbound approach has one 10-foot-wide left-turn bay, two 12-foot-wide through lane and one 12-foot-wide channelized right-turn lane. Huttleston Avenue westbound approach has one 12-foot-wide left-turn bay, two 12-foot-wide through lanes, and one 12-foot-wide channelized right-turn lane. Route 240 northbound approach has one 10-foot-wide left-turn bay, two 12-foot-wide through lanes, and one 18-foot-wide channelized right-turn lane. Route 240 southbound approach has one 10-foot-wide left-turn bay, two 12-foot-wide through lanes and one 22-foot-wide channelized right-turn lane. All the approaches have 8-foot-wide pedestrian crosswalks and Huttleston Avenue eastbound and westbound approaches have bicycle symbols on the intersection approach intending the actuation of bicycle green signal.

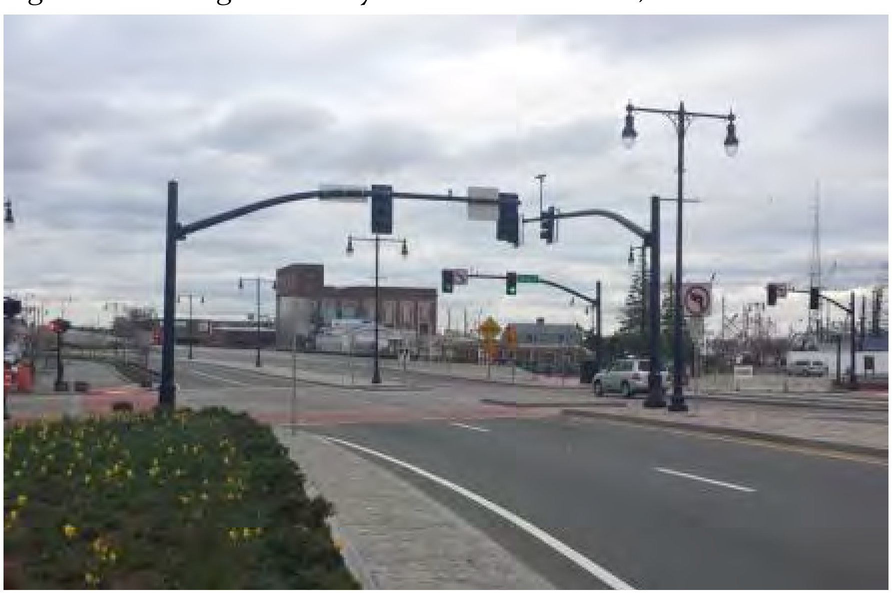
Figure 2.27. Regional Study Area Intersections 16 and 17

18. **Bridge Street and Alden Road.** This is a four-legged signalized intersection with two-way Bridge Street forming the eastbound and westbound approaches and two-way Alden Street forming the northbound and southbound approach. Bridge Street eastbound approach has one 11-foot-wide left-turn bay and one 11-foot-wide through/right-turn lane. Bridge Street westbound approach has one 11-foot-wide left-turn bay, one 11-foot-wide through lane and one 11-foot-wide right-turn lane. Alden Road northbound approach has one 12-foot-wide left-turn bay, one 12-foot-wide through lane, and one 12-foot-wide right-turn lane. Alden Road southbound approach has one 11-foot-wide left-turn bay, an 11-foot-wide through lane, and an 11-foot-wide right-turn lane. All the approaches have 2-foot-wide shoulders. Northbound approach of Alden Road and eastbound approach of Bridge Street have 10-foot-wide pedestrian crosswalks. All the approaches have bicycle symbols on the intersection approach intending the actuation of bicycle green signal.
19. **Bridge Street and Route 240.** This is a four-legged signalized intersection with two way Bridge Street forming the eastbound and westbound approaches and two way Route 240 forming the northbound and southbound approach. Bridge Street eastbound approach has one 11-foot-wide left-turn bay, one 11-foot-wide left/through lane and one 12-foot-wide right-turn bay. Bridge Street westbound approach has one 12-foot-wide left-turn bay, 12-foot-wide through lane and one 26-foot-wide channelized right-turn lane. Route 240 northbound approach has one 10-foot-wide left turn bay, two 12-foot-wide through lane, and one 10-foot-wide right-turn bay. Route 240 southbound approach has one 10-foot-wide left-turn bay, two 12-foot-wide through lanes and one 20-foot-wide channelized right-turn lane. All the approaches except the westbound approach have raised medians. All the approaches have 2-foot-wide shoulders. The northbound Route 240 approach has a 12-foot-wide pedestrian crosswalk.

Figure 2.28. Regional Study Area Intersections 18 and 19

20. **Union Street and Route 18.** This is a three-legged signalized intersection with two-way Union Street forming the eastbound approach a two-way Route 18 forming the northbound and the southbound approach. Union Street eastbound approach has one 12-foot-wide left-turn lane and one 12-foot-wide right-turn lane. There is a "No Turn on Red" sign for the eastbound approach. Route 18 northbound approach has two 12-foot-wide through lanes. Route 18 southbound approach has one 12-foot-wide through lane and one 12-foot-wide through/right-turn lane. Route 18 northbound and southbound approaches have 2-foot-wide shoulders and bicycle symbols on the intersection approach intending the actuation of bicycle green signal. All the approaches have 10-foot-wide pedestrian crosswalks.

Figure 2.29. Regional Study Area Intersection 20, View from the South



21. **Hillman Street and Purchase Street.** This is a three-legged signalized intersection with two-way Purchase Street forming the northbound and southbound approaches and one-way

Hillman Street forming the westbound approach. Purchase Street northbound has 30-foot-wide through/right-turn lane and Purchase Street southbound has 30-foot-wide through/left-turn lane. Hillman Street westbound approach has one 18-foot-wide left/right-turn lane. Westbound Hillman Street and northbound Purchase street approaches have 8-foot-wide pedestrian crosswalks and all the three approaches have sidewalks. There is a far-side bus stop 140 feet away from the intersection on the westbound Hillman Street approach and 70 feet away from the intersection on northbound Purchase Street.

22. **Hillman Street and Northbound JFK Memorial Highway on-ramp.** This is a three-legged intersection with two-way Hillman Street forming the eastbound and westbound approaches and JFK Memorial Highway on-ramp forming the receiving lane for eastbound left-turn and westbound right-turn approaches. Hillman Street eastbound approach has one 16-foot-wide left/through lane and westbound approach has one 16-foot-wide through/right-turn lane. All the approaches including the on-ramp have two-foot-wide shoulders. There is a far-side bus stop 80 feet away from the intersection on the eastbound Hillman Street.
23. **Purchase Street and Southbound JFK Memorial Highway off-ramp.** This is a three-legged intersection with two-way Purchase Street forming the flashing yellow light controlled northbound and southbound approach, and stop-controlled JFK Memorial Highway off-ramp forming the westbound approach. Purchase Street northbound and southbound approach has one 12-foot-wide through lane each and an eight-foot-wide marked parking space on both the sides of the roads. The southbound JFK Memorial Highway off-ramp westbound approach has one 30-foot-wide left/right-turn lane. There is a 10-foot-wide pedestrian crosswalk on the northbound approach.
24. **Linden Street and County Street.** This is a four-legged stop controlled intersection with two-way Linden Street forming the eastbound and westbound approaches and two-way County Street forming the northbound and southbound approaches are at an offset on Linden Street. Linden Street eastbound approach has one approximately 15-foot-wide through/right-turn lane and westbound approach has one approximately 15-foot-wide left/through lane. County Street northbound approach has one approximately 15-foot-wide left/right-turn lane. All the approaches have concrete sidewalk. Thirty-minute parking is allowed on eastbound Linden Street and 15-minute parking is allowed on northbound County Street.

Figure 2.30. Regional Study Area Intersections 23 and 24

25. **Washburn Street and Belleville Avenue.** This is a four-legged stop controlled intersection with one-way Washburn Street forming the eastbound, two-way Washburn Street forming the westbound approach and two-way Belleville Avenue forming the northbound and southbound approach. Eastbound Washburn Street has one approximately 26-foot-wide left/through/right-turn lane. Washburn Street westbound approach has one 19-foot-wide left-turn lane and one 19-foot-wide right-turn lane. Belleville Avenue northbound approach has one approximately 16-foot-wide through/right-turn lane and southbound approach has one approximately 26-foot-wide left/through lane. Parking is allowed on the eastbound Washburn Street.

Figure 2.31. Regional Study Intersections 25, 29, 30, 31, and 32

26. **Coggeshall Street and Mount Pleasant Street.** This is a four-legged stop controlled intersection with two-way Coggeshall Street forming the eastbound and westbound approaches and two-way Mount Pleasant Street forming the northbound and southbound approaches. Coggeshall eastbound and westbound approaches have 16-foot-wide left/through/right-turn lane each and Mount Pleasant northbound and southbound approaches each have 16-foot-wide left/through/right-turn lanes. There is parking allowed on both sides of the road on eastbound and westbound approaches of Coggeshall Street and southbound approach of Mount Pleasant Street. There is a nearside bus stop 25 feet away from the intersection on the southbound Mount Pleasant Street approach and 15 feet away from the intersection on the northbound Mount Pleasant Street approach.
27. **Coggeshall Street and County Street.** This is a four-legged signalized intersection with Coggeshall Street forming the eastbound and westbound approaches, and County Street forming the northbound and southbound approaches. Coggeshall Street eastbound and westbound approaches have 17-foot-wide left/through/right-turn lane and County Street northbound and southbound approaches have 17-foot-wide left/through/right-turn lane. All the approaches have eight-foot-wide pedestrian crosswalks and sidewalks. There is a nearside bus stop 15 feet away from the intersection on the southbound County Street approach. Parking is allowed on the southbound approach of the County Street and eastbound approach of Coggeshall Street.

28. **Coggeshall Street and Purchase Street**. This is a four legged stop controlled intersection with two-way Coggeshall Street forming the eastbound and westbound approaches and Purchase Street forming the northbound and southbound approaches. Coggeshall Street eastbound and westbound approaches have 17-foot-wide left/through/right-turn lane. Purchase Street northbound approach and southbound approach have one 17-foot-wide left/through/right-turn lane. All the approaches have 8-foot-wide pedestrian crosswalks and sidewalks. There is a bus stop at the intersection on northbound and southbound approaches of Purchase Street. A school is located at the southwest corner of the intersection.

Figure 2.32. Regional Study Intersections 26 to 28

29. **Coggeshall Street and Ashley Boulevard.** This is a four-legged signalized intersection with two-way Coggeshall Street forming the eastbound and westbound approaches and one way Ashley Boulevard forming the southbound approach. Coggeshall Street eastbound and westbound approaches have 18- and 16-foot-wide left/through/right-turn lanes, respectively. Ashley Boulevard southbound approach has one 11-foot-wide left/through lane, one 11-foot-wide through lane and one 10-foot-wide right-turn lane. All the three approaches have eight-foot-wide pedestrian crosswalks and sidewalks. Parking is allowed on westbound Coggeshall Street.
30. **Coggeshall Street and Acushnet Avenue**. This is a four-legged signalized intersection with two way Coggeshall Street forming the eastbound and westbound approaches and one way Acushnet Avenue forming the northbound approach. Coggeshall Street eastbound approach has one 12-foot-wide left-turn lane and one 11 -foot-wide through lane. Coggeshall Street westbound approach has one 11-foot-wide through/right-turn lane. Acushnet Avenue northbound approach has one 12-foot-wide left-turn lane, one 12-foot-wide through lane and one 12-foot-wide right-turn lane. All the approaches have 8-foot-wide pedestrian crosswalks and sidewalks. There is a five-foot-wide bicycle lane on the other side of the intersection on the northbound approach. Marked parking spaces are located on both the sides of the eastbound and westbound of Coggeshall Street.
31. **Coggeshall Street and North Front Street.** This is a four legged stop controlled intersection with two-way Coggeshall Street forming the eastbound and westbound approaches and one-way stop controlled North Front Street forming the northbound approach. Coggeshall Street eastbound and westbound approaches have one 16-foot-wide

left/through/right-turn lane each. North Front Street northbound approach has one 13-foot-wide left/through/right-turn lane. All the approaches have eight-foot-wide pedestrian crosswalks and sidewalks. There is a nearside bus stop 35 feet away from the intersection on the North Front Street northbound approach. Parking is allowed on both Coggeshall Street and North Front Street.

32. **Coggeshall Street and Belleville Avenue.** This is a four-legged signalized intersection with two-way Coggeshall Street forming the eastbound and westbound approaches and two-way Belleville Avenue forming the northbound and southbound approaches. Coggeshall Street eastbound approach has one 10-foot-wide left-turn lane and one 10-foot-wide through/right-turn lane. Coggeshall Street westbound approach has one 10-foot-wide left-turn bay, one 10-foot-wide through lane and one 10-foot-wide right-turn lane. Belleville Avenue northbound approach has one 10-foot-wide left/through lane and one 10-foot-wide right-turn lane. Belleville Avenue southbound approach has on an 11.5-foot-wide left/through lane and an 11.5-foot-wide through/right-turn lane. All the approaches have eight-foot-wide pedestrian crosswalks and sidewalks. Parking is allowed on southbound Belleville Avenue.
33. **Coggeshall Street and Westbound I-195 off-ramp**. This is a four-legged signalized intersection with two-way Coggeshall Street forming the eastbound and westbound approaches and two-way WB I-195 off-ramp forming the northbound and southbound approaches. Coggeshall Street eastbound approach has one 10-foot-wide left turn lane, one 11-foot-wide through lane and one 11-foot-wide channelized right-turn lane. Coggeshall Street westbound approach has one 10-foot-wide left turn lane and one 11-foot-wide through/right-turn lane. The westbound I-195 off-ramp northbound approach has one 12-foot-wide left turn lane, one 12-foot-wide through lane and one 12-foot-wide through/right-turn lane. The westbound I-195 off-ramp southbound approach has one 11-foot-wide left-turn lane, one 11-foot-wide through lane and one 11-foot-wide right-turn bay. There is an 8-foot-wide pedestrian crosswalk on the southbound approach of WB I-195 off-ramp. There is a four-foot-wide shoulder on the westbound approach of Coggeshall Street and a two-foot-wide shoulder on the eastbound approach of the Coggeshall Street and southbound approach of the I-195 off-ramp.

