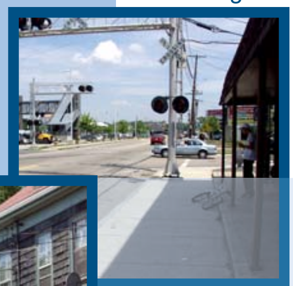
Bicycle and Pedestrian Improvements in Six Urban Centers

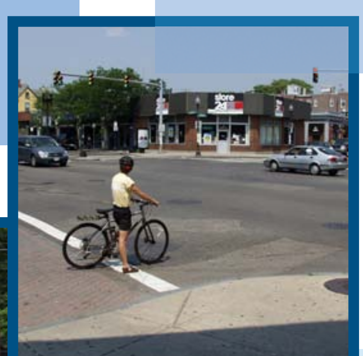
Brookline

Framingham



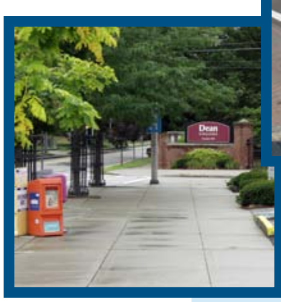
Chelsea

Weymouth



Allston

Franklin



Boston Region Metropolitan Planning Organization

Bicycle and Pedestrian Improvements in Six Urban Centers

Project Managers
Cathy Buckley
Ben Rasmussen

Contributors
John Hersey
Kate Parker-O'Toole
Kathy Jacob
Alicia Wilson

Cover Design
Kim Noonan

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Central Transportation Planning Staff of the **Boston Region Metropolitan Planning Organization**. The MPO is composed of state and regional agencies and authorities, and local governments.

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1 Introduction

An urban center is the heart of a community. An urban center that invites walking and bicycling is vital to a healthy community. Pleasant, safe, and convenient access for pedestrians and bicyclists to and within an urban center will attract residents, shoppers, visitors, workers, and transit commuters alike. Pedestrian and bicycle networks connecting surrounding areas to urban centers provide alternatives to the automobile for trips within a community. Improved pedestrian and bicycle access to an urban center supports economic vitality by encouraging more people to stroll and cycle by businesses and storefronts on their way to other destinations. In some cities, business owners have renovated their facades after pedestrian and bicycle improvements have been implemented. Better conditions for walking and bicycling to and within urban centers improve people's quality of life by reducing congestion, improving air quality, reducing carbon dioxide emissions, and encouraging exercise.

Most New England centers were built before the advent of the automobile. Many destinations are within walking distance of each other, including municipal offices, fire and police stations, libraries, churches, schools, health and human services centers, and connections to public transportation. Storefronts are plentiful, and many have offices or residential units above, with nearby multifamily housing that might serve elderly and low-income populations. Many of these residents are less likely to own a car and more likely to walk, bicycle, or use transit to get where they need to go. Transit stations connect many urban centers to destinations throughout the region by bus, light rail, subway, and train.

Motor vehicles have some attributes that have a more negative effect in an urban center than, at the other extreme, on an interstate highway. Cars and trucks take up a lot of space, may be loud, emit pollutants, and are massive compared to people and therefore can do great harm in collisions. On hot days, especially when their air conditioners are running, motor vehicles generate much heat, affecting nearby walkers and bicyclists. Furthermore, fewer motor vehicles in urban centers would result in less congestion and less travel time for drivers.

As urban centers became more auto oriented, investments in the maintenance and construction of pedestrian facilities lost their traditional priority. The compact New England center also has the disadvantage that the automobile has taken much of the space otherwise available to pedestrians and bicyclists. There is no space to widen the road to accommodate bicyclists. Parking lots have replaced some older buildings, requiring more vigilance at driveways from pedestrians and bicyclists, and providing much less interesting streetscapes and vistas. While parking spaces along sidewalks provide a buffer for pedestrians from moving traffic, the parked cars may reduce safety by preventing motorists from seeing crossing pedestrians. Drivers pulling into or out of parking spaces and opening car doors can endanger bicyclists.

This study includes recommendations in six selected urban centers for relatively low-cost, easy-to-implement improvements for pedestrians and bicyclists. Safer and more enjoyable environs for these modes would encourage more people to walk and bicycle, creating an even more inviting atmosphere and more vibrant, viable urban centers.

The improvements for bicycling and walking are treated separately in this report, as they are very different modes of travel. Bicycles are legal vehicles, allowed to use all roads except where specifically prohibited, such as limited-access highways. Bicyclists must yield to pedestrians. Bicyclists are generally prohibited from traveling on sidewalks, per municipal regulations.

1.1 BACKGROUND

The Boston Region Metropolitan Planning Organization (MPO) is committed to improving the transportation network for pedestrians and bicyclists. The measures for improving the network are found in the MPO's most recent policies, under the categories of system preservation, modernization, and efficiency; mobility; environment; safety and security; and land use and economic development (*Journey to 2030, Transportation Plan of the Boston Region Metropolitan Planning Organization*, June 28, 2007, pp. 4-2–4-6).

This Urban Centers study is a companion to the MPO's May 2007 report *Bicycle and Pedestrian Improvements in Town Centers*. That study focused on municipalities with a population of fewer than 20,000 people. This study includes municipalities with populations of over 30,000. Accordingly, the centers in this study are denser and more active than those in the Town Centers study.

The Town Centers study was recommended by the MPO's 2004 Report of the Congestion Management System (CMS), now known as the Congestion Management Process (CMP). The CMP is an ongoing program that provides the MPO and other parties with timely information about transportation system performance in the region, making recommendations where congestion and other mobility deficiencies are found. The CMP documents how the region's transportation network accommodates bicycling and walking.

The Massachusetts Department of Transportation Highway Division released its *Project Development and Design Guide* (*Design Guide*) in 2006, providing a framework for incorporating context-sensitive design and multimodal elements into transportation improvement projects. Transportation projects developed with the provisions outlined in the *Design Guide* are likely to significantly enhance the bicycle and pedestrian environments.

The concept of improving the bicycle and pedestrian environments in urban centers is also supported by and consistent with regional, state, and federal transportation plans and policies, which include:

- Boston Region MPO policies (referenced above)
- *Massachusetts Pedestrian Transportation Plan*, 1998
- *MetroFuture*, the long-range land use plan for the Boston region, by the Metropolitan Area Planning Council (MAPC), 2008
- MassHighway's Bicycle Route and Share the Road Signing Policy (Policy Directive P-98-003), 1998
- The Executive Office of Transportation and Public Works (now the Massachusetts Department of Transportation), *A Framework for Thinking – A Plan for Action*, the Statewide Transportation Plan, 2005
- *Massachusetts Bicycle Plan*, 2008
- *Regional Bicycle Plan*, prepared by MAPC for the Boston Region MPO, 2007

MAPC's update of the MPO's Regional Pedestrian Plan will be available in 2010.

1.1.1 OBJECTIVES

The MPO articulated three objectives for this study: 1) identify urban centers to include in the study, 2) identify opportunities to improve pedestrian and bicycle access and safety within those urban centers, and 3) recommend measures that would both improve conditions in the urban centers studied and highlight opportunities that could serve as a model for other communities in the region. Throughout this process, MPO staff was to work with municipal officials to ensure that study recommendations would be integrated into current municipal planning processes and implemented in the near future.

1.1.2 SELECTION OF URBAN CENTERS

The criteria for site selection were organized into two tiers. The first tier was based solely on population and population density. Eliminating municipalities with populations of less than 30,000 resulted in a list of 28 municipalities. MPO staff then created a list of 94 urban centers within those municipalities. Thereafter, the following second-tier criteria were applied:

- The number of residents, jobs, and pedestrian and bicycle crashes in and adjacent to the urban center
- The availability of transit services
- The location of services, such as municipal libraries, post offices, town halls, banks, grocery stores, and parks
- The location of obstacles to continuous safe access, such as major roadways or railroad tracks
- The type of urban center, such as an intersection, corridor, or multi-block area
- The geographic location within the region

- Municipalities that had hosted a Walkable Community Workshop or had recently undergone MPO studies

The above criteria yielded 12 urban centers in 9 municipalities as candidates for consideration for this study. Staff contacted officials in each of the municipalities to determine whether there were already plans underway for improving the urban center and whether there was sufficient interest in participating in the study. Staff also visited urban centers with which they were not familiar to observe the current condition of pedestrian and bicycle facilities. The list was narrowed down to six urban centers in six municipalities, and the MPO's Transportation Planning and Programming Committee approved those for inclusion.

The selected urban centers are Union Square in the Boston neighborhood of Allston, Brookline Village in Brookline, Downtown Chelsea, Downtown Framingham, Downtown Franklin, and Jackson Square in Weymouth.

1.2 COMPARATIVE DATA

Crash data and user counts are presented in the chapters devoted to specific municipalities. This section presents and compares the data for the six communities.

1.2.1 BICYCLE AND PEDESTRIAN COUNTS

Counts of bicyclists and pedestrians were done in the six study areas on Thursday, August 28, 2008. Counts were done in the morning, 6:00–10:00 AM, for three of the study areas, and from 2:00–6:00 PM for the other three. The morning counts are shown in Table 1-1.

TABLE 1-1
Counts of Pedestrians and Bicyclists and the Ratio of the Counts:
Allston, Brookline, and Weymouth, Thursday, August 28, 2008, 6:00–10:00 AM

Location	Pedestrians	Bicyclists	Pedestrians/Bicyclists
Allston	304	132	2.3
Brookline	426	121	3.5
Weymouth	57	10	5.7

For the morning counts, Brookline had the highest pedestrian count and Allston the highest volume of bicyclists. The Weymouth counts are about an order of magnitude lower than those high volumes in both categories. For all three communities, there are more pedestrians than bicyclists: from over twice as many in Allston to almost six times as many in Weymouth.

For the afternoon counts (see Table 1-2), Chelsea has by far the most pedestrians, over twice the count in Framingham, which is in turn over three times the count in Franklin. The most bicyclists were found in Framingham—about 50 percent more than in Chelsea, and almost 10 times the volume in Franklin. The ratios of pedestrians to bicyclists in these three areas are higher than in the other three communities, and significantly so in Chelsea and Framingham. There were 25 times as many pedestrians as bicyclists in Chelsea, and over 18 times as many in Framingham.

TABLE 1-2
Counts of Pedestrians and Bicyclists and the Ratio of the Counts
Chelsea, Framingham, and Franklin, Thursday, August 28, 2008, 2:00–6:00 PM

Location	Pedestrians	Bicyclists	Pedestrians/Bicyclists
Chelsea	2, 022	81	25.0
Framingham	934	128	7.3
Franklin	276	15	18.4

While the AM and PM counts cannot be strictly compared because they were taken at different times, it is clear that the highest pedestrian volumes by far are in Chelsea. The 4-hour count there, 2,022, is almost five times the next highest count of 426 in Brookline and 35 times the volume in Weymouth. The differences amongst the communities' bicyclist volumes were less striking. Allston, Framingham, and Brookline had the highest volumes and were somewhat comparable to each other. Compared to these three, the Chelsea volumes were about 50 percent less and those in Franklin and Weymouth were about an order of magnitude lower.

While all six areas in the study are called urban centers, the above data indicate that some have significantly more activity than others.

1.2.2 CRASH DATA

Table 1-3 presents the total number of pedestrian crashes and the total number of bicycle crashes for the six municipalities for two different five-year periods: 1997-2001 and 2002-2006. Data from both of these time periods are presented because a significant change in the reporting requirements took place in December 2001. The Massachusetts Registry of Motor Vehicles lengthened the crash report form, requiring more information. While the increased level of detail would be helpful in determining the causes of crashes and possible trends, the change to the longer form seems to have had the effect of decreasing the number of reported crashes.

For the six municipalities, the average number of reported bicycle crashes in 2002-2006 fell to 57 percent of the 1997-2001 level. The ratio of bicycle crashes in the more recent time period to the 1997-2001 time period fell the least in Framingham, where the rate decreased to 85 percent. The largest decrease was in Allston-Brighton, where there was

TABLE 1-3
Bicycle and Pedestrian Crashes Reported in the Six Urban Center Communities, and the Ratios of the Crashes for the Two Time Periods, 1997-2001 and 2002-2006

	1997-2001		2002-2006		Bicycle	Pedestrian
Community	**Bicycle Crash**	**Pedestrian Crash**	**Bicycle Crash**	**Pedestrian Crash**	**Ratio of 2002-2006 / to 1997-2001**	**Ratio of 2002-2006 / to 1997-2001**
Allston-Brighton	45	122	8	27	0.18	0.22
Brookline	158	321	86	177	0.54	0.55
Chelsea	112	270	59	170	0.53	0.63
Framingham	142	333	121	144	0.85	0.43
Franklin	21	54	7	15	0.33	0.28
Weymouth	95	168	44	109	0.46	0.65
Average	95	211	54	107	0.57	0.51

less than one bicycle crash reported in 2002-2006 for every five reported in the previous five years. The reported number of bicycle crashes in Franklin fell by two-thirds. Reported bicycle crashes filed in Brookline, Chelsea, and Weymouth police fell to approximately half of their previous five-year levels.

The pedestrian crashes reported in 2002-2006 fell to 51 percent of the 1997-2001 level, a slightly larger decline than the corresponding bicycle percentage. The lowest decreases occurred in Chelsea and Weymouth, where about two pedestrian crashes were reported in 2002-2006 for every three reported the previous five-year period. The largest decline was again in Allston-Brighton (22 percent as many reported) followed by Franklin (28 percent as many reported). Falling in the middle were Brookline (55 percent as many reported) and Framingham (43 percent as many reported).

It is not known how much, if any, of these differences between the two time periods may be due to an actual decrease in the number of crashes. Also unknown is the comparative rate at which different police departments reported crashes prior to the 2001 change in the form. For example, during the 1997-2001 period, there were 158 bicycle crashes reported in Brookline and 45 in Allston-Brighton. Were there three times as many bicycle crashes in Brookline during this period, or were crashes there reported more diligently? An analysis of hospital data might help shed light on these questions, but that inquiry is beyond the scope of this study. It should be noted that both police officers and individuals involved in crashes can file these reports. It is generally believed that the police reports are more objective.

In comparing the number of crashes in different municipalities, it is important to consider population and user volumes. That is, one would expect fewer crashes in settings with little or no traffic than in ones where there is more activity. Table 1-4 indicates, for each municipality, the pedestrian and bicyclist crashes per 10,000 residents, using U.S. Census data from 2000, and the number of crashes compared to the user volumes collected.

TABLE 1-4
Population (2000 U.S. Census); Reported Bicycle and Pedestrian Crashes per 10,000 Residents, 2002-2006; August 2008 Four-Hour Volumes of Pedestrians and Bicyclists; and Crashes per Count Index, for the Six Communities

Community	Population	Bicycle Crashes/ 10,000 Residents	Pedestrian Crashes/ 10,000 Residents	4-Hour Bicycle Count	4-Hour Pedestrian Count	Bicycle Crashes per Count Index*	Pedestrian Crashes per Count Index**
Allston-Brighton	64,961	1	4	132	304	6	9
Brookline	57,107	15	31	121	426	49	42
Chelsea	35,080	17	48	81	2,022	73	8
Framingham	66,910	18	22	128	934	95	15
Franklin	29,560	2	5	15	276	47	5
Weymouth	53,988	8	20	10	57	440	191

*Bicycle Crashes per Count Index: Bicycle Crashes (2002-2006) divided by the 4-hour bicycle count, multiplied by 100.
** Pedestrian Crashes per Count Index: Pedestrian Crashes (2002-2006) divided by the 4-hour pedestrian count, multiplied by 100.

There are problems with almost all the data in the above table. The limitations of the reported crash data were noted above. Also, the user volumes were taken on only one day at one location in each municipality. The population figures, although probably accurate as of 2000, are being used to compare crash data for the years 2001-2006. This would only be an issue if the populations of these six municipalities changed significantly relative to each other. Given the other problems with the data, this one is relatively minor.

Given all these data limitations, detailed comparisons of rates amongst the communities are not warranted. A couple of points are worth noting, however. First, the Allston-Brighton numbers reinforce the conclusion that reported crash data there are low. The Allston-Brighton crashes per capita for bicyclists and for pedestrians are the lowest for all six communities. In terms of crashes per volume of users, Allston-Brighton is the lowest by far for bicycle crashes and amongst the lowest for pedestrian crashes.

Second, the crashes per capita are higher for pedestrians than for bicyclists by a factor of at least two to one for each municipality except Framingham, where the pedestrian rate is only slightly higher. Yet the ratios based on user counts tell a different story. The number of crashes using the count index is higher for bicyclists than for pedestrians in all municipalities except Allston-Brighton. And, except for Brookline, the bicycle ratio is significantly higher than the pedestrian ratio: more than two to one in Weymouth, six to one in Framingham, and nine to one in Chelsea and Franklin. Even taking into account the limitations of the data, it is fair to say that bicyclists are involved in crashes disproportionately more than pedestrians when considering the relative number of trips these two groups make. Overall there are more pedestrian crashes because there are many more walking than bicycling trips.

