

Route 6 Corridor Study

March 2020



SRPEDD
Southeastern Regional Planning
& Economic Development District

Table of Contents

Executive Summary 1

Introduction 5

 Goals & Timeline 7

 Study Phases 7

 Public Outreach 7

Phase 1: Existing Conditions..... 10

 Physical Layout 10

 Land Uses 12

 Traffic Data 13

 Crash Analysis..... 14

 Bicycle, Pedestrian & Transit Network..... 16

 Traffic Operations 19

 Public Meetings 21

Phase 2: Future Conditions 22

 Future Traffic Volumes..... 22

 Future Scenarios..... 22

 Operations Analysis Results 24

 Improvements 28

 Conceptual Layout Alternatives 29

 Public Meetings..... 33

Conclusions & Recommendations 35

 Conclusions 35

 Recommendations 36

Appendix A: Public Outreach Program

Appendix B: Public Survey Results

Appendix C: Public Comment Cards

Appendix D: SMMPO 21-day Public Comment Period Comments

Appendix E: Phase 1 Public Meeting Exercise Summary

Appendix F: Phase 2 Public Meeting Exercise Summary

Appendix G: Intersection Crash Summaries

Appendix H: Level-of-Service Analyses

Appendix I: Traffic Data



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Executive Summary

Prior to the extension of Interstate 195 to Route 25 in the 1970s, Route 6 was the primary highway used to access Cape Cod. Therefore, at that time, the roadway was designed to accommodate a higher number of vehicles traveling at higher speeds in order to get “from point A to point B.” Although it still allows for that use, it also serves other purposes – providing access to residential properties, local businesses, recreational areas, and municipal facilities. Those land uses, the trips they create, and the associated users all need a roadway that is safe, reliable, and accessible. Currently, Route 6 is auto-centric, 4-lane highway, that prioritizes vehicle uses and discourages walking or biking. As such, the Route 6 Corridor Study was initiated to analyze current and future traffic conditions and to develop improvements aimed at making the roadway safer for all road users.

The Process

The study included these main sequential steps:

Step #1: Develop Study Goal

To improve conditions of Route 6 for all road users employing a context sensitive approach.



Step #2: Identify Core Issues

- High vehicle speeds
- Narrow travel lanes with little to no shoulder
- Sidewalk network is not consistent, close to road, and in need of repairs to be ADA compliant
- No bicycle accommodations
- Some drainage structures are sinking, creating depressions along curb
- Some unsignalized intersections have geometric challenges leading to sight distance issues
- Signalized intersections lack protected left turn lanes blocking visibility for oncoming traffic



Step #3: Create Guiding Principles

- Enhance or implement pedestrian and bicycle accommodations
- Revise signal timing and phasing at signalized intersections to improve operations and safety
- Modify selected intersection geometries to improve sight distances
- Improve pavement markings, lighting, signage, and drainage to increase safety
- Provide more public transportation to reduce traffic volumes
- Investigate reducing the number of travel lanes (road diet) to help lower travel speeds

Improvements

During the study, it became clear that improving the corridor needed to include answers to two basic questions – First: “what improvements can be made with the existing layout?” and, Second, “is it possible to reduce the number of travel lanes?” Similar to typical transportation studies, SRPEDD first developed several improvements that answered the first question and then developed four (4) conceptual layout alternatives to build consensus around the second question, otherwise known as the “number of travel lanes” conversation.

Importantly, both the future improvements and the conceptual layout alternatives (page 30) were crafted considering: (1) the overall goal of the study, (2) the core issues, (3) the guiding principles, and (4) current federal and state design guidance.

In the end, SRPEDD recommends that the communities work with MassDOT to implement the following future improvements:

1. Signalize New Boston Road (Fairhaven)
2. Signalize Spring Street (Marion)
3. Signalize Swifts Beach Road (Wareham)
4. Modify North Street traffic signal to include protected/permissive left turns (Mattapoisett)
5. Modify Front Street traffic signal to include protected/permissive left turns (Marion)
6. Change physical geometries to create 90-degree intersections at six (6) locations
 - a. Brandt Island Road (Mattapoisett)
 - b. Church Street Extension (Mattapoisett)
 - c. Marion Road (Mattapoisett)
 - d. Converse Road (Marion)
 - e. Creek Road (Marion)
 - f. Hathaway Street (Wareham)

Additionally, the following general improvements should be made to improve safety:

1. Replace all existing signage and pavement markings with high-visibility retroreflective materials to improve visibility
2. Replace all existing High-Pressure Sodium (HPS) streetlights with high-efficiency LED lights to improve visibility
3. Replace all existing “standard” style crosswalks with “continental” or “ladder” style to improve visibility
4. Reconstruct existing drainage structures that are in disrepair and bring flush to pavement surface to avoid depressions and standing water
5. Remove telephone poles from existing sidewalks or include a path that provides adequate clearance widths and add ADA compliant curb ramps to improve pedestrian mobility
6. Add bicycle signage along the corridor to improve awareness of bicycle activity

It should be noted that these improvements are intended to be implemented regardless of the future layout of Route 6.

Conceptual Layout Alternatives

The conceptual layout alternatives highlight potential strategies to address the lack of multi-modal accommodations on Route 6. The basic goals for the conceptual designs were to attempt to use only the existing land owned by MassDOT (Right-of-Way or “ROW”) and to accommodate all road users. Each alternative generally achieved the basic goals but come with a set of “pros” and “cons”. It should be noted that they are not meant to be a “one size fits all” approach. Rather, the intent is to answer the question – “is it possible to reduce the number of travel lanes?” and if so, “where?”

Alternatives #1 & #2

Alternatives #1 and #2 have some notable similarities and distinct differences. While both focus on improving conditions for pedestrians, they do not include the same type of improvements for bicyclists. Alternative #1 simply includes providing a consistent 6-foot sidewalk on both sides of the road for the entire corridor while continuing bicycle travel in the roadway. Meanwhile, Alternative #2, includes a 10-foot, separated “sidepath” on both sides of the road to accommodate both pedestrian and bicycle travel. In this alternative, bicyclists would be physically separated from motorists, no longer needing to “share the road”. Both alternatives make no physical changes to the roadway or utilities (drainage system, utility pole locations); however, Alternative #2 would require additional land acquisition to accommodate the sidepath, therefore, resulting in a higher cost.

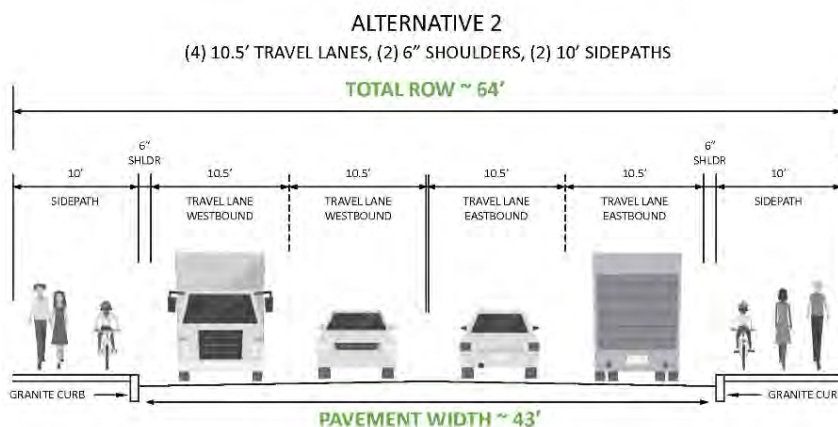


Pros:

- Consistent sidewalk on both sides of the road
- No additional ROW needed
- No drainage system modifications required

Cons:

- No improvement for bicycle travel
- No increase in shoulder width



Pros:

- Shared off-road facility for bicycles and pedestrians
- No drainage system modifications required

Cons:

- No increase in shoulder width
- Additional ROW needed

Figure 1: Conceptual Layout Alternatives #1 and #2

Alternatives #3 & #4

Alternatives #3 and #4 are very similar. Both focus on improving conditions for all road users – providing separation between the bicyclists and pedestrians from the travel way, reducing the number of travel lanes to reduce vehicle speeds, and enlarging the current shoulder area to accommodate first responders. These options would include improvements to the drainage system and potential utility pole relocations. The main difference between the two options is the design of the separated bicycle and pedestrian environment. In Alternative #3, bicyclists and pedestrians would have their own space while in Alternative #4, bicyclists and pedestrians would share the 10-foot, separated “sidepath”. These options would not include land acquisition; however, it would involve upgrades to the drainage system, curb relocations, and restriping of the travel way.

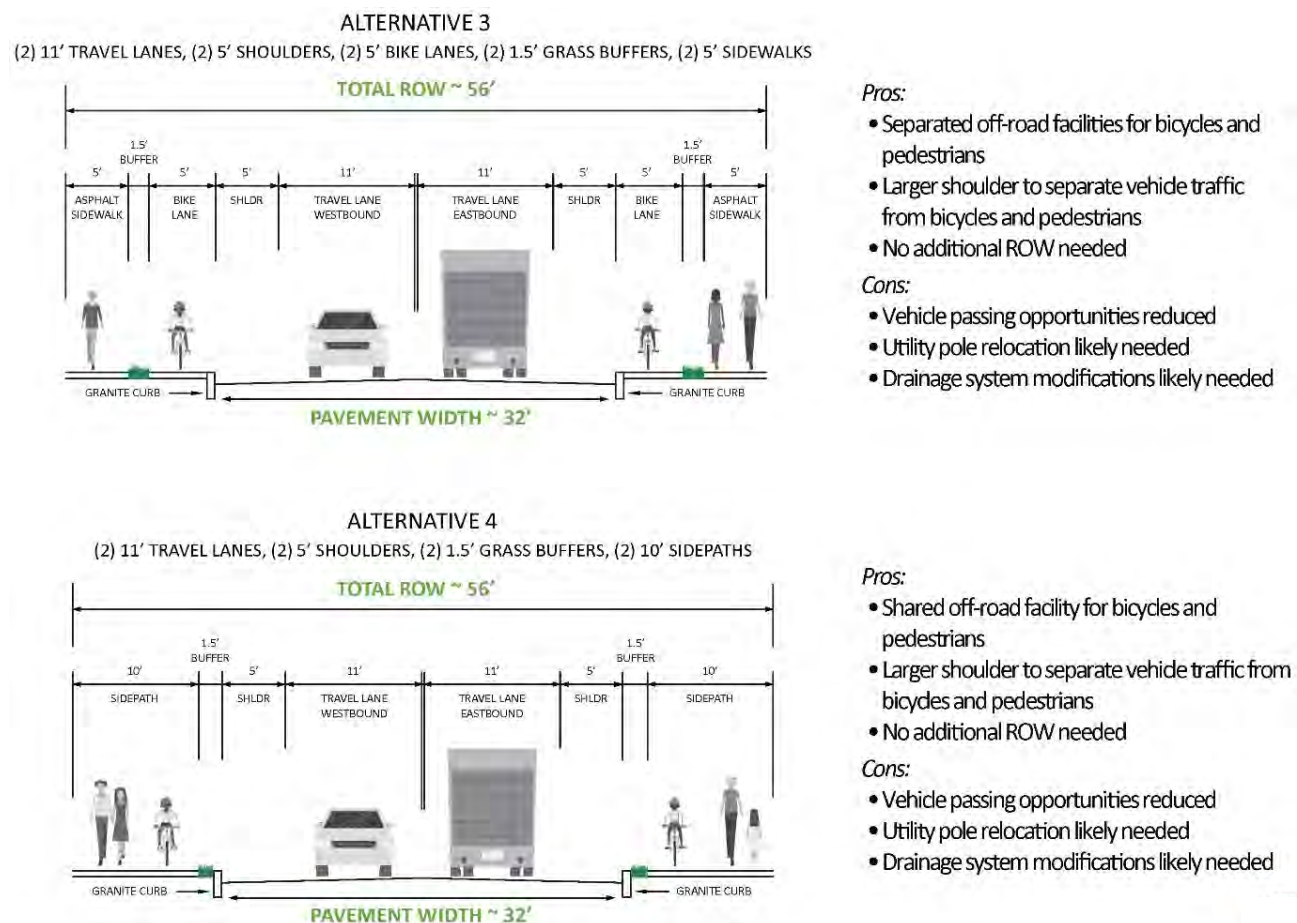


Figure 2: Conceptual Layout Alternatives #3 and #4

During both of the Phase 2 public meetings and for a two-week period following those events, the public was encouraged to fill out a preference survey which asked them to provide input about the future of Route 6 (see page 33 for more detail). Importantly, the survey was flexible – the participants could select multiple alternatives if that suited them or even design their own alternative. SRPEDD simply asked that they indicate any “modifications” on the survey to ensure accurate review and cataloging. In the end, Alternative #2 was the most popular choice followed by Alternative #1.