Figure 2.33. Regional Study Intersection 33

34. **Howland Road and Main Street.** This is a four-legged signalized intersection with two-way Howland Road forming the eastbound and westbound approaches and two way Main

Street forming the northbound and southbound approaches. Howland Road eastbound and westbound approaches have one 12-foot-wide left/through/right-turn lane each. Main Street northbound and southbound approaches have one 15-foot-wide and one 13-foot-wide left/through/right-turn lane, respectively. Main Street northbound and southbound approaches have bicycle symbols on the intersection approach intending the actuation of bicycle green signal. All the approaches have eight-foot-wide pedestrian crosswalks and sidewalks. There is a 4-foot-wide shoulder on both sides of the eastbound Howland Road approach. Parking is allowed on southbound Main Street approach.

35. **Howland Road and Adams Street.** This is a four-legged signalized intersection with two-way Howland Road forming the eastbound and westbound approaches and two way Adams Street forming the northbound and southbound approaches. Howland Road eastbound and westbound approaches have one 12-foot-wide left/through/right-turn lane each. Adams Street northbound and southbound approaches have one 13-foot-wide and one 15-foot-wide left/through/right-turn lanes, respectively. Adams Street northbound and southbound approaches have bicycle symbols on the intersection approach intending the actuation of bicycle green signal. All the approaches have eight-foot-wide pedestrian crosswalks and sidewalks. There is a nine-foot-wide parking lane on the eastbound approach of the Howland Road. There is a two-foot-wide shoulder on the northbound approach of the Adams Street.

Figure 2.34. Regional Study Intersections 34 and 35

36. **Howland Road and Alden Road.** This is a four legged stop controlled intersection with two-way Howland Road forming the eastbound approach and westbound approach called Nancy Street and two-way Alden Road forming northbound and southbound approaches. Howland Road eastbound approach has one 11.5-foot-wide left/through/right-turn lane. Nancy Street westbound approach has one 12-foot-wide left/through/right-turn lane. Alden Road northbound and southbound approaches have 12-foot-wide left/through/right-turn lane each. Howland Road eastbound approach and southbound approach of Alden Road has 8-eight-foot-wide pedestrian crosswalks and sidewalks. Howland Road eastbound approach has a 4-foot-wide shoulder on both side of the road and Alden Road northbound and southbound approach has five-foot-wide shoulders on both sides of the road.

Figure 2.35. Regional Study Intersection 36, View from South

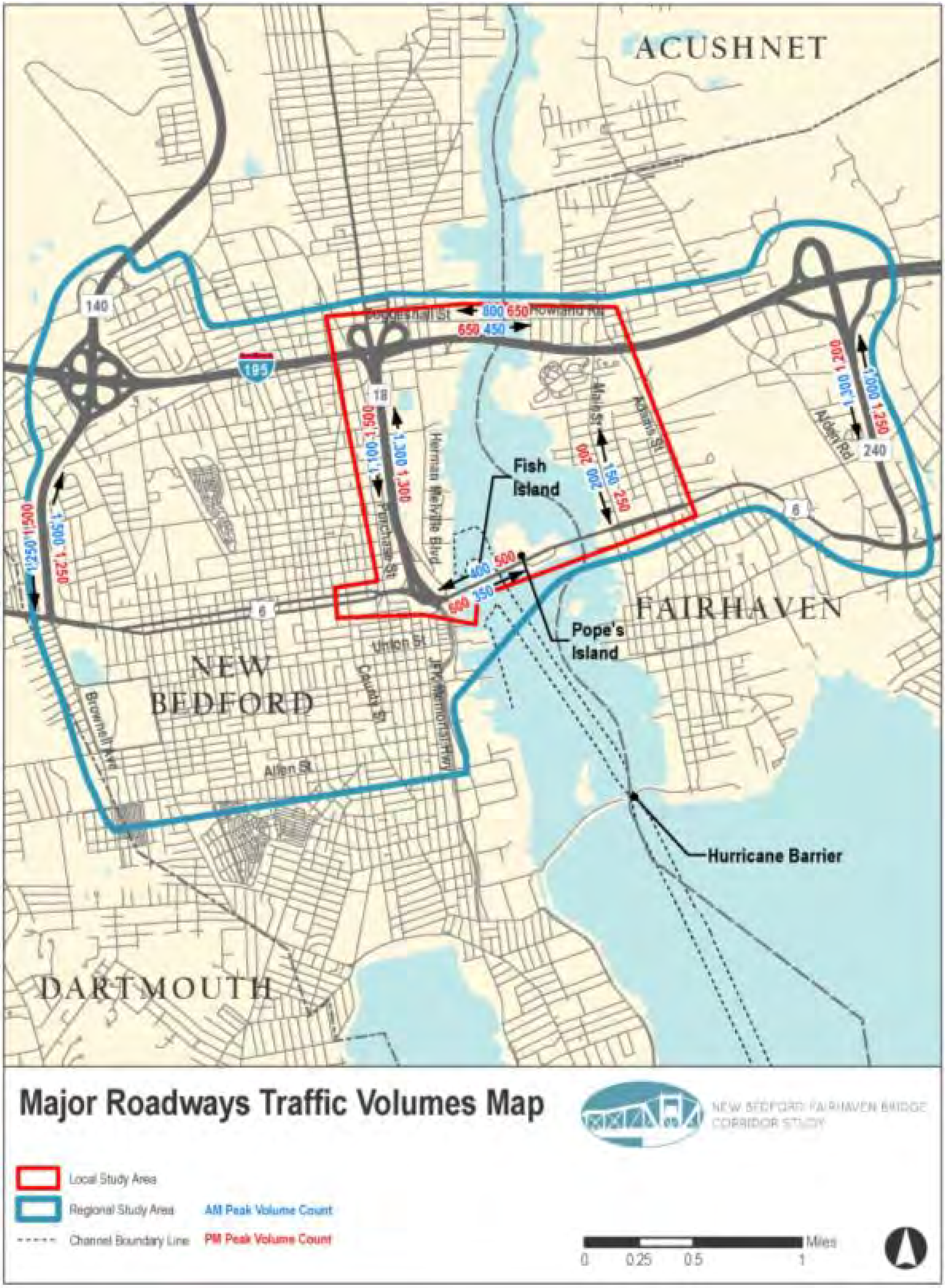
TRAFFIC VOLUMES

As discussed in Traffic Counts part of Section 2.7.1, traffic volumes were collected during the AM and PM peak periods for bridge closure and open conditions in April 2014. The traffic counts for the AM and PM peak hours for both conditions are shown in Figure 2.20. More detailed counts for the major intersections in the Regional Study Area are shown in Appendix C. Within the Regional Study Area, Route 140, Route 240, and Route 18 are the major thoroughfares in the north-south directions and Coggeshall Street is the major east-west roadway. Though the traffic on the New Bedford-Fairhaven Bridge is comparable to Coggeshall Street bridge in the PM peak hour, it is considerably lower in the AM peak hour. This could be due to the delays associated with the bridge closures or construction-related lane closures. The representative traffic volumes along major roadways within the Regional Study Area for the AM and PM peak hours are listed in Table 2.18 and shown on Figure 2.36.

Table 2.18. Representative Peak Hour Traffic Volumes along Major Roadways, 2014

Major Roadway	AM Peak Hour EB	AM Peak Hour WB	AM Peak Hour NB	AM Peak Hour SB	PM Peak Hour EB	PM Peak Hour WB	PM Peak Hour NB	PM Peak Hour SB
Route 6	350	400	-	-	600	500	-	-
Route 140	-	-	1500	1250	-	-	1250	1500
Route 240	-	-	1000	1300	-	-	1250	1200
Route 18	-	-	1300	1100	-	-	1300	1500
Main St	-	-	150	200	-	-	250	200
Coggeshall St Bridge	450	800	-	-	650	650	-	-

Figure 2.36. Representative Peak Hour Traffic Volumes along Major Roadways, 2014



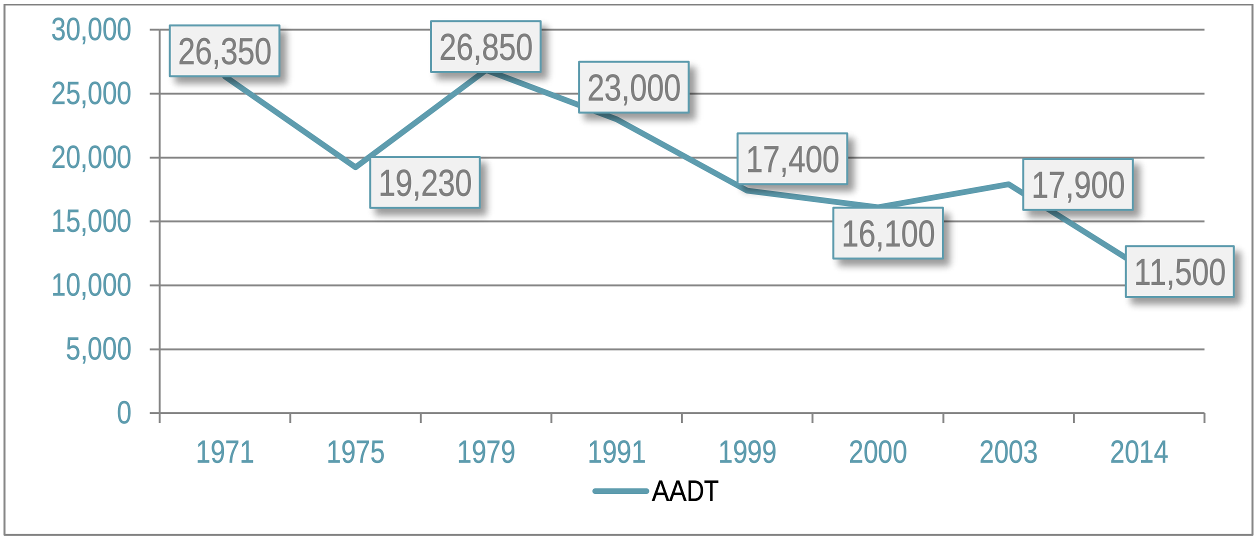
The 2014 traffic counts collected during the bridge closure were compared to traffic counts collected during the bridge open condition. Several roadways and intersections experienced higher volumes, while some saw decreased volumes. The following observations were made:

- The Coggeshall Street bridge traffic counts during bridge closure were 38 percent higher in the AM and 25 percent higher in the PM peak periods as compared to bridge open condition.
- Traffic volumes were also higher on Route 240, Main Street, Purchase Street, and Route 18 during the bridge closure.
- Traffic counts from the Route 18 on ramp and off ramp located immediately north of the New Bedford-Fairhaven Bridge are higher by 22 percent in both AM and PM peak periods.
- Main Street at Huttleston Avenue traffic counts during bridge closure were higher by 36 percent and 48 percent in the AM and PM peak periods, respectively.
- Westbound Route 6 in New Bedford and northbound Route 140 experienced reduced volume during the closure. Northbound Route 140 traffic counts during bridge closure were lower by 18 percent and 29 percent in the AM and PM peak periods respectively as compared to the bridge open condition.
- The intersection of Pleasant Street, Kempton Street, Mill Street, Sixth Street, and Route 6 in New Bedford (i.e., "Octopus Intersection"), experienced increased traffic turning left onto northbound Purchase Street from eastbound Kempton Street.

As shown in Figure 2.37, annual traffic volumes on the New Bedford-Fairhaven Bridge have been declining for the last 40 years. Regional traffic on Route 6 was affected by the opening of I-195 between New Bedford and Wareham in 1974. Bridge traffic counts from 2014 indicate that local traffic has also shifted to alternative routes, including I-195 and Coggeshall Street/Howland Road. The 2014 traffic counts indicate that Coggeshall Street/Howland Road experienced higher traffic volumes than the New Bedford-Fairhaven Bridge when the bridge was both open and closed to vehicular traffic.

It was also noted that traffic queues due to bridge openings are a significant issue in the corridor. During the AM peak period, it was observed that the westbound queue due to bridge closure reaches the Dunkin' Donuts driveway and was about 1,300 feet long. The eastbound queue was observed to extend until the Route 18 southbound off-ramp, which is approximately 1,600 feet from the stop line. During the PM peak period, the westbound queue was noted as approximately 2,350 feet long. Although there are no observations available for the eastbound direction, the high traffic volumes during the PM period can potentially result in queues that will extend beyond the Route 18 off-ramps and reach Route 18, as well as the "Octopus Intersection."

Figure 2.37. New Bedford-Fairhaven Bridge Annual Traffic Volumes, 1971 to 2014



Sources: 1985 EA, MassDOT, SRPEDD, 2014 ATR Traffic Counts
** Bridge under construction (lane restriction) during 2014 count*

2.7.3 Capacity Analysis

Most of the intersections within the Regional Study Area operate at an acceptable LOS. However, a sizeable subset has one or more lane groups that operate above the HCM defined delay threshold during one or more peak hours. An acceptable mid-LOS D is defined as 45 seconds of delay for signalized intersections and 30 seconds of delay for non-signalized intersections.

During the AM peak hour, seven of the 36 intersections operate with overall intersection average vehicle delay values above the delay threshold. An additional eight intersections have one or more lane groups that exceed the delay threshold. Thus a total of 15 of the 36 intersections currently have an approach or the entire intersection operating at a delay that exceeds the threshold in the AM peak hour.

During the PM peak hour, ten of the 36 intersections operate with overall intersection average vehicle delay values above the delay threshold. An additional seven intersections have one or more lane groups that exceed the delay threshold. Thus, a total of 17 of the 36 intersections currently have an approach or the entire intersection operating at a delay that exceeds exceed the HCM threshold in the PM peak hour.

The delay and LOS results are summarized in Table 2.19. A graphical representation of the LOS at all study intersections is shown on Figure 2.38. Detailed delay and LOS tables are provided in Appendix A.