A third point is that in Weymouth, for both bicyclists and pedestrians, the number of reported crashes compared to the volumes is significantly higher than in the other five communities.

In summary, high crash numbers may indicate more diligent reporting of crashes or higher levels of activity, or both, rather than less safe conditions. The crash data may help, however, in identifying specific areas that could be improved for bicyclists and walkers.

1.3 OVERVIEW OF REPORT

The next chapter provides information on methods to improve the environment for pedestrians and bicyclists in urban areas. These methods are presented separately for the two modes. While this report focuses on physical improvements, efforts in other areas – such as education and enforcement – are also important. A section on funding then presents information on programs at the federal, state and local levels of government that are potential sources to undertake improvements. Tables in Chapter 2 present cost estimates for various types of construction.

The remaining six chapters are each devoted to one of the urban centers. Each of these chapters begins with an overview of the entire community in which the urban center is located, including a history, and information on land use, population and employment, transportation services, and crash data. Then, the specific study area within each community is described in more detail. The study areas then are broken down into even smaller areas, to describe the existing conditions and recommendations in more detail. These descriptions are presented separately for the two modes.

While the recommendations are specific to the urban areas in this report, they also are intended to convey general concepts applicable to other sites.

2 Best Practices

This chapter discusses pedestrian and bicycle issues encountered in urban areas and information on the types of measures that can be implemented to address them. The subsequent six chapters describe specific pedestrian and bicycle issues for each of the urban centers evaluated in this study and the recommended actions for addressing them. The estimated capital costs of these measures are included in this chapter, as well as potential sources of funding.

This chapter is strongly informed by *Bicycle and Pedestrian Improvements in Town Centers* (Boston Region MPO, May 2007), mentioned in Chapter 1. A major source of information for both that study and this one is MassDOT Highway Division's *Project Development and Design Guide* (January 2006). This *Design Guide* provides a framework for incorporating context-sensitive design for all transportation modes, from trucks to pedestrians.

The main source of information for general costs of materials and treatments is *Weighted Average Bid Prices from Highway and Bridge Projects*, which MassDOT Highway Division produces annually.

The four E's—engineering, education, enforcement, and encouragement—are a description of ways to address bicycling and pedestrian issues. While this report is concerned primarily with engineering and design issues, the others issues are also important.

Walking and bicycling are very healthy for individuals and therefore should be encouraged. The laws that protect people who are walking and bicycling need to be enforced. Likewise, pedestrians and bicyclists need to follow the law. And all road users need to be educated and reminded that following the rules does not guarantee safety. Many pedestrians, for example, are hit while lawfully crossing a road in a crosswalk. Pedestrians need to be certain that oncoming motorists see them and yield to them before crossing.

Traveling on the roads without the surrounding armor of a motor vehicle makes bicyclists very vulnerable to injury in a collision. Unsafe bicycling habits include riding against motor vehicle traffic, going through stop signs and red lights, and passing too closely. Some bicyclists, including children, were observed disobeying traffic laws in the urban centers evaluated for this study. It is especially important for children to be educated about how to ride safely on and off the roads. Parents need to model safe bicycling and pedestrian behavior to their children. Educating children about safe walking and bicycling is one component of the Commonwealth's Safe Routes to School program, described later in this chapter.

2.1 PEDESTRIAN ENVIRONMENT

We can divide walking areas into two major categories: shared use paths, or trails, and facilities that are integrated into the roadway system. The former are separated from motor vehicles everywhere except at intersections. The only trail system discussed in this report is in Weymouth. The bulk of this study deals with walking within the street system. The major physical components of the walking environment are sidewalks, crosswalks, and the connections between them—curb ramps. Other important items are street furniture, buffers between sidewalks and roadways, and signage.

A comprehensive pedestrian network provides safe, convenient, and pleasant access to places pedestrians want to go. Sidewalks should be located strategically to connect centers of activity, including residential and commercial areas, schools, libraries, places of worship, and recreation areas. A well-maintained, attractive sidewalk designed to meet safety standards can reduce crashes, as well as encourage more people to walk.

The *sidewalks* discussed in this study are made of concrete, brick, or asphalt. Brick and concrete are found more often in urban areas than in suburban and rural areas. These materials wear differently over time, and the installation and maintenance costs vary considerably. While cost and durability are major factors in deciding which treatment to employ, connectivity, character, aesthetics, and accessibility for persons with disabilities are also important. Table 2-1 indicates the median bid prices for items related to the pedestrian environment.

As are our roads, so are sidewalks subject to the vicissitudes of New England winters. Freezing and thawing can cause cracking and buckling of a sidewalk's surface. The roots of nearby trees can push upward on a sidewalk, creating bumps and cracks. General wear over time causes deterioration of the surface. All sidewalk surface materials require periodic maintenance, some more frequently than others. The condition of sidewalk surfaces is discussed in each chapter devoted to a municipality.

A six-foot width allows two pedestrians to walk side by side comfortably. Sidewalks should be at least five feet wide to allow pedestrians to pass one another. Likewise the Massachusetts Architectural Access Board requires a five-foot width for the passage of two wheelchairs.[1] A three-foot width is considered acceptable in order to bypass obstructions. If there is no buffer between the roadway and the sidewalk, a six-foot width is desirable in residential areas, eight feet in commercial areas.

Curb ramps connect sidewalks to intersecting roadways or driveways, providing a smooth pedestrian transition. Curb ramps make sidewalks accessible for those with limited mobility, as well as for people pushing strollers. Curb ramps should be at least three feet wide, preferably four.

Every street crossing needs an exclusive curb ramp. In many instances in the urban centers in this study, a shared curb ramp is installed at the corner of an intersection. Crosswalks are then

[1] Commonwealth of Massachusetts Regulations: 521 CMR Section 6.2.

TABLE 2-1
MassHighway Weighted Bid Prices, All Districts, Pedestrian Environment, 9/07-9/08
http://www.mhd.state.ma.us/PE/WeightedAverageBook.aspx

Surface Treatments	Recommendation	Item Number	Median Average Bid
Sidewalks Surface Treatment	Cement Concrete Sidewalk	701.	$50/sq. yd.
	Cement Concrete Sidewalk at Driveways	701.1	$60/sq. yd.
	Cement Concrete Wheelchair Ramp	701.2	$78/sq. yd.
	Brick Walk	706.	$170/sq. yd.
	Hot Mix Asphalt Walk Surface	702.	$135/ton
Curb Cut Ramps	Granite Transition Curb for Wheelchair Ramp - Straight	509.	$38/ft.
	Granite Transition Curb for Wheelchair Ramp - Curved	509.1	$43/ft.
	Cement Concrete Wheelchair Ramp	701.2	$78/sq. yd.
Curbs	Granite Curb	501. to 506.1	$32 to $52/sq. ft.
	Granite Transition Curb for Wheelchair Ramp - Straight	509.	$38/ft.
	Granite Transition Curb for Wheelchair Ramp - Curved	509.1	$43/ft.
	Concrete Curb	520.	$24/ft.
	Hot Mix Asphalt Curb	570. to 572.3	$5 to $10/ft. or $182.50 to $225.00/ton
Buffers	Brick Walk	706.	$170/sq. yd.
	Loam Borrow	751.	$40/cu. yd.
	Topsoil Rehandled and Spread	752.	$20/cu. yd.
	Impervious Soil Borrow	760.	$35/ cu. yd.
	Seeding	765.	$1.60/sq. yd.
	Lawn Sodding	770.	$10/sq. yd.
	Plantings (Trees, Shrubs, Bushes)	772.058 to 796.853	$30 to $1,035/each
Street Furniture	Park Bench	707.1	$1810/each
	Plantings (Trees, Shrubs, Bushes)	772.058 to 796.853	$30 to $1035/each
	Area Lighting Luminare 400Watt	823.17	$10,000/lump sum
Crosswalk Markings	Cross Walks and Stop Lines Reflectorized White (painted)	865.	$2.25/sq. ft.
	Cross Walks and Stop Lines Reflectorized White (thermoplastic)	865.1	$1.50/sq. ft.
Signage	*Pedestrian Traffic, School, State Law Yield to Peds*		
	Demountable Reflectorized Reference Location Sign	834.	$34.50/each
	Removed and Reset	734.	$200/each
	Traffic Sign Removed and Stored	874.4	$40/each
Stop Lines	Cross Walks and Stop Lines Reflectorized White (painted)	865.	$2.25/sq. ft.
	Cross Walks and Stop Lines Reflectorized White (thermoplastic)	865.1	$1.50/sq. ft.
Signalized Pedestrian Crosswalks	Traffic Control Signal	815.	$122,000/lump sum

marked to connect to such shared curb ramps, resulting in longer crossing distances for pedestrians. All such shared curb ramps should be replaced with exclusive ones.

Sidewalks with asphalt surfaces often slope down to the level of intersecting roadways and driveways. This requires pedestrians to go down when crossing the road or driveway and then back up again. There is also a psychological message established: you are now entering the domain of the motor vehicle. The corresponding message goes to the drivers, that this crossing is their territory, albeit a shared one.

An alternative to constructing curb ramps is to increase the height of the intersecting roadway or driveway to the height of the sidewalk. This not only eliminates the need to go down and up, but also reinforces that this is the realm of the pedestrian, and that motorists have permission to cross when there are no conflicts. Most of the sidewalks evaluated for this study have either curb ramps or sloping asphalt at intersecting roadways and driveways.

Curbs between a sidewalk and a roadway improve pedestrians' perceived and real safety, forming a physical barrier from traffic. Curbs also help deter motorists from parking on sidewalks and channel roadway water runoff. Curbs are made of granite, concrete, or asphalt.

Curb extensions are an extension from the curb line of the sidewalk at crosswalks. A curb extension shortens the crossing distance for a pedestrian, thereby decreasing the time of exposure to traffic and the time required to cross. The extension also allows motorists and pedestrians to be more visible to each other. Curb extensions also preclude motorists from parking too closely to intersections and decreasing sight distance on cross streets. The space made available by the curb extension can be used for such items as plantings, fire hydrants, or benches.[2]

Buffers between the sidewalk and the roadway increase the distance between the walking area and moving traffic. For pedestrians, this creates a sense of security and a more pleasant environment. Buffers that are landscaped with grass, brick, or plants, including trees, further enhance the walking experience, as well as that of drivers. There are buffers along some of the sidewalks in each of the urban centers evaluated in this study.

It is important to keep sidewalks clear for safe passage. In many cases, it is the responsibility of owners to clear the sidewalks that front their property. In the winter, snow and ice can make sidewalks hazardous, or even impassable. People clearing roads and driveways sometimes plow extra material onto sidewalks. Throughout the year, but especially in late winter and early spring, sand and debris collect on sidewalks. The accumulation of leaves, most common in autumn, can be a hazard, especially when they are wet and slippery.

Street furniture items such as benches offer a welcome respite to many, from parents with young children to the elderly. Benches under shade trees are wonderful respites from the summer heat. After dark, lighting not only allows pedestrians to see where they are going and motorists to see pedestrians, but also provides a sense of security. If street furniture needs to be located in places where it partially obstructs the sidewalk, then it should not reduce the width to less than three feet.

[2] *Design Guide*, p. 16-29.

Crosswalks connect sidewalk segments across roadways and sometimes across driveways. A well-designed crosswalk includes a highly visible treatment in the roadway, usually consisting of a painted pattern or inlaid brick, curb ramps on both sides, and sometimes signs to alert motorists. Crosswalks should be installed at intersections and at other locations where it is safe and desirable for pedestrians to cross a roadway or a driveway. They should be strategically placed where pedestrians make connections to high-traffic destinations.

There are several treatments that make crosswalks more visible to pedestrians and motorists. MassDOT Highway Division allows three crosswalk-marking patterns: ladder-style (the agency's preferred option), parallel-bar-style, and zebra-style. These patterns are shown in Figure 2-1. Many crosswalks evaluated in this study are a modified parallel-bar-style. In many cases, those crosswalks are accented by a solid painted color (yellow or green), or inlaid bricks, between two parallel white lines.

The condition of the crosswalk markings in this study varies widely. Some crosswalks had recently been repainted and were highly visible, but others were very faded. Generally, municipal staff members repaint crosswalks annually, usually in the spring. Crosswalks therefore get increasingly less visible through the fall and into the winter. The lack of visibility in winter is compounded by the accumulation of sand and other materials on roadways.

Signs are often installed near crosswalks to warn motorists of the possible presence of pedestrians. Several types of signs were observed in the Urban Centers study areas: pedestrian-traffic, school, and state-law-yield-to-pedestrians signs, with or without an indication of a fine for not yielding. Yield-to-pedestrian signs on movable posts are often placed in, or adjacent to, the roadway, particularly at crosswalks near schools.

Medians or crossing islands provide a refuge for pedestrians. Pedestrians can cross one half of a roadway and wait for an opening to cross the other side. Medians also can help slow down motor vehicles. These islands need to be at least six feet wide. Fifty feet is considered the longest acceptable length for an uninterrupted crosswalk, but medians can be used for much shorter crossings.[3]

Stop lines, indicating where vehicles should stop at a stop sign or traffic signal, should be positioned at least four feet before the crosswalk.[4] Stop lines remind motorists to look for pedestrian traffic. They are also very important to pedestrians. By stopping well before the crosswalk, motorists indicate to the pedestrians that they are seen.

This is even more critical on multilane roads. If a motorist in the lane closest to the sidewalk stops well before the crosswalk, a motorist coming up in an adjacent lane has more time to see the pedestrian in the crosswalk, and respond. Likewise, the pedestrian has more time to react to the motorists in the adjacent lane.

[3] Ibid., p. 6-63.
[4] Ibid., p. 6-61.

Figure 2-1
Various Crosswalk Designs in the Urban Centers

Parallel Bars with Inlaid Brick
Harvard and Brighton Avenues, Allston

Ladder Style with Parallel Bars
Harvard and Linden Streets, Brookline

Ladder Style with Parallel Bars
Concord and Clinton Streets, Framingham

Parallel Bars, Solid Green Infill
Jackson Square, Weymouth

Zebra Style
Beacon Street off-ramp, Tobin Bridge, Chelsea

Parallel Bars
Alpine Place, Franklin

Signals allowing pedestrians to cross are typically integrated into traffic signals located at intersections. Sometimes separate pedestrian signals are placed where there is significant pedestrian traffic or where it may be unsafe to cross while automobile traffic is moving. At intersections, these signals provide either an exclusive pedestrian phase, when only pedestrians are allowed to traverse the intersection, or a concurrent pedestrian phase, when pedestrians cross a crosswalk while motor vehicle traffic is allowed to move in a parallel direction. A concurrent phase decreases the time pedestrians have to wait to cross. A variant on this is a leading pedestrian interval that allows pedestrians to begin crossing before the traffic light turns green for the parallel-moving motorists. This increases the visibility of pedestrians and helps prevent motorists from making turns ahead of the pedestrians, resulting in, at best, delays, and at worst, crashes.[5]

The pedestrian phase of a signalized crosswalk consists of a walk signal, which indicates when pedestrians may enter the crosswalk, and a flashing don't-walk signal, which indicates that pedestrians already in the crosswalk may continue to the other side of the roadway, but pedestrians not yet in the crosswalk should not begin to cross. The pedestrian phase should be long enough for a pedestrian walking at a speed of 3.5 feet per second to cross to the other side.[6]

Countdown signals indicate how much time remains to complete the crossing. They allow pedestrians to make a more informed decision as to whether to initiate a crossing or not. They are particularly recommended where crossing time is limited or where there have been signal-related crashes.[7] One study in San Francisco reported that countdown signals were associated with a 53 percent decrease in pedestrian injuries. In addition, 92 percent of those interviewed preferred them to traditional signals.[8]

The time allotted to pedestrians was measured for the 25 signalized crossings in this study. The time was called adequate if there was enough from the beginning of the "Walk" phase to the end of the flashing "Don't Walk" phase. It would be more conservative, however, to measure the walk time from the end of the "Walk" phase to the end of the "Don't Walk" phase, as pedestrians are allowed to begin crossing up until the "Don't Walk" phase begins. Municipal staff are urged to adjust the timing on signals so that the "Don't Walk" phase allows enough time to cross.