Introduction

Prior to the extension of Interstate 195 to Route 25 in the 1970s, Route 6 was the primary highway used to access Cape Cod. At that time, the 4-lane highway provided more “mobility” than “access”. In other words, the roadway was designed to accommodate a high volume of vehicles traveling at higher speeds in order to “get from point A to point B.” Although it still allows for that use, it now serves other purposes – providing access to residential properties, local businesses, and municipal facilities. Those land uses, the trips they create, and the associated users all need a roadway that is safe, reliable, and accessible.

The Route 6 Corridor Study was the result of initiatives from two separate entities: the Town of Marion and the Massachusetts Department of Transportation (MassDOT) District 5 office. The Town of Marion initiated the request as a result of several goals found in their new Master Plan (completed by SRPEDD in 2017). Meanwhile, MassDOT District 5 was expressing interest in examining the corridor for potential improvements. Shortly after Marion’s request, the town of Mattapoisett approached SRPEDD and MassDOT District 5 with interest in improving the corridor and within a few months, Fairhaven and Wareham were also on board. To support the study, each community submitted separate letters expressing concerns about safety at various intersections, vehicle speeds, and the lack of multi-modal accommodations along the corridor.

The goal of this study was to build consensus around the concept of improving conditions for all road users employing a context sensitive approach.

In the end, the Route 6 Corridor Study included a thirteen (13) mile stretch of roadway, from approximately Route 240 in Fairhaven, east to High Street in Wareham (see Figure 3).

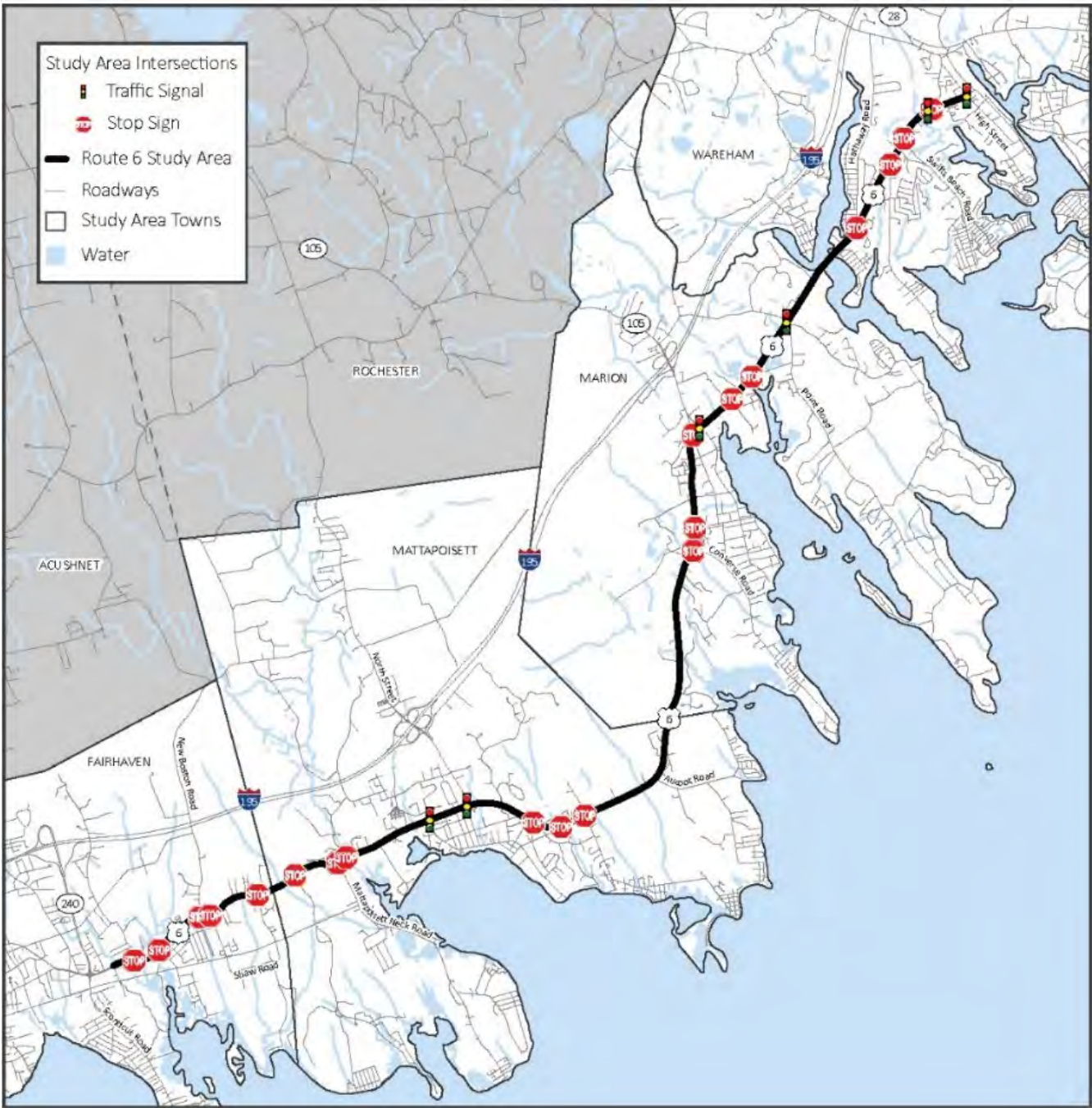


Figure 3: Study Area

Goals & Timeline

During Marion's Master Plan process, SRPEDD continually heard that Route 6 was not accommodating to bicyclists and pedestrians, the intersections were difficult to navigate, traffic speeds were high, and it was difficult to cross – essentially, dividing the community. However, at the time, there wasn't a clear direction toward improving these conditions. In other words, there wasn't consensus about the corridor's future. Therefore, the goal of the study was to build that consensus – improve conditions along Route 6 for all road users employing a context sensitive approach.

Study Phases

The study was divided into two phases, generally covering a two-year period (2018 and 2019). Phase 1 focused on existing conditions – a comprehensive analysis of transportation and land use data such as traffic volumes, intersection operations, roadway and intersection safety, bicycle, pedestrian, and transit facilities, recent and anticipated developments, and existing zoning. Phase 2 focused on future conditions – an in-depth analysis of future traffic projections, roadway and intersection operations, and potential improvements.

Public Outreach

Public engagement was a core component of the study. With four communities, several stakeholders, and one roadway owner, it was imperative that the study provide ample opportunity for input, comment, and review. As such, SRPEDD developed and implemented a comprehensive public outreach program that included: (1) creating multiple outlets for information distribution (project webpage, Facebook page, project brochure, informational posters, etc.), (2) generating a public survey and comment card, (3) meeting individually with key stakeholders, and (4) facilitating four

public meetings (2 meetings for each study phase). Utilizing those methods, SRPEDD gathered a great deal of input from a variety of stakeholders – each providing their own perspective of the current and future Route 6 corridor.



Figure 4: Project webpage

Stakeholder Meetings

At the outset of the study, stakeholder meetings were held with each community and MassDOT District 5 to introduce the study and to gather feedback about community specific issues, ongoing initiatives, and future goals for the corridor. This process was incredibly valuable as it provided direct insight about the roadway and its intersections from local experts and added locations for further study that had not been previously included.

Phase 1 stakeholder meetings:

- June 28, 2018 – Marion Transportation & Circulation Task Force
- July 1, 2018 – MassDOT District 5
- August 8, 2018 – Town of Marion
- August 9, 2018 – Town of Fairhaven
- August 28, 2018 – Town of Mattapoisett & Town of Wareham (separate meetings)
- October 17, 2018 – Town of Mattapoisett Bicycle & Pedestrian Committee

As a result of these stakeholder meetings, the following six (6) intersections were added to the study:

1. Fairhaven – New Boston Road & Weeden Road (*two intersections*)
2. Mattapoisett – River Road & Prospect Road (*two intersections*)
3. Marion – Hermitage Road & Creek Road (*two intersections*)

Public Survey

A 17-question public survey was developed that asked a variety of questions related to the public's experience with Route 6. The survey was translated into three languages (Spanish, Portuguese, and Haitian-Creole) and distributed to each study area town hall. Additionally, the survey link was provided on the project webpage, sent out in several Facebook posts and in study specific direct email blasts. Lastly, paper copies were available at all four public meetings. As of February 1, 2020, the survey gathered over 800 responses.

Project Webpage, Social Media, Printed Materials

SRPEDD created a project webpage that contained relevant project information, existing conditions mapping, links to the public survey and comment card, and ways for the public to engage with the project team. Additionally, SRPEDD distributed the printed materials (see Figure 5 below) to public buildings (town halls, libraries, councils of aging) in the study area to increase awareness of the study.

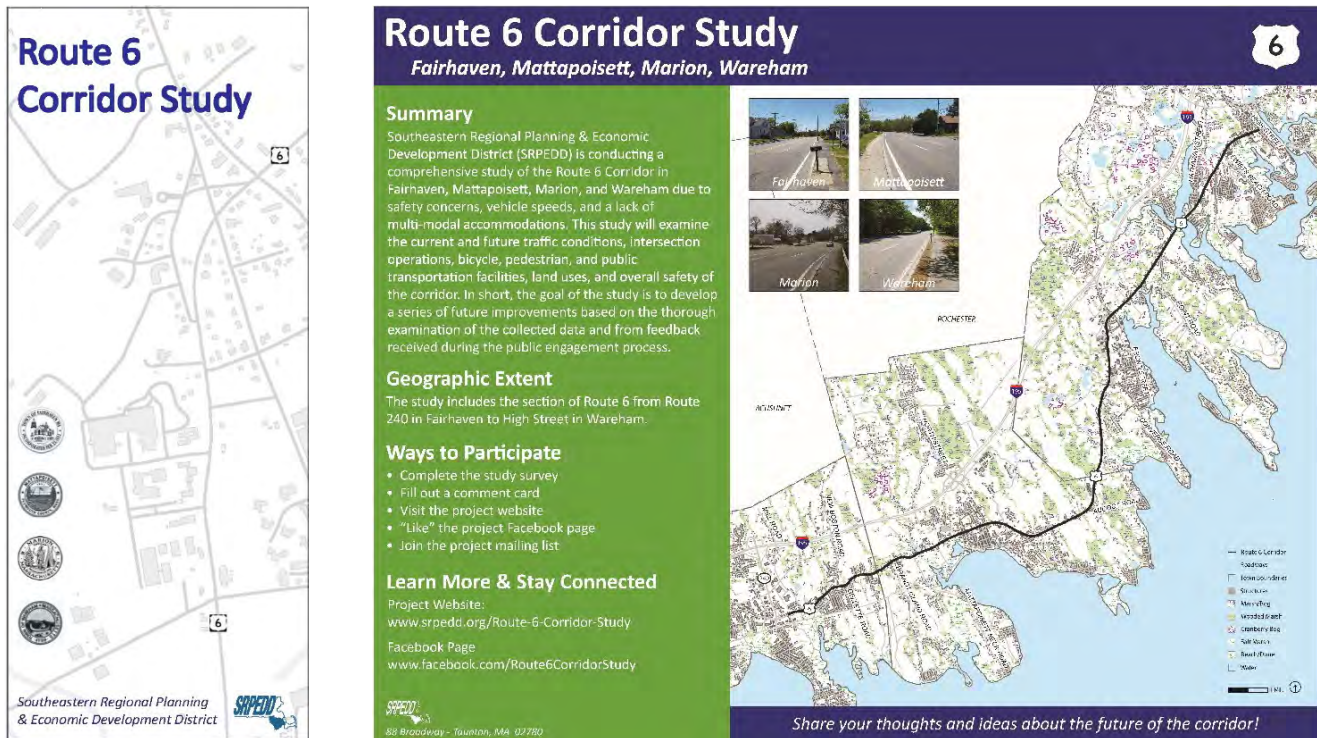


Figure 5: Study brochure (left) and informational poster (right)

Public Meetings

SRPEDD held a total of four public meetings for the study – two meetings for each study phase. More information about the purpose of the meetings and feedback received is included in the following sections of this report.

Phase 1: Existing Conditions

- November 8, 2018 – Wareham Town Hall, Wareham (31 attendees)
- November 14, 2018 – Old Rochester Regional High School, Mattapoisett (34 attendees)

Phase 2: Future Conditions

- December 12, 2019 – Center Elementary School, Mattapoisett (40 attendees)
- January 6, 2020 – Sippican Elementary School, Marion (145 attendees)

Phase 1: Existing Conditions

The first phase of the study focused on all existing aspects of the corridor – including, but not limited to the physical layout and condition of the roadway; bicycle, pedestrian and transit facilities; location and severity of crashes along the corridor; intersection operations; and, the current land uses and zoning regulations.

Over the spring and summer of 2018, SRPEDD staff completed an extensive Data Collection and Analysis Program. This work included a thorough inventory of pavement and sidewalk conditions (noting gaps in the network and issues with Americans with Disabilities Act [ADA] compliance), roadway cross-section and intersection dimensions (lane, shoulder, sidewalk, and crosswalk widths) and physical infrastructure locations (utility pole locations, catch basins, signage, lighting, etc.). This inventory is explained in more detail in the following sections.