Figure 2.38. Regional Study Area Intersection LOS, 2014

Table 2.19. Intersection Delay and LOS Summary, 2014

ID #	Intersection Name	AM Int. Delay	AM Int. LOS	PM Int. Delay	PM Int. LOS
1	Kempton St & Brownell Ave/Route 140	54.9	D	63.9	E
2	Kempton St & Cornell St	11	B	9	A
3	Kempton St & Rockdale Ave	53.8	D	56.8	E
4	Mill St & Rockdale Ave	16.8	B	16.8	B
5	Mill St & Cottage St	17.6	B	16.5	B
6	Kempton St & Cottage St	20.8	C	14.4	B
7	Mill St & County St	20.6	C	23.3	C
8	Kempton St & County St	15.4	B	14.6	B
9	Kempton St/Mill St & Purchase St	73.5	E	80.7	F
10	Huttleston Ave & Middle St	9	A	10.3	B
11	Huttleston Ave & Main St	25	C	26.8	C
12	Huttleston Ave & Green St	12.1	B	10.4	B
13	Huttleston Ave & Adams St	26	C	16.7	B
14	Huttleston Ave & Holcomb St	7	A	7.1	A
15	Huttleston Ave & Bridge St	15.1	B	17.8	B
16	Huttleston Ave & Alden Rd	28.36	C	39.8	D
17	Huttleston Ave & Route 240	20.7	C	20	C
18	Bridge St & Alden Rd	44	D	51.8	D
19	Bridge St & Route 240	114.8	F	51.4	D
20	Union St & Route18	2.3	A	2.4	A
21	Hillman St & Purchase St	11.2	B	12.8	B
22	Hillman St & NB JFK Memorial Hwy on-ramp	-	-	-	-
23	Purchase St & SB JFK Memorial Hwy off-ramp	25.9	D	18.8	C
24	Linden St & County St	10.8	B	14.3	B
25	Washburn St & Belleville Ave	26.3	D	107.3	F
26	Coggeshall St & Mt. Pleasant	11.7	B	12.2	B
27	Coggeshall St & County St	12.2	B	13.1	B
28	Coggeshall St & Purchase St	170	F	14.7	B
29	Coggeshall St & Ashley Blvd	21.9	C	48.9	D
30	Coggeshall St & Acushnet Ave	18.1	B	19.6	B
31	Coggeshall St & N Front St	7.2	A	58.2	F
32	Coggeshall St & Belleville Ave	27.6	C	28.9	C
33	Coggeshall St & 195 off-ramp	56.6	E	64.3	E
34	Howland Rd & Main St	50.8	D	124.7	F
35	Howland Rd & Adams St	41.4	D	39	D
36	Howland Rd & Alden Rd	4.2	A	5.6	A

Source: HCM 2000 based Synchro outputs

2.7.4 Safety

The most recent crash data obtained from MassDOT was for the years 2009, 2010, and 2011. This crash data was reviewed to identify crashes involving fatalities, bicycles, or pedestrians within the Regional Study Area and more closely for the overall crashes within the local study area. As shown in Figure 2.39, there were 11 fatal crashes within the Regional Study Area between 2009 and 2011. Of the 11 fatal crashes, three occurred within the Local Study Area. Two fatal crashes involved pedestrians. No fatal crashes involved bicycles. Descriptions of the fatal crashes in the Local Study Area are provided in Table 2.20. Descriptions of the fatal crashes in the Regional Study Area are provided in Table 2.21.

Table 2.20. Fatal Crashes within Local Impact Study Area, 2009-2011

No.	Date	Time	Location	Description
1	August 8, 2009	2:46 AM	New Bedford-Fairhaven Bridge	A light truck travelling eastbound collided with a guiderail
2	June 15, 2010	6:03 AM	Intersection of Washburn Street and Belleville Avenue	A tractor trailer traveling eastbound collided with the motorcycle traveling southbound
3	October 29, 2010	3:30 PM	Intersection of Route 6 and Pleasant Street	A light truck traveling eastbound turning left at the intersection collided with a pedestrian*

Source: MassDOT

Table 2.21. Fatal Crashes within Regional Study Area, 2009-2011

No.	Date	Time	Location	Description
1	May 22, 2009	8:00 AM	New Bedford-Fairhaven Bridge	A motorcycle traveling eastbound collided with a movable object
2	July 21, 2009	9:12 AM	Elm Street near SRTA Terminal	A bus traveling eastbound turning left collided with a pedestrian*
3	August 31, 2009	12:47 PM	Intersection of Elm Street and Purchase Street	A car traveling westbound turning left collided with a pedestrian*
4	September 27, 2009	8:20 PM	Route 18 off ramp at Purchase Street	Two cars and one light truck traveling southbound collided when one car was changing lanes and the other car and light truck were traveling straight
5	November 12, 2010	11:02 PM	Northbound County Street and Merrimac Street	A car traveling Northbound County Street collided with a pedestrian
6	December 22, 2010	5:19 PM	Northbound Jenny Lind Street, south of Route 6	A light truck traveling northbound collided with a pedestrian while backing up*
7	April 12, 2011	9:04 PM	Intersection of Willis Street and Purchase Street	A car traveling eastbound turning left collided with a car traveling southbound
8	August 19, 2011	1:08 AM	Intersection of Acushnet Avenue and Washburn Street	A car traveling Northbound Acushnet Ave collided with a utility pole

**Fatal crash involving pedestrians.*
Source: MassDOT

Figure 2.39. Fatal Crash Locations, 2009-2011

Fatal Crash Locations, 2009-2011

City	FATAL CRASHES FY2009	FY2010	FY2011	TOTAL
New Bedford	5	4	2	11
Fairhaven	0	0	0	0

Local Study Area
Regional Study Area
Channel Boundary Line
Fatal Crash Location
Open Space/Public Land

NEW BEDFORD-FAIRHAVEN BRIDGE CORRIDOR STUDY

0 0.25 0.5 1 Miles

Figure 2.40 shows the locations of crashes involving bicycles and pedestrians. Figure 2.40 also includes a table of the number of crashes involving bicycles and pedestrians between 2009 and 2011 within the Regional Study Area. Seventy-three total crashes occurred during the three-year period. Seven of the 51 crashes involving pedestrians and six of the 22 crashes involving bicycles occurred along the Route 6 corridor within the limits of the Regional Study Area.

The crash data along the Route 6 corridor between County Street in New Bedford and Green Street in Fairhaven was analyzed and the number of crashes by severity and collision type is listed in Tables 2.22 and 2.23, respectively.

Table 2.22. Crashes by Severity within Local Impact Study Area, 2009-2011

No.	Severity	2009	2010	2011	Total
1	Fatal injury	2	1	0	3
2	Non-fatal injury	21	21	24	66
3	Property damage only (none injured)	50	61	52	163
4	Not Reported	1	1	1	3
5	Unknown	2	2	0	4
	Total	76	86	77	239

Source: MassDOT

Table 2.23. Crashes by Collision Type within Local Impact Study Area, 2009-2011

No.	Collision Type	2009	2010	2011	Total
1	Angle	35	36	31	102
2	Head-on	0	3	2	5
3	Not reported	0	0	0	0
4	Rear-end	27	18	24	69
5	Rear-to-rear	0	0	1	1
6	Sideswipe, opposite direction	0	1	2	3
7	Sideswipe, same direction	7	5	7	19
8	Single vehicle crash	6	21	9	36
9	Unknown	1	2	1	4
	Total	76	86	77	239

Source: MassDOT

The information in Tables 2.22 and 2.23 is represented as percentages in Figures 2.41 and 2.42, respectively. As shown in Table 2.22 and Figure 2.41, 68 percent of accidents involved only property damage. Approximately 28 percent of accidents involved non-fatal injuries and 1 percent of accidents involve fatal injuries. As shown in Table 2.23 and Figure 2.42, the majority of crashes occurred due to angle collision (43 percent), rear-end collision (29 percent), or single vehicle collision (15 percent).

Figure 2.40. Locations of Bicycle and Pedestrian Crashes

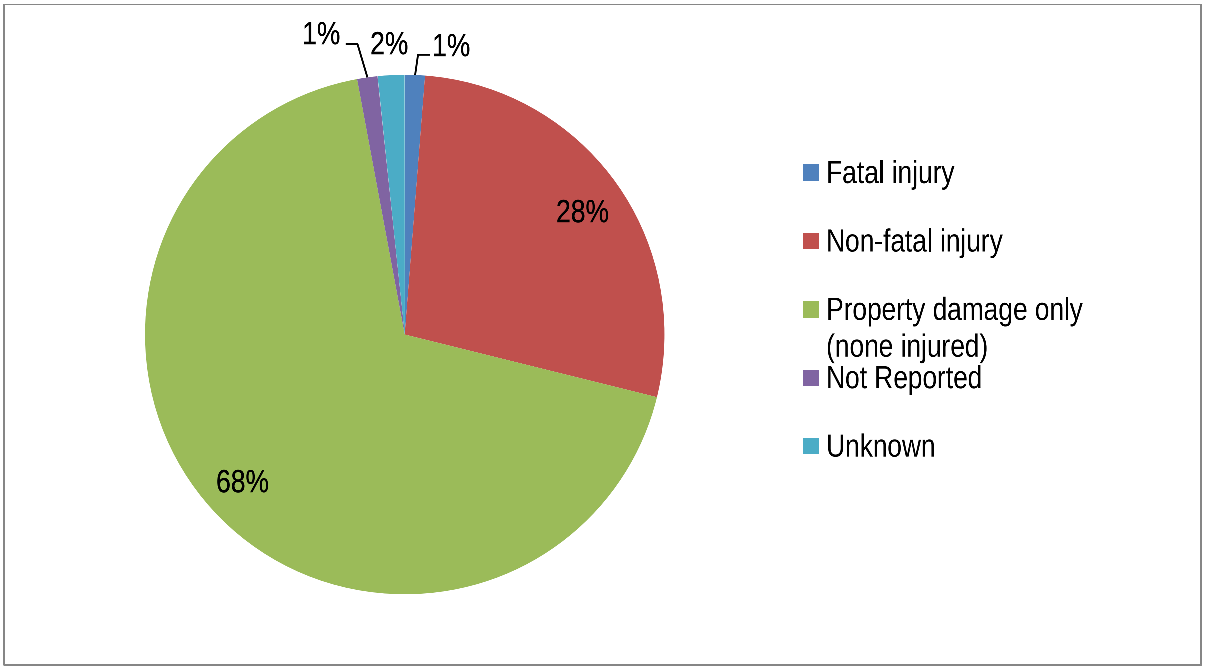
Bicycle and Pedestrian Crashes, 2009-2011

City	BICYCLE CRASHES FY2009	FY2010	FY2011	TOTAL	PEDESTRIAN CRASHES FY2009	FY2010	FY2011	TOTAL
New Bedford	4	4	5	13	11	18	18	47
Fairhaven	1	3	5	9	1	0	3	4

Regional Study Area
Local Study Area
Bicycle Crash
Pedestrian Crash

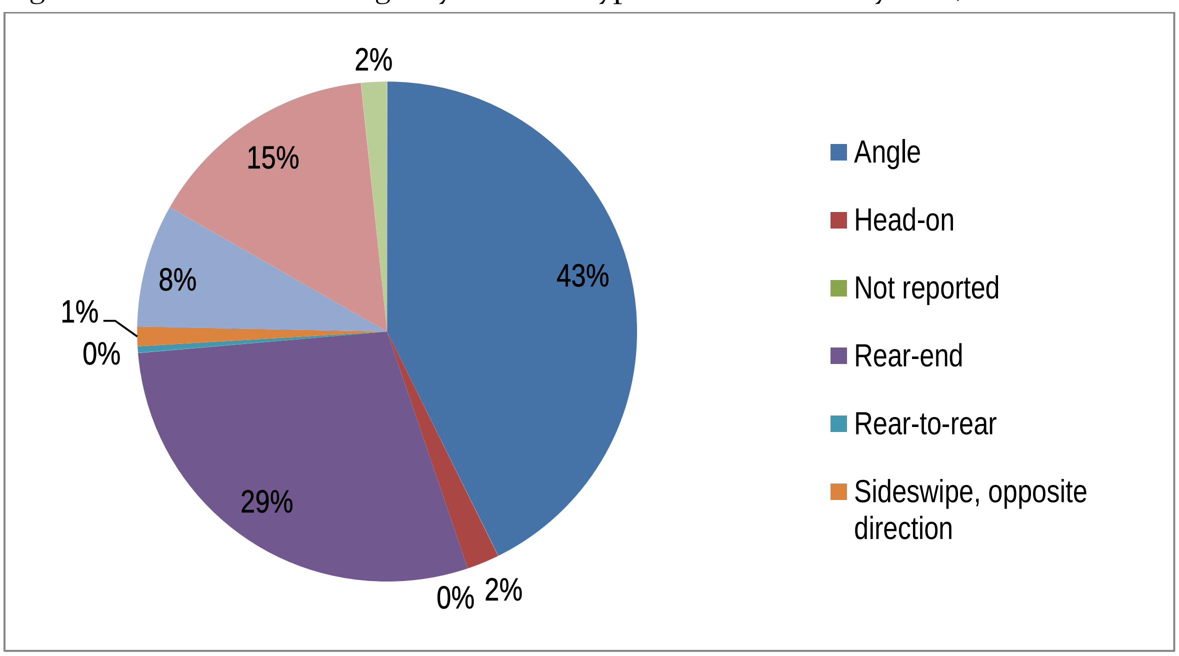
0 0.25 0.5 1 Miles

Figure 2.41. Crash Percentages by Severity within Local Impact Study Area, 2009-2011



Source: MassDOT

Figure 2.42. Crash Percentages by Collision Type within Local Study Area, 2009-2011



Source: MassDOT

The majority of angle collisions occurred at intersection approaches between turning vehicles and vehicles traveling straight. Among the angle collisions that occurred along the New Bedford-

Fairhaven Bridge, a majority occurred due to vehicles slowing while queuing, turning left, or changing lanes.

Approximately 60 of the 69 rear-end crashes that occurred on the New Bedford-Fairhaven Bridge were in slow-moving traffic. This is potentially due to the queuing that occurs when the bridge is closed to traffic. Most of these crashes caused property damage only and there were no fatal injuries involved.

Most of the single vehicle crashes occurred on the New Bedford-Fairhaven Bridge. These crashes involved vehicles colliding with physical objects such as trees, guiderails, medians, curbs, bridge overhead structures, or other movable objects. There were two fatal crashes on the New Bedford-Fairhaven Bridge due to a single vehicle colliding with a movable object and guiderail. After construction activity along the bridge is completed and construction objects such as guiderails, median barriers, and other equipment are removed, a reduction in the number of single vehicle collisions can be expected.

2.7.5 ITS

In the event of bridge closures to traffic, drivers are informed of the closure using Intelligent Transportation Systems (ITS) signs such as the ones shown in Figure 2.43 below. All signs are ground-mounted except for one sign, which is mounted on a signal mast arm. Five signs are located west of the bridge and three signs are located east of the bridge. Three of the five signs west of the bridge are located at the intersection of Kempton Street and Purchase Street. Two of the five signs west of the bridge are located along Route 18. The three signs located east of the bridge are installed at the intersection of Huttleston Avenue and Main Street, one of which is installed on a signal mast arm. Figure 2.44 illustrates the approximate locations of the ITS signs.