In addition to good accommodations, the pedestrian environment is greatly affected by the *speed of motor vehicles* on adjacent roadways. Slower-moving motorists are less likely to hit a pedestrian and, if there is a collision, less likely to inflict serious injury. As indicated in Table 2-2, in a crash, the speed of the motor vehicle largely determines the fate of the pedestrian. A pedestrian's chance of survival in a crash goes from 95 percent when the motorist is traveling at 20 miles per hour to 55 percent when the motorist is traveling at 30 miles per hour, only 10 miles per hour faster.

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[5] Ibid., p. 6-20.
[6] The *Manual on Uniform Traffic Control Devices* changed the walking speed from 4.0 to 3.5 feet per second in January 2010.
[7] Ibid., p. 6-21.
[8] F. Markowitz, S. Sciortino, "Pedestrian Countdown Signals: Experience with an Extensive Pilot Evaluation," *ITE Journal,* 76, No. 1, 2006, as reported in *Pedestrian Safety, Report to Congress*, FHWA, August 2008, p. 13.

TABLE 2-2
Effect of Impact Speed of Motor Vehicle on Fatality and Injury Rates of Pedestrians[9]

	Speed of Motor Vehicle			
Probability of:	**20 mph**	**30 mph**	**40 mph**	**50 mph**
Death	5%	45%	85%	100%
Injury	65%	50%	15%	-
No Injury	30%	5%	-	-

There are many recommendations in this report to reduce the *width of travel lanes*. The reduced widths not only slow down motorists but also make more of the roadway width available to bicyclists. A travel lane width of 10 feet is considered appropriate when the intent is to calm traffic. Wider travel lanes are necessary on roadways with a large number of trucks or buses, and on arterials.[10]

Right-turn (auxiliary) lanes are generally not recommended in areas where the emphasis is on accommodating pedestrians. The extra pavement width for the right-turning traffic requires pedestrians to walk a longer distance to cross the street, and there is an increased potential for conflicts between pedestrians and motorists. *Left-turn lanes* should also be used sparingly. The slowing of traffic due to waiting for left-turning vehicles can have a positive effect in areas of high pedestrian activity. Removing on-street parking from both sides at an intersection can accommodate left-turn lanes where they are needed.[11]

2.2 BICYCLE ENVIRONMENT

Other than the Back River Trail discussed in the Weymouth chapter (Chapter 8), the focus on bicycling in this study is on accommodating that mode within the roadway system. In general, given the rarity of rights-of-way available for trails, almost all bicycling in our region, in the Commonwealth, and in our country, is on the roadway system. Costs of items associated with bicycling on the roadway system are shown in Table 2-3.

While many factors affect how safe and welcome a bicyclist feels on a road, the *roadway width* is perhaps the main factor. The width of available space determines whether there is room for a bicycle lane or a shoulder or whether bicyclists need to share lanes with motor vehicles.

Bumps, cracks, and potholes are a nuisance to motorists, sometimes resulting in damage to their vehicles. These nuisances can be much more dangerous to bicyclists, possibly causing falls or last-minute swerves into motor vehicles. Unfortunately, bumps and cracks occur more often near the edge of a roadway, where bicyclists travel. This is why this study assessed the *condition of the roadway surface,* particularly near the edge, because it is a major factor in bicyclist safety and comfort.

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[9] US DOT, Leaf WA, Preusser DF, 1999.
[10] *Design Guide*, p. 16-19.
[11] Ibid., p. 16-21.

TABLE 2-3

MassHighway Weighted Bid Prices, All Districts, Bicycle Environment, 9/07-9/08

www.mhd.state.ma.us/PE/WeightedAverageBook.aspx

Surface Treatments	Recommendation	Item Number	Median Average Bid
On-Street Bicycling			
Roadway Surface	Hot Mix Asphalt	460.	$82/ton
Shoulders	Hot Mix Asphalt	460.	$82/ton
	Drainage Grates	222. to 222.2	$500 to $600/each
Bicycle Lanes	6" Reflectorized White Line (painted)	860.06	$0.45/ft.
Signage	*Bicycle Traffic, Bike Lane Ahead, Bike Lane Ends, Share the Road*		
	Demountable Reflectorized Reference Location Sign	834.	$34.50/each
	Traffic Sign Removed and Reset	734.	$200/each
	Traffic Sign Removed and Stored	874.4	$40/each
Bicycle Parking	Bicycle Rack	707.9	$1,000/each

Paved shoulders provide space for bicycling outside of the travel lane. Shoulders that are at least four feet wide can fully accommodate bicyclists, but even narrower shoulders provide some space for bicyclists. Shoulders should be kept free of debris (sand, gravel, and refuse) so as not to obstruct bicyclists. Drainage grates that are set back from the roadway so that bicyclists do not have to ride over them make for a smoother, safer bicycle ride.

Bicycle lanes are delineated by a six-inch wide solid stripe and symbols on the pavement. Bicycle lane markings increase a bicyclist's confidence that motorists will not stray into their path of travel. Likewise, passing motorists know that this space is for bicyclists. When there is no delineation, some motorists overcompensate for bicyclists and swerve left out of their own travel lane. Bicycle lanes should be at least four feet wide, but five feet is preferred in most situations.[12] Many of the roadways in the urban centers evaluated in this study are not wide enough to accommodate bicycle lanes. Bicycle lanes need to be wider when they are adjacent to parking lanes (see further discussion below).

On-street parking may constitute a hazard for bicyclists. Both motorists and bicyclists must be alert. Bicyclists should ride outside the reach of an opened car door to avoid a collision. Likewise, motorists wishing to exit their parked vehicle should look behind them for bicyclists before opening the door. Bicyclists should reduce their speed and ride to the left of parked cars in a straight, predictable line. Bicycle lanes and shoulder lines between on-street parking and travel lanes guide bicyclists to a safe location on the roadway. They also remind motorists to be alert for passing bicyclists.

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[12] Ibid., p. 5-6.

An on-street configuration that is safer for bicyclists is *back-in diagonal parking*. This is similar to traditional angle parking except instead of driving into the parking spot, the motorist backs in. Because the parking is angled away from the curb, the maneuver is less difficult than parallel parking. A major reason for this being an improvement is that bicyclists have a much better view of the drivers wishing to exit, and vice versa. With head-in diagonal parking, the motorist is looking through the vehicle and around any adjacent parked vehicles. Likewise, the bicyclist cannot see if anyone is in the vehicle until passing it.

Back-in parking is also better than head-in for motorists and their occupants. First, the car doors open facing the sidewalk, blocking access to the roadway, the opposite of head-in parking. This is especially important with children in the car, who might suddenly run in the direction of the opened door. Second, the trunk or storage area of the vehicle is on the sidewalk side, not the street side.

Diagonal parking also has benefits over parallel parking. As noted above, it is easier to back into a diagonal parking spot than a parallel one. Also, no car doors have to be opened into traffic. This latter reason is the most important one for bicyclists. When traveling alongside parallel-parked cars, bicyclists have to be constantly on the alert for a door suddenly opening in front of them.

The width required for diagonal parking varies, depending primarily on the angle of the parking. The City of Vancouver, Washington, allows 12 feet for parking at 45 degrees from the curb.[13] Less width is required as the parking angle approaches zero degrees, or parallel to the curb. More width is required as the angle approaches 90 degrees, perpendicular to the curb (the configuration in most parking garages).

Bicycle-route signs are used to mark a suggested route for bicyclists. The only long-distance bicycle route in Massachusetts is the Claire Saltonstall Bikeway, between Boston and Cape Cod. *Share-the-road signs* are used when there is not enough width to create bicycle lanes or shoulders. These signs remind motorists to be on the alert for bicyclists sharing the roadway. None of the urban centers evaluated in this study have bicycle-route or share-the-road signs. MassDOT Highway Division sometimes installs these signs along state highways if several criteria are met. For more information, see MassDOT Highway Division's Bicycle Route and Share the Road Signing Policy (Policy Directive P-98-003, August 25, 1998).

Bicyclists need safe, convenient places to store their bicycles at a destination. *Bicycle racks* should be located at important activity centers, such as town halls, libraries, post offices, schools, commercial areas, recreational facilities, and transit stations. They should be located near the main entrance to these facilities, and should be highly visible, not only so that bicyclists can easily find them and but also to discourage theft and vandalism. Where possible, racks should be positioned so that bicycles are protected from precipitation.

The MPO's Bike Rack Program, described later in this chapter, provides some reimbursement for bicycle racks. The guidelines recommend that bicycle racks: support the bicycle frame in two

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[13] Back-in/Head-out Angle Parking, Nelson\Nygaard Consulting Associates, January 2005.

locations, enabling the frame and one or both wheels to be secured; allow both front-in and back-in parking; and be compatible with today's bicycle frames and locks.

Among racks that meet the above guidelines are the inverted-U, the *A* (an inverted-U with a horizontal bar), and the post-and-loop (also known as *bike hitch*). Each of these racks supports two bicycles. Many manufacturers produce these or similar styles. These racks are often arranged in a row; the spacing between the racks should be a minimum of 30 inches (on centers), but preferably 36 to 42 inches.

2.3 SOURCES OF FUNDING

The following state programs are potential sources of funding for the improvements to pedestrian and bicycle networks recommended in this study. Many of these programs in turn receive funds from the federal government.

Some municipal transportation projects are funded through the Commonwealth's Chapter 90 program. These funds, distributed by MassDOT Highway Division, may be used for many types of transportation projects, including roadway resurfacing, sidewalk construction, the installation of street lighting, and the construction and maintenance of trails. Municipalities pay for the projects they choose to undertake and are reimbursed for eligible expenditures.

In state fiscal year (SFY) 2009, MassDOT Highway Division allocated $150 million in Chapter 90 funds to municipalities. Funding is made available annually based on a municipality's population, employment, and number of miles of local roadways. For more information on the Chapter 90 program, visit www.massdot.state.ma.us.

Since federal fiscal year (FFY) 2007, the Regional Bike Parking Program reimbursed municipalities in the Boston region for the purchase of bicycle racks. The program, administered by the Metropolitan Area Planning Council (MAPC) and funded by the Boston Region MPO, MassDOT, and the Federal Highway Administration (FHWA), had three participating vendors that provided a variety of styles of bicycle racks and other related products. Municipalities paid up front for their purchases and then were reimbursed. The cost of shipping and installation were the responsibility of the municipality. In FFY 2010, the program was incorporated into the MPO's Clean Air and Mobility Program. Bike parking infrastructure projects are eligible under the new program, and the same guidelines apply. For further information, go to www.bostonmpo.org.

The Commonwealth's Transit-Oriented Development (TOD) Infrastructure and Housing Program (also known as the TOD Bond Program) was created to increase the supply of compact, mixed-use, walkable development close to transit stations. The program provides financial assistance for the construction of pedestrian improvements, bicycle facilities, housing projects, and parking facilities within a quarter mile of a commuter rail station, subway station, bus or bus rapid transit station or stop, or a ferry terminal. The program also funds the preliminary design of pedestrian and bicycle facility projects near transit stations.

In SFY 2006, $7 million was awarded to four projects. In SFY 2007, $6 million was awarded to 16 projects. No awards were given in SFY 2008, and awards are still pending for SFY 2009. All public entities, including municipal governments, are eligible for the program.

Massachusetts' Safe Routes to School (SRTS) program aims to improve walking and bicycling conditions for children traveling to school in the commonwealth. Elementary schools that are partnered with the program help implement education programs, activities to encourage bicycling and walking, traffic enforcement, and engineering solutions.

Mass*RIDES* administers the program for MassDOT. The SRTS Manual has been sent to all elementary school principals in Massachusetts. The program is funded by the FHWA, which allocated over $2.7 million in SFY 2008 to Massachusetts for its SRTS program. Massachusetts is projected to receive over $3.4 million in SFY 2009. For more information, visit www.commute.com.

The Commonwealth's Public Works Economic Development (PWED) program, administered by MassDOT, assists municipalities in funding transportation infrastructure projects that stimulate economic development. The program supports transportation projects that are consistent with the Commonwealth's Sustainable Development Principles. For more information, visit www.massdot.state.ma.us.

3 Allston

The initial section of this chapter provides a profile of Allston. The second section describes existing bicycling and walking conditions in the study area and recommendations for improvements.

Allston is part of the most northwest neighborhood of Boston, often referred to as Allston-Brighton. It is bordered on the north by the Charles River, on the west by the City of Newton, and on the south and east by the Town of Brookline. It is physically connected to the rest of Boston by a narrow stretch of land north of Commonwealth Avenue. The population is composed of families, professionals, and students. There is also a good deal of institutional and commercial development.

The study area, Allston's Union Square and the area to the east, is located in the east-central portion of Allston-Brighton. The findings of this study are based on meetings and correspondence with local staff, fieldwork, and a review of previous studies. The City of Boston's North Allston–North Brighton Master Plan is in effect here. Several institutions in the area, including hospitals and universities, have developed master plans as well.

3.1 COMMUNITY PROFILE

Included here are a short history of Allston, a general description of land use, population and employment data, an overview of the transportation network, and crash data.

3.1.1 HISTORY

Allston was originally part of the town of Brighton. In 1868, a new railroad depot and post office in east Brighton were given the name "Allston" after Washington Allston, the noted painter who had lived and worked across the Charles River in Cambridgeport. The City of Boston annexed Brighton, including its Allston neighborhood, in 1874. The Allston community developed largely around railroad and livestock operations near what is now known as Beacon Park Freight Yard, but all livestock activity ended by the mid-twentieth century.

A strip running from Brighton Avenue in Allston toward Kenmore Square via Commonwealth Avenue was Boston's original *Automile*, lined with car dealerships. Packard's Sales Stable and Riding School gave Packard's Corner its name, which was then perpetuated by the presence of an opulent Packard dealership. Although restaurants, service businesses, and academic institutions have replaced these dealerships, many of their large-windowed storefronts remain.

3.1.2 LAND USE

The east–west Massachusetts Turnpike bisects the neighborhood of Allston. The area between the Charles River and the Turnpike is often referred to as “Lower Allston” or "North Allston." The western edge of Allston is roughly defined as Everett, Gordon, and Kelton Streets.

Allston has several ties to academia. Parts of Harvard University are in Lower Allston, including the business school and the stadium. Harvard recently announced plans for a substantial new development in the area called Allston Landing. Boston University extends along Commonwealth Avenue between Allston and Kenmore Square. Berklee College of Music has a practice and rehearsal building near Commonwealth Avenue, just east of the study area.

Much of the housing stock consists of brick apartment buildings, especially on Commonwealth Avenue and connecting streets. There are many wooden triple-deckers on Brighton Avenue. Lower Allston has mostly single-family and multi-family Victorian homes from the 1890-1920 era. The busiest section of the neighborhood lies immediately south of the turnpike and centers on the stretch of Harvard Avenue between Cambridge Street and Commonwealth Avenue, which houses many shops, bars, and restaurants.

This study examines the Brighton Avenue corridor between Harvard Avenue and the Cambridge Street intersection at Union Square. Land uses are primarily commercial and residential.

3.1.3 POPULATION AND EMPLOYMENT

Joined with its neighboring enclave, Allston-Brighton is the most populated community examined in this study. The 1990 population of 70,284 grew by 7.7 percent to 75,680 in 2000, and is projected by the Metropolitan Area Planning Council (MAPC) to increase another 12.1 percent to 84,836 by 2030. MAPC projects the employment in Allston-Brighton, listed at 33,758 in 2000, to grow by 21.2 percent, to 40,904, by 2030.

TABLE 3-1
Population and Employment in Allston-Brighton in 2000, 2010, 2020, and 2030

Allston-Brighton	2000	2010	Change 2000 to 2010	2020	Change 2010 to 2020	2030	Change 2020 to 2030
Population	75,680	80,107	5.5%	83,917	4.5%	84,836	1.1%
Employment	33,758	36,759	8.2%	39,403	6.7%	40,904	3.7%

3.1.4 TRANSPORTATION

The Massachusetts Turnpike Extension, built largely on railroad right-of-way, opened in 1964 and 1965. Interchange 18-20 serves the Allston-Brighton area. Soldiers Field Road runs on the northern border of Allston-Brighton, adjacent to the Charles River. East–west numbered roads serving Allston-Brighton include U.S. Route 20 (Brighton Avenue) and State Route 30 (Commonwealth Avenue). There are no numbered north–south routes.

The “B” branch of the MBTA’s Green Line serves Allston via Commonwealth Avenue. The “A” branch ran on Brighton Avenue until 1969; today its route is served by MBTA bus Route 57. Bus Routes 64, 66, 70, and 86 provide access between that neighborhood and Cambridge, Brookline, and other parts of Boston. In May 2006, Harvard University officials expressed interest in a new commuter rail stop on the Framingham/Worcester line to serve the proposed Allston Landing development.