Physical Layout

Route 6 is as an Urban Minor Arterial, that runs parallel to Interstate I-195, connecting the Providence area to Cape Cod. In general, the 13-mile study area (Arsene Street in Fairhaven to High Street in Wareham) is a 4-lane, auto-oriented streetscape with, little to no shoulder, and, in most cases, five-foot sidewalks located close to the road.

General observations:

- Travel lanes are narrow (generally 10.5 feet)
- Very small painted shoulder (8 to 10 inches)
- Roadway curves (horizontal & vertical) create safety issues
- Several angled “T-style” intersections that have difficult sight distances
- Drainage system issues (standing water in outside lane)
- Turning movements at some signalized intersections create visibility issues



Figure 6: Route 6 in Marion at Wareham Town Line, looking westbound



Figure 7: Route 6 in Mattapoisett between Main Street and North Street, looking eastbound

Cross Sections

For the most part, Route 6 includes four (4) 10.5-foot travel lanes with 8 to 10-inch shoulders. There are two sections in the study area where this condition is different (displayed below): (1) Mattapoisett – Main Street to North Street (3 lanes) and (2) Wareham – Gibbs Avenue to High Street (2 lanes).

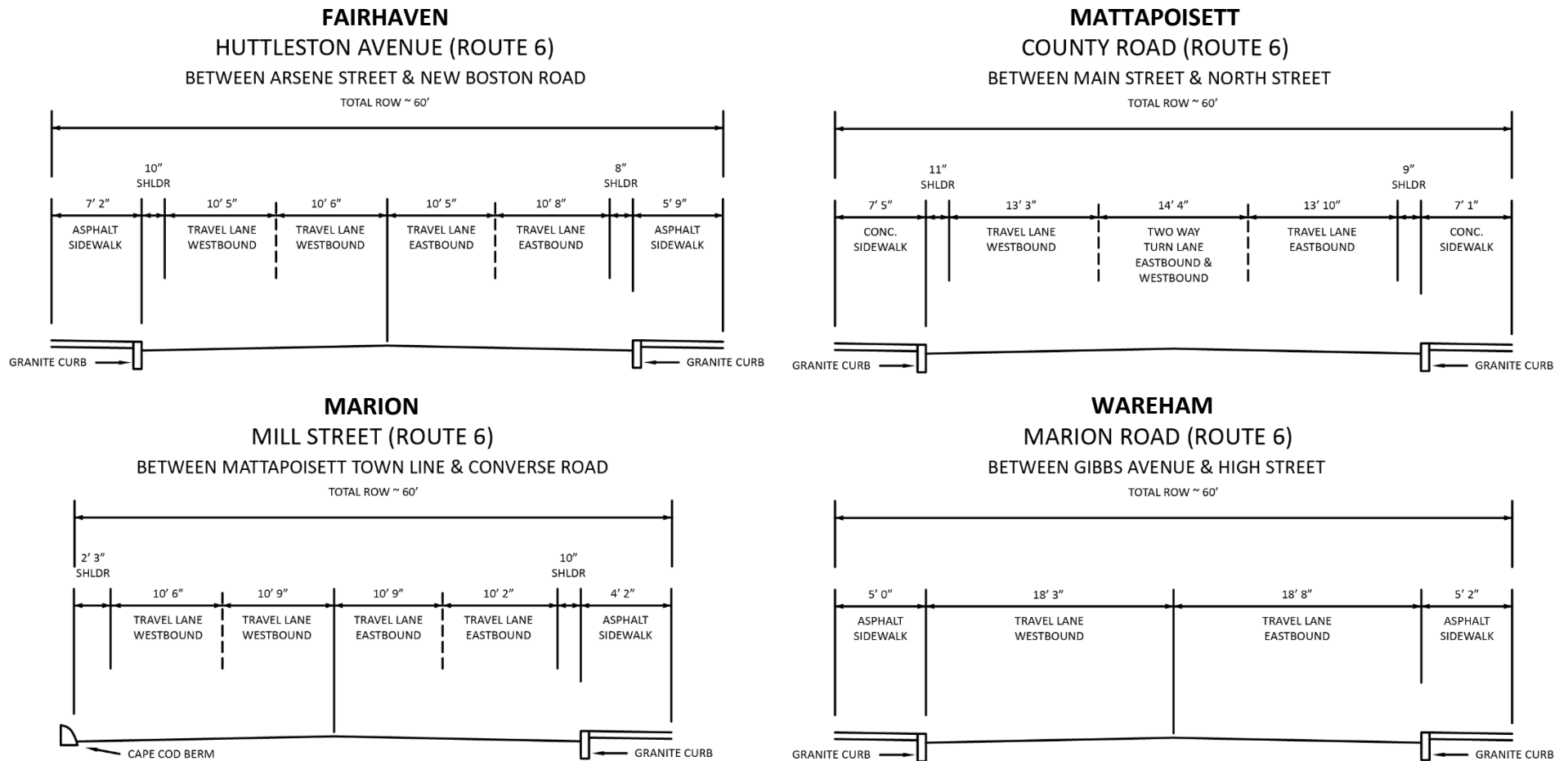


Figure 8: Typical Route 6 cross-sections

Posted Speed Limits

Overall, posted speed limits along the corridor range from 35 MPH to 50 MPH. The 35 MPH zones are located at three points along the corridor; at the two ends of the corridor (in Fairhaven from Arsene Street to Shaw Road and in Wareham from Gibbs Avenue to High Street) and along a small section in Marion in the area of the “S curve” – just south of Converse Road. The area between Main Street and North Street in Mattapoisett is speed zoned at 40 MPH, which many residents are seeking to lower because of the dense commercial activity found in that area (more details are provided later in the report). Lastly, the remainder of the corridor is posted at either 45 MPH or 50 MPH (see the Crashes & Posted Speed Limits map on page 15 for more detail).

Pavement Conditions, Utilities, Signage

According to surveys completed in 2018, pavement along Route 6 in Fairhaven, Mattapoisett, and Wareham, while pavement in Marion is generally in poor condition. Typically, pavement that is considered to be in poor condition has extensive and high severity distresses (cracking, potholes, rutting, etc.). Of particular concern for Route 6, are the drainage structures along the corridor that are sinking and creating depressions in the outer lane (see Figure 9). Vehicles are travelling in the inside lane to avoid these distresses.



Figure 9: Drainage issues and utility pole locations

For the most part, the utility poles and signage along the corridor are located at the curb edge. Their location coupled with the high travel speeds create serious safety hazards for motorists.

Land Uses

A key component of the study is an examination of land uses and zoning along the corridor. To that end, SRPEDD selected and analyzed parcels that were located within 500 feet of the corridor – known as the “study area parcels”. Land uses are predominantly residential (approximately 65% to 75% of study area parcels); however, there is a steady mix of commercial entities along the corridor and several “nodes” of commercial activity. That said, commercial uses only accounted for approximately 3% to 5% of the total study area parcels while vacant land (12% to 16%) and institutional uses such as municipally owned buildings accounted for more (4% to 11%).

Traffic Data

Over the spring and summer of 2018, SRPEDD staff collected mainline roadway traffic data using Automatic Traffic Recorders (ATRs) that provided vehicle volumes, speeds, and classifications for a 48-hour period. Additionally, SRPEDD collected peak-hour intersection turning movements at twenty-six (26) major intersections along the corridor to perform existing operational analyses.

Vehicle Volumes

The highest traffic volumes recorded were in Fairhaven, near Mill Road while the lowest were recorded in Marion, near Spring Street and Front Street. Not surprisingly, the higher volumes were found near roadways that provided access to I-195; Mill Road, North Street, Front Street, and Gibbs Avenue. Figure 8 below shows the average vehicles per day for a 24-hour period.

Vehicle Speeds

Recorded 85th percentile speeds ranged from a low of 36 MPH to a high of 55 MPH. As to be expected, the lower speeds were recorded in higher activity or more densely developed areas (i.e. near High Street in Wareham) while the higher speeds were found in low density residential areas (i.e. Mattapoisett/Marion town line).

Heavy Vehicle Percentages

Heavy vehicles generally accounted for approximately 5-6% of the total vehicles in the counts. This type of truck traffic activity is expected on roadways like Route 6. Once again, higher percentages were found near roadways that provided access to I-195.

Fairhaven & Mattapoisett

Mill Road	New Boston Road	Mattapoisett Town Line	Main Street	North Street	Marion Town Line
15,600	11,000	9,600	10,600		7,500
48 MPH	49 MPH	48 MPH	N/A		53 MPH
5.1%	9.0%	5.2%	N/A		6.2%

Marion & Wareham

Spring Street	Front Street	Wareham Town Line	Hathaway Street	Swifts Beach Road	High Street
8,600		9,700	9,500		10,100
36 MPH		55 MPH	52 MPH		37 MPH
6.3%		5.2%	3.7%		3.9%

Figure 10: Average Daily Traffic, 85th Percentile Speeds, and Heavy Vehicle Percentages

Crash Analysis

The most recent three-year period of crash reports (2015 through 2017) were obtained from all four municipal police departments and analyzed for the study area intersections. Most of the study area intersections had crash rates below both the most recently available Statewide and District 5 average crash rates for signalized and unsignalized intersections and only a handful of locations had concerning numbers of injury crashes. That said, improvements can be made to enhance safety at a number of locations. Table 1 provides a summary of the crash data for the study area intersections.

Table 1: Study Area Intersection Crash Summary (2015-2017)

Route 6 Intersection	Community	Total Crashes	Property Damage Only	Injury Crashes	Crash Rate ACC/MEV	Crash Rate EPDO
Mill Road	Fairhaven	3	3	0	0.14	1.00
Weeden Road	Fairhaven	12	8	4	0.91	9.33
New Boston Road	Fairhaven	7	7	0	0.46	2.33
Gellette Road	Fairhaven	4	2	2	0.29	4.00
Shaw Road	Fairhaven	2	0	2	0.17	0.66
Brandt Island Road	Mattapoisett	6	1	5	0.55	8.66
Mattapoisett Neck Road	Mattapoisett	3	3	0	0.28	1.00
River Road	Mattapoisett	5	4	1	0.46	3.00
Main Street	Mattapoisett	6	5	1	0.48	3.33
North Street	Mattapoisett	24	17	6	1.32	15.66
Church Street Ext.	Mattapoisett	2	2	0	0.21	0.66
Marion Road	Mattapoisett	2	1	1	0.25	2.00
Prospect Road	Mattapoisett	3	2	1	0.31	2.33
Converse Road	Marion	1	1	0	0.10	0.33
Main Street	Marion	1	1	0	0.10	0.33
Spring Street	Marion	7	4	2	0.48	4.66
Front Street	Marion	6	3	3	0.94	6.00
Hermitage Road	Marion	1	1	0	0.11	0.33
Creek Road	Marion	2	1	1	0.42	2.00
Point Road	Marion	4	2	2	0.45	4.00
Hathaway Street	Wareham	4	1	3	0.35	5.33
Cromesett Road	Wareham	10	5	5	0.71	10.00
Swifts Beach Road	Wareham	10	8	2	0.56	6.00
Shaw's Plaza	Wareham	15	10	5	0.91	11.66
Gibbs Avenue	Wareham	4	4	0	0.28	1.33
High Street	Wareham	6	2	4	0.44	7.33

At the time of the analysis, the Statewide & District 5 region crash rate (ACC/MEV) thresholds were 0.78 and 0.75 respectively for signalized intersections and 0.57 for unsignalized intersections. Locations with averages above statewide or regional thresholds are indicated in red – identifying a safety issue.