In the event of bridge closure, all signs display 'CLOSED.' The signs are turned on or off by a radio signal sent by the bridge operator. The existing signs, which were installed in 1996, use now outdated technology that is difficult to repair. SRPEDD recently completed an ITS study in October 2014 to evaluate the existing system. MassDOT is proceeding with plans to replace the existing signs.

The bridge is closed to traffic approximately once every hour during rush hours. The duration of bridge closure to traffic is approximately 11.5 minutes. As mentioned in Table 2.2 and observed in the field, the bridge is closed at about 8:00 AM and 4:15 PM during AM and PM peak hours, respectively.

By reviewing the traffic count data in 15-minute intervals, a decrease in the bridge traffic was observed on the approaches where ITS signs are displayed during the interval when the bridge is closed. The decrease in traffic is approximately 60 percent during the AM peak hour and 25 percent during the PM peak hour. This shows a higher delay tolerance in the drivers during PM peak hours despite a high overall volume on the roadway network.

These percentages also represent a compliance rate of ITS signs that reflect the driver's choice of alternate paths during bridge closure. Despite a compliance rate as high as 60 percent during the AM peak hour, the queues are as long as 1,300 feet and 1,600 feet in the westbound and eastbound directions, respectively. The high westbound queues (2,350 feet) during the PM peak hour when there is a low ITS sign compliance highlights the importance of considering new ITS signs and/or relocating existing ITS signs.

In the future conditions analysis, the location and types of ITS signs will be evaluated and adjusted to provide detours along streets during the bridge closure condition to minimize delay.

Figure 2.43. Examples of Bridge ITS

Ground-mounted ITS sign near the "Octopus Intersection" in New Bedford.

ITS sign located on mast arm in Fairhaven.

Figure 2.44. Bridge ITS Location Map

2.8 TRANSIT

2.8.1 Existing Service

The Southeastern Regional Transit Authority (SRTA) provides bus transit service in New Bedford and Fairhaven. As shown in Figure 2.45, several bus routes operate within the Local Study Area and along portions of the corridor, but none currently crosses over the bridge. The downtown New Bedford Bus Terminal is located just outside the Local Study Area near New Bedford City Hall.

According to the *New Bedford Transit Development Plan* (TDP) prepared in December 2011, the SRTA bus routes provide service to areas identified as having higher proportions of transit dependent populations. The City of New Bedford's major employment, retail, and educational services, including the port and downtown, are located within SRTA's service area. In 2014, SRTA completed a Comprehensive Service Assessment (CSA) that evaluated each route and the service as a whole. This CSA will be used by the agency to guide transit improvements and changes over the coming years.

The majority of the 10 SRTA bus routes that operate in the Local Study Area run between 6 AM and 6 PM on weekdays and Saturday. Headways for each of the bus routes, and the start and end locations for each route, is provided in Table 2.24.

Currently, bus service is not provided over the New Bedford-Fairhaven Bridge due in part to the scheduling unreliability from frequent bridge openings. In the past, SRTA Route 11 crossed the bridge along Route 6 between the downtown New Bedford transit hub and shopping centers in Fairhaven. In 2013 the route was rerouted to travel up Main Street in Fairhaven to Howland Road/Coggeshall Street, and connects back to downtown New Bedford along Front Street/Herman Melville Boulevard.

Table 2.24. SRTA Bus Routes in Regional Study Area, 2014

Bus Route	Start Location	End Location	Headway (min)
Route 1 - Fort Rodman	- New Bedford Terminal - Brook Ave and Coral	- Brook Ave and Coral - New Bedford Terminal	- 20 - 20
Route 2 - Lund's Corner	- New Bedford Terminal - Lund's Corner	- Lund's Corner - New Bedford Terminal	- AM -12; PM -20 - 20
Route 3 - Dartmouth St.	- New Bedford Terminal - Big Value Plaza (Sol E Mar Street and Dartmouth Street)	- Big Value Plaza (Sol E Mar Street and Dartmouth Street) - New Bedford Terminal	- 30 - 30
Route 4 - Ashley Boulevard	- New Bedford Terminal - Trucchi's	- Trucchi's - New Bedford Terminal	- 30 - 30
Route 5 - River St.	- New Bedford Terminal - Stop & Shop (Rockdale Ave and Hemlock Street)	- Stop & Shop (Rockdale Avenue and Hemlock Street) - New Bedford Terminal	- 45 - 45

Bus Route	Start Location	End Location	Headway (min)
Route 6 - Shawmut/ Rockdale	- New Bedford Terminal - Stop & Shop (Rockdale Avenue and Hemlock Street)	- Stop & Shop (Rockdale Avenue and Hemlock Street) - New Bedford Terminal	- 45 - 45
Route 8 - Mt. Pleasant	- New Bedford Terminal - Field Stone Market Place	- Field Stone Market Place - New Bedford Terminal	- 45 - 45
Route 9 - New Bedford/Fall River	- New Bedford Terminal - Fall Terminal	- Fall River Terminal - New Bedford Terminal	- 60 - 61
Route 10 - Dartmouth Mall	- New Bedford Terminal - Dartmouth Mall	- Dartmouth Mall - New Bedford Terminal	- 62 - 63
Route 11 - Fairhaven	- New Bedford Terminal - Stop & Shop (Huttleston Avenue and Sconticut Neck Road)	- Stop & Shop (Huttleston Avenue and Sconticut Neck Road) - New Bedford Terminal	- 35 - 30

Source: SRTA

2.8.2 Planned Improvements

SOUTH COAST RAIL

The South Coast Rail project is the proposed restoration of commuter rail service between Boston's South Station, Fall River, and New Bedford. The proposed route would extend the commuter rail service from the route's current terminus in Stoughton and would terminate at a new station in New Bedford located within the Local Study Area. As described in the 2009 *South Coast Rail Economic Development and Land Use Corridor Plan* (South Coast Rail Corridor Plan), the proposed Whale's Tooth Station would restore passenger commuter rail to the City of New Bedford and maximize on the economic and environmental benefits of rail investment to the city and the region.

The project is currently transitioning from conceptual planning and environmental review to permitting and design. Some rail improvements including track work, grade crossings, and the design for the replacement or repair of four railroad bridges, including the Wamsutta Bridge in New Bedford are underway. Improvements to the track and bridges will allow for continued use for freight service and allow the extension of passenger service in the future. The replacement of Wamsutta Bridge is anticipated for completion in fall 2016.

Figure 2.45. Existing Transit Service

The South Coast Rail Corridor Plan designated 30 different Priority Development Areas (PDA) within the overall region. These areas are specific locations that have the greatest capacity or potential to accommodate and support new development such as major downtowns, employment centers, and future station areas. The entire New Bedford portion of the Local Study Area falls within a Priority Development Area, including the waterfront, the area around the proposed Whale's Tooth Station, and downtown New Bedford.

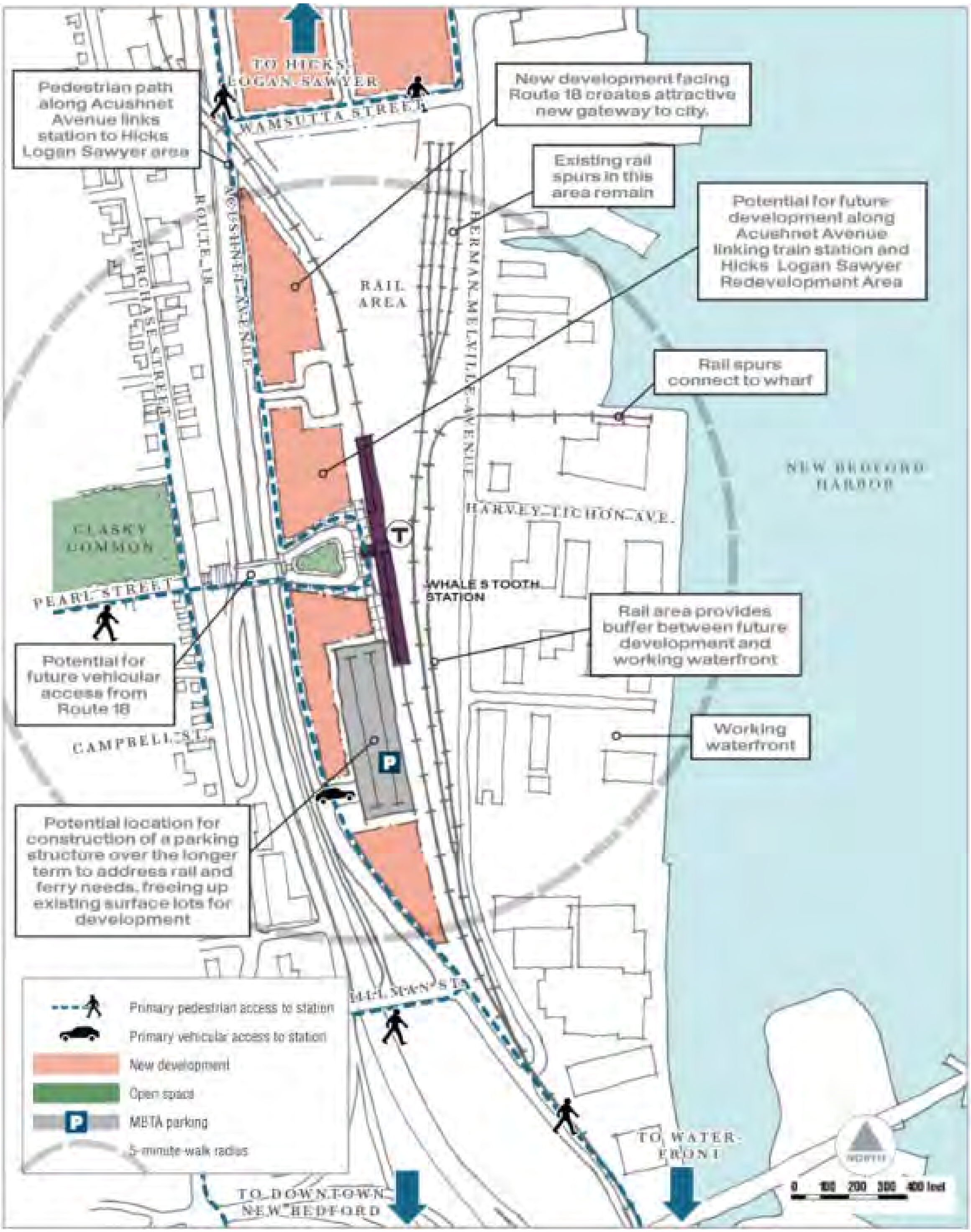
According to the South Coast Rail Corridor Plan, the area around the Whale's Tooth Station has the potential to become a transit-oriented development (TOD) intermodal center. The plan includes a concept plan for the Whale's Tooth Station area, shown in Figure 2.46, that provides a framework for the integration of the rail station with area land uses. The plan includes connections between the station and the working waterfront between Route 6 and I-195, the Route 6 corridor, and mixed-use redevelopment in downtown New Bedford, the Hicks-Logan-Sawyer District, and the residential areas west of Route 18. The plan indicates that enhancements are needed to improve local pedestrian access and transit bus service between the station area and adjoining neighborhoods.

BUS TRANSIT

As the vision for transit service in New Bedford, the 2011 TDP offered numerous recommendations for short-term transit improvements. In anticipation of the South Coast Rail expansion into the city, the plan includes recommendations to improve existing transit operations and establish a strategy to integrate future rail service and local bus service. The plan recommends the replacement of the existing downtown bus terminal with a new transit terminal adjacent to the proposed rail Whale's Tooth Station (see Figure 2.46). The replacement station is planned even if the rail station is not realized. Bike and pedestrian connections would be important considerations to connect riders to the station from downtown New Bedford and Route 6.

As detailed in the *South Coast Rail Corridor Plan Feeder Bus Plan* (2012), several bus routes would be rerouted to serve the proposed Whale's Tooth Station and relocated bus transit center. The altered bus routes, including SRTA routes 1, 2, 3, 4, 6, 8, 9, 10, and 11 would access the area from a proposed transit only bridge over Route 18 at Pearl Street. No new routes were proposed for Route 6 or the New Bedford-Fairhaven Bridge. If improvements were made to the bridge to increase reliability, SRTA Route 11 could potentially be realigned along its former route along the Route 6 corridor and once more cross the bridge.

Figure 2.46. Whale's Tooth Station Area Development



Source: South Coast Rail Corridor Plan, 2009

2.9 BICYCLE/PEDESTRIAN NETWORK

2.9.1 Existing Network

Currently, pedestrian conditions are not consistent and bicycle accommodations are limited along the Route 6 corridor within the Local Study Area. There is not a high demand for bicycle and pedestrian facilities along the corridor but the demand does exist. Data regarding pedestrian counts at each surveyed intersection is included in the Appendix. Due to the access limitations of the ramps over Route 18, Route 6 does not have a direct connection for pedestrians and bicyclists along the entire corridor. The following review of existing pedestrian and bicycle accommodations highlights the recent improvements and remaining issues along the Route 6 corridor. Specific accommodations are shown on Figure 2.47.

Figure 2.47. Route 6 Corridor Bicycle and Pedestrian Accommodations

MILL STREET/KEMPTON STREET

In New Bedford, westbound Route 6 (Mill Street) between Pleasant Street and County Street was recently reconstructed including new sidewalks. The project was completed in 2013 and upgraded the roadway to include new crosswalks, ADA ramps, walk signal indicators, and bicycle traffic indicators in each vehicular lane. The intersection of Kempton Street and County Street also has new ADA ramps, crosswalks, walk signal indicators, and bicycle signal indicators in each vehicular lane. The unsignalized intersection of Kempton Street and Hill Street lacks crosswalks, ADA ramps, or any pedestrian or bicycle signalization. With the exception of the north side of Kempton Street between Hill Street and Pleasant Street and a grassy median between Kempton Street and Foster Street that lack sidewalks, sidewalk conditions along Kempton Street are in fair to good condition.

KEMPTON STREET/ROUTE 6 AND PURCHASE STREET/PLEASANT STREET "OCTOPUS INTERSECTION"

The intersection of Pleasant Street, Kempton Street (eastbound Route 6), Mill Street, Sixth Street, and the ramps to the New Bedford-Fairhaven Bridge is a busy intersection just west of Route 18. The intersection provides access to the bridge from the west, to downtown New Bedford from the north and west, and to Route 18 and I-195 from the downtown. Although there are extensive pedestrian accommodations at the intersection, the majority are flawed and do not meet current ADA guidelines. Each approach has crosswalks and a pedestrian signal, with the exception of the Kempton Street approach.