3.1.5 CRASH DATA

Between 2002 and 2006 there were 26 reported crashes involving pedestrians in Allston-Brighton, representing 1.1 percent of all crashes and resulting in eight fatalities. In the same period there were seven reported crashes involving bicyclists, representing 0.3 percent of all crashes and resulting in one fatality. As noted in Chapter 1, it is very likely that more crashes involving bicyclists and pedestrians occurred than were reported.

TABLE 3-2
Bicycle, Pedestrian, Motor-Vehicle and Total Crashes and Fatalities in Allston-Brighton, by Number and Percentage, 2002-2006

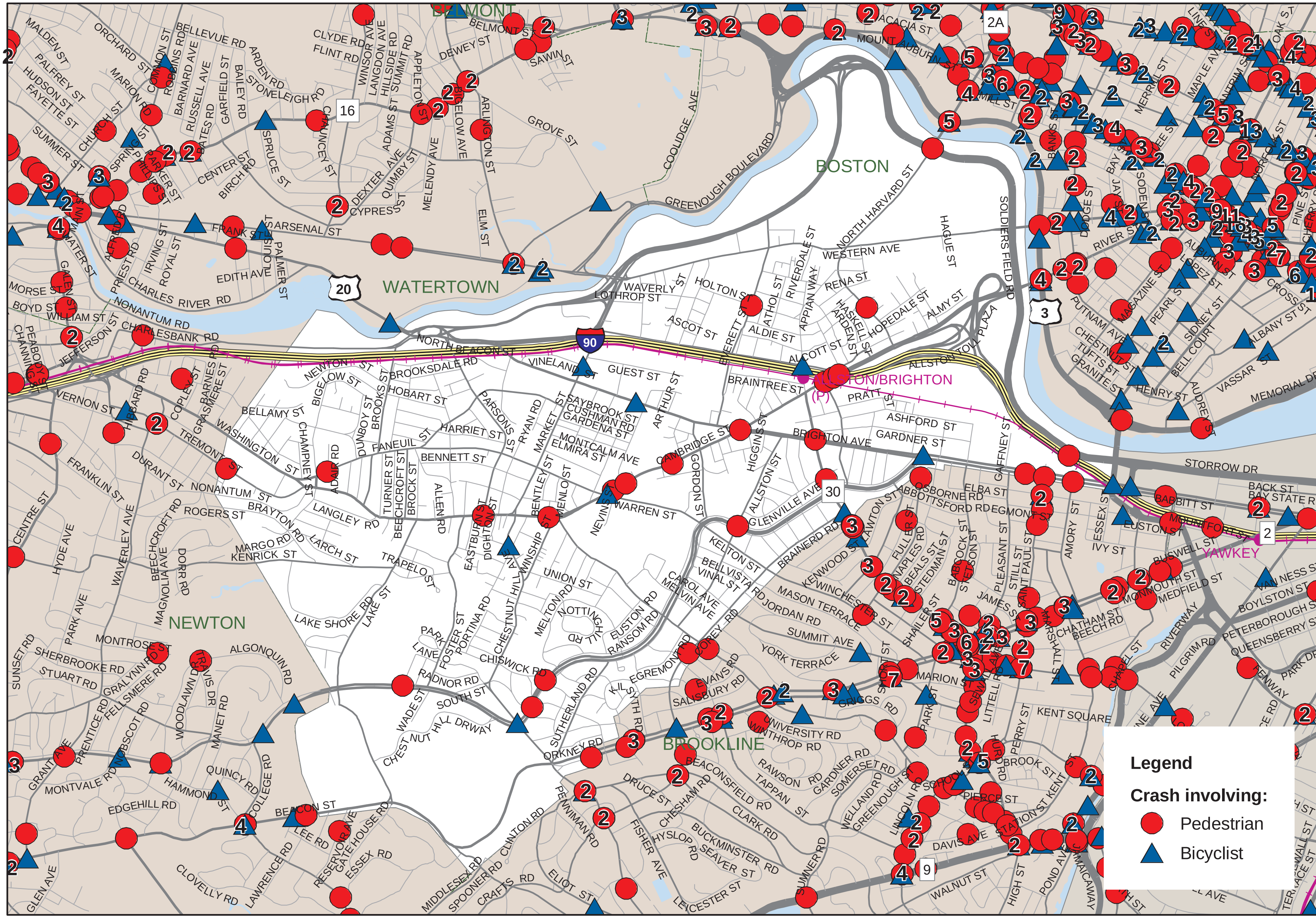
	Crashes		Fatalities	
Mode	**Number**	**Percentage**	**Fatalities**	**Percentage**
Bicycle	7	0.3%	1	7.1%
Pedestrian	26	1.1%	8	57.1%
Motor vehicles (only)	2,338	98.6%	5	35.7%
All crashes (bike, ped, & motor-vehicle)	2,371	100%	14	100%

Figure 3-1 shows the locations of the bicycle and pedestrian crashes.

3.2 STUDY AREA

The first part of this section of the chapter defines the study area and gives an overview of transit service and walking and bicycling conditions. Subsequent sections give more details on the different parts of the study area.

FIGURE 3-1
Allston/Brighton: Crashes in 2002-2006 Involving Pedestrians and Bicyclists



The study area for Allston (shown in Figure 3-2) includes:

- Union Square and environs
- The intersection of Harvard and Brighton Avenues
- Brighton Avenue between Union Square and Harvard Avenue

Three buses serve the study area each day: Route 57 between Watertown and Kenmore Square, Route 64 between Brighton's Oak Square and Central Square in Cambridge, and Route 66 between Harvard Square in Cambridge and Dudley Square in Roxbury. The buses run multiple times an hour throughout the day. Five stations on the MBTA's Green Line B Branch (Boston College line) are within walking distance of Union Square: Warren Street to the south, Packard's Corner to the east, and, in between, Allston Street, Griggs Street, and Harvard Avenue.

The sidewalks, made of concrete with granite curbs, are generally in good condition. Few of the sidewalks have weeds or cracking. There are some street trees, but more could be added.

Most of the crosswalks are highly visible, but some are faded. Most crosswalks have their own curb ramps; a couple of crosswalks share curb ramps. Almost all of the crosswalks extend along the most logical path for pedestrians. The crosswalks are ladder-style, either brick-inlaid or with white bars. There are a few curb extensions. Brighton Avenue has a median.

There are four signalized pedestrian crossings. The pedestrian phases at most of the intersections are adequate. There are countdown signals at three intersections in the study area. Two of the pedestrian phases are exclusive.

There are no bicycle lanes within the study area. The edges of the roadways in the study area generally do not have significant cracks or large pieces of debris, and drainage grates are set back from the roadway. There is no formal bicycle parking in the study area. See Figure 3-2 for information on the pedestrian and bicycle networks.

In the study area, between 2002 and 2006, the police reported only two pedestrian-related crashes, one a fatality, and no bicycle-related crashes. The fatality occurred at the intersection of Brighton and Harvard Avenues. The other reported crash occurred at the intersection of North Beacon and Cambridge Streets and Brighton Avenue (see Figure 3-3). As noted above, it is likely that there were other crashes that were not reported.

The following three sections provide more detail on the bicycling and walking environments. As noted above, the existing conditions are shown in Figure 3-2. Figure 3-4 indicates recommendations.

FIGURE 3-2
Allston – Union Square
Existing Conditions
Legend
Highly visible crosswalk
Very faded crosswalk
Shared curb ramp
Sidewalk in good condition
No street striping
Train station
Train line
School
Playground
Post office
Fire department
Park
Traffic signal
North Beacon St
Cambridge St
Brighton Ave
Harvard Ave
Gardner St
Union Square
Sinclair
Everett St
Hano St
Emery Rd
Craftsman St
Islington St
Higgins St
Allston St
Quint Ave
Parkvale Ave
Linden St
Gordon St
Imrie Rd
Barrows
Ringer Park
Commonwealth Ave
PACKARDS CORNER
HARVARD AVE
WARREN ST
ALLSTON ST
GIGGS ST
PG
PO
90
N
0
0.25 Miles
0
300 Feet

FIGURE 3-3
Union Square, Allston
Crashes in 2002-2006 Involving Pedestrians and Bicyclists

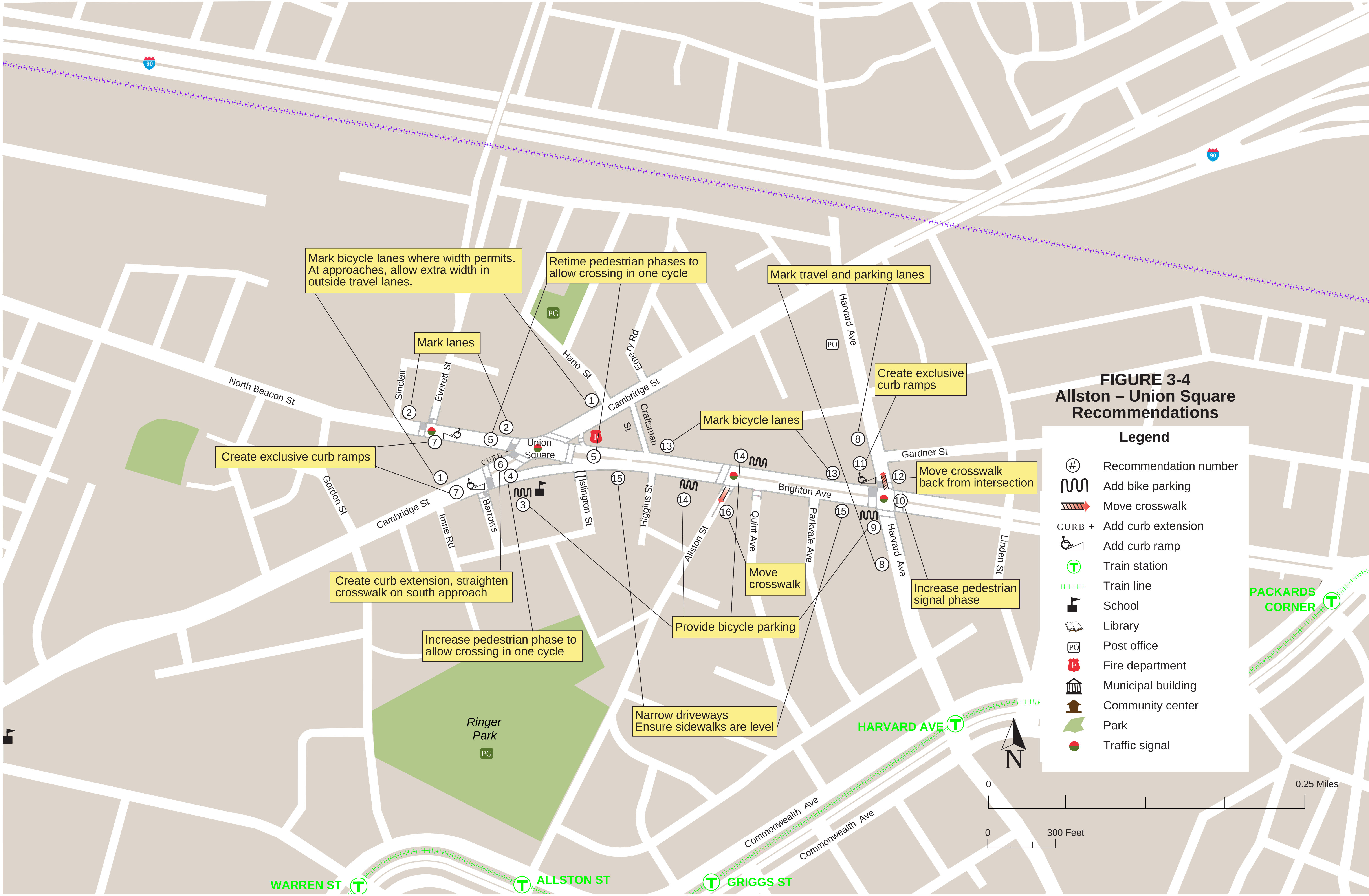
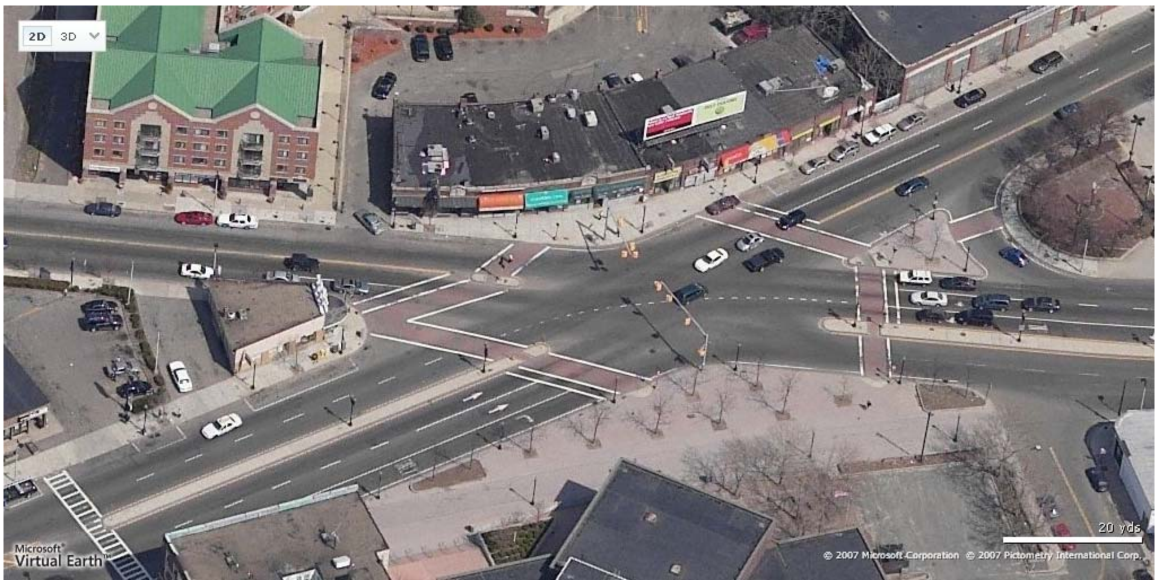


FIGURE 3-4
Allston – Union Square Recommendations

3.2.1 UNION SQUARE AND ENVIRONS

Union Square, the intersection of Cambridge and North Beacon Streets and Brighton Avenue, is a busy intersection in the heart of Allston. Cambridge Street connects to the Massachusetts Turnpike just over a mile to the northeast. Brighton Avenue is a major east–west connector in the area. The primary land use here is commercial. There is a public school located on the south side of the intersection and a fire station in the northeast corner.



Union Square, Allston: The intersection of Cambridge Street with Brighton Avenue on the right and North Beacon Street on the left.

Bicycling

Existing Conditions

Both east and west of Union Square, Cambridge Street, which is 48 to 56 feet wide, consists of a travel lane and a parking lane in each direction. On the north approach, the one travel lane expands to two when the parking lane ends. There are two travel lanes and a parking lane on the other side of the intersection heading southbound, and the two travel lanes narrow to one lane. Approaching from the south, there are three northbound lanes: two through lanes, and a right-turn lane. There are no left turns allowed.

Approaching the Square from the west, North Beacon Street, which is 41 feet wide, changes from one travel lane and one parking lane to two travel lanes. Heading westbound from the Square on North Beacon Street, there is one travel lane and then, after one block, both a travel lane and a parking lane.

Heading westbound on Brighton Street into the intersection, there are two left-turn lanes, a through lane, and an exit for right-turning traffic before the island. Leaving the intersection eastbound, Brighton Avenue consists of two travel lanes and a parking lane.

There are no bicycle lanes or bicycle parking. The edge of the pavement on North Beacon Street is rough.

Recommendations

1. Where Cambridge Street is 48 feet wide and there is a travel lane and a parking lane in each direction, stripe 11-foot travel lanes, 6-foot bicycle lanes, and 7-foot parking lanes. On the northbound approach (Cambridge Street), mark an 11-foot-wide leftmost through lane and right-turn lane, with the remainder for the rightmost through lane. On the southbound approach, mark the inner lane 11 feet wide and the parking lane 7 feet wide, with the remainder for the outer lane.

2. Mark North Beacon Street, where the width is 41 feet, with 7-foot-wide parking lanes and 10-foot-wide travel lanes. This leaves a 3.5-foot-wide marked space between the travel lanes and the parking lanes for bicycles, not wide enough for marked bicycle lanes. Improve the pavement condition, especially along the edges.

3. Install bicycle parking on the southeast corner, by the school, covered if possible.

Walking

Existing Conditions

There are street trees on the south side of the intersection in front of the school, along the fire station on the northeast corner, and on Cambridge Street north of the intersection. There is a brick-paved island with trees and benches on the northeast corner of the intersection.

The crosswalks are ladder-style, inlaid with brick-pattern pressed concrete. They are highly visible and in very good condition. Most of the crosswalks have separate curb ramps. There is a shared curb ramp where the crosswalks on Cambridge and North Beacon Streets meet on the southwest corner. The two crosswalks that meet at Cambridge and Barrows Streets also share a curb ramp. There are no curb extensions.