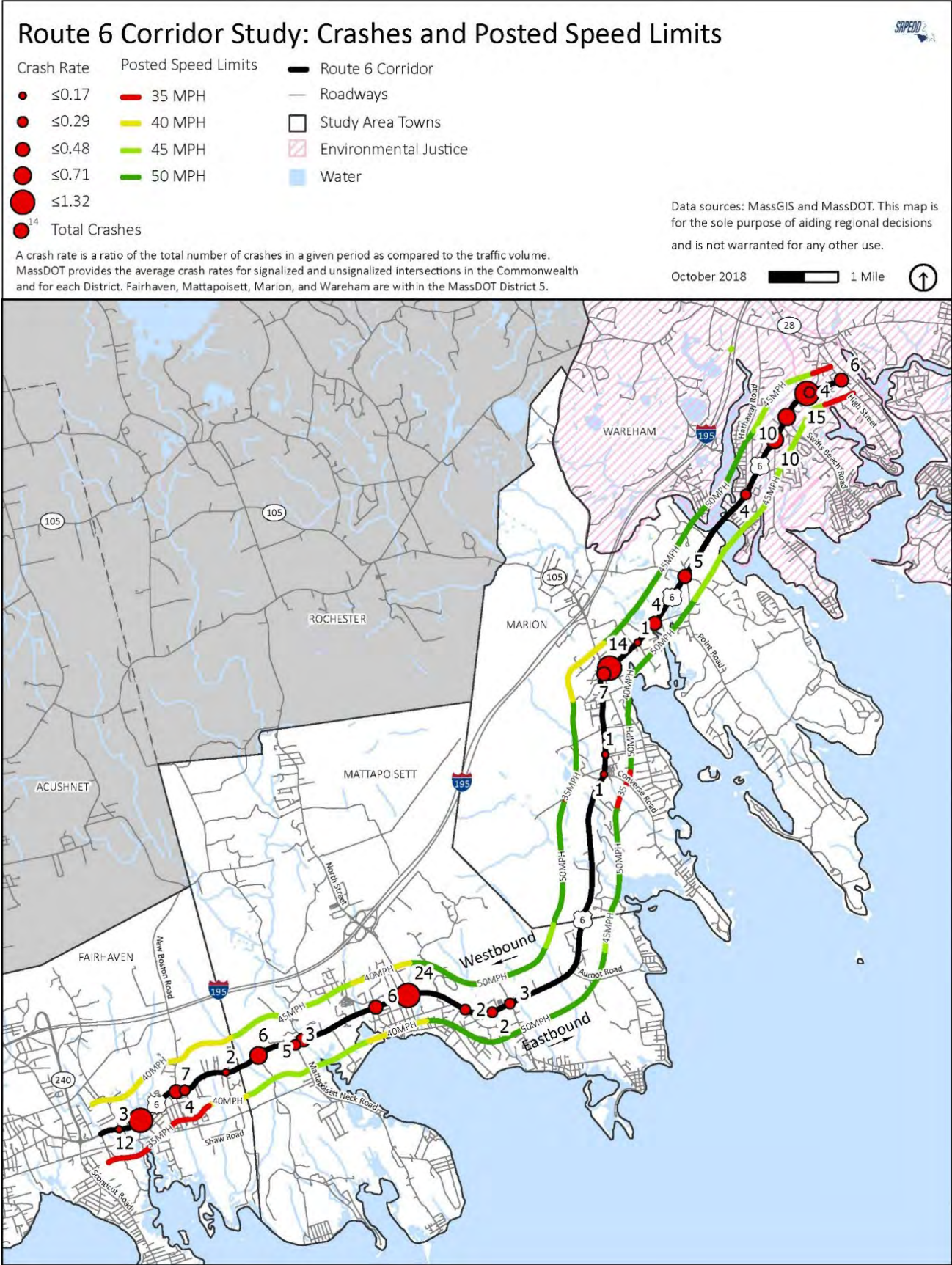


Figure 11: Study area crashes and posted speed limits

Bicycle, Pedestrian & Transit Network

Bicycle Facilities

There are no dedicated bicycle facilities along Route 6. In other words, there are no bike lanes or off-road facilities. Additionally, there are no shared-use pavement markings such as “sharrows” or signage alerting motorists to the presence of bicyclists. Therefore, bicyclists must share the road with motor vehicles – this is especially challenging due to the narrow travel lanes, lack of shoulders and the elevated travel speeds. During site visits, some bicyclists were observed riding on the sidewalk, which creates the potential for conflicts with pedestrians.

Pedestrian Facilities

Route 6 lacks consistent sidewalks. Although the western portion of the study area (Arsene Street in Fairhaven to North Street in Mattapoisett) generally has 5 to 6-foot asphalt sidewalks with granite curbing on both sides of the road, there are significant gaps in the network in Marion and Wareham. The sidewalks in Fairhaven and Mattapoisett (up to North Street) are in good condition – having minimal surface cracking, proper clearance widths and ADA compliant curb ramps. However, east of North Street, the sidewalk conditions begin to deteriorate, and, in some areas, the sidewalk simply ends. Figure 12 below shows the location and condition of the sidewalks in the study area.

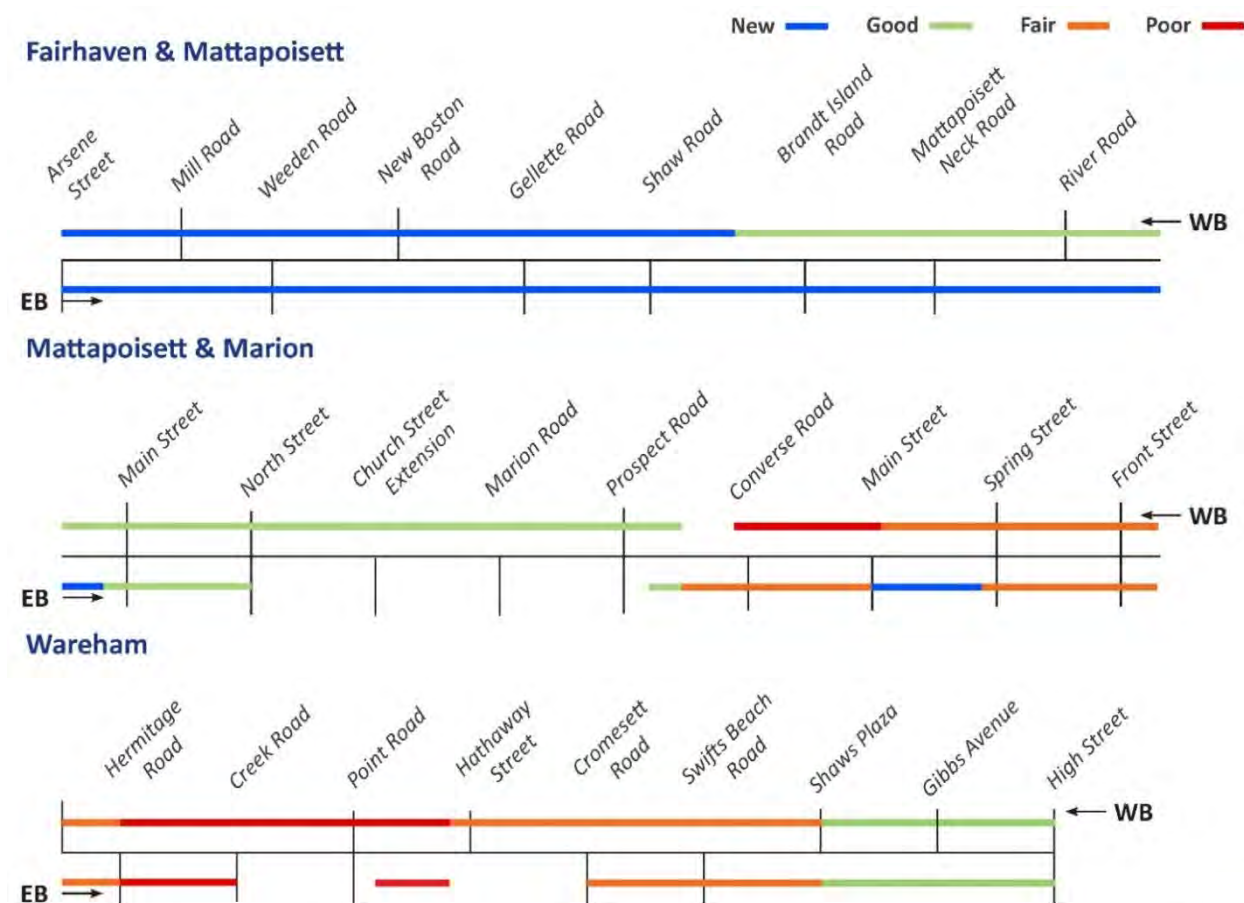


Figure 12: Sidewalk locations and condition

Figure 13 below illustrates the mix of conditions of pedestrian facilities along the Route 6 corridor.



Figure 13: Pedestrian facility examples on Route 6

The image in Mattapoisett (top right) clearly shows pedestrian foot traffic indicating that a sidewalk is needed while the image in Marion (bottom left) shows a sidewalk in disrepair with inadequate clearance widths. Meanwhile, the images in Wareham (top left) and Fairhaven (bottom right) show sidewalks that are in very good condition and free of obstructions.

Public Transportation

The only public transportation in the study area is provided by the Greater Attleboro Taunton Regional Transit Authority (GATRA) – the “Wareham-New Bedford Connection.” This service primarily provides medical trips along Route 6 between the New Bedford Terminal and Cranberry Plaza in Wareham; however, GATRA service is a flag stop system, meaning that a patron can wave the bus down anywhere along the route and the bus will stop as long as it is safe to do so.

Although recent data sampled by SRPEDD indicates lower ridership, the service provides lifeline connections for low income individuals in Wareham needing to access services in New Bedford. As such, GATRA just recently secured state grant funding to continue this service for another year.

Figure 14 (next page) shows the study area bicycle, pedestrian, and transit network.

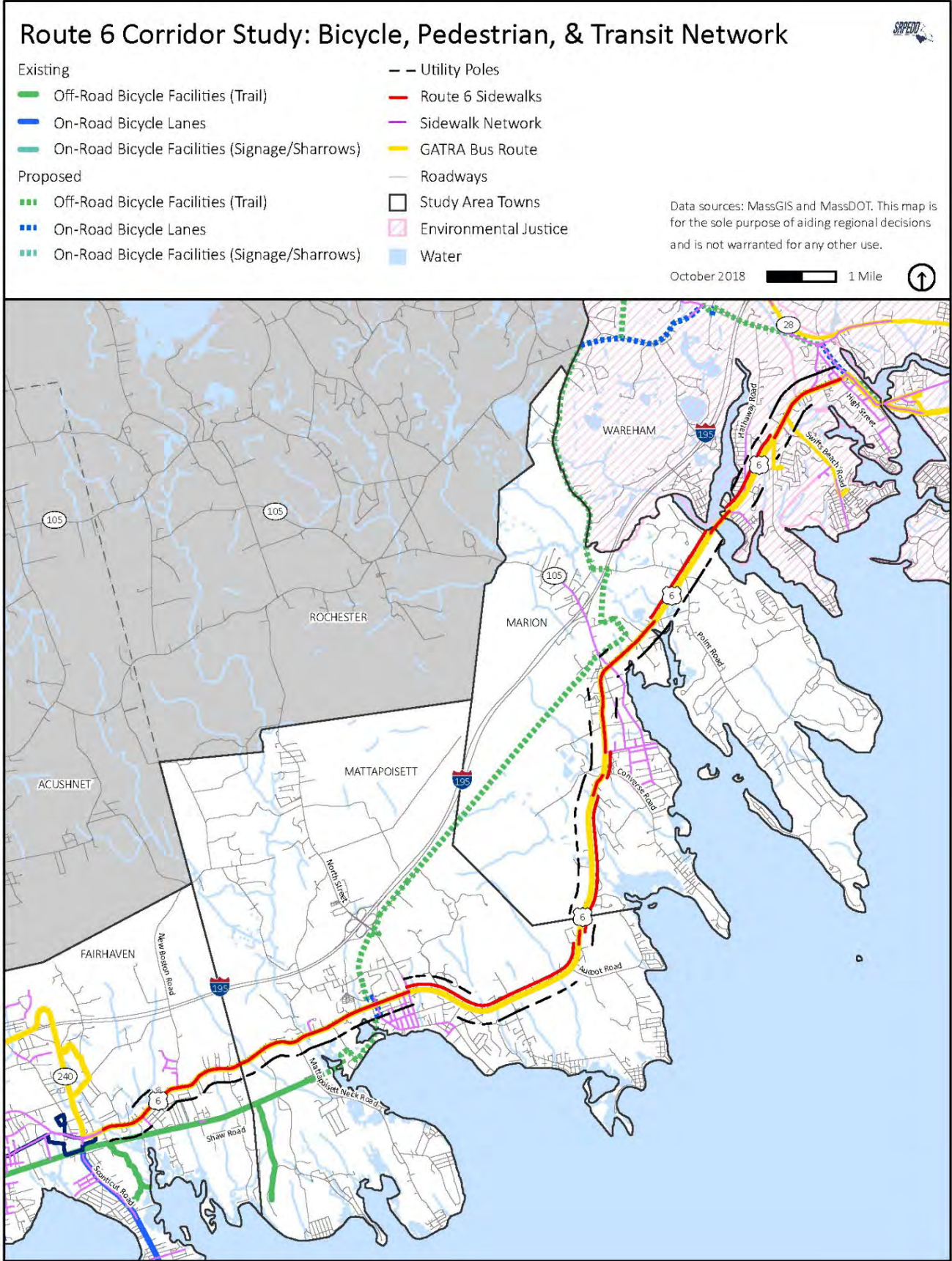


Figure 14: Study area bicycle, pedestrian, and transit network

Traffic Operations

Level-of-service analysis is a general measure that summarizes the overall operation of an intersection or transportation facility. The analysis includes inputs such as lane uses and widths, traffic control, traffic volumes and operating speeds to calculate a range of operating conditions. It is summarized with letter grades from “A” to “F”, with “A” being the most desirable and “F” representing the maximum flow rate or the worst possible traffic congestion. Table 2 summarizes the existing levels-of-service for the study area intersections during the afternoon peak period.