SRPEDD completed the *Pleasant Street-Kempton Street-Mill Street-Sixth Street-Route 6 Intersection Study* (Octopus Intersection Study) for the "Octopus Intersection" in New Bedford in 2012. Three pedestrian crashes have occurred at this intersection in the past several years, with one fatality, due to numerous safety and congestion problems. A pedestrian bridge was located east of the intersection that connects over Route 6, but pedestrians were reluctant to use it due to its isolated location, steep grade, and concern for personal safety and has since been removed by the City of New Bedford.

The City of New Bedford is undertaking a $750,000 improvement project based on the results of the Octopus Intersection Study. The project is focused on pedestrian improvements and will add new walk signals, improved lighting, brick islands, and landscaping that will shorten the crosswalk length and slow down traffic. The construction is planned to occur in the spring and summer of 2015.

WEST BRIDGE APPROACH

The segment of Route 6 between the "Octopus Intersection" and MacArthur Drive has a bicycle and pedestrian prohibition that forces bicyclists and pedestrians to seek different routes to access the bridge. A new ramp that runs from northbound Route 18 (JFK Memorial Highway) near Union Street provides access over MacArthur Drive up to the southerly sidewalk along the bridge. The only access to the northerly sidewalk on the western end of the bridge is from a set of stairs that leads up from MacArthur Drive.

NEW BEDFORD-FAIRHAVEN BRIDGE

A sidewalk runs along the entire length of the northerly and southerly sides of the bridge between MacArthur Drive in New Bedford and Middle Street in Fairhaven. The bridge does not have a dedicated bike lane in either direction. During bridge construction events, at least one of the sidewalks along the bridge has been closed, causing pedestrians to detour to the other side of the street to cross the bridge. Locations for safe pedestrian crossings are extremely limited along the length of the bridge. A single crosswalk on Pope's Island is the only crosswalk between the shorelines. Pedestrians or bicyclists using the northerly sidewalk cannot cross Route 6 and access the ramp that connects the southerly sidewalk to Route 18/JFK Memorial Highway. Instead, they must use a set of stairs that leads down to MacArthur Drive.

MIDDLE STREET TO ADAMS STREET

MassDOT completed a project in 2013 to install new traffic signal systems and new ADA-compliant curb ramps at Middle Street, Main Street, Green Street, and Adams Street. The traffic signal systems were coordinated and included phasing to improve safety and congestion. Signage indicating the shared use of the vehicular lanes with bicyclists and "sharrows" are located on the outside vehicular traffic lanes for the entire segment. SRPEDD's 2006 *Route 6 Corridor Safety Study* had identified the 1.6-mile segment between Middle Street and Narragansett Boulevard in Fairhaven as experiencing a high percentage of traffic crashes.

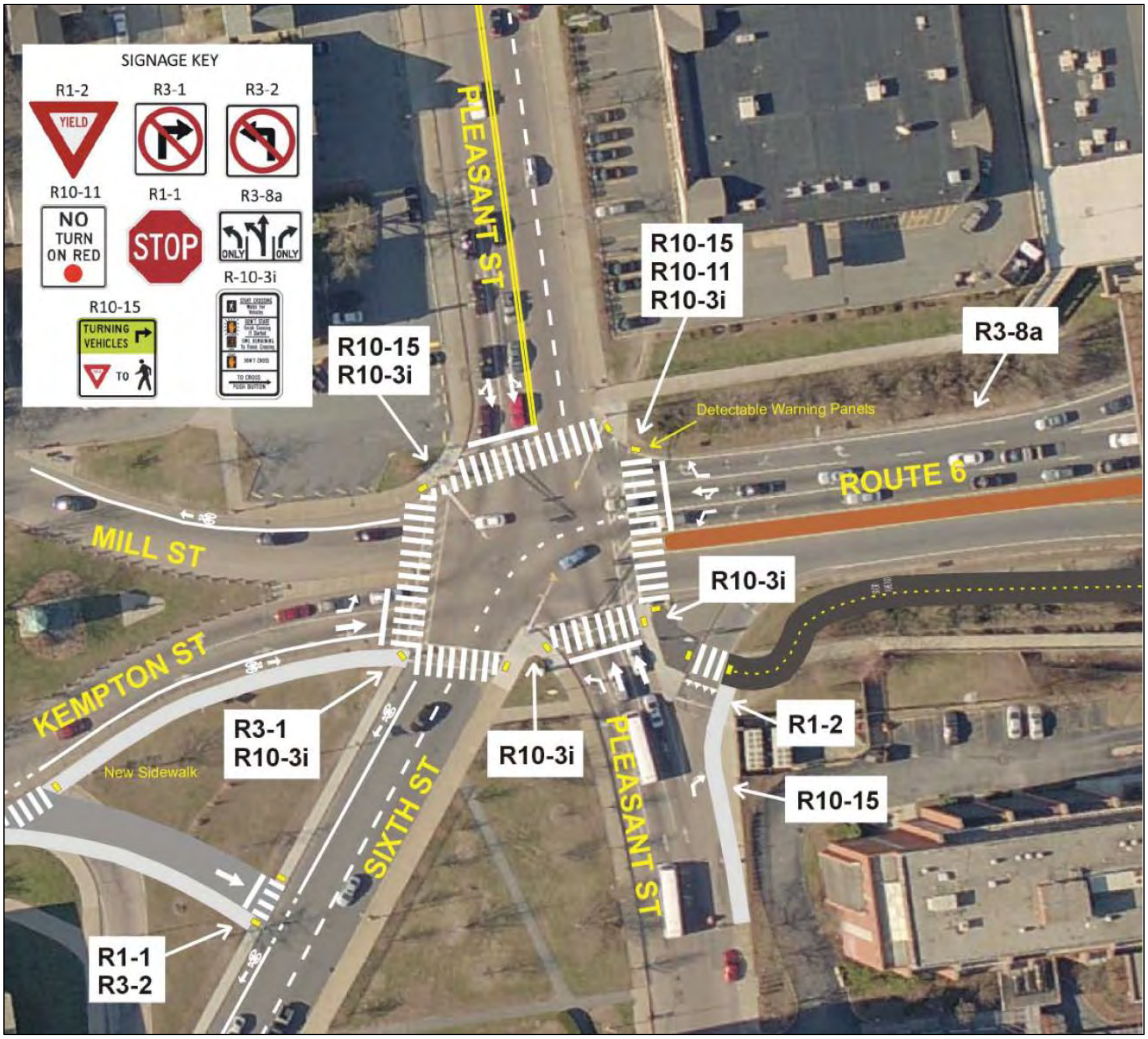
2.9.2 Planned Improvements

As shown in Figure 2.48, the Octopus Intersection Study concluded that upgrades to traffic signal equipment, pavement markings, signage, ADA compliant sidewalks, crosswalks, and formal bicycle lanes, and the pedestrian overpass are needed at this important intersection. The plan also recommended a multi-use path on the south side of Route 6 east of Pleasant Street that would connect to the JFK Memorial Highway Bike Path.

As a component of SRPEDD's *Southeastern Massachusetts Bicycle Plan* and the *2012 Regional Transportation Plan*, the South Coast Bikeway is a proposed 50-mile continuous system of bike or multi-use paths that would run from the Rhode Island-Massachusetts border to the Cape Cod Canal. As shown in Figure 2.49, several segments of the bikeway network have been completed, including the Phoenix Rail Trail in Fairhaven. As previously shown in Figure 2.47, this multi-use path ends at Main Street in Fairhaven. An on-road segment is proposed to run along Main Street in Fairhaven between Route 6 and the existing path. Another on-road segment is proposed along Route 6 to allow bicycles to cross the New Bedford-Fairhaven Bridge. A multi-use path aligned along Route 18/JFK Memorial Highway in New Bedford is proposed to provide connections to the north and south.

The bridge corridor is also included on the MassDOT's proposed Bay State Greenway on-road and off-road bicycle network initially proposed in 2008.

Figure 2.48. "Octopus Intersection" Recommended Improvements



Source: Pleasant Street-Kempton Street-Mill Street-Sixth Street-Route 6 Intersection Study, New Bedford

Figure 2.49. Proposed South Coast Bikeway

Source: SRPEDD/South Coast Bikeway

2.10 NO BUILD CONDITIONS ANALYSIS

An analysis of the conditions projected for 2035 with no substantial changes in the corridor was conducted. The analysis, called the No Build conditions analysis was completed to evaluate the need for corridor intersection improvements regardless of the decisions related to long-term bridge alternatives. As will be further detailed in Chapter 3 and 4, the long-term alternatives for the bridge have little impact on future corridor traffic conditions, therefore the more detailed no-build conditions analysis was conducted which separates any potential impacts from changes to the bridge with improvement needs within the corridor. The following section identifies the demands and conditions of travel projected to occur within the corridor in 2035.

2.10.1 Future Demand (Maritime Traffic Forecasts)

The biggest demand for vessel access north of the New Bedford-Fairhaven Bridge is created by the cargo and fishing industries. The demand for larger vessel access is currently driven by the commerce generated by Maritime Terminal, whose primary warehouse and cold storage facility is located above the bridge. The HDC is also looking at the potential development of additional facilities north of the bridge, including the potential for offshore wind turbine fabrication and development in the future.

MARITIME TERMINAL

Maritime Terminals is one of the primary importers of fruit and other agricultural products reaching the markets of New England and Canada. The company provides chilled and frozen product storage services as well as warehousing services. New Bedford is a primary intermodal connecting port for these products as well as other fisheries-based product. Port facilities including Maritime Terminals have good highway and rail access. Maritime Terminals will soon have its interchange restored and will be able to access rail equipment, capable of handling approximately three times the capacity of a single truck. Rail car weights are up to 263,000 pounds per car including the weight of the car. Truck weights average 80,000 pounds.

According to representatives from Maritime Terminals, the company currently handles about 10 to 12 ships per year at the terminal, but in past years handled as many as 25 ships. The highest number of vessels in recent history was 30 ships in a year. The company handled about 600 reefer containers in 2013 last year by rail and truck. Ships average around 2,000 to 2,600 pallets with larger vessels around 3,500 pallets.

The terminal once handled a significant amount of South American fruit including apples. These cargoes are now handled by competitive ports including Wilmington, Delaware and Philadelphia, Pennsylvania. Ship calls have dropped off since the 1990s, but are potentially on the rise with Maritime Terminals expecting 25 ships in 2015. Recapturing this cargo alone would add another 10 to 12 ship calls annually. The key factor is the amount of unencumbered deep water berthing available, which optimally would include the existing facility above the bridge, the State Pier and the new Marine Commerce Terminal. Competition in these market areas is considered significant and New Bedford is among a few remaining ports that have full service facilities that can handle these cargos, including the Delaware River facilities.

Maritime Terminals representatives reported a substantial concern about the New Bedford-Fairhaven Bridge. In 2013, three ships were delayed and could not transit the bridge due to wind restrictions. This adds substantial cost to a vessel's port call. These same restrictions do not exist for New Bedford's primary competitors.

COMMERCIAL FISHING INDUSTRY

The highest regular demand for bridge openings is created by the fishing industry. The port is home on a permanent or transient basis to over 360 fishing vessels engaged in ground fishing and other fishing activities, including the scallop industry. Many of the boats in New England have relocated to New Bedford because of its proximity to fishing grounds, regulatory constraints and high value harvesting of scallops. Berthing and other services have expanded in the port due to these relocations.

Fishing vessels require frequent openings of the bridge to accommodate their outriggers since when they are stowed, the masts and antennas exceed the available air draft height of the current bridge when closed. For the most part, any commercial vessel transiting north of the bridge will require a bridge opening because of the shallow air draft of the closed bridge. Overall, however, vessels time their transits to the scheduled bridge openings and are not adversely impacted unless the bridge cannot be opened.

There is a good amount of vessel berthing north of the bridge. An estimated 30 to 40 vessels berth at piers or nest in the upper harbor. There are also unloading and storage/processing facilities including American Seafoods International, Eastern Fisheries, and Marlees Seafood, located just north of Maritime Terminals. Processors report at least 10 to 12 vessels are berthed at any one time either unloading or moored at each facility.

Eastern Seafoods, for example, operates 25 of their own scallop vessels with 30 on site currently. The vessels range from 75 to 100 feet in length. They have three waterfront plant locations in New Bedford totaling 110,000 square foot of processing and cold storage space in the port, most of which is located above the bridge. This includes a 44,000 square foot facility and a 42,000 square foot facility. They also have approximately 500 feet of berthing with 25 to 30 feet alongside. The company also provides ice to the fishing fleets but a number of vessels prefer not to load ice above the bridge due to potential delays caused by the bridge schedule if they miss an opening. The company handles 20 million pounds of scallops annually as well as monkfish, dogfish and skate.

OTHER FACTORS FOR FUTURE PORT DEMAND

In addition to expansion of existing facilities, the Port of New Bedford has potential expansion from the development of new facilities at the waterfront properties in the North Harbor. Additional expansion could come from undefined sources that evolve from the opportunities related to access benefits of New Bedford related to regional highway and rail network connections to the major metropolitan markets of New York and Boston.

The Port of Boston is undertaking an expansion of their international container activity at Conley Terminal and addressing roadway constraints into the facility. This increase in cargo activity could result in potential constraints with road access for trucks calling on Conley Terminal. Shippers benefit from competitive transportation services. If the Port of New Bedford is able to develop alternative services to areas not served by Boston's ocean carriers, the Port may consider it logical for New Bedford to develop potential short sea services to New York or ocean cargo services into Mexico or South America.

The State is currently developing a *Ports of Massachusetts Strategic Plan* to evaluate the potential of the Port of New Bedford for maritime cargo. The State's Seaport Advisory Council is currently studying how to expand the focus on the state's ports. Significant to this is the development of the marine highway network that could open up realistic opportunities for the Port. Marine highway activities could include exported seafood product and transloading of heavy weight cargo from rail cars such as paper being shipped to Asia. The Seaport Advisory Council identified that to optimize these activities, expansion of cargo activities should take into account a maximum amount of deep-water berthing and associated facilities with cargo handling equipment. It should also include protection of the marine industrial zones along the New Bedford waterfront.