Union Square has a four-way stoplight with pedestrian-activated crossing signals. There are medians with pedestrian signals in the middle of Brighton Avenue, North Beacon Street, and the south approach of Cambridge Street. The signal has a somewhat concurrent pedestrian phase consisting of (clockwise) an 11-second “Walk” and a 10-second flashing “Don’t Walk” signal across the north approach of Cambridge Street; a 6-second “Walk” and a 15-second flashing “Don’t Walk” signal and a 9-second “Walk” and an 11-second flashing “Don’t Walk” signal across Brighton Avenue; an 11-second

"Walk" and a 10-second flashing "Don't Walk" signal across the south approach of Cambridge Street; and a 7-second "Walk" and a 16-second flashing "Don't Walk" signal and a 10-second "Walk" and a 10-second flashing "Don't Walk" signal across North Beacon Street. The crosswalks, clockwise, are 70, 69 (35 plus 26 with an 8-foot median), 118, and 94 feet long (62 plus 28 with a 4-foot median).

Using a 3.5-foot-per-second standard, the pedestrian phase is adequate for two of the lengths of the crossings, barely adequate for the north side of the intersection (Cambridge Street), and not adequate for the south approach (Cambridge Street) unless pedestrians stop in the middle in the median and wait through a cycle for a new "Walk" signal. Pedestrians are unlikely to do this. The pedestrian phase for the east and west approaches of the intersection are adequate yet undesirable since pedestrians have a "Walk" signal across only half of the street. There they must stop and wait for the next "Walk" signal. Waiting in the middle of the street even with a median can be dangerous, and certainly unpleasant, for pedestrians, as motor vehicles move fast through here.

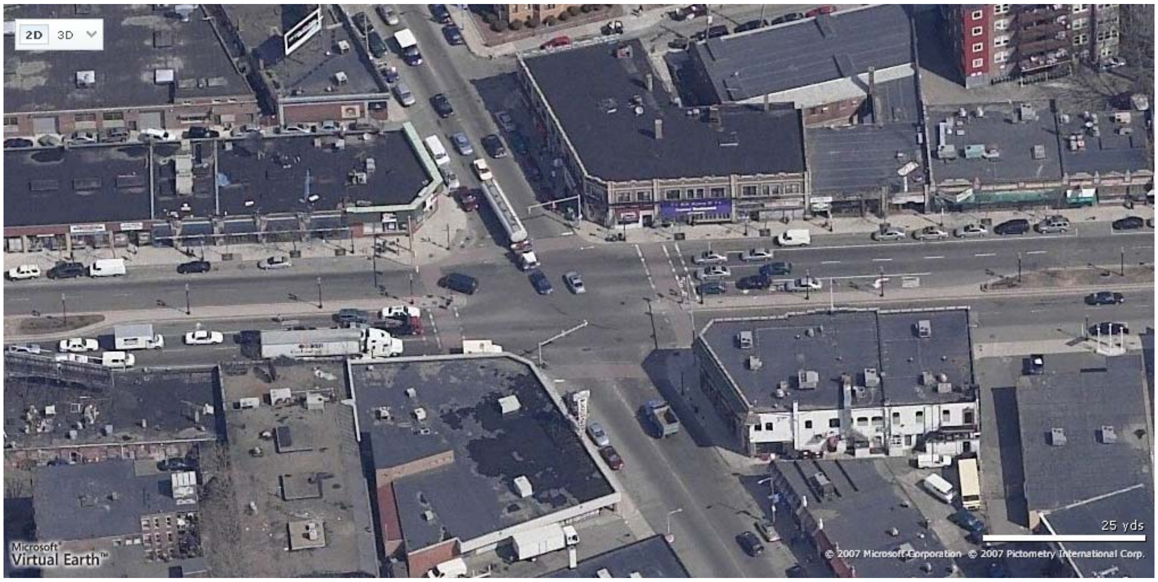
North Beacon and Everett Streets – The intersection has a three-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 6-second "Walk" signal and a 10-second flashing "Don't Walk" signal. The two ladder-style crosswalks are 47 feet across North Beacon Street and 43 feet across Everett Street. Using the 3.5-foot-per-second standard, the pedestrian phase is adequate for the lengths of the crossings.

Recommendations

4. Increase the pedestrian signal phase across Cambridge Street by at least 13 seconds to allow pedestrians to cross the south approach of the intersection in one cycle.
5. Retime the pedestrian phases so that pedestrians crossing North Beacon Street or Brighton Avenue can do so in one phase.
6. Create a curb extension on the east side of the southwest corner, on Cambridge Street, and create curb ramps. This will allow the crossing of North Beacon Street to be straightened and shortened. Likewise straighten the crossing for the south approach, across Cambridge Street, thereby shortening it. This also will decrease slightly the time required for the pedestrian phases.
7. Create exclusive curb ramps for the crosswalks at Cambridge and Barrows Streets and at North Beacon and Everett Streets.

3.2.2 Intersection of Harvard and Brighton Avenues

Harvard Avenue is a major north–south route in this area. Its name changes to Harvard Street in Brookline, where it goes through Coolidge Corner to Brookline Village, another urban center discussed in this study (see Chapter 4). Brighton Avenue extends from where Commonwealth Avenue turns southward, at Packards Corner, about a mile east of the study area, to North Beacon Street. The primary land use at this intersection is commercial.



Harvard and Brighton Avenues, looking north.

Bicycling

Existing Conditions

Both Brighton and Harvard Avenues are two-way streets, with parking on both sides. Brighton Avenue generally has two travel lanes in each direction, Harvard Avenue one. The lanes are marked on Brighton Avenue. There is only a centerline marked on the 43-foot wide Harvard Avenue. For all four approaches of the intersection, the parking lanes end before the intersection, allowing another lane of traffic to form. On the Brighton Avenue eastbound approach, there are two through lanes and a right-turn lane. On the westbound approach of Brighton Avenue, there are two through lanes, a left-turn lane cut into the median, and, after the parking lane ends, an unmarked lane that functions as a right-turn lane. For both the southbound and northbound approaches of Harvard Avenue, there is one travel lane in each direction, plus a second approach lane near the intersection, due to the elimination of parking near the intersection.

Traveling outbound from the intersection, there is one travel lane and one parking lane for both northbound and southbound Harvard Avenue, and, for Brighton Avenue, two travel lanes and a parking lane. A median separates the travel lanes on Brighton Avenue, and striping demarcates the lanes as they approach the intersection. There is a single white center line on Harvard Avenue. There are no lane markings for parking. The roadway surfaces are mostly smooth, with no major impediments. The roadway edge is generally clear of obstructions that would decrease the safety of bicyclists.

There is no bicycle parking in the area.

Recommendations

8. On Harvard Avenue, mark 7-foot parking lanes and 10-foot travel lanes, leaving a 4.5-feet-wide space for bicycles, too narrow to be marked as a bicycle lane.

9. Provide bicycle parking, preferably under cover, as close to the commercial area as possible. One option would be to remove the parking spot located immediately before a crosswalk and place bicycle parking there. This also would provide the benefit of a curb extension, increasing the visibility of pedestrians in the crosswalk.

Walking

Existing Conditions

There are parallel-bar crosswalks inlaid with brick-pattern pressed concrete at all approaches of the intersection. All the curb ramps are separate except for a shared one on the northwest corner.

The intersection has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 7-second "Walk" signal and a 12-second flashing "Don't Walk" signal. There are medians with push buttons halfway across Brighton Avenue on the east and west approaches of the intersection. Clockwise, the crosswalks are 67, 74, 56, and 74 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is not adequate.

There are street trees on Brighton Avenue, but not on Harvard Avenue.

Recommendations

10. Increase the pedestrian signal phase by at least three seconds.

11. Construct separate curb ramps for the crosswalks on the northwest corner of the intersection.

12. Move the crosswalk further north on the north approach. This will shorten the distance for crossing pedestrians and also require motorists to look for pedestrians before entering the intersection. Although there is a "No Right Turn on Red" sign, field observations indicate that it is not always obeyed. Move the stop lines further back from the crosswalks.

3.2.3 BRIGHTON AVENUE BETWEEN UNION SQUARE AND HARVARD AVENUE

Brighton Avenue is a major arterial connector between Allston and points east and west. This area is primarily commercial, consisting of storefronts, a strip development, and a fast-food establishment.

Bicycling

Existing Conditions

Brighton Avenue consists of two travel lanes and one parking lane in each direction and a wide, sometimes planted median. The width on each side of the median is approximately 32 feet, accommodating two travel lanes and a parking lane.

There is no bicycle parking along this corridor.

Recommendations

13. Given a 32-foot width on each side of the median, mark a 7-foot parking lane, a 5-foot bicycle lane, and two 10-foot travel lanes.

14. Provide bicycle parking, preferably covered, as close to commercial areas as possible. One option would be in the commercial parking lots, if the owners were amenable to installing them. Another option is to place parking adjacent to trees on the sidewalks, in areas that would not interfere with pedestrians.

Walking

Existing Conditions

Close to the intersection of Brighton and Harvard Avenues, storefronts line the sidewalks on both sides of the street, helping to create a pleasant walking environment. Further west, commercial driveways cross the sidewalk. For example, there is a strip development on the north side, with parking in front and two wide driveways. There is a fast-food restaurant on the south side, with two driveways on Brighton Avenue. The sidewalks generally slope down to the level of the intersecting driveways.

There are trees on the south side of Brighton Avenue and vegetation along the median strip.

The Brighton Avenue and Allston Street intersection has a three-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase with a countdown signal. There are crosswalks on the west and south approaches. The crosswalks on the southwest corner share a curb ramp.

Recommendations

15. Narrow the intersecting driveways wherever possible both to reduce the crossing distance for pedestrians and to slow the entering and exiting motor vehicles. Ensure that sidewalks are level and not sloping down for driveways.

16. Move the crosswalk that crosses Allston Street further back from the street, create separate curb ramps, and increase the distance between the crosswalk and the stop line.

4 Brookline

The first section of this chapter provides a profile of the town. The second section describes existing bicycling and walking conditions in the study area and recommendations for improvements. The study area, Brookline Village and its environs, is located in the east central portion of the town. The findings are based on meetings and correspondence with local staff, fieldwork, and a review of previous studies.

The town's Ad Hoc Sidewalk Committee released a report in June 2001. It prioritizes which roadways should qualify for the construction of new sidewalks and provides information about financing, construction standards, and safety. The report recommends that the Town budget $100,000 per year for sidewalk construction along priority roadways. The *Gateway East Public Realm Plan*, October 2006, was issued by the Gateway East Citizens' Advisory Committee and two Town of Brookline departments: Planning and Community Development, and Economic Development. That report describes possible improvements for the area between Brookline Village and a new development to the east. The report *Restoring Emerald Necklace Greenway Paths: Netherlands Road to Route 9,* Muddy River Design Group, April 2007, recommends improvements at the Route 9/Jamaicaway crossing and environs.

4.1 COMMUNITY PROFILE

Included in this chapter are a short history of Brookline, a general description of land use, population, and employment data, an overview of the transportation network, and crash data.

4.1.1 HISTORY

Brookline is a vibrant community surrounded by the Boston neighborhoods of Allston-Brighton on the north, Jamaica Plain on the south, and the City of Newton on the west. Incorporated in 1705 as an agricultural hamlet between the Charles River and the Muddy River, today the 6.6-square-mile town is a dynamic community of more than 57,000 residents attracted to its mix of urban and suburban living—from more densely developed apartments to large estates, commercial and retail activities, and many opportunities for recreation. Names of streets and districts like Boylston, Aspinwall, Winchester, and Heath speak to the town's place in the region's evolution. Its most prominent centers include Brookline Village, Coolidge Corner, and Washington Square. The town's historically Brahmin roots contrast with its current diversity; students who attend its nationally renowned public high school hail from more than 50 countries.

4.1.2 LAND USE

Brookline Village, located along Route 9, retains the feeling of a traditional village, with shops, restaurants, and cafes dotting the eclectic area. Thickly settled residential streets emanate from the commercial center into tightly knit neighborhoods.

4.1.3 POPULATION AND EMPLOYMENT

Of the six study area communities, Brookline is the third most populated. As shown in Table 4-1, there were 57,186 residents in 2000, which is a 4.3 percent increase from 1990. The Metropolitan Area Planning Council (MAPC) projects that Brookline's population will grow to 61,962 residents by 2030, representing an 8.4 percent increase from 2000. MAPC projects Brookline's employment, recorded at 18,939 in 2000, to decrease by 1.8 percent by 2030.

TABLE 4-1
Population and Employment in Brookline in 2000, 2010, 2020 and 2030

Census Data	2000	2010	Change 2000 to 2010	2020	Change 2010 to 2020	2030	Change 2020 to 2030
Population	57,186	58,790	2.7%	60,518	2.9%	61,962	2.3%
Employment	18,939	18,798	-0.7%	18,675	-0.7%	18,604	-0.4%

4.1.4 TRANSPORTATION

Major east–west roadways providing access to Brookline include State Route 30, which forms the town's northern boundary with the City of Boston; Beacon Street, which passes through Coolidge Corner; and State Route 9, the southern border of the study area. Brookline Avenue provides access to Brookline Village from the east, as does the Jamaicaway, which runs along the Muddy River.

All three branches of the MBTA's Green Line serve Brookline. The B Branch runs on Commonwealth Avenue and the C Branch runs on Beacon Street. The D Branch and MBTA bus Routes 60, 65 and 66 serve Brookline Village.

4.1.5 CRASH DATA

Table 4-2 presents data on reported crashes in Brookline for the years 2002-2006. During these five years, there were 142 reported crashes involving pedestrians—4.8 percent of all crashes—resulting in two fatalities. There were 68 reported crashes involving bicyclists—2.3 percent of all crashes—resulting in 1 fatality. Crashes involving bicyclists and pedestrians represented 7.1 percent of all crashes, yet 75 percent of the fatalities.

TABLE 4-2
Bicycle, Pedestrian, Motor-Vehicle, and Total Crashes and Fatalities in Brookline, by Number and Percentage, 2002–2006

Mode	**Crashes**		**Fatalities**	
	Number	**Percentage**	**Number**	**Percentage**
Bicycle (bike)	68	2.3%	1	25.0%
Pedestrian (ped)	142	4.8%	2	50.0%
Motor vehicles (MV) only	2765	92.9%	1	25.0%
All crashes (bike, ped, & MV)	2975	100%	4	100%

Figure 4-1 shows all bicycle and pedestrian crashes throughout the town for the five years reported here. As noted in Chapter 1, some crashes may not have been reported.

4.2 STUDY AREA

The first part of this section of the chapter defines the study area and gives an overview of transit service and walking and bicycling conditions. Subsequent sections give more details on different parts of the study area. Those sections describe existing conditions for bicycling and walking, and then list recommendations for improving them.