Table 2: Study Area Intersections PM Peak Hour Level-of-Service (LOS)

Route 6 Intersection	Community	Traffic Control	LOS
Mill Road	Fairhaven	Stop Sign	E
Weeden Road	Fairhaven	Stop Sign	C
New Boston Road	Fairhaven	Stop Sign	C
Gellette Road	Fairhaven	Stop Sign	C
Shaw Road	Fairhaven	Stop Sign	C
Brandt Island Road	Mattapoisett	Stop Sign	B
Mattapoisett Neck Road	Mattapoisett	Stop Sign	B
River Road	Mattapoisett	Stop Sign	B
Main Street	Mattapoisett	Traffic Signal	B
North Street	Mattapoisett	Traffic Signal	B
Church Street Ext.	Mattapoisett	Stop Sign	B
Marion Road	Mattapoisett	Stop Sign	B
Prospect Road	Mattapoisett	Stop Sign	C
Converse Road	Marion	Stop Sign	C
Main Street	Marion	Stop Sign	B
Spring Street	Marion	Stop Sign	D
Front Street	Marion	Traffic Signal	B
Hermitage Road	Marion	Stop Sign	B
Creek Road	Marion	Stop Sign	B
Point Road	Marion	Traffic Signal	B
Hathaway Street	Wareham	Stop Sign	B
Cromesett Road	Wareham	Stop Sign	C
Swifts Beach Road	Wareham	Stop Sign	F
Shaw’s Plaza	Wareham	Traffic Signal	C
Gibbs Avenue	Wareham	Stop Sign	C
High Street	Wareham	Traffic Signal	B

Table 2 shows that most study area intersections operate with acceptable delay (LOS D or better). That said, Mill Road and Swifts Beach Road operate at failing LOS (E and F respectively). Based on satisfaction of a Traffic Signal Warrants Analysis (TSWA) completed for Swifts Beach Road, MassDOT District 5, in conjunction with the town of Wareham, is currently exploring signalization, which will improve delay and improve safety at that intersection.

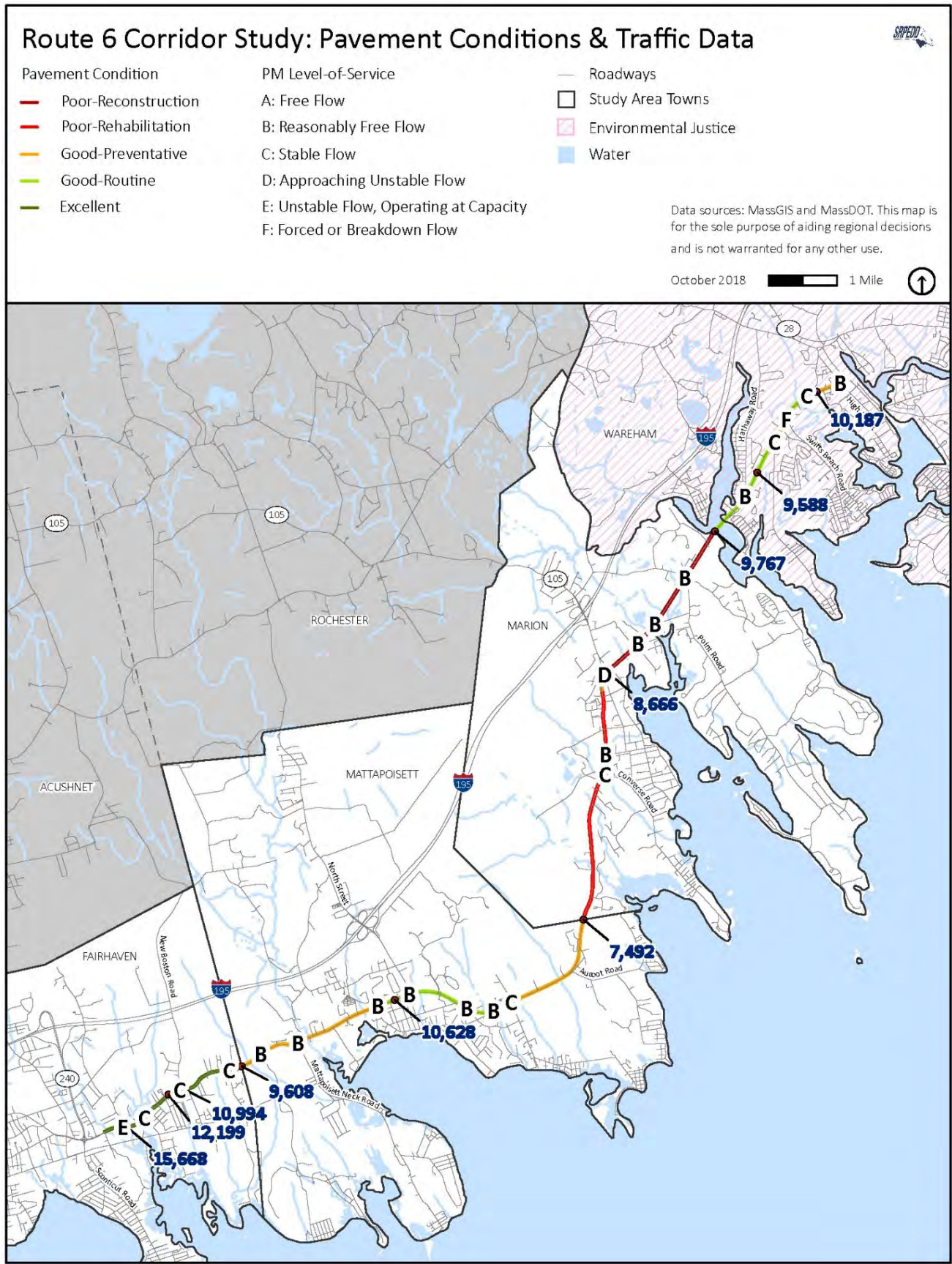


Figure 15: Study area pavement conditions and traffic data

Public Meetings

The goal of the public process was to identify issues, collect additional information to substantiate these issues, consider measures to address them, and seek support for recommendations leading to implementation.

Phase 1 concluded in November 2018, as SRPEDD facilitated public workshops at the Wareham Town Hall and the Old Rochester Regional High School. The purpose of this meeting was to: (1) present the results of SRPEDD's existing conditions data collection and analyses; (2) gather the public's concerns about the corridor; and, (3) create "future vision" diagrams of Route 6 using a table-top, icon based layout exercise.



Figure 16: Public Meeting at Wareham Town Hall

All together, thirty-two (32) diagrams were completed, cataloged, and analyzed following the meeting. Although there was a variety of options recorded, a total of three (3) layouts (shown below) had the most consensus, therefore, they were advanced to Phase 2 of the study and ultimately helped create the future improvement alternatives (discussed in more detail later in this report).

Two Lane Road with Bike/Ped Lane (14 participant suggestions)



Center Turn Lane/Three Lane Road with Bike/Ped Lane (8 participant suggestions)



Transit-Oriented Design (3 participant suggestions)

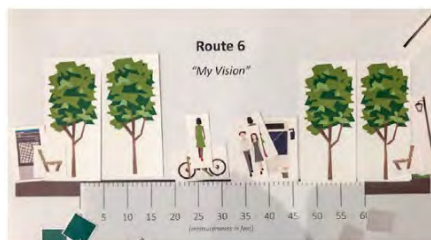
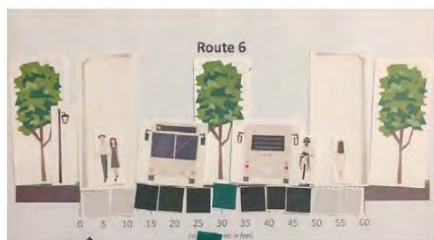


Figure 17: Top three "Future Visions" from Phase 1 Public Meetings

Phase 2: Future Conditions

The second phase of the study focused on an analysis of future development potential along the corridor and the associated traffic volume increases, the effect on the roadway and intersection operations and potential improvements that would mitigate those volume increases as well as address the concerns raised during Phase 1. In other words, future traffic increases affect the way the corridor operates – this phase is intended to mitigate those impacts and use those future traffic figures to test different long-term improvements.

Based on the feedback recorded from the public survey, from the stakeholder meetings, and from the participants at the public meetings, SRPEDD focused on the following principles during the development of future improvements:

- Enhance or implement pedestrian and bicycle accommodations
- Revise signal timing and phasing at signalized intersections to improve operations and safety
- Modify selected intersection geometries to improve sight distances
- Improve pavement markings, lighting, signage, and drainage to increase safety
- Provide more public transportation to reduce traffic volumes
- Investigate reducing the number of travel lanes (road diet) to help lower travel speeds

Future Traffic Volumes

Future traffic volumes were generated using SRPEDD's Regional Travel Demand Model coupled with future development activity information from each community. The model analyzes existing traffic operations for the entire SRPEDD region and forecasts future traffic patterns based on projected growth in the region that considers population, households, employment and development. Consistent with MassDOT's Traffic Impact Assessment (TIA) guidelines and SRPEDD's Regional Transportation Plan (RTP) process, the future traffic conditions analysis included both short term (7-year) and long-term (20+ year) time horizons. That said, the three analysis periods used in this study included: (1) 2018 or "Existing"; (2) 2025 or "Short-Term"; and, (3) 2040 or "Long-Term".

Future Scenarios

Using the principles from Phase 1 (identified above), in conjunction with federal and state design guidance documents, SRPEDD staff developed the following future scenarios:

- 2025 & 2040 No Improvements
- 2025 & 2040 With Improvements (4 Lanes)
- 2025 & 2040 With Improvements (2 Lanes)

The first scenarios (noted above as "No Improvements") simply add future traffic volumes to the "Existing" scenario (2018) and do not include improvements – the intent is to show what operations would look like in the future (short-term and long-term) if no changes were made. In contrast, the four (4) remaining scenarios (noted above as "With Improvements") included enhancements to the bicycle and pedestrian environment, improvements to the traffic signal timings and phasing, and modifications to several intersections with difficult geometry – the only difference is the number of travel lanes (4 versus 2).

Two Lane Capacity

Based on the recorded traffic volumes, especially during the peak period (highest was approximately 850 to 900 vehicles), and analysis performed using the Highway Capacity Manual (HCM), Route 6 is projected to operate at LOS C when reduced to a 2-lane configuration. The analysis shows that Route 6 is currently operating under capacity and investigating a potential road diet is feasible.

Three Lane (Two-Way Left Turn Lane) Scenario

Although the public indicated preference for a three-lane configuration at the Phase 1 public meetings, SRPEDD did not include it based on design guidance in the MassDOT Project Development and Design Guide (“Design Guide”) and due to safety concerns.

The MassDOT Design Guide specifically states that “The two-way left-turn lane is a special application of flush medians which allows turning movements along its entire length. TWLTs may be appropriate in areas with frequent driveway spacing in highly developed, or commercialized areas. Two-way left-turn lanes are appropriate on roadways with no more than two through lanes in each direction and where operating speeds are in the range of 30 miles per hour.”

It goes on to say “TWLT lanes may be used where daily traffic through volumes are between 10,000 and 20,000 vehicles per day for 4-lane roadways and between 5,000 and 12,000 vehicles per day for 2-lane roadways. Left-turn movements should consist of at least 70 turns per ¼ mile during the peak hours and/or 20 percent of the total volume. Careful evaluation of individual site is required for implementation of TWLT lanes.”

The main concern with this treatment is the operating speeds along the corridor. As summarized on page 13, recorded 85th percentile speeds ranged from a low of 36 MPH to a high of 55 MPH – all above the 30 MPH range guidance found in the Design Guide. Additionally, other than the section of Route 6 between North Street and Main Street in Mattapoisett (already has this treatment), there were no other areas that appeared to have the development density and the left turns that would warrant this type of treatment. Rather, SRPEDD felt that other options such as “pocket” style left turn lanes would be a better and safer approach by (1) providing a “safe-haven” for turning movements, (2) allowing uninterrupted flow for thru vehicles, and (3) reducing the chances of head-on collisions.



Figure 18: Example of “Pocket” style left turn improvement (City of Davis, CA)

That said, the public made it clear that this option should be fully explored when improvements are initiated on Route 6. Therefore, at that time, MassDOT should work closely with the communities to determine if a solution to this issue is possible and can be engineered.

Operations Analysis Results

Figure 19 below illustrates the PM peak hour future conditions operations analysis results for the Town of Fairhaven.