To accommodate future growth the EPA facility in the north harbor area would need to be redeveloped in order to make the North Terminal area capable of handling cargo shipments. This would entail construction of new bulkheads, pier areas with dredged berths, and an extension of the channel. Even with the identified improvements, the full functionality of the North Terminal area would be constrained unless the New Bedford-Fairhaven bridge were modified to eliminate or minimize navigational constraints.

The cargo potential for the North Harbor includes business related to containerized cargo, scrap steel, project cargos, and road salt. For example, containers destined to Southeastern Massachusetts are now trucked from New York, Boston and other port locations. This traffic could potentially come through a North Harbor facility instead. Additionally road salt was once handled by White Construction in New Bedford but is now transported from Rhode Island.

South of the bridge, the State Pier is currently the primary cargo facility in the port. It is used by Maritime Terminal to some extent for handling cargo. The facility is also used for berthing of fishing boats. Annual boat rates for the fishing fleet are $1,500 per year per boat. According to the HDC, in the future, the northern side of the State Pier may be appropriate for mixed-use development and the south side of the property could be used for tourism and cargo. The area might include moveable food areas or tables/chairs for picnics. These areas would be transformed and tourism based equipment removed when a cargo ship was docked. The property, however, is under the ownership and responsibility of the State. To make this vision possible, the State would need to give these facilities to the City of New Bedford.

If the Marine Commerce Terminal is not fully utilized as planned, even with the State Pier's and Maritime Terminal's berth, berthing capacity is below what is available at competitive ports. The bridge, if not modified or replaced to reduce or eliminate restrictions, would be a further limiting factor that would place the port at a competitive disadvantage.

VESSEL PROJECTIONS

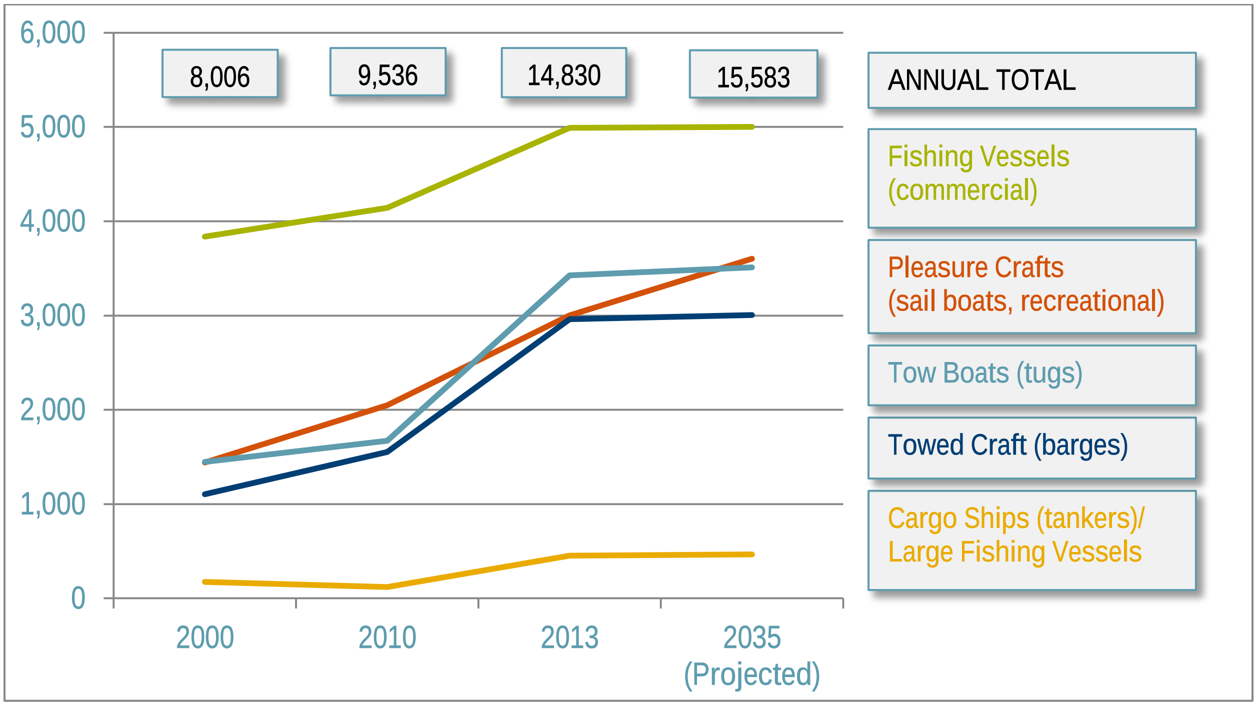
As previously discussed, the number of vessels that transit the bridge has increased in recent years. This increase is due in part to both ongoing port development and the EPA harbor cleanup. In the future, if the New Bedford-Fairhaven Bridge is not altered and the same physical limitations exist to vessels to transit through the bridge, it is anticipated that the growth will be minimal.

Using the MassDOT's Monthly Drawbridge Reports between 2000 and 2013, the number of annual bridge openings and the types of vessels that passed through the bridge were analyzed. Between 2000 and 2013, the total number of vessels increased by 85 percent, from 8,006 to 14,830. This growth is due to an increase in all types of vessels: commercial fishing vessels, pleasure crafts (i.e., sailboats or other recreational vessels), towboats, towed craft, and cargo ships or large commercial fishing vessels.

As shown in Figure 2.50, the growth of commercial fishing vessels and cargo ships is expected to increase only slightly between 2013 and 2035. The projected growth during this time is based on a five percent growth assumption, with is consistent with industry-wide growth projections.

This is a modest rate of growth, and would result in an increase from 14,830 vessels in 2013 to 15,583 vessels in 2035. Pleasure craft such as sailboats and other recreational vessels are anticipated to be the primary growth of vessels using the bridge. While the EPA harbor cleanup is expected to wind down in the upcoming years, the number of towboats and tugs is anticipated to stay at current levels to accommodate the growth of cargo and sand barges that will utilize new facilities north of the bridge.

Figure 2.50. Vessel Projections



Source; 2010-2013 MassDOT Monthly Drawbridge Reports

2.10.2 Future Conditions (Vehicular Traffic Forecasts)

The No Build conditions analysis included evaluating traffic conditions projected for the year 2035 within the Regional Study Area. The existing balanced traffic volumes collected in April 2014 were projected to the year 2035 and combined with the potential traffic generated due to planned developments in the study area. The resulting traffic volumes were analyzed to obtain baseline future traffic conditions that will be compared against the proposed alternative scenario conditions to determine the impacts due to each alternative.

BACKGROUND GROWTH RATE

In order to calculate the background growth rate, the TransCAD regional traffic forecasting model provided by SRPEDD was used. The forecast model is assumed to capture the effects of increases in housing, population, employment, and economic activity within the region, and is thus used as a representative measure for traffic growth. The 2035 projected traffic volumes along all major arterials and highways in the study area were compared with SRPEDD's baseline volumes to estimate an average traffic growth rate. A growth rate of 0.6 percent and 0.7 percent per year was estimated for the towns of New Bedford and Fairhaven, respectively. These growth rates were used to project 2014 balanced existing traffic volumes to 2035 background traffic volumes.

FUTURE DEVELOPMENTS

Based on an investigation of various proposed developments in the Local Study Area it was determined that the South Coast Rail project is expected to generate a considerable amount of traffic in the areas adjacent to the New Bedford-Fairhaven Bridge. A Final Environmental Impact Statement (FEIS) dated August 2013 published for this project was reviewed and the proposed additional traffic in the study area was estimated.

In addition, the City of New Bedford and the regional Economic Development Corporation (EDC) were consulted to investigate additional potential developments in the study area that could generate significant traffic. It was determined that a proposed hotel with approximately 150 rooms, on the corner of Elm Street and Water Street, in downtown New Bedford is expected to generate traffic. Potential trips generated due to this development were estimated using the Trip Generation Manual (9^{th} Edition) published by the Institute of Transportation Engineers (ITE).

2035 NO BUILD VOLUME DEVELOPMENT

In order to develop the projected 2035 No-Build roadway volumes, the traffic generated due to the South Coast Rail project and the proposed hotel were added to the 2035 background traffic to develop 2035 No Build traffic volumes. These trips were assigned to the study area roadway network based on traffic counts and previous knowledge of the study area. Detailed No Build traffic volumes for the major intersections in the Regional Study Area are shown in Appendix E.

2035 NO BUILD CAPACITY ANALYSIS

The No Build traffic volumes were used to conduct a detailed capacity analysis of the intersections within the Regional Study Area. This was done to gain an understanding of future traffic conditions along the Route 6 corridor and existing and potential detour routes.

Synchro was used and the HCM-based methodology was applied to determine performance metrics such as volume-to-capacity ratio, delay, and LOS of the study intersections. As noted in Section 2.7.3, an acceptable mid-LOS D is defined as 45 seconds of delay for signalized intersections and 30 seconds of delay for non-signalized intersections.

During the AM peak hour, 12 of the 36 intersections are projected to operate with overall intersection average vehicle delay values above the acceptable delay threshold. An additional eight intersections will have one or more lane groups that exceed the acceptable delay threshold. Thus 20 of the 36 intersections will have an approach or the entire intersection operating at a delay that exceeds the threshold in the AM peak hour. This is an increase of five intersections over the existing condition that exceed the acceptable threshold.

The intersections with deteriorated AM peak hour conditions include:

- Kempton Street and Cottage Street;
- Huttleston Avenue and Adams Street;
- Coggeshall Street and Ashley Boulevard;
- Coggeshall Street and Belleville Avenue; and
- Howland Road and Alden Road.

During the PM peak hour, 15 of the 36 intersections will operate with overall intersection average vehicle delay values above the delay threshold. An additional six intersections will have one or more lane groups that exceed the delay threshold. Thus a total 21 of the 36 intersections will have an approach or the entire intersection operating at a delay that exceeds the HCM threshold in the PM peak hour. This is an increase of four intersections over the existing condition that exceed the acceptable threshold. . The intersections with deteriorated PM peak hour conditions include:

- Mill Street and County Street;
- Huttleston Avenue and Bridge Street;
- Coggeshall Street and Acushnet Avenue; and
- Coggeshall Street and Belleville Avenue.

A graphical representation of the LOS at all study intersections is shown on Figure 2.51. Detailed delay and LOS tables are provided in Appendix F.

CAPACITY ISSUES

In order to highlight capacity issues and constraints in the study area, intersections have been divided into the following three categories:

- Route 6 corridor;
- Intersections along MassDOT's current detour route; and
- Intersections along potential future detour routes within the Regional Study Area.

Route 6 Corridor
The Route 6 corridor consists of Route 6 from County Street in New Bedford to Adams Street in Fairhaven. Seven intersections were analyzed along this corridor for detailed capacity constraints. A summary of intersection delays and LOS for 2035 No-Build conditions are provided in Table 2.25 below:

Figure 2.51. Regional Study Area Intersection LOS, 2035 No Build Conditions

Table 2.25. Comparison of Route 6 Corridor Intersection Delay and LOS Summary, 2014 Existing and 2035 No Build Conditions

ID#	Intersection Name	2014 AM Int. Delay	2014 AM Int. LOS	2014 PM Int. Delay	2014 PM Int. LOS	2035 AM Int. Delay	2035 AM Int. LOS	2035 PM Int. Delay	2035 PM Int. LOS
1	Mill Street and County Street	20.6	C	23.3	C	22.6	C	49.6	D
2	Kempton Street and County Street	15.4	B	14.6	B	17.5	B	17.5	B
3	Kempton Street/Mill Street and Purchase Street ("Octopus Intersection")	73.5	E	80.7	F	87.7	F	112.5	F
4	Huttleston Avenue and Middle Street	9	A	10.3	B	9.8	A	11.6	B
5	Huttleston Avenue and Main Street	25	C	26.8	C	26.3	C	28.6	C
6	Huttleston Avenue and Green Street	12.1	B	10.4	B	13.2	B	11.4	B
7	Huttleston Avenue and Adams Street	26	C	16.7	B	39.1	D	18.1	B

An intersection with a LOS E or worse and a volume-to-capacity ratio of one or more approaches equal to or greater than 1.0 is considered to be at or over capacity. As noted in the above table, all the intersections along the Route 6 corridor will operate at acceptable LOS with an exception of one intersection that is highlighted in red. The primary issues along the Route 6 corridor occur at the "Octopus Intersection" due to capacity constraints. The other issue is the additional capacity required on northbound and southbound Adams Street.

- **Kempton Street/Mill Street and Purchase Street.** The intersection of Kempton Street/Mill Street and Purchase Street ("Octopus Intersection") will deteriorate from LOS E under existing conditions to LOS F under No-Build conditions during the AM peak hour. Though it will remain at LOS F during the PM peak hour, an increase in delay will be experienced. Currently, there is considerably high left-turn traffic demand on the eastbound and westbound approaches under current conditions, and as noted in Section 2.7.2 and based on observations made during April 2014 counts, this left-turn traffic demand is only expected to increase. By 2035, this intersection is expected to have an increase in eastbound left-turn traffic during long-term bridge closures along with an overall increase in traffic. This highlights the need to address future capacity issues through additional lanes and signal timing adjustment. This intersection currently operates on a pre-timed split signal phasing. The approaches have approximately equal traffic demand.
- **Huttleston Avenue and Adams Street.** The intersection of Huttleston Avenue and Adams Street will deteriorate from LOS D under existing conditions to LOS E and F under future conditions during the AM peak and PM peak hours, respectively. During both peak hours, the northbound approach will operate at LOS F.

Intersections Along Current MassDOT Detour Route
MassDOT closed the New Bedford-Fairhaven Bridge to vehicular traffic for necessary structural repairs in April 2014. The following detour plan was posted for the drivers by MassDOT.

- **Route 6 westbound traffic.** Travel north along Main Street, left onto Howland Road until Coggeshall Street, and left onto Route 18 southbound.
- **Route 6 eastbound traffic**. Travel along Route 18 northbound onto I-195 eastbound at Exit 15 to Exit 18 and onto Route 240 southbound.

Ten key intersections along the current detour path were analyzed as part of the existing and 2035 No-Build conditions analysis. The delays and LOS associated with each of these intersections under the 2035 No Build conditions for AM and PM peak hours are provided in Table 2.26. In addition, the detour route and the intersections impacted due to the current detour route are shown in Figure 2.52.