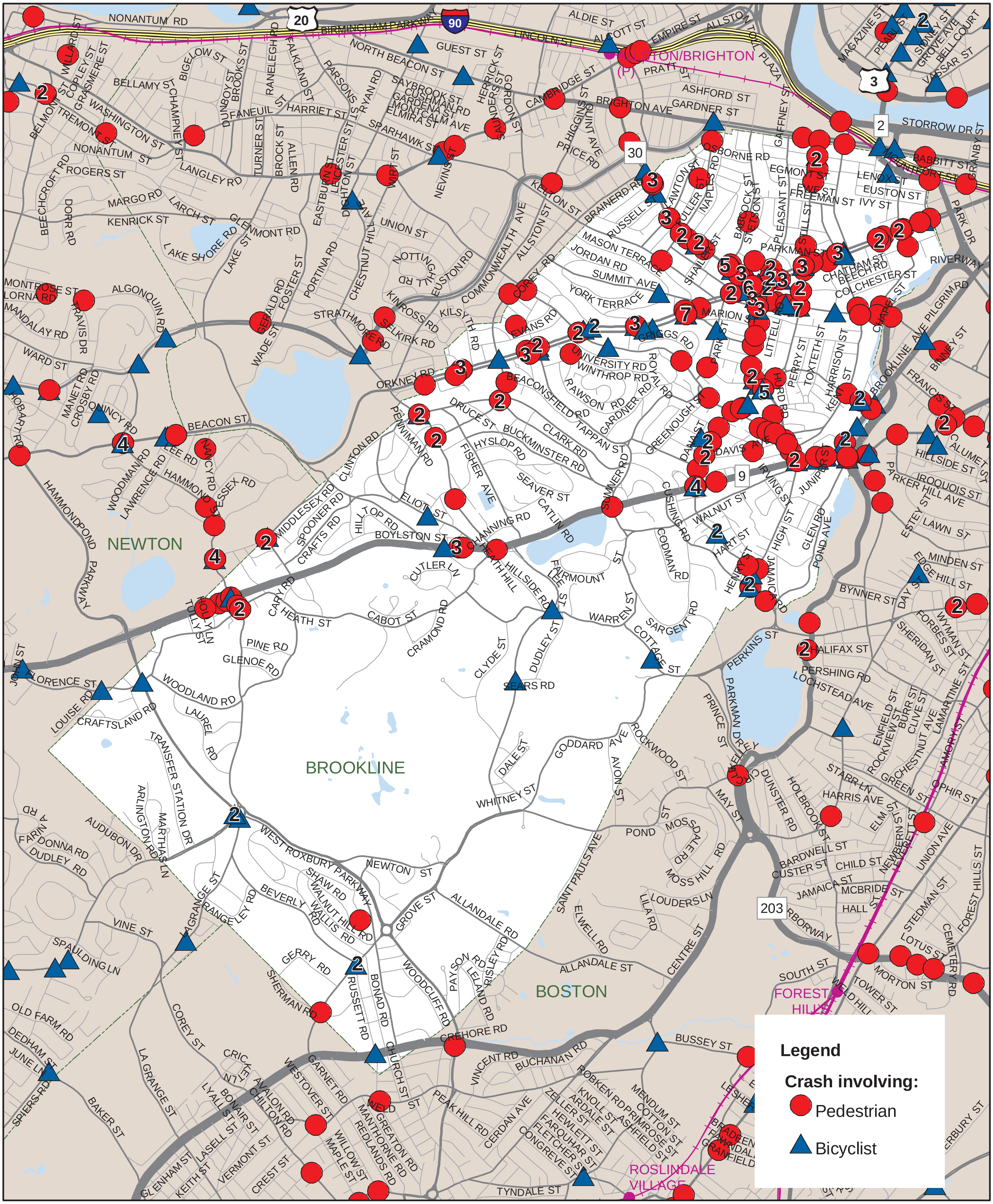
The study area for Brookline Village (shown in Figure 4-2) includes:

- Harvard Street from Washington Street to Aspinwall Avenue/School Street
- Kent Street from Harvard Street to Aspinwall Avenue, Aspinwall Avenue from Kent Street to Brookline Avenue, Linden Street from Harvard Street to Kent Street, and Station Street from the MBTA station to Kent Street
- The Muddy River Path/Emerald Necklace from Routes 1 and 9 to Aspinwall Avenue

The MBTA's Green Line D Branch stops at Brookline Village Station on Station Street. The frequency of service is every five minutes during peak periods, every 10 minutes during the rest of the day and evening, and every 13 minutes late at night. Four buses serve the study area: Route 39, connecting Forest Hills and Back Bay station; Route 60, connecting Kenmore Station and Chestnut Hill; Route 65, connecting Brighton Center and Kenmore Station; and Route 66, connecting Harvard Square and Dudley Station. For each of these routes, buses arrive between 2 and 10 times an hour throughout the day.

Figure 4-2 indicates existing pedestrian and bicycle conditions. Sidewalks, made of concrete with granite curbs, are generally in good condition. Few have weeds or are cracked. Most have street trees, and many front yards have large trees that provide shade along the street.

FIGURE 4-1
Brookline: Crashes in 2002-2006 Involving Pedestrians and Bicyclists



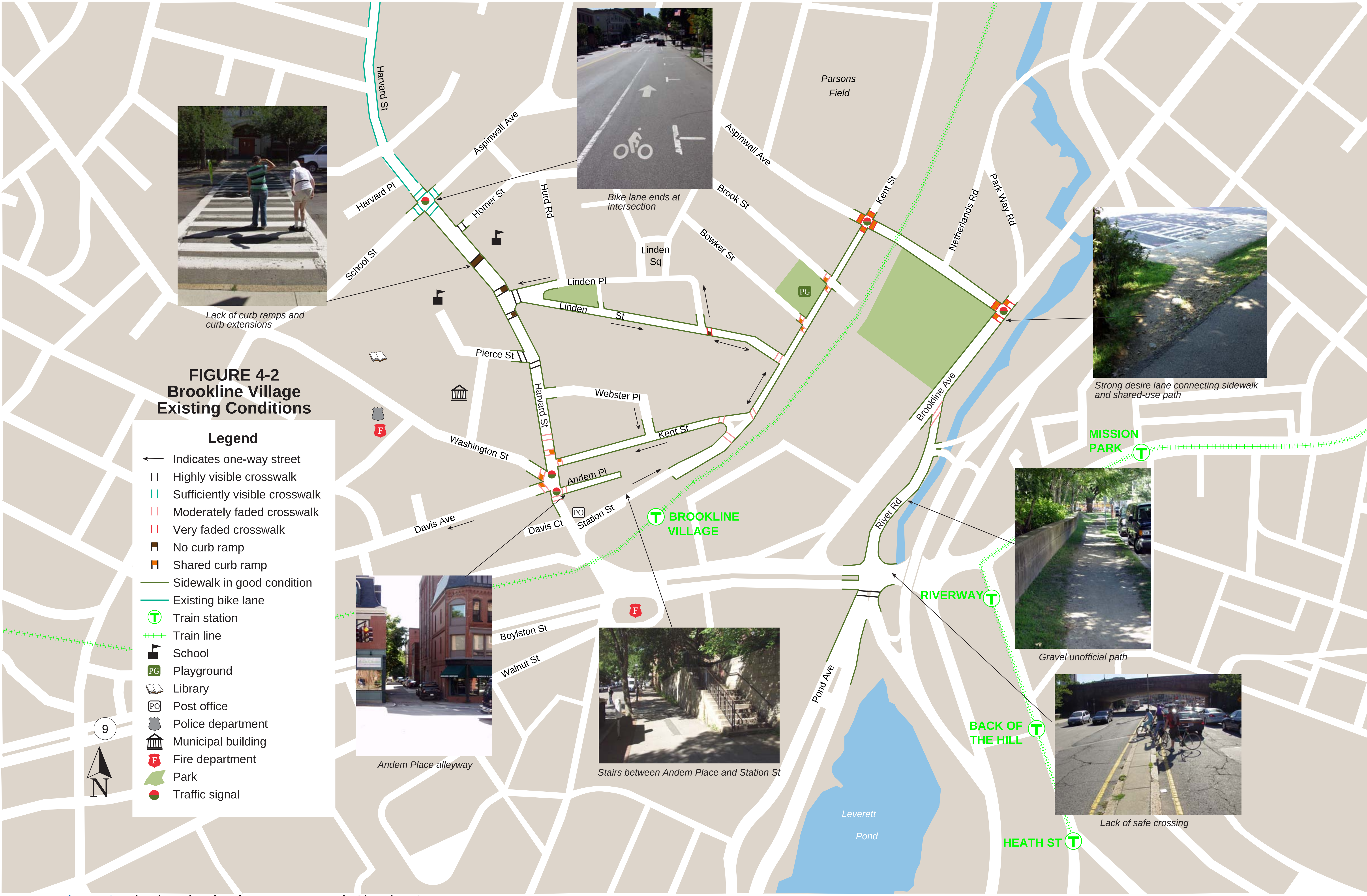


FIGURE 4-2
Brookline Village
Existing Conditions

Many pairs of crosswalks share curb ramps. Some crosswalks have no curb ramps. At least a few crosswalks should be added, particularly for the Route 9 crossing of the Muddy River Path. Most crosswalks extend along the most logical path for pedestrians. Most of the crosswalks are ladder-style, with white or yellow bars. Some are parallel bar-style. There are few curb extensions. A median exists at the Route 9 crossing of the Muddy River Path, but it is not adequate for the volume of people crossing this busy roadway. There is also a median in Harvard Street between Station Street and Davis Avenue.

There are several signalized pedestrian crossings, none with countdown signals. The pedestrian phases at some of the intersections are adequate, others too short. Most of the pedestrian phases are exclusive.

Bicyclists entering the study area do so primarily from Harvard Street from the north, Davis Avenue from the west, Walnut Street from the southwest, and the Muddy River Path from the east. There are no continuous on-street connections that adequately accommodate bicyclists. The Gateway East plan recommends improving the connections between the Emerald Necklace and the MBTA station.

While there are no bicycle lanes within the study area, there are some extending north on Harvard Street from its intersection with Aspinwall Avenue/School Street. Although there is on-street parking on both sides of Harvard Street, it is wide enough to accommodate the continuation of these bicycle lanes to Washington Street. And while there is parking on Kent Street, the low motor-vehicle volumes render bicycling relatively comfortable.

The roadways all have two travel lanes, except for Kent Street, which is one-way westbound from Station Street to Harvard Street, and Station Street, which runs one-way eastbound. The edges of the roadway generally do not have significant cracks or large pieces of debris, and drainage grates are set back from the roadway.

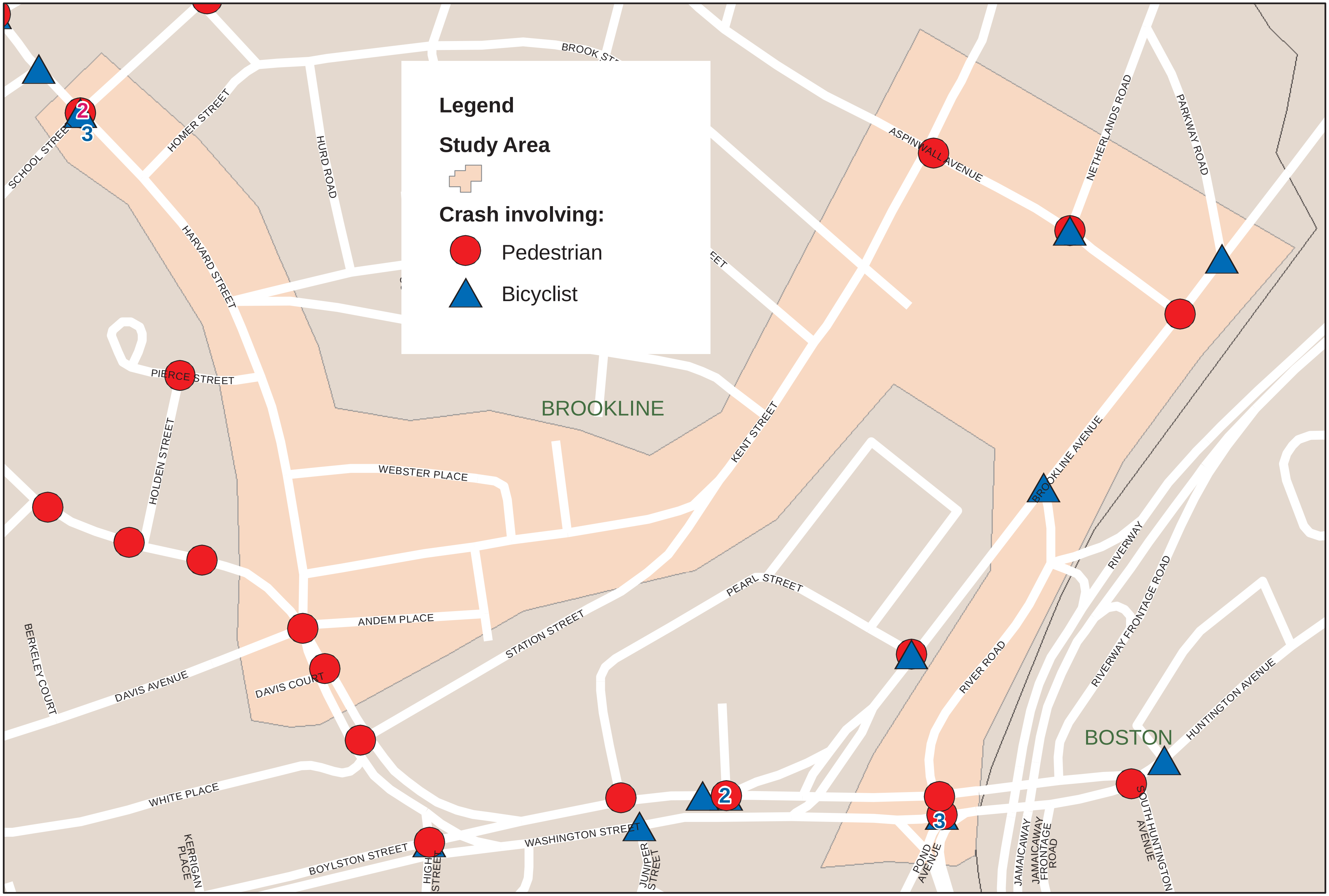
There are 10 parking spaces for bicycles at Brookline Village Station. No cover is provided.

Figure 4-3 indicates the location of crashes in the Brookline Village study area that involved pedestrians and bicyclists. Between 2002 and 2006, there were nine pedestrian-related crashes, as well as nine bicycle-related crashes. None of these were fatal.

There were three locations where multiple crashes occurred:

- Harvard Street at School Street/Aspinwall Avenue—three bicycle, two pedestrian
- Boylston Street (Route 9) at River Road/Pond Avenue—three bicycle, two pedestrian
- Aspinwall Avenue at Netherlands Road—one bicycle, one pedestrian

FIGURE 4-3
Brookline Village
Crashes in 2002-2006 Involving Pedestrians and Bicyclists



The following three sections provide more detail on the bicycling and walking environments. As noted above, the existing conditions are shown in Figure 4-2. Figure 4-4 indicates recommendations.

4.2.1 Harvard Street: Washington Street to Aspinwall Avenue

Harvard Street is a key north–south roadway that connects Brookline Village with the Allston/Brighton neighborhood of Boston to the north. Within the study area, Harvard Street connects Washington Street with a commercial area to the north at the intersection of Aspinwall Avenue/School Street. Commercial and institutional buildings include the Pierce Elementary School, St. Mary of the Assumption School, and Brookline Town Hall.

Bicycling

Existing Conditions

Harvard Street is a two-way roadway, approximately 47 feet wide, with two travel lanes and parking on both sides. The only lane marking is a double yellow centerline. The roadway surface is mostly smooth, with no major impediments. The roadway edge is generally clear of obstructions. There is no bicycle parking along this corridor.

Bicyclist on Harvard Street.

Recommendations

1. The roadway is approximately 47 feet wide from School Street/Aspinwall Avenue south, adequate for adding bicycle lanes. Extend the bicycle lanes on both sides of Harvard Street to Washington Street. Travel lanes could be 11 feet wide in each direction, with 5.5-foot-wide bicycle lanes, and the remainder of the roadway, approximately 7 feet wide on each side of the road, could be used for parking.
2. Install bicycle parking at various locations along the corridor, under cover when possible.