Figure 19: PM peak hour future conditions LOS in Fairhaven

As expected, intersection operations at the major intersections in Fairhaven (Mill Road and New Boston Road) will get worse in the future if improvements are not implemented. The analysis shows that the Mill Road intersection is projected to worsen over time to LOS F from LOS E. Additionally, New Boston Road will downgrade from LOS C to LOS E in 2040.

Currently, Mill Road is used as a cut-through street to avoid the very busy Route 6 & Route 240 intersection. Signalizing this intersection will serve to encourage this behavior, therefore, it was not considered for improvements. However, installing a traffic signal at New Boston Road (town request), improves safety and LOS both in the 4-lane and 2-lane configurations.

Except for Gellette Road in 2040 with a 2-lane configuration, the remainder of Fairhaven's intersections are projected to operate at acceptable LOS ("A" to "D").

Figure 20 below illustrates the PM peak hour future conditions operations analysis results for the Town of Mattapoisett.

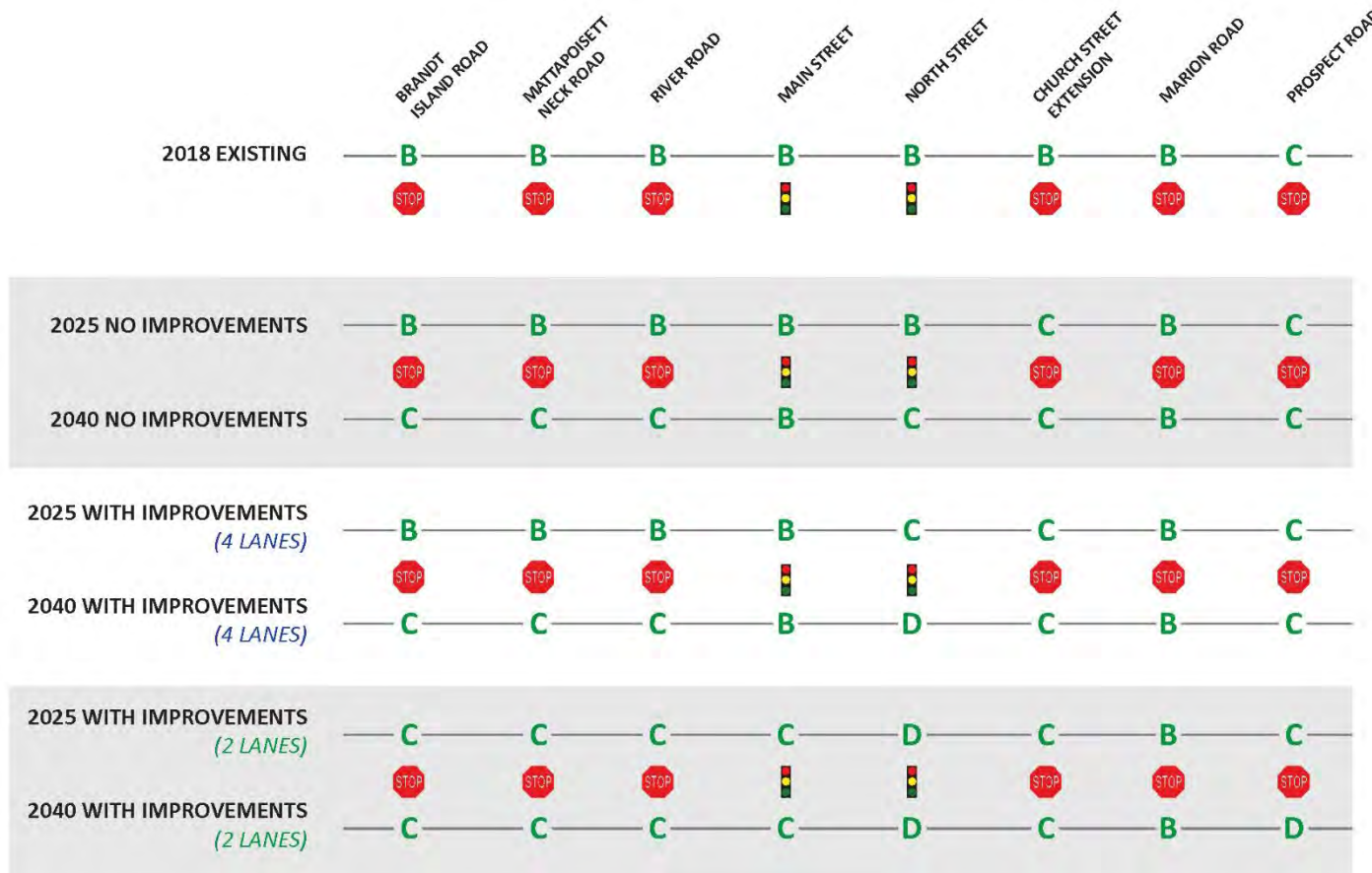


Figure 20: PM peak hour future conditions LOS in Mattapoisett

All of the intersections in Mattapoisett have acceptable LOS (“A” to “D”) in all scenarios. As previously mentioned, signal phasing improvements (dedicated left turns) at the North Street intersection would improve safety while geometric improvements at Brandt Island Road, Church Street Extension, and Marion Road would improve sight lines. Additional intersection ahead warning signage on Route 6 would improve conditions at the Prospect Street intersection.

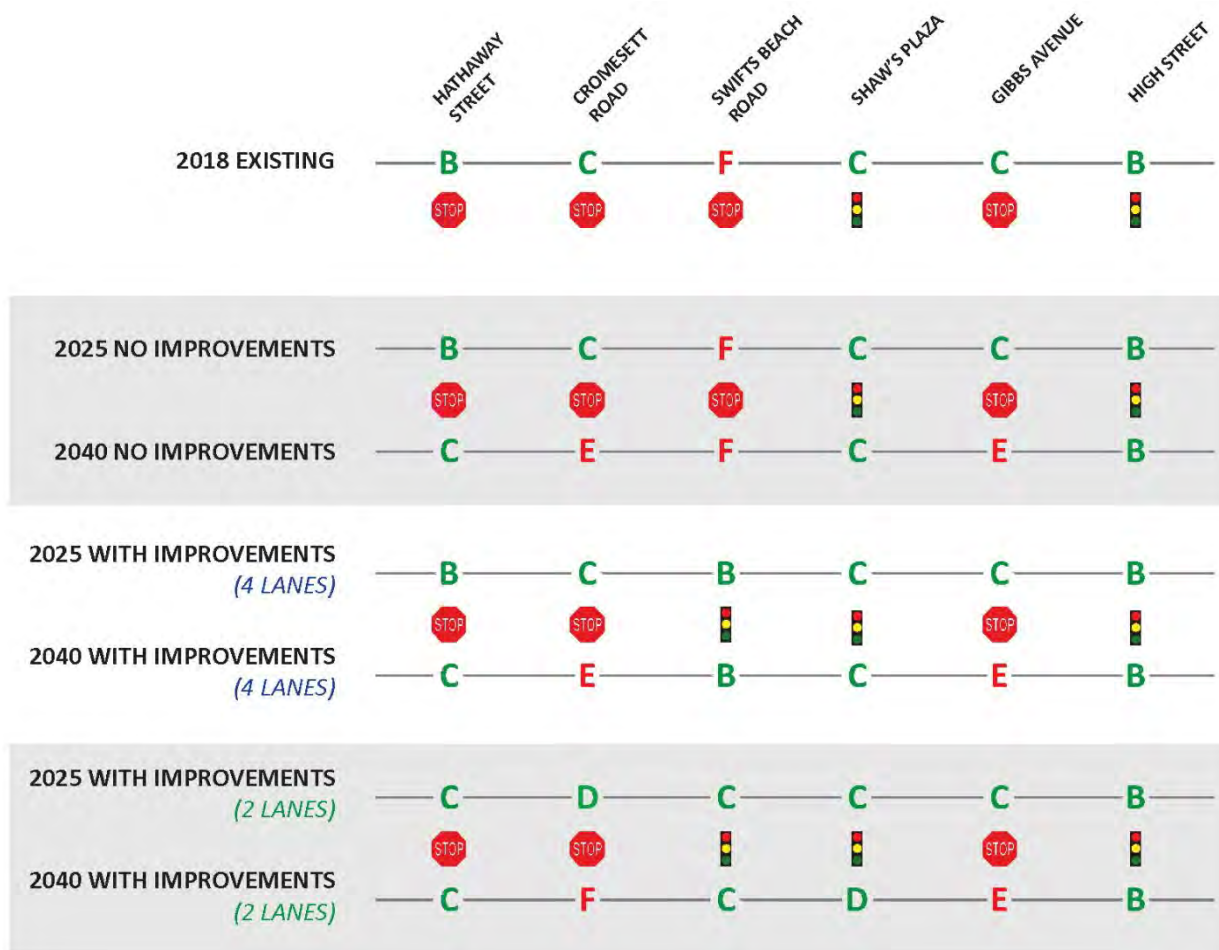
Figure 21 below illustrates the PM peak hour future conditions operations analysis results for the Town of Marion.



Figure 21: PM peak hour future conditions LOS in Marion

In Marion, the only intersection that operates at failing LOS (“E” and “F”) in the future is Spring Street. Conditions are expected to worsen from LOS D to LOS F in 2040 without improvements. Unfortunately, traffic volumes did not warrant the installation of a traffic signal until Route 6 is reduced to 2 travel lanes in that area. That said, once a traffic signal is in place, LOS is expected to operate at LOS B. However, the town has options – consideration of a roundabout at this location also provides dramatic improvement to the LOS and safety. This type of improvement would need to be thoroughly designed and vetted with the town to ensure it’s the right fit for Marion.

Figure 22 below illustrates the PM peak hour future conditions operations analysis results for the Town of Wareham.



The Cromesett Road, Swifts Beach Road, and Gibbs Avenue intersections are expected to have failing LOS ("E" and "F") in 2040 if improvements are not implemented. That said, MassDOT and the town are pursuing signalization of the Swifts Beach Road intersection – expecting to improve conditions from LOS F to LOS B in the 4-lane configuration and from LOS F to LOS C in the 2-lane layout. No improvements are expected or planned for Cromesett Road; however, as conditions worsen, the Town will need to explore options similar to the Swifts Beach Road project.

Figure 22: PM peak hour future conditions LOS in Wareham

Improvements

During the study, it became clear that improving the corridor needed to include answers to two basic questions – First: “what improvements can be made with the existing layout?” and, Second, “is it possible to reduce the number of travel lanes?” Similar to typical transportation studies, SRPEDD first developed several improvements that answered the first question and then developed four (4) conceptual layout alternatives to build consensus around the second question, otherwise known as the “number of travel lanes” conversation.

Importantly, both the future improvements and the conceptual layout alternatives (page 30) were crafted considering: (1) the overall goal of the study, (2) the core issues, (3) the guiding principles, and (4) current federal and state design guidance.

Overall Goal

- To improve conditions of Route 6 for all road users employing a context sensitive approach.

Guiding Principles

- Enhance or implement pedestrian and bicycle accommodations
- Revise signal timing and phasing at signalized intersections to improve operations and safety
- Modify selected intersection geometries to improve sight distances
- Improve pavement markings, lighting, signage, and drainage to increase safety
- Provide more public transportation to reduce traffic volumes
- Investigate reducing the number of travel lanes (road diet) to help lower travel speeds

Core Issues

- High vehicle speeds
- Narrow travel lanes with little to no shoulder
- Sidewalk network is not consistent, close to road, and in need of repairs to be ADA compliant
- No bicycle accommodations
- Some drainage structures are sinking, creating depressions along curb
- Some unsignalized intersections have geometric challenges leading to sight distance issues
- Signalized intersections lack protected left turn lanes blocking visibility for oncoming traffic

Design Guidance

- MassDOT Project Development and Design Guide
- FHWA Manual on Uniform Traffic Control Devices (MUTCD)
- AASHTO: A Policy on the Geometric Design of Highways and Streets
- AASHTO: Guide for the Development of Bicycle Facilities
- United States Access Board Streets and Sidewalks Guidelines
- Massachusetts Architectural Access Board (AAB 521 CMR: 21.2.1)
- MassDOT Separated Bike Lane Planning & Design Guide
- National Association of City Transportation Officials Design Guides

In the end, SRPEDD recommends that the communities work with MassDOT to implement the following future improvements:


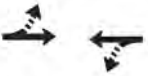
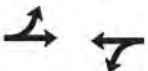
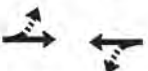
1. Signalize New Boston Road (Fairhaven)
2. Signalize Spring Street (Marion)
3. Signalize Swifts Beach Road (Wareham)
4. Modify North Street traffic signal to include protected/permissive left turns (Mattapoisett)
5. Modify Front Street traffic signal to include protected/permissive left turns (Marion)
6. Change physical geometries to create 90-degree intersections at six (6) locations
 - a. Brandt Island Road (Mattapoisett)
 - b. Church Street Extension (Mattapoisett)
 - c. Marion Road (Mattapoisett)
 - d. Converse Road (Marion)
 - e. Creek Road (Marion)
 - f. Hathaway Street (Wareham)

Traffic Control Type

<u>Intersection</u>	<u>Existing</u>	<u>Future</u>
New Boston Road		
Spring Street*		
Swifts Beach Road		

*Only in 2 lane configuration

Traffic Signal Movements

<u>Intersection</u>	<u>Existing</u>	<u>Future</u>
North Street		
Front Street		

Protected/
Permissive
Left Turns

Figure 23: Traffic Control Changes

Conceptual Layout Alternatives

The conceptual layout alternatives (next page) highlight potential strategies to address the lack of multi-modal accommodations on Route 6. The basic goals for the conceptual designs were to attempt to use only the existing land owned by MassDOT (Right-of-Way or “ROW”) and to accommodate all road users. Each alternative generally achieved the basic goals but come with a set of “pros” and “cons”. It should be noted that they are not meant to be a “one size fits all” approach. Rather, the intent is to answer the question – “is it possible to reduce the number of travel lanes?” and if so, “where?”