Table 2.26. Comparison of Delay and LOS Summary of Intersections along current MassDOT Detour Route, 2014 and 2035 No Build Conditions

ID #	Intersection Name	2014 AM Int. Delay	2014 AM Int. LOS	2014 PM Int. Delay	2014 PM Int. LOS	2035 AM Int. Delay	2035 AM Int. LOS	2035 PM Int. Delay	2035 PM Int. LOS
1	Huttleston Avenue & Route 240	20.7	C	20	C	22.1	C	21.9	C
2	Bridge Street & Route 240	114.8	F	51.4	D	157.6	F	78.6	E
3	Hillman Street & Purchase Street	11.2	B	12.8	B	12.2	B	15.4	B
4	Hillman Street & JFK Memorial Hwy NB on-ramp	-	-	-	-	-	-	-	-
5	Coggeshall Street & Ashley Boulevard	21.9	C	48.9	D	34.4	C	102.0	F
6	Coggeshall Street & Acushnet Avenue	18.1	B	19.6	B	20.5	C	35.2	D
8	Coggeshall Street & N Front Street	7.2	A	58.2	F	19.0	C	180.1	F
9	Coggeshall Street & Belleville Avenue	27.6	C	28.9	C	49.5	D	56.9	E
10	Coggeshall Street & I-195 off-ramp	56.6	E	64.3	E	79.0	E	97.1	F
11	Howland Road & Main Street	50.8	D	124.7	F	93.3	F	225.6	F

Out of the ten intersections analyzed, the intersections that operate at LOS E or F during either AM and/or PM peak hours under No Build conditions are highlighted in red in Table 2.26.

- **Bridge Street and Route 240.** During AM peak hour, the intersection of Bridge Street and Route 240 will experience an increase in delay while operating at LOS F under both existing and No-Build conditions. During PM peak hour, the LOS changes from D under the existing condition to E under the No-Build condition. In 2035, a LOS F will be experienced on all approaches except westbound approach during AM peak hour and southbound approach during PM peak hour. This intersection experiences high traffic demand due to its location along Route 240.

- **Coggeshall Street and Ashley Boulevard.** During the PM peak hour, the intersection of Coggeshall Street and Ashley Boulevard is expected to change from a LOS D in the existing conditions to LOS F in a No-Build condition.
- **Coggeshall Street and N. Front Street.** The intersection of Coggeshall Street and N. Front Street is a stop-controlled intersection. Under PM peak hour conditions the intersection is currently operating at a LOS F, but an increase in delay from existing to No-Build conditions is anticipated.
- **Coggeshall Street and Belleville Avenue.** During the PM peak hour, the intersection of Coggeshall Street and Belleville Avenue will change from a LOS C in existing condition to LOS E in No Build conditions.
- **Coggeshall Street and I-195 off-ramp.** During AM peak hour, the intersection of Coggeshall Street and the I-195 off-ramp is anticipated to experience increase in delay from the existing to No Build conditions. Whereas during PM peak hour, the intersection changes from LOS E in existing to LOS F in the No-Build condition. The westbound and southbound approaches during both peak hours and northbound I-195 off-ramp approach during PM peak hour exceed capacity and operate at LOS F. This intersection will need additional capacity under high right-of-way constraints to accommodate 2035 traffic conditions.
- **Howland Road and Main Street.** During the AM peak hour, the intersection of Howland Road and Main Street will change from LOS D in the existing condition to LOS F in the No Build condition. While the intersection currently operates at LOS F, the intersection will experience increase in delay during the PM peak hour. All approaches except westbound approach of this intersection have currently reached or exceeded capacity.

As noted above, three out of six intersections along the current detour route are expected to exceed capacities in the No Build condition. They are currently experiencing high delays on almost all the approaches and will likely require additional capacity in terms of additional lanes. While the remaining intersections are currently operating adequately, they could be improved by adjusting signal timing phasing, splits, or offsets. Considering the capacity constraints, the diversion of traffic to these intersections needs to be reviewed and placement of additional ITS signs to divert traffic to other streets should be considered.

Intersections Along Potential Future Detour Routes

In addition to the intersections listed above, nineteen other key intersections within the regional study area were analyzed for capacity issues and constraints. In the event of a long-term bridge closure, these intersections are expected to experience changes in traffic patterns. The knowledge of operations of these intersections in future conditions will support the task of reviewing the placement of current ITS signs and propose new signs. The delay and LOS associated with these intersections are summarized in Table 2.27.

Figure 2.52. Current Detour Routes

Table 2.27. Comparison of Delay and LOS Summary of Intersections along Potential Future Detour Routes, 2014 Existing and 2035 No Build Conditions

ID #	Intersection Name	2014 AM Int. Delay	2014 AM Int. LOS	2014 PM Int. Delay	2014 PM Int. LOS	2035 AM Int. Delay	2035 AM Int. LOS	2035 PM Int. Delay	2035 PM Int. LOS
1	Kempton Street and Brownell Avenue/Route 140	54.9	D	63.9	E	84.3	F	93.6	F
2	Kempton Street and Cornell Street	11	B	9	A	13.5	B	10.6	B
3	Kempton Street and Rockdale Avenue	53.8	D	56.8	E	80.5	F	76.2	E
4	Mill Street and Rockdale Avenue	16.8	B	16.8	B	19.0	B	21.4	C
5	Mill Street and Cottage Street	17.6	B	16.5	B	19.2	B	17.0	B
6	Kempton Street and Cottage Street	20.8	C	14.4	B	34.7	C	14.0	B
7	Huttleston Avenue and Holcomb Street	7	A	7.1	A	7.7	A	8.0	A
8	Huttleston Avenue and Bridge Street	15.1	B	17.8	B	17.4	B	27.8	C
9	Huttleston Avenue and Alden Road	28.36	C	39.8	D	31.6	C	62.1	E
10	Bridge Street and Alden Road	44	D	51.8	D	60.2	E	77.1	E
11	Union Street and Route18	2.3	A	2.4	A	2.8	A	2.9	A
12	Purchase Street and JFK Memorial Highway SB off-ramp	25.9	D	18.8	C	65.6	F	48.0	E
13	Linden Street and County Street	10.8	B	14.3	B	12.1	B	18.2	C
14	Washburn Street and Belleville Avenue	26.3	D	107.3	F	63.4	F	1941.6	F
15	Coggeshall Street and Mt. Pleasant	11.7	B	12.2	B	13.4	B	14.6	B
16	Coggeshall Street and County Street	12.2	B	13.1	B	12.9	B	14.4	B
17	Coggeshall Street and Purchase Street	170	F	14.7	B	261.5	F	20.7	C
18	Howland Road and Adams Street	41.4	D	39	D	52.3	D	50.0	D
19	Howland Road and Alden Road	4.2	A	5.6	A	6.1	A	24.0	C

As highlighted in red in Table 2.27, seven of the nineteen intersections in this sub category will operate at either LOS E or F during AM and/or PM peak hours under No-Build conditions.

- **Kempton Street and Brownell Ave/Route 140.** The intersection of Kempton Street and Brownell Avenue/Route 140 will change from LOS D to LOS F during AM peak hour and will change from LOS E to LOS F during the PM peak hour. All approaches except westbound approach will operate at LOS F during the No Build condition. Heavy left turn and through movement volumes on the eastbound and southbound approaches cause equal demand for signal split time. The southbound and northbound approaches operate at split phases thus increasing the demand for signal split times. This intersection potentially needs additional lane capacity.

- **Kempton Street and Rockdale Avenue.** The intersection of Kempton Street and Rockdale Avenue will change from LOS D in the existing condition to LOS F in the No Build condition during AM peak hour. The intersection will remain at LOS E in the No Build condition, but will have increased delays during PM peak hour. It currently experiences significantly high northbound left turn volumes, especially during the AM peak hour, which results in long queues on the northbound approach. The southbound approach has considerably high volumes as well; however, it does not receive adequate split time due to the advanced lead phase on the northbound left-turn. There is a need for additional turning lanes in the northbound direction with potential right-of-way constraints. This intersection has high truck turn volumes as well, causing other potential issues such as inadequate turning radii and safety concerns.
- **Huttleston Avenue and Alden Road.** During the PM peak hour, the intersection of Huttleston Avenue and Alden Road will change from LOS D in the existing condition to LOS E in the No Build condition. The Route 6 eastbound and westbound approaches experience high demand.
- **Bridge Street and Alden Road.** The intersection of Bridge Street and Alden Road will change from LOS D in the existing condition to LOS E in the No Build condition, during both AM and PM peak hours. The southbound approach will operate at LOS F during the AM peak hour and the eastbound and northbound approaches will operate at LOS F during the PM peak hour, whereas the remaining two approaches operate at LOS E. This intersection potentially needs additional lane capacity in combination with signal timing adjustment to address LOS issues.
- **Purchase Street and JFK Memorial Highway.** The intersection of Purchase Street and JFK Memorial Highway southbound off-ramp will change from LOS D to LOS F during the AM peak hour and from LOS C to LOS E during the PM peak hour. This is a result of high left turn demand on the westbound approach operating under stop control. Though there is high demand on the westbound approach there is relatively less conflicting traffic on the northbound and southbound Purchase Street approaches. Field observations or gap study should be considered to estimate whether sufficient gaps would be available for the side street turning traffic.
- **Washburn Street and Belleville Avenue.** The intersection of Washburn Street and Belleville Avenue will change from LOS D to LOS F during AM peak hour and will remain at LOS F during PM peak hour, though with a higher delay. This intersection is primarily used by traffic entering and exiting eastbound I-195. The I-195 ramps are located approximately 300 feet east of this intersection along Washburn Street. The majority of I-195 exiting traffic makes right turn at the westbound approach of the intersection, which is under stop control. However, this movement is not in conflict with any major movements at the intersection. The other major movements include southbound left-turn movement and eastbound through movement, which are conflicting traffic. Traffic on eastbound approach is stop controlled and, as noted during field visits, has sufficient gap time to maneuver through the intersection

without excessive delay. Consequently, this intersection is expected to experience less delay than projected in the HCM based analysis.

- **Coggeshall Street and Purchase Street.** The intersection of Coggeshall Street and Purchase Street will experience an increase in delay while operating at LOS F under AM conditions. The traffic demand is not excessive at this intersection.

The short- and medium-term alternatives to be discussed in subsequent chapters will be developed with an objective of addressing the issues and constraints discussed above. These alternatives upon implementation are expected to accommodate the long-term replacement or closure of the bridge under forecasted 2035 traffic demand conditions.

2.11 SUMMARY OF ISSUES

2.11.1 Vehicular Traffic

CURRENT

The minimum time to open and close the bridge is 7.5 minutes. The typical time to open and close the bridge is actually 12.5 to 22.5 minutes, depending on vehicular, pedestrian, and marine traffic clearance times. Due to the variable traffic delays and bridge maintenance projects that have occurred numerous times over the last 30 years, vehicular traffic on the bridge has declined. Motorists have found other routes to avoid the growing number of delays caused by the bridge openings and construction.

Located about one mile north of the New Bedford-Fairhaven Bridge, Coggeshall Street/Howland Road and I-195 provide alternatives to local and regional traffic. When the bridge closes for construction or when it opens for marine traffic, traffic detours onto these roadways adding to the existing capacity issues. Several intersections within the Regional Study Area, including the alternate route along Coggeshall Street/Howland Road currently operate with overall intersection average vehicle delay values above the acceptable delay threshold. The LOS of several intersections, including the "Octopus Intersection," currently operate at a LOS E or F, which are below the acceptable threshold.

The New Bedford-Fairhaven Bridge closes to vehicular approximately once an hour between 6AM and 7PM. The average delay time is approximately 12.5 minutes. During the hourly bridge closures, traffic queues form on either side of the movable bridge. Based on recent observations that coincided with lane reductions on the bridge, the eastbound queue typically extends 1,600 feet onto the Route 18 southbound off-ramp during the AM peak period. The westbound queue extends 1,300 feet to the Dunkin Donuts driveway on Pope's Island in the AM. It is typically even longer, almost 2,350 feet to the Fairhaven shoreline, during the PM peak period.

ITS signs are utilized in both New Bedford and Fairhaven to inform drivers when the bridge is closed to vehicular traffic. Traffic count data reveals that a decrease in traffic on the bridge approaches occurred when the signs were illuminated indicating that the bridge is closed. This decrease in traffic indicates that drivers are utilizing alternate routes during bridge closure. However, lengthy traffic queues continue to occur on both sides of the bridge.

FUTURE

In the future No-Build Condition, the overall intersection average vehicle delay values at key intersections within the Regional Study Area, including several along the Route 6 corridor and the Coggeshall Street/Howland Road detour route will continue to experience delays above the acceptable threshold. At several intersections, delays will increase and LOS will decline. Three out of the six corridor intersections are expected to exceed capacities in No-Build conditions and experience high delays on almost all approaches. The LOS at two corridor intersections and several intersections along Coggeshall Street/Howland Road will deteriorate and increased delay times will occur.

The two intersections along the Route 6 Corridor with existing delay times above the acceptable delay threshold will experience a further increase in delay times. The "Octopus Intersection" is expected to experience an increase in delays by 15 and 30 seconds, with a LOS of F in both the AM and PM peak travel periods. The Huttleston Avenue and Adams Street intersection is expected to see an increase in delays of 30 to 70 seconds, with a LOS of E in the AM and LOS of F in the PM peak travel periods. Intersections along the bridge detour route are also expected to experience increases in delay time and declining LOS.

2.11.2 Marine Traffic

CURRENT

The current bridge has a vertical clearance of only six feet. Due to the limited vertical clearance, the majority of vessels, including recreational vessels, require the bridge to open to pass through the bridge. Over the last 30 years, the number of bridge openings has increased 200 percent. Each day, the bridge is scheduled to open 13 times, equaling 4,380 scheduled openings per year. In 2013, the bridge opened 5,524 times.

The number of vessels per year has increased over the last 30 years, from just 2,403 in 1981 to 14,830 vessels in 2013. The number of larger vessels has also increased. Between 1981 and 2013, the number of cargo ships or large fishing vessels increased almost 600 percent, from 81 to 452 vessels.

The width of the New Bedford-Fairhaven Bridge's opening is another constraint to vessels. The swing span navigational width is 92 feet, compared to the 150-foot wide hurricane barrier that limits vessel size at the entrance to the harbor. To navigate through the bridge, larger vessels require additional pilotage and tug fees to deal with other navigational constraints. Some larger vessels are unable to navigate the bridge.