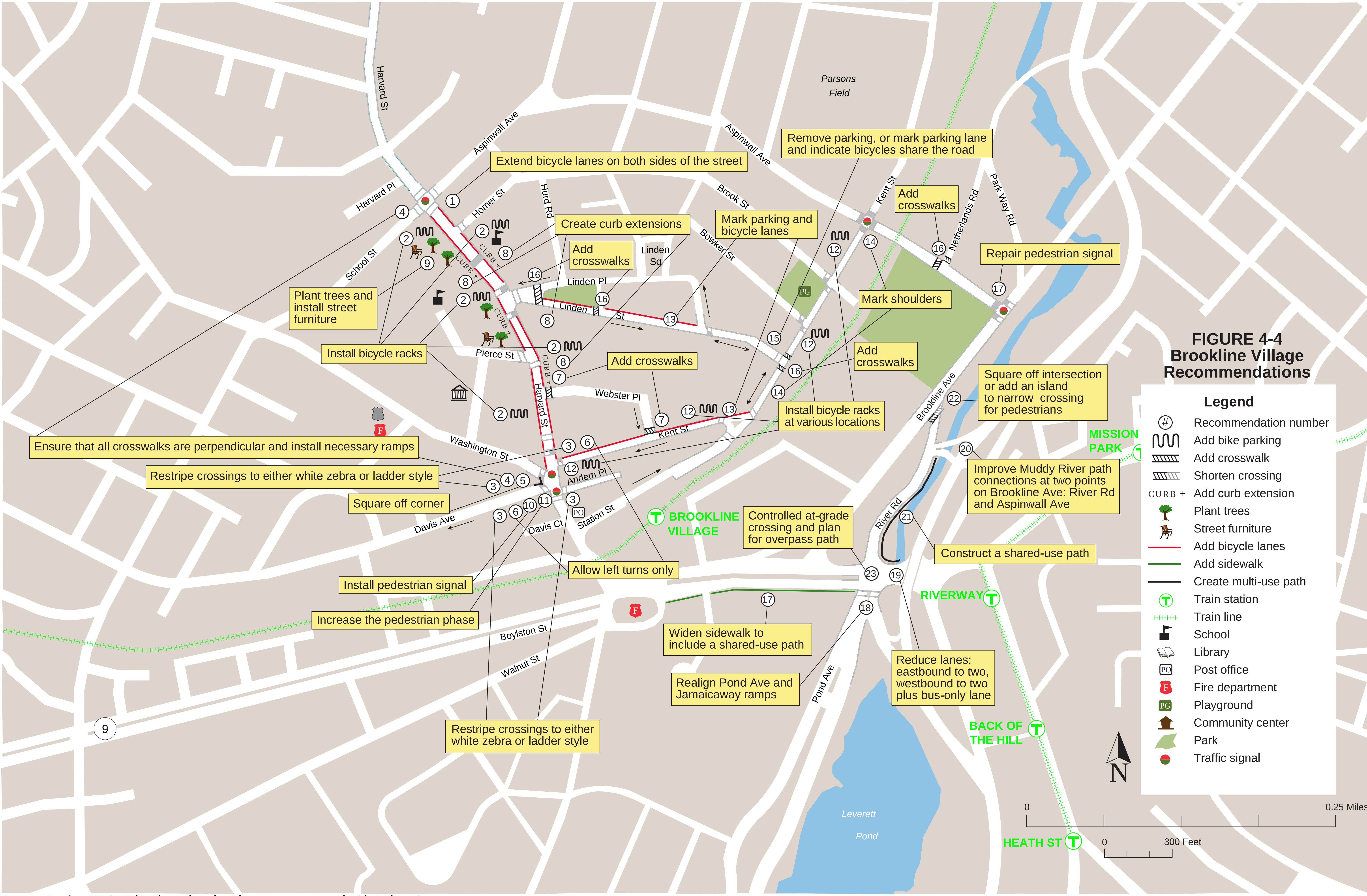


FIGURE 4-4
Brookline Village
Recommendations
Legend
Recommendation number
Add bike parking
Add crosswalk
Shorten crossing
CURB + Add curb extension
Plant trees
Street furniture
Add bicycle lanes
Add sidewalk
Create multi-use path
Train station
Train line
School
Library
Post office
Fire department
Playground
Community center
Park
Traffic signal
Extend bicycle lanes on both sides of the street
Create curb extensions
Add crosswalks
Mark parking and bicycle lanes
Remove parking, or mark parking lane and indicate bicycles share the road
Add crosswalks
Repair pedestrian signal
Mark shoulders
Plant trees and install street furniture
Install bicycle racks
Add crosswalks
Add crosswalks
Square off intersection or add an island to narrow crossing for pedestrians
Install bicycle racks at various locations
Ensure that all crosswalks are perpendicular and install necessary ramps
Restripe crossings to either white zebra or ladder style
Square off corner
Improve Muddy River path connections at two points on Brookline Ave: River Rd and Aspinwall Ave
Controlled at-grade crossing and plan for overpass path
Construct a shared-use path
Allow left turns only
Install pedestrian signal
Increase the pedestrian phase
Widen sidewalk to include a shared-use path
Realign Pond Ave and Jamaicaway ramps
Reduce lanes: eastbound to two, westbound to two plus bus-only lane
Restripe crossings to either white zebra or ladder style
BROOKLINE VILLAGE
MISSION PARK
RIVERWAY
BACK OF THE HILL
HEATH ST
Parsons Field
Leverett Pond
Harvard St
Aspinwall Ave
Harvard Pl
Homer St
Hurd Rd
School St
Linden Pl
Linden Sq
Linden St
Brook St
Bowker St
Kent St
Netherlands Rd
Park Way Rd
Pierce St
Webster Pl
Washington St
Andem Pl
Davis Ave
Davis Ct
Station St
Brookline Ave
River Rd
Boylston St
Walnut St
Pond Ave
0 0.25 Miles
0 300 Feet
N

Walking

Existing Conditions

The sidewalks, greater than five feet wide on both sides, are concrete and brick with granite curbs in the area of Harvard and Washington Streets, and concrete with granite curbs elsewhere. The surface is smooth and free of significant bumps or cracks. There are street trees along both sides of Harvard Street, except on the west side between Pierce and School Streets.

There are several crosswalks, many of which either have no curb ramp or share one with an adjacent crosswalk. There are curb ramps at Webster Place but no crosswalk. Most of the crosswalks in the corridor are white parallel bars with yellow or white stripes. The crosswalks at Harvard Street and Aspinwall Avenue/School Street are bar style. There are a few curb extensions.

The intersection of Harvard Street and Aspinwall Avenue/School Street has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 5-second “Walk” signal and a 14-second flashing “Don’t Walk” signal. There are bar-style crosswalks on each side of the intersection. Clockwise from the north, they are 49, 34, 48, and 44 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is adequate.

The heart of Brookline Village, formally named Harvard Square but not popularly known as such, is described below as two intersections, Harvard Street at Kent Street, and Harvard/ Washington/Davis Avenue/Andem Place.

The intersection of Harvard and Kent Streets has a three-way stoplight with automatic crossing signals. The signal has a concurrent pedestrian phase consisting of (clockwise from the north) an 11-second “Walk” signal and a 7-second flashing “Don’t Walk” signal, a 37-second “Walk” signal and a 7-second flashing “Don’t Walk” signal, and a 5-second “Walk” signal and an 11-second flashing “Don’t Walk” signal. There are crosswalks across each side of the intersection, all ladder style. Clockwise, they are 47, 29, and 48 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is adequate.

The intersection of Harvard Street, Washington Street, Davis Avenue and Andem Place has a three-way stoplight with automatic crossing signals. The signal has a concurrent pedestrian phase consisting of (clockwise) a 29-second “Walk” signal and a 10-second flashing “Don’t Walk” signal, and a 4-second “Walk” signal and an 11-second flashing “Don’t Walk” signal. There is no pedestrian signal for crossing Davis Avenue. Using a 3.5-foot-per-second standard, the pedestrian phase is adequate for the north approach, but not for the south. There are ladder-style crosswalks across each side of the intersection. Clockwise from the north, they are 54, 59, and 42 feet long.

Recommendations

3. Restripe the crosswalks to either white zebra-style or ladder-style.
4. Ensure that all crosswalks are perpendicular to the connecting sidewalks and install necessary curb ramps.
5. Square off the northwest corner of Davis Avenue and Washington Street to provide a safer crossing for pedestrians.
6. Consider allowing motor vehicles to make only right turns from Kent Street to Harvard Street and from Davis Avenue to Washington Street. These movements could be allowed as right turns on red, eliminating the signal phases now allowed for the relatively low volumes of left-turning vehicles. This will decrease significantly the wait times for pedestrians. For the longer term, determine whether a roundabout is possible and, if so, preferred.
7. Create a crosswalk across Webster Place.
8. Construct a curb extension at the following locations:
   - On the east side of Harvard Street for the crosswalk south of Pierce Street
   - On the west side of Harvard Street for the crosswalk south of Linden Place
   - On each side of Harvard Street for the mid-block crosswalk in front of St. Mary of the Assumption School
9. Plant street trees along the west side of Harvard Street between Pierce and School Streets.
10. Install pedestrian signals across Davis Avenue at its intersection with Washington Street.
11. Increase the pedestrian phase for the crosswalk across the south side of the intersection of Washington and Harvard Streets.

4.2.2 Kent, Linden, and Station Streets, and Aspinwall Avenue

Kent Street connects Harvard Street and the Brookline Village MBTA station to high-density residential areas to the northeast. The discussion in this section also includes Aspinwall Avenue between Kent Street and Brookline Avenue, Linden Street between Harvard and Kent Streets, and Station Street between the MBTA station and Kent Street.

Bicycling

Existing Conditions

Kent Street, which is 27-feet wide, is a two-way street north of Station Street, and one-way westbound between Station and Harvard Streets. There is parking on the south side of the one-way portion. Linden Street, also 27-feet wide, is one-way eastbound from Harvard Street and then becomes two-way. There is parking on the south side of Linden Street and on both sides of Aspinwall Avenue, which is 34 feet wide.

There is no line demarcating the parking lane on any of the streets discussed in this section. A double yellow line separates the travel lanes on Aspinwall Avenue. The roadway surfaces are mostly smooth, with no major impediments. The roadway edges are generally clear of obstructions.

There is no bicycle parking along this corridor.

Recommendations

12. Install bicycle racks at various locations, under cover where possible.
13. On the one-way portion of Kent Street, and the one-way portion of Linden Street, mark an 8-foot-wide parking lane and a 12-foot-wide travel lane on the south side, and, on the north side, mark a 7-foot bicycle lane. If more parking is desired, consider changing the parallel parking to back-in angle parking. Assuming 12 feet for the parking, install a 5-foot bicycle lane adjacent to the sidewalk, and a 10-foot travel lane between the bicycle lane and the parking. Alternatively, consider widening sidewalks on one or both sides, reducing the travel lane to 10 or 11 feet, with a five-foot bicycle lane.
14. On the two-way portion of Kent Street, mark two 10-foot travel lanes and two 3.5-foot shoulders.
15. On the two-way portion of Linden Street, consider eliminating the parking. This would allow two 10-foot travel lanes and two 3.5-foot shoulders. Otherwise, mark a 6-foot parking lane, an 11-foot eastbound lane, and a 10-foot westbound lane. Indicate by signage that bicycles share the road.

Walking

Existing Conditions

Sidewalks on both sides, made of concrete with granite curbs, are greater than five feet wide. The surfaces are generally smooth and free of significant bumps or cracks. While there is no vegetation buffer between the sidewalk and the roadway, there are some street trees and many front yards with large trees that provide shade. In general, the sidewalk along the street slopes down to the level of intersecting driveways.

All of the crosswalks in this area are ladder-style. Several share a curb ramp with an adjacent crosswalk.

The intersection of Kent Street and Aspinwall Avenue has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 7-second “Walk” and a 7-second flashing “Don’t Walk” signal. There are zebra-style crosswalks on each approach of the intersection. Clockwise from the north, they are 27, 34, 27, and 34 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is adequate.

The intersection of Brookline Avenue and Aspinwall Avenue has a three-way traffic light with pedestrian-activated signals. There is a concurrent pedestrian phase consisting of a 4-second “Walk” and a 12-second flashing “Don’t Walk” signal. There are ladder-style crosswalks on each approach to the intersection. Clockwise from the north, they are 57, 56, and 49 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is just barely adequate. One of the pedestrian signal pushbuttons located on the north corner does not work.

Recommendations

16. Create crosswalks at the following locations:

- Across Linden Place and Linden Street, connecting to the sidewalk that crosses the park
- Across Linden Place at Linden Street
- Across the north and west approaches to the intersection of Netherlands Road and Aspinwall Avenue
- Across Linden Street at Netherlands Road

17. At the intersection of Aspinwall and Brookline Avenues, fix the broken pedestrian signal situated in the north corner.

4.2.3 THE MUDDY RIVER PATH/EMERALD NECKLACE: ROUTE 9 TO ASPINWALL AVENUE

This section discusses the Muddy River Path/Emerald Necklace crossing of Route 9 and environs. Route 9 consists of three travel lanes in each direction in this area. There is a cut in the median of Route 9, but it provides little refuge for the high volumes of bicyclists and pedestrians crossing here. There is no marked crosswalk.

The Town’s Gateway East Public Realm Plan from October 2006, discussed below, provides alternative realignments of Pond Avenue and the on- and off-ramps to the Riverway. Besides improving this crossing, the report suggests that connections be created or strengthened between Route 9 and Brookline Village; along Route 9 to Washington Street; and along the path to Brookline Avenue.

Evaluation of Options for the Crossing of Route 9

Option 1 – Create a nonsignalized, at-grade crossing with a refuge island/median planted with vegetation, as shown in the Gateway East Public Realm Plan (see Figure 4-5 below, taken from the Plan).

- Advantages:
  - A wide refuge island/median provides a protected place for pedestrians and bicyclists.
  - As stated in the Gateway East Public Realm Plan, the installation of “Special paving, in-pavement lighting for strong visual cues for drivers” would alert drivers to the presence of pedestrians and bicyclists; flashing pedestrian

crossing signs—overhead and/or to the sides in advance of the crossing—would further strengthen these cues.

- Challenges:
  - Motorists may not stop for pedestrians/bicyclists in the crosswalk.
  - Vegetation should be low so that pedestrians are visible not only in the median but also approaching it.
  - To counter queued traffic from nearby signals blocking the crosswalk, a box surrounding the crosswalk should be clearly marked with prominent signs stating "Do Not Block the Box."

Figure 4-5: Alignment of Pond Avenue, Riverway On- and Off-Ramps, and the Crossing of Route 9

Source: Brookline's Gateway East Public Realm Plan (2006), p. 4.

Option 2 – Create a signalized, at-grade crossing with a refuge island/median with plantings (same as option above, with a traffic signal added).

- Advantages:
  - Provides an improved crossing for pedestrians and bicyclists across Route 9.
  - Wide refuge island/median provides a protected place for pedestrians and bicyclists to evaluate when it is safe to cross the next set of lanes.
  - Motorists must stop for pedestrians/bicyclists in the crosswalk.

- Challenges:
    - Timing would need to be well coordinated with the Route 9-Brookline Avenue signal as well as Boston's Huntington Avenue-South Huntington Avenue signal.
    - The existing bridge reduces the sight lines for the signal; the signal would need to be carefully situated for maximum visibility. "Signal Ahead" signs should be installed for motorists approaching the crossing from Boston. This sign could be automated so that a sign saying "Red" lights up when the crossing signal is red.
    - Same as last two challenges for Option 1, regarding vegetation and queued traffic blocking the crossing.

Option 3 – Construct a pedestrian/bicyclist footbridge, separated from but adjacent to the west side of the Jamaicaway Bridge, in line with the report *Restoring Emerald Necklace Greenway Paths: Netherlands Road to Route 9.*

- Advantages:
    - Would allow many path users to avoid interactions with motorists on Route 9.
    - Allows bicyclists, skaters and joggers to maintain speed.

- Challenges:
    - The at-grade crossing would need to be improved anyway, for those who would not choose to use the footbridge.
    - Many pedestrians, and wheelchair users in particular, would view the bridge as more onerous and physically demanding than crossing at grade.
    - On the north side of the crossing, the footbridge would connect to a boardwalk on the Boston side of the Muddy River.
    - The footbridge would obscure views of the bridge.
    - The state's Department of Conservation and Recreation (DCR) and the City of Boston would need to be actively involved in a redesign.

Recommendations

18. Improve the area in line with the Gateway East Public Realm Plan, which states:

- Realign Pond Avenue and the on- and off-ramps to the Jamaicaway
- Hire a designer to investigate alternative approaches to addressing the issues at this crossing and alternative approaches to River Road's configuration for pedestrian and bicycle access
- Improve access for Emerald Necklace pedestrians and cyclists
    - Create a direct connection to Route 9 crossing.
    - Improve the geometry to make narrower crossings, which allow a more comfortable connection for bicyclists and pedestrians.
    - Relocate the Riverway access point to allow a more comfortable transition between that roadway crossing and a second crossing at Washington Street for bicyclists and pedestrians.
- Narrow the lanes and reduce corner radii where possible to reduce unnecessary pavement.
- Widen the sidewalks.

19. As shown in the Gateway East Public Realm Plan, reduce the eastbound roadway to two lanes and reduce the westbound side to three defined lanes between the Jamaicaway bridge and the Route 9-Brookline Avenue intersection. In line with the report *Restoring Emerald Necklace Greenway Paths: Netherlands Road to Route 9,* the westbound lane closest to the sidewalk could be a bus-only lane.

20. Improve the connections between the Muddy River Path and Brookline Avenue, particularly at the intersections of Brookline Avenue with Aspinwall Avenue and with River Road. There are “desire lines” from the path to these intersections, indicating existing use. These areas need to be paved for increased safety and accessibility.

21. Construct a paved shared-use path on the east side of River Road from Route 9 north to the on- and off-ramps to the Riverway. There are desire lines already there.

The dirt path along River Road, looking southward.

22. Square off the intersection of River Road and Brookline Avenue, or add an island. This will cause traffic to move more slowly, and will shorten the extremely long crossing for pedestrians.

Long crosswalk on River Road at Brookline Avenue.

23. Recommended Option for the Route 9 Crossing – Option 2

- Bicyclists and pedestrians wishing to access Brookline Village and streets in that area would be better served by an at-grade crossing with traffic controls.
- While the crosswalk (signalized or not) must be improved, an overpass option of some type would be much preferred by through bicyclists and skaters, as well as some pedestrians. While design issues and cost make this a more long-term endeavor, it is an important element that would encourage the increased use of nonmotorized modes.