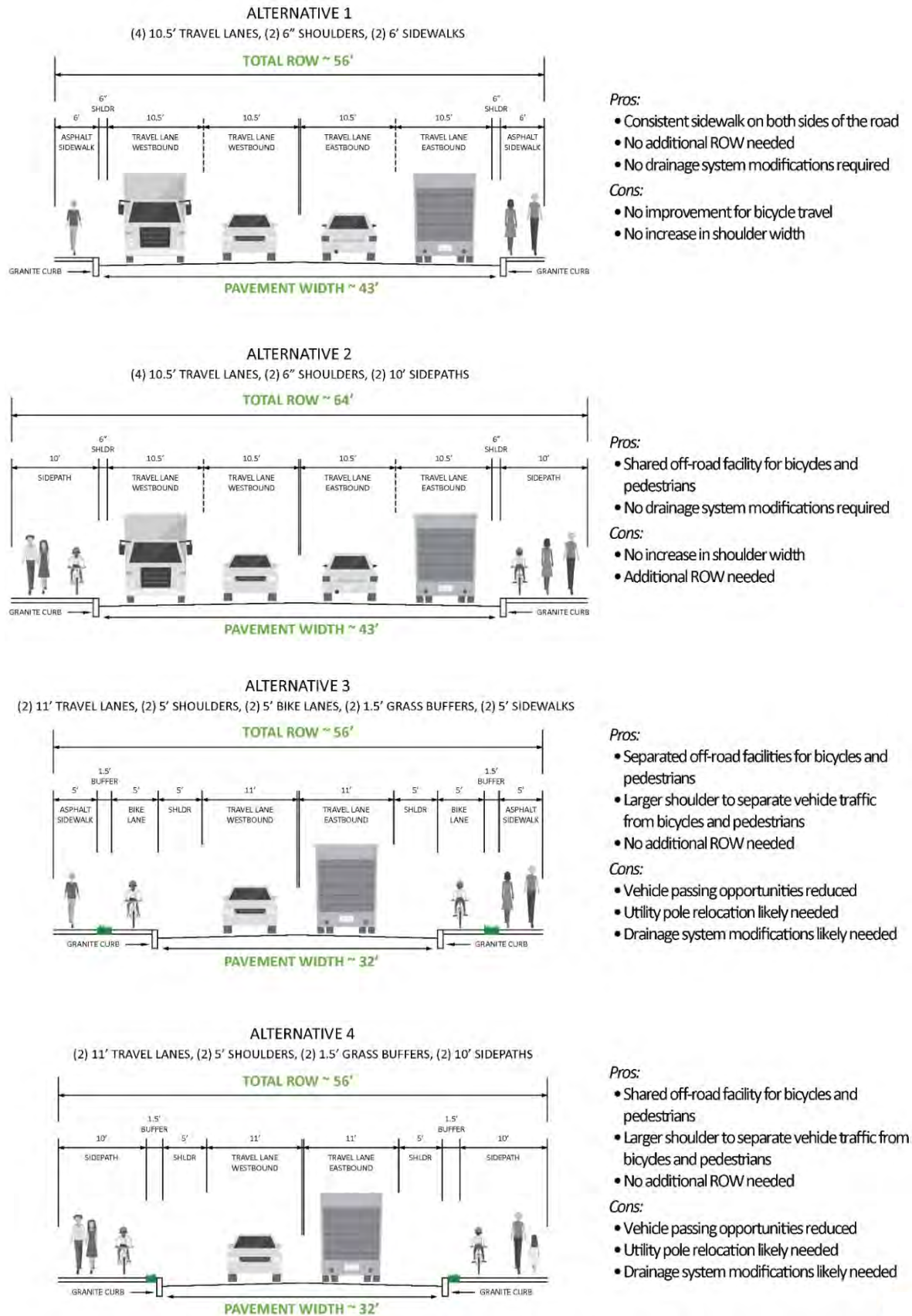


Figure 24: Conceptual Layout Alternatives

Alternative #1

Alternative #1 focuses on improving conditions for pedestrians. It includes no physical changes to the roadway or utilities (drainage system, utility pole locations). It does, however, include installing 6-foot sidewalks where gaps exist and upgrading the existing sidewalks to meet ADA guidelines (replacing the walk surface, removing obstructions, providing adequate clearance widths, etc.). Bicyclists would still need to “share the road” with motorists in this alternative. This option presents the lowest cost improvement.

Alternative #2

Alternative #2 focuses on improving conditions for bicyclists and pedestrians. It includes no physical changes to the roadway or utilities (drainage system, utility pole locations). It does, however, include providing a 10-foot, separated “sidepath” on both sides of the road to accommodate pedestrian and bicycle travel. Sidepaths are shared-use paths that are located immediately adjacent or parallel to the side of the road. Bicyclists would be physically separated from motorists, no longer needing to “share the road”. This option presents a higher cost mainly due to land acquisition.

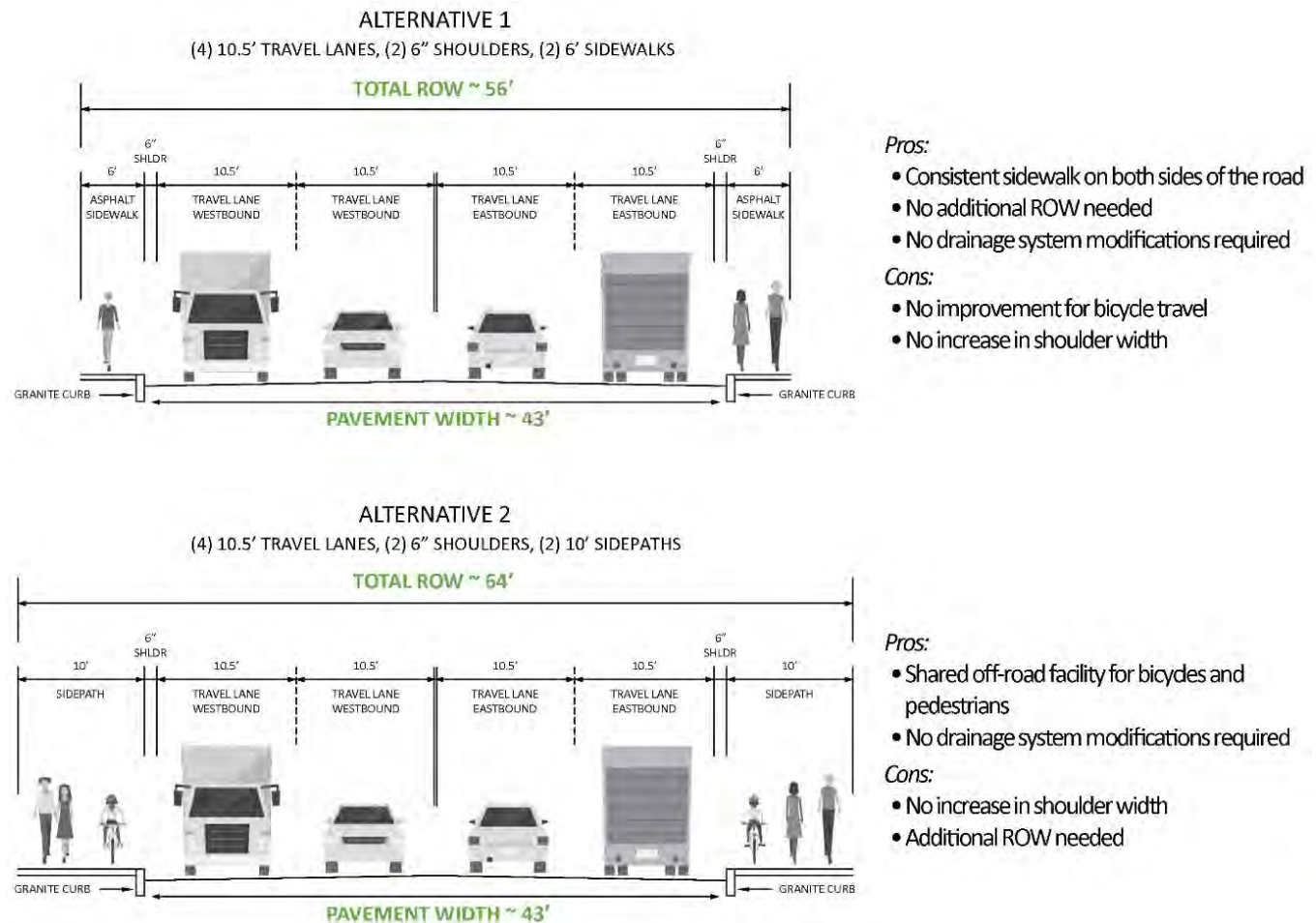


Figure 25: Conceptual Layout Alternatives #1 & #2

Alternatives #3 & #4

Alternatives #3 and #4 are very similar. Both focus on improving conditions for all road users – providing separation between the bicyclists and pedestrians from the travel way, reducing the number of travel lanes to reduce vehicle speeds, and enlarging the current shoulder area to accommodate first responders. This option would include improvements to the drainage system and potential utility pole relocations. The main difference between the two options is the design of the separated bicycle and pedestrian environment. In Alternative #3, bicyclists and pedestrians would have their own space while in Alternative #4, bicyclists and pedestrians would share the 10-foot, separated “sidepath”. These options would not include land acquisition; however, it would involve upgrades to the drainage system, curb relocations, and restriping the travel way.

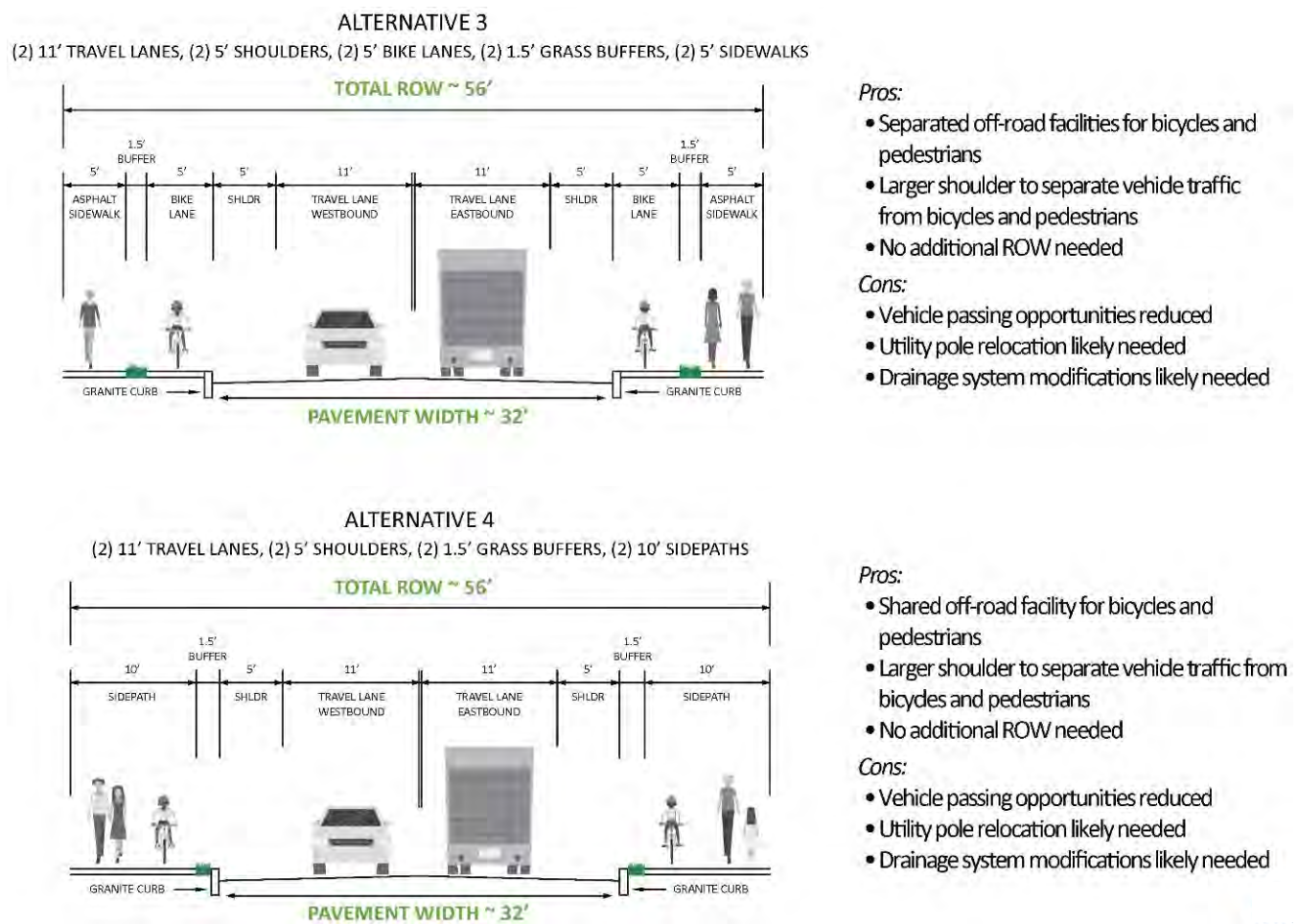


Figure 26: Conceptual Layout Alternatives #3 & #4

Public Meetings

The goal of Phase 2 was to build consensus about the future of Route 6 – balancing efforts to improve bicycle and pedestrian facilities while maintaining acceptable traffic flow and to identify where specific improvements would be most appropriate.