The shipping channel also presents limitations to vessel depth and speed. While the federal shipping channel is 30 feet deep, under keel clearance requirements results in an effective transit draft of 26 feet for vessels. New Bedford Harbor requires a slow speed transit. The speed limit in the harbor is 5 mph.

FUTURE

In the future even without changes to the configuration of the bridge, the number of vessels per year is expected to continue to increase. Between 2013 and 2035, the number of vessels is projected to increase by five percent. Correspondingly, the number of bridge openings is also projected to increase by four percent. The number of large vessels, including cargo ships (tankers) and large fishing vessels, tow boats, and barges are expected to increase only modestly, by approximately two to three percent. The number of pleasure crafts including sailboats and motor boats that pass through the bridge are anticipated to increase by 20 percent. Significant changes to bridge configuration is anticipated to result in changes to the make-up of the future marine traffic. By eliminating the constraint, the number of large cargo vessels to serve New Bedford could increase. Although these vessels represent a small percentage of marine traffic, they could result in substantial benefits to the regional economy.

2.11.3 Multi-Modal Access

The New Bedford-Fairhaven Bridge is the only pedestrian or bicycle access point between downtown Fairhaven and New Bedford. The bridge has a sidewalk on either side of the travel lanes, but there is only one crosswalk between the New Bedford and Fairhaven shores. Pedestrian access to the bridge from New Bedford is limited to a sidewalk constructed as part of a new ramp from northbound JFK Memorial Highway. A staircase on the north side of Route 6 connects down to MacArthur Drive. Pedestrians and bicyclists are prohibited on the Route 6 ramps between Purchase Street and MacArthur Drive. The primary concern along the bridge is the lack of crosswalks. A single crosswalk on Pope's Island provides a safe crossing point for pedestrians between the New Bedford and Fairhaven shorelines.

The pedestrian facilities in the remainder of the corridor were examined and in most of the corridor the facilities were in fair to good condition. Some limited areas lack sidewalks, including the north side of Kempton Street between Hill Street and Pleasant Street and a grassy median between Kempton Street and Foster Street.

Currently, there are no safe routes for bicyclists on the bridge. Many bicyclists use the sidewalks to cross the bridge, which creates additional safety concerns for pedestrians. At the western end of the bridge, bicyclists cannot cross from the north side of the bridge to the pedestrian/bicycle ramp that leads from the south side of the bridge down to JFK Memorial Highway. A staircase is the only way off the bridge on the north side.

2.11.4 Safety

As discussed in Section 2.7.4, the most common types of crashes in the Local Study Area are angle crashes, rear-end crashes, and single-vehicle crashes.

Most of the rear-end crashes occur along the New Bedford-Fairhaven Bridge in slow moving traffic. This is potentially due to the stop-and-go conditions as part of long queues. In addition, a majority of the single vehicle crashes occurred on the New Bedford-Fairhaven Bridge. These crashes involved vehicles colliding with physical objects such as trees, guiderails, medians, curbs, bridge overhead structures, or other movable objects. A review of accident data indicates that the addition of construction related activities in the corridor accounts for a high percentage of the crashes.

2.11.5 Transit

In July 2013, the SRTA Route #11 was altered to avoid the bridge and use Coggeshall Street bridge instead. A major reason for the route modification was the inconsistent travel times that occurred due to bridge openings. The alternative route between New Bedford and Fairhaven proved more reliable for scheduled service between the two communities. Although the modified service is longer, it can serve more people along the route.

2.11.6 Environmental

Within the Local Study Area, there are numerous environmental considerations, including floodplains, wetlands, and other natural resources. The New Bedford Harbor has existing PCB contamination and an ongoing EPA cleanup to remediate the issues. Some of the EPA cleanup CAD disposal sites are located in the north harbor area, just north of Pope's Island.

The study area also includes historic resources, including the New Bedford National Register Historic District. The middle bridge has been deemed eligible for listing on the National Register.

2.11.7 Community Effects

Within the Local Study Area, demographic data indicates a high percentage of minority, low-income, or limited-English proficiency populations. The concentration of these populations indicates that the entire Local Study Area is within an area of EJ populations. This raises the potential for concern if the negative project impacts are significant since the study area's EJ population percentage is higher than the regional percentage. Community outreach efforts are important to ensure that project impacts do not discriminate based on race, color or national origin, age, disability and sex, among other protected categories.

Several parks and open spaces are located within the Local Study Area. This includes the City of New Bedford's Marine Park located on Pope's Island. Changes to the existing roadway could affect access to this city-owned park and marina.

The middle bridge was previously deemed eligible for listing on the National Register of Historic Places. Due to its eligibility, the bridge will be subject to the requirements of Section 106 of the National Historic Preservation Act (NHPA). A previous determination by the Massachusetts Historical Commission in 1980 indicated that since there were no feasible or prudent alternatives to avoid demolition, replacement of the bridge could progress following proper documentation of the structure. As the current bridge project develops, the FHWA will need to enter into consultation with the MHC to address any effects to historic properties, including any impacts on the adjacent historic districts.

2.11.8 Economic Development/Land Use

The channel width of the New Bedford-Fairhaven Bridge limits the development potential of the port north of the bridge. Several properties are available for redevelopment and there is potential to expand existing maritime uses within the Designated Port Area.

Increasing the bridge opening could increase the attractiveness of the Port of New Bedford as a destination for large cargo vessels. Other 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.

Unemployment is high in New Bedford (9.5 percent compared to 6.0 percent in Massachusetts or 6.3 percent in the U.S.) The port is not only an important employer, it is also a valuable economic engine for the city, region, and state. Due to the strong scallop market, the catch value is increasing and the port has been the most valuable in the U.S. for the last 10 years. Each vessel has an estimated $100,000-$150,000 direct impact on the local economy. The port provides 4,400 existing jobs. The future expansion potential at the port is critical for job growth and local and regional economic development.

The physical constraints of the bridge have resulted in delays to cargo shipments. If winds are greater than 10 knots, vessels cannot transit the bridge due to the width. Vessels can be delayed for a day or more, with each day of delay costing on average $40,000.

The New Bedford-Fairhaven Bridge provides the sole access to Fish Island and Pope's Island. Continued and future development on these islands is closely tied to potential bridge improvements. The elevation of the existing roadway and bridge could directly affect access to the majority of the properties on these two islands.

2.12 SUMMARY OF OPPORTUNITIES

In development of long-term Alternatives, the following opportunities will be evaluated for incorporation into the concept designs and configuration of potential improvements

2.12.1 Marine Traffic

The Port of New Bedford has extensive refrigeration and processing/handling facilities available to support both the fishing industry and cargo shipments, with 4.5 million cubic feet of cold storage and excellent distribution and warehousing facilities. As noted in the 2010

Massachusetts Freight Plan The harbor is host to an already substantial seafood processing industry, with 25 wholesale and 35 processing operations, and is poised to continue to grow. By improving port access through bridge improvements, the demand for seafood processing operations will undoubtedly increase; the Port of New Bedford has the expertise, equipment, and available space to accommodate continued growth in this highly important complementary industry. Increasing the port's ability to accept incoming fish creates a direct local economic impact by increasing demand for employment in the processing industry.

The port has a Foreign Trade Zone (FTZ), which is particularly important for sustaining freight operations and provides an incentive for future growth. Goods in the FTZ can be assembled, manufactured, or processed, and final products re-exported, without paying Customs duties. The Port of New Bedford also notes that commercial use of the port is also exempt from the Harbor Maintenance Tax, a federal tax imposed on shippers based on the value of imported goods being shipped through a particular port. These factors provide the port with a considerable competitive advantage, offering a potential cost advantage for foreign businesses considering trade in U.S. markets.

The Port once handled a significant amount of South American fruit. These cargos are now handled by competitive ports including Wilmington, Delaware and Philadelphia, Pennsylvania. Ship calls have dropped off since the 1990s, but are potentially on the rise with Maritime Terminals expecting 25 ships in 2015. Recapturing this cargo alone would add another 10 to 12 ship calls annually from past years. The key factor to this growth is the amount of unencumbered deep water berthing available, which optimally would include the North Harbor area, the State Pier and the new Marine Commerce Terminal. Competition in these market areas is considered significant and New Bedford is among a few remaining ports that have full service facilities that can handle these cargos, including the Delaware River facilities.

2.12.2 Multi-Modal Access

Key components of the North Harbor, are the direct highway connections to I-195 and Route 6 and the New Bedford Rail Yard. Connecting to the north and into the national railroad network, the 33.5-acre rail facility has 12 acres available for rail car staging and can accommodate 100 rail cars in its present configuration. These critical intermodal connections, along with a large amount of industrial land and potential for expanded berthing, provide the port with a viable and realistic seaport development zone. This includes further development of deep water berthing constrained only potentially by the existing bridge. Currently, the New Bedford-Fairhaven Bridge limits the size of vessels that can enter the north harbor area and limits the expansion potential of existing maritime uses within the Designated Port Area north of the bridge.

The Port of New Bedford benefits from great access to a diverse and growing transportation network. Trucking rates are significantly lower in New Bedford as compared to other major regional ports like Boston, New York, and Philadelphia. According to the Port of New Bedford, the port offers a shorter distance to many end-destinations, provides access to New England, the greater Northeast, and southern Canada markets, and offers an alternative that avoids major bottlenecking intersections along the I-95 Corridor.

New Bedford already has the infrastructure setup to expand its cargo operations. The harbor itself is well protected from surges by its hurricane barrier. The port enjoys unencumbered deep-water access. Extensive navigational dredging has recently taken place in the harbor, improving water quality and allowing the port to continue to accept larger vessels that cannot be accommodated by most other ports in New England.

2.12.3 Transit

The South Coast Rail project is the proposed restoration of commuter rail service between Boston's South Station, Fall River, and New Bedford. The proposed route would extend the commuter rail service from the route's current terminus in Stoughton and would terminate at a new station in New Bedford located within the Local Study Area.

As described in the 2009 South Coast Rail Economic Development and Land Use Corridor Plan, the proposed Whale's Tooth Station, which is located near the Route 6 corridor, and would restore passenger commuter rail to the City of New Bedford and maximize on the economic and environmental benefits of rail investment to the city and the region.

2.12.4 Economic Development/Land Use

Significant area for redevelopment exists within the entire Port of New Bedford. Within the North Harbor area, improving the bridge could encourage business development throughout the entire harbor.

The *New Bedford/Fairhaven Municipal Harbor Plan* is the state-approved plan for New Bedford Harbor. The plan includes the Designated Port Area (DPA) master plan and outlines the ongoing dredging process established through the State Enhanced Remedy (SER) and the location of the Confined Aquatic Disposal (CAD) sites in the harbor.

A portion of the 65 acre New Bedford DPA extends into the Local Study Area. Along with 10 other DPAs in Massachusetts, state policy seeks to "preserve and enhance the capacity of the DPAs to accommodate water-dependent industrial uses and prevent significant impairment by non-industrial or non-water-dependent types of development, which have a far greater range of siting options."

Additionally the Hicks-Logan-Sawyer neighborhood located adjacent to the North Harbor and within the Local Study Area is prime for redevelopment. The City of New Bedford developed the *Hicks-Logan-Sawyer Master Plan that* guides the development for this important mixed-use waterfront neighborhood.

The 10-acre North Terminal, an area with redevelopment potential, is located in the study area and currently has a range of existing uses. The North Terminal Area could accommodate a freight laydown and open storage area. Part of the area is owned by the City of New Bedford and the HDC has plans to rehabilitate and add five additional acres of usable land. Plans include dredging and fill, addition of a new pier, and adding rail spurs allowing for additional vessel/rail connections.

The entire New Bedford portion of the Local Study Area falls within a Priority Development Area, including the waterfront, the area around the proposed Whale's Tooth Station, and downtown New Bedford. A Priority Development Area is a zone established through the South Coast Rail Corridor Plan that have the greatest capacity or potential to accommodate and support new development such as major downtowns, employment centers, and future station areas. The plan designated 30 different Priority Development Areas within the overall region.

2.13 SUMMARY OF CONSTRAINTS

In development of long-term Alternatives, the following constraints will be incorporated into the concept designs and configuration of potential improvements

2.13.1 Marine Traffic

In the closed position, the bridge creates an impediment to most marine traffic. Any improvement should minimize the closure time during the construction phase. Prolonged closures will not be acceptable, as it would eliminate marine access to all businesses in the North Harbor.

2.13.2 Horizontal Clearance

A potential replacement bridge will need to accommodate between 125 and 150 feet of horizontal clearance. The two existing marine channels are 94 and 95 feet on either side of the central pier. The hurricane barrier offers a 150-foot wide horizontal clearance for vessels into the New Bedford Harbor. An increase in channel width at the bridge to match the width of the hurricane barrier would remove shipping constraints for vessels into the North Harbor.

2.13.3 Vertical Under-clearance (Air Draft)

Any replacement bridge needs to provide sufficient vertical under-clearance, or air draft, for vessels into the North Harbor. The tallest vessels that currently transit the bridge require at least 100-125 feet of air draft. Currently, emergency vessels cannot transit the existing bridge in the closed position and must wait for the bridge to open. The majority of the existing emergency vessels require 14 feet of vertical clearance.

2.13.4 Roadway Profile

While the elevation of the bridge to increase vertical under-clearance in the closed position would benefit unimpeded marine vessel transit and reduce the vehicular traffic delays, an increased roadway profile could affect pedestrian and bicycle access across the bridge. The maximum grade should be five percent, but a less steep grade would be preferred to facilitate bicycle and pedestrian access across the bridge. Additionally, the five percent grade should not extend for more than 800 feet as the grade then becomes difficult for bicycle and pedestrian travel.

2.13.5 Roadway Traffic

The New Bedford-Fairhaven Bridge currently operates with one lane in each direction due to construction activity and experiences long queues during peak hours. As discussed in Section 2.7.5, the queues extend to Route 18 on- or off-ramps on the west and few feet short of the Middle Street intersection on the east. During the No-Build conditions, the queue lengths along the New Bedford-Fairhaven Bridge are expected to increase due to an increase in traffic caused by background growth and additional developments in the area.

2.13.6 Community Impacts

The existing bridge provides the only way to access the properties and businesses located on Fish Island and Pope's Island. Any future bridge or roadway improvements should maintain access to adjacent parcels and businesses along both Fish Island and Pope's Island.

2.13.7 Environmental Conditions

Any improvements should consider the existing PCB contamination in the New Bedford Harbor. Improvements that require significant in-water work is also likely to disturb contaminated soils within the harbor and require significant environmental mitigation activities.