Phase 2 concluded in January 2020, as SRPEDD facilitated the second of two public meetings. The first meeting was held at the Center Elementary School (December 2019) and second meeting was held at the Sippican Elementary School (January 2020). The purpose of these meetings was to: (1) present the results of SRPEDD’s future conditions analyses; (2) present and gather the public’s feedback on the set of draft improvement alternatives; and, (3) to build consensus about the type and locations of future layouts using a preference survey (see Figure 28 on the following page).



Figure 27: Public Meeting at Sippican Elementary School

Similar to Phase 1, SRPEDD asked for the public to consider which presented alternative reflected their preference for the future of Route 6 and to indicated that choice on the survey. Importantly, the survey was flexible – the participants could select multiple alternatives if that suited them or even design their own alternative. SRPEDD simply asked that they indicate any “modifications” on the survey to ensure accurate cataloging following the meetings.

The survey was posted on the project webpage and paper copies were made available at the town halls. Following a 2-week comment period, SRPEDD cataloged and analyzed one hundred thirteen completed surveys. Importantly, this exercise allowed residents, town officials, business owners, commuters and others to express their opinions about the corridor and brought the communities closer to consensus.

As shown in Table 3 (page 37), the majority of respondents preferred Alternative #2 – keeping the 4-lane configuration while expanding the existing sidewalks to provide a 10-foot sidepath on both sides of the road for the entire corridor. While this conceptual alternative addresses two of the core issues (lack of sidewalk consistency and bicycle accommodations) by providing the separated space for bicycles and pedestrians, it does not address the high vehicle speeds and narrow travel lanes and shoulders. Additionally, it requires land acquisition in order to provide the sidepath on both sides of road. That said, if and when this alternative moves forward as a project, the final design could be modified in a way that reduces this impact and associated costs.

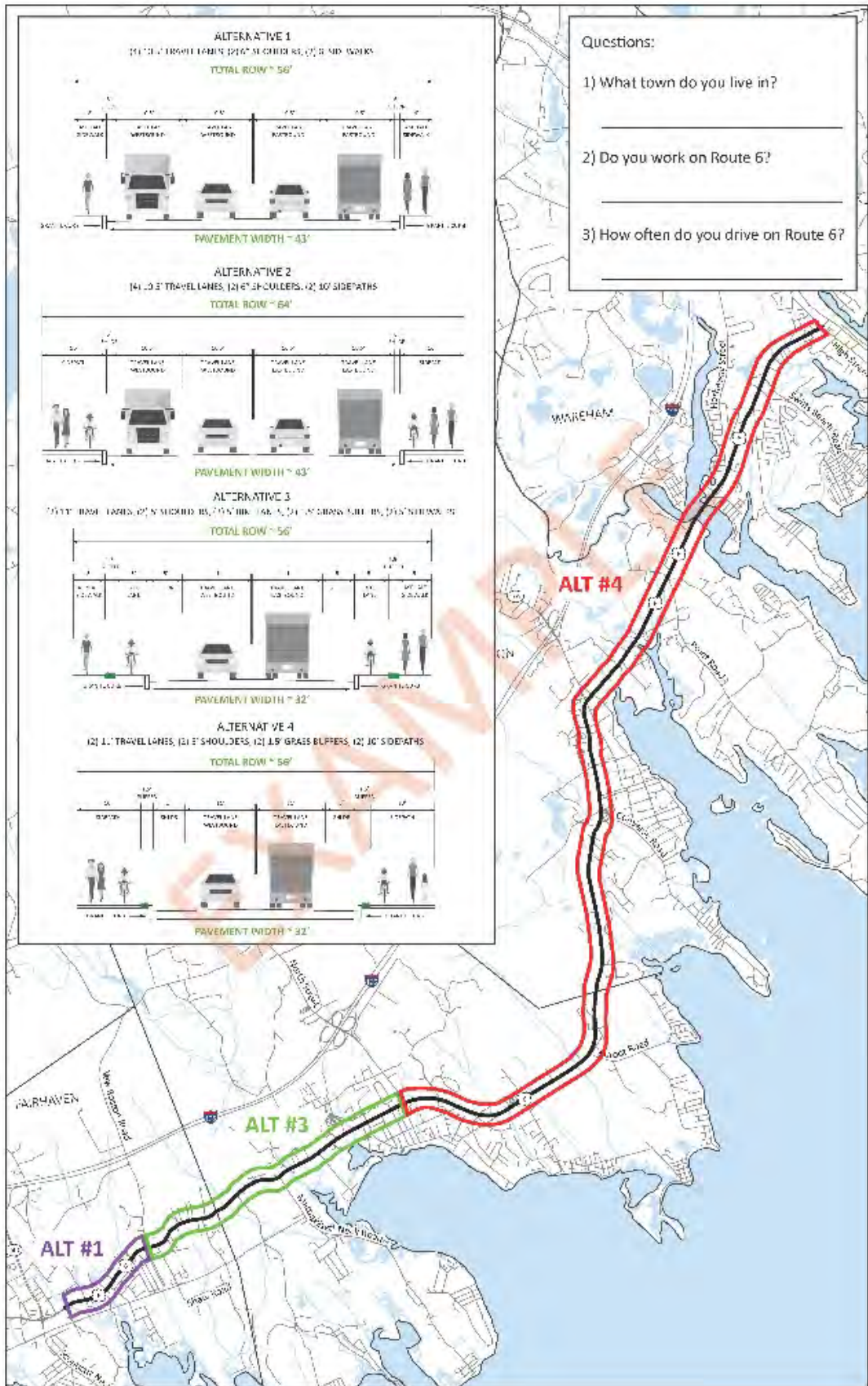


Figure 28: Preference Survey Example presented at the public meetings

Conclusions & Recommendations

Conclusions

Prior to the extension of Interstate 195 to Route 25 in the 1970s, Route 6 was the primary highway used to access Cape Cod. Therefore, at that time, the roadway was designed to accommodate a higher number of vehicles traveling at higher speeds in order to get “from point A to point B.” Although it still allows for that use, it also serves other purposes – providing access to residential properties, local businesses, recreational areas, and municipal facilities. Those land uses, the trips they create, and the associated users all need a roadway that is safe, reliable, and accessible. Currently, Route 6 is auto-centric, 4-lane highway, that prioritizes vehicle uses and discourages walking or biking. The goal of this study was to build consensus around the concept of improving conditions along Route 6 for all road users employing a context sensitive approach. Ultimately, significant changes cannot be accomplished overnight; however, with continual dialogue and engineering expertise, Route 6 can be improved.

Core Issues

Throughout the study, SRPEDD identified the following core issues:

- High vehicle speeds
- Narrow travel lanes with little to no shoulder
- Sidewalk network is not consistent, close to road, and in need of repairs to be ADA compliant
- No bicycle accommodations
- Outside lane drainage structures are sinking, creating depressions along curb
- Some unsignalized intersections have geometric challenges leading to sight distance issues
- Signalized intersections lack protected left turn lanes blocking visibility for oncoming traffic

Guiding Principles

Based on an understanding of the core issues coupled with the feedback recorded from the public survey, from the stakeholder meetings, and from the participants at the public meetings, SRPEDD focused on the following principles during the development of future improvements:

- Enhance or implement pedestrian and bicycle accommodations
- Revise signal timing and phasing at signalized intersections to improve operations and safety
- Modify selected intersection geometries to improve sight distances
- Improve pavement markings, lighting, signage, and drainage to increase safety
- Provide more public transportation to reduce traffic volumes
- Investigate reducing the number of travel lanes (road diet) to help lower travel speeds

Recommendations

Improvements

Considering the core issues and the guiding principles, SRPEDD recommends that the communities work with MassDOT to implement the following improvements:

7. Signalize New Boston Road (Fairhaven)
8. Signalize Spring Street (Marion)
9. Signalize Swifts Beach Road (Wareham)
10. Modify North Street traffic signal to include protected/permissive left turns (Mattapoisett)
11. Modify Front Street traffic signal to include protected/permissive left turns (Marion)
12. Change physical geometries to create 90-degree intersections at six (6) locations
 - a. Brandt Island Road (Mattapoisett)
 - b. Church Street Extension (Mattapoisett)
 - c. Marion Road (Mattapoisett)
 - d. Converse Road (Marion)
 - e. Creek Road (Marion)
 - f. Hathaway Street (Wareham)

Additionally, the following general improvements should be made to improve safety:

1. Replace all existing signage and pavement markings with high-visibility retroreflective materials to improve visibility
2. Replace all existing High-Pressure Sodium (HPS) streetlights with high-efficiency LED lights to improve visibility
3. Replace all existing “standard” style crosswalks with “continental” or “ladder” style to improve visibility
4. Reconstruct existing drainage structures that are in disrepair and bring flush to pavement surface to avoid depressions and standing water
5. Remove telephone poles from existing sidewalks or include a path that provides adequate clearance widths and add ADA compliant curb ramps to improve pedestrian mobility
6. Add bicycle signage along the corridor to improve awareness of bicycle activity

It should be noted that these improvements are intended to be implemented regardless of the future layout of Route 6.

Future Route 6 Layout

In total, SRPEDD received 113 preference surveys with a range of opinions. The vast majority of the completed surveys included the selection of a provided alternative for the entire corridor. However, there were some that (1) chose a combination of the provided alternatives (classified as “Combination”), (2) modified a provided alternative or created a new one (classified as “Other”), and (3) neglected to select a specific alternative (classified as “Blank”). The results of the comprehensive review, cataloging effort, and final tally are shown below, ranked by total number of selections:

Table 3: Preference Survey Exercise Results

Rank	Alternative	Total Tally	Percent of Total
1	Alternative #2	35	31%
2	Alternative #1	21	19%
3	“Combination”	15	13%
4	Alternative #3	14	12%
5	Alternative #4	13	12%
6	“Other”	9	8%
7	“Blank”	6	5%
Total		113	100%

As shown in Table 3, the majority of respondents preferred Alternative #2 – keeping the 4-lane configuration while expanding the existing sidewalks to provide a 10-foot sidepath on both sides of the road for the entire corridor. While this conceptual alternative addresses two of the core issues (lack of sidewalk consistency and bicycle accommodations) by providing the separated space for bicycles and pedestrians, it does not address the high vehicle speeds and narrow travel lanes and shoulders. Additionally, it requires land acquisition in order to provide the sidepath on both sides of road. That said, if and when this alternative moves forward as a project, the final design could be modified in a way that reduces this impact and associated costs.

Although this exercise provided valuable insights about the public’s preference, it is important to note that this is not considered to be a final “vote” or “decision” about the future layout of Route 6. Rather, it should be used as a foundation on which to build continued support for future layout changes, should specific communities wish to move forward. As previously noted, there are several improvements in this report that provide increased intersection efficiencies and safety, Americans with Disabilities Act (ADA) compliance, enhanced visibility, and infrastructure upgrades that should be pursued regardless of the roadway layout.

Lastly, the preference for a 3-lane configuration (2 travel lanes with a two-way left-turn lane) was expressed and supported during the public meetings and preference survey comment period. Although the MassDOT Project Development & Design Guide indicated that this treatment may not be preferable for Route 6 (mainly due to operating speeds), SRPEDD recommends that, at a minimum, it be considered during the design stage of any future project to ensure all possibilities are evaluated.