5 Chelsea

The first section of this chapter provides a profile of the city. The second section describes existing bicycling and walking conditions in the study area, Downtown Chelsea, and recommendations for improvements. The findings are based on meetings and correspondence with local staff, fieldwork, and review of a previous study entitled *Downtown Chelsea Historic Streetscape Project,* prepared for the City in 1997 by Carol R. Johnson, Inc.

5.1 COMMUNITY PROFILE

Included in this chapter are a short history of Chelsea; a general description of land use; population and employment data; an overview of the transportation network; and crash data.

5.1.1 HISTORY

Settled in 1624 as a neighborhood of nearby Boston, the area was first called Winnisimmet, meaning, "good spring nearby," by the Massachusetts tribe that lived there. The community remained part of Boston until incorporated as a town in 1739 as the namesake of a London neighborhood. Chelsea included Revere, Winthrop, and parts of Saugus until 1846. Reincorporated as a city in 1857, the approximately 2-square-mile municipality developed as an industrial center, producing rubber and elastic goods, boots and shoes, stoves, and adhesives, and became home to a naval hospital and a soldiers' home. On April 12, 1908, nearly half the city was destroyed in the First Great Chelsea Fire, so named subsequent to a second huge conflagration in 1973.

Chelsea fell on difficult fiscal times towards the end of the twentieth century; in 1991 it became the first municipality to come into state receivership since the Great Depression. A charter change in 1995 established fiscal management policies that have significantly improved the city's financial condition. Increased emphasis on economic development and capital improvement has led to an influx of new businesses and homebuyers. In 1998, the National Civic League honored Chelsea with the All-America City Award.

5.1.2 LAND USE

Chelsea, an inner urban suburb of Boston, has excellent air, land, water, and rail transportation access. Dense residential neighborhoods sit between industrial parcels along both Chelsea Creek and the Mystic River.

The study area considered in this report includes the Broadway corridor from Beacon Street to Sixth Street/City Hall Avenue, a length of six blocks, and areas several blocks north and south of there.

5.1.3 Population and Employment

Home to 28,710 residents in 1990, Chelsea's population grew by 22.2 percent, to 35,081, by 2000. The Metropolitan Area Planning Council (MAPC) forecasts a 23.6 percent increase, to 43,349, by 2030. Chelsea businesses employed 13,302 in 2000, a figure estimated by MAPC to increase 11.8 percent, to 14,871, by 2030.

TABLE 5-1
Population and Employment,
in Chelsea, 2000, 2010, 2020, and 2030

Chelsea	2000	2010	Change 2000 to 2010	2020	Change 2010 to 2020	2030	Change 2020 to 2030
Population	35,081	37,839	7.9%	40,732	7.6%	43,349	6.5%
Employment	13,302	13,961	5.0%	14,542	4.2%	14,871	2.3%

5.1.4 Transportation

U.S. Route 1, winding southward from the North Shore, passes over Chelsea on a viaduct, and enters Boston via the Tobin (Mystic River) Bridge. Local collector roads serve Williams Street, Pearl Street, and Broadway, which lead to Everett, East Boston, and Revere, respectively.

The MBTA's Newburyport/Rockport commuter rail line serves Chelsea via a station on Arlington Street. MBTA bus Routes 111, 112, 114, 116, and 117 provide direct access between Chelsea and the cities of Boston, Revere, and Everett.

5.1.5 Crash and Usage Data

As indicated in Table 5-2, between 2002 and 2006 there were 35 reported crashes in Chelsea involving bicyclists, representing 1.1 percent of all crashes, with no fatalities. In the same period there were 144 reported crashes involving pedestrians, representing 4.5 percent of all crashes and resulting in one fatality. As noted in Chapter 1, some crashes may not have been reported.

Figure 5-1 shows all bicycle and pedestrian crashes in Chelsea for the five years reported here. In the portion of Chelsea included in this study, between 2002 and 2006 there were 65 pedestrian-related crashes, including a fatality, and 19 bicycle-related crashes. These are discussed further below.

FIGURE 5-1
Chelsea: Crashes in 2002-2006 Involving Pedestrians and Bicyclists

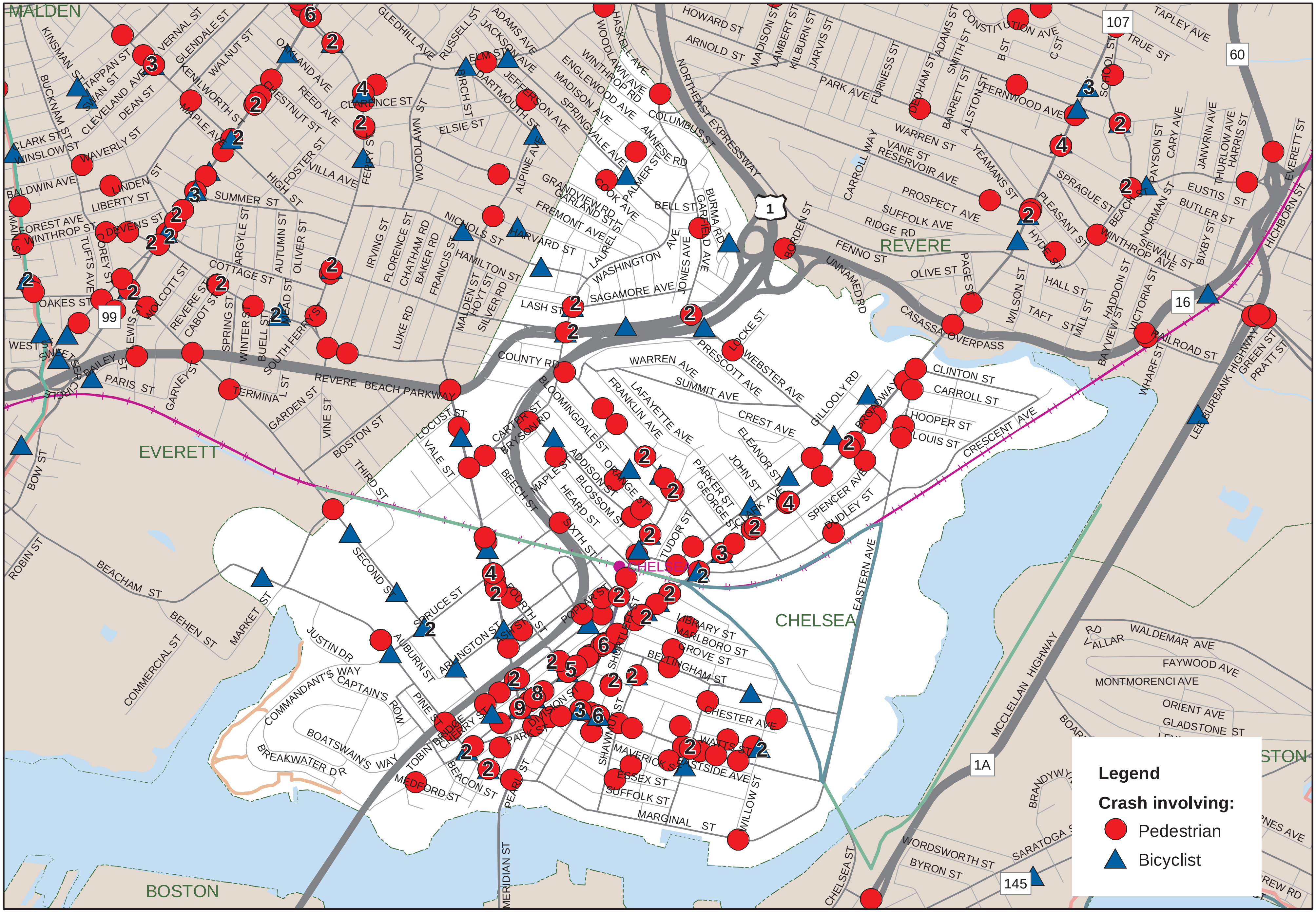


TABLE 5-2
Bicycle, Pedestrian, Motor-Vehicle, and Total Crashes and Fatalities in Chelsea, by Number and Percentage, 2002-2006

	Crashes		Fatalities	
Chelsea	**Number**	**Percentage**	**Fatalities**	**Percentage**
Bicycle	35	1.1%	0	0.0%
Pedestrian	144	4.5%	1	12.5%
Cars	3,003	94.4%	7	87.5%
Total	3,182	100%	8	100%

Several intersections in Chelsea are included in the Boston Region MPO's ongoing Congestion Management Process. Table 5-3 indicates motor-vehicle, bicycle and pedestrian peak-hour volumes at nine intersections in the study area. For more information, see the Mobility Management section of the Boston Region MPO's website, (www.bostonmpo.org/apps/mms/mms_intersection_query.cfm).

TABLE 5-3
Motor-Vehicle, Bicycle, and Pedestrian Peak-Hour Volumes of Selected Intersections within the Study Area

Location	Motor-Vehicle	Bicycle	Pedestrian	Time of Peak-Hour
Broadway and Third Street	832	6	113	7:15-8:15 AM
Broadway and Third Street	1,243	0	272	4:45-5:45 PM
Washington Ave and Broadway/Hawthorn	1,229	6	719	7:30-8:30 AM
Fifth St and Arlington Street	510	6	238	7:15-8:15 AM
Fourth St and Arlington Street	392	1	239	8:00-9:00 AM
Beacon St and Chestnut Street	547	1	36	4:30-5:30 PM
Beacon St and Broadway	280	2	38	7:00-8:00 AM
Broadway and Williams/Tremont Streets	1,398	14	125	4:30-5:30 PM
Broadway and Everett/Cross/Winnisimmet	750	1	140	8:00-9:00 AM
Broadway and Everett/Cross/Winnisimmet	1,076	2	232	4:45-5:45 PM
Third St and Chestnut Street	1,087	0	183	8:00-9:00 AM

5.2 STUDY AREA

The first part of this section of the chapter defines the study area (shown in Figure 5-2) and gives an overview of transit services and walking and bicycling conditions. Subsequent sections provide more details on the different parts of the study area.

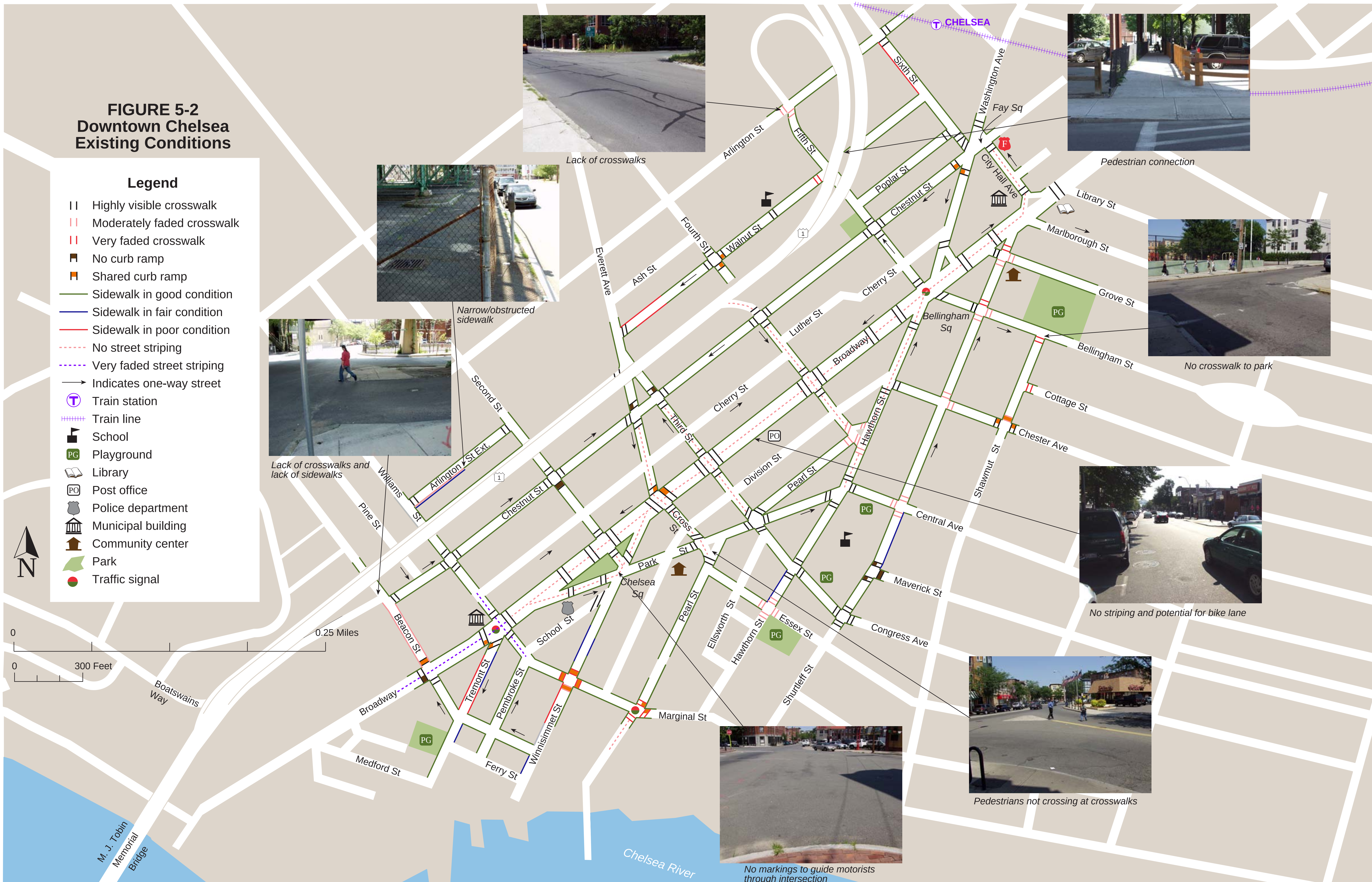


FIGURE 5-2
Downtown Chelsea
Existing Conditions
Legend
Highly visible crosswalk
Moderately faded crosswalk
Very faded crosswalk
No curb ramp
Shared curb ramp
Sidewalk in good condition
Sidewalk in fair condition
Sidewalk in poor condition
No street striping
Very faded street striping
Indicates one-way street
Train station
Train line
School
Playground
Library
Post office
Police department
Municipal building
Community center
Park
Traffic signal
N
0
0.25 Miles
0
300 Feet
Lack of crosswalks
Narrow/obstructed sidewalk
Lack of crosswalks and lack of sidewalks
Pedestrian connection
No crosswalk to park
No striping and potential for bike lane
Pedestrians not crossing at crosswalks
No markings to guide motorists through intersection
CHELSEA
Sixth St
Fifth St
Fourth St
Third St
Second St
Washington Ave
Fay Sq
City Hall Ave
Library St
Marlborough St
Grove St
Bellingham St
Cottage St
Chester Ave
Central Ave
Maverick St
Congress Ave
Essex St
Marginal St
Arlington St
Arlington St Ext.
Poplar St
Chestnut St
Walnut St
Ash St
Everett Ave
Cherry St
Luther St
Broadway
Bellingham Sq
Hawthorn St
Shawmut St
Division St
Pearl St
Cross St
Park St
Chelsea Sq
School St
Ellsworth St
Shurtleff St
Williams St
Pine St
Beacon St
Tremont St
Pembroke St
Winnisimmet St
Ferry St
Medford St
Boatswains Way
M. J. Tobin Memorial Bridge
Chelsea River
PG
PO

The study area for Chelsea includes:

- Broadway
- Northwest of Broadway
- Southeast of Broadway

Five MBTA bus routes serve the study area: Route 111, connecting Haymarket Station and Revere; Route 112, connecting Wellington and Wood Island Stations; Route 114, connecting Maverick Station and Revere; and Routes 116 and the 117, both connecting Wonderland and Maverick Stations. The buses run multiple times an hour throughout the day.

Chelsea’s commuter rail station, on the Newburyport/Rockport Line, is located on the corner of Sixth and Arlington Streets, north of the downtown corridor and on the northeast periphery of the study area. There are 26 inbound trains to Boston between 6:03 AM and 11:44 PM, and 25 outbound trains from Boston between 6:54 AM and 12:21 AM. There are no dedicated bicycle parking spaces.

The sidewalks along Broadway and in immediately adjacent areas are brick, with granite curbs, and are generally in good condition. Most of the sidewalks elsewhere are concrete, with granite curbs. Sidewalks on the minor streets are mainly asphalt, with granite curbs or no curbs, and are in poor to fair condition. Some of these sidewalks have weeds and minor cracking. Most sidewalks have street trees. The sidewalks along Broadway have regularly spaced trees; there are fewer trees in other areas.

The crosswalks are generally highly visible, and have exclusive curb ramps. Crosswalks extend along the most logical path for pedestrians except some at multi-street intersections. Most of the crosswalks are zebra-style; some along Broadway are brick. Long crosswalks have either a median for refuge or striping to keep cars away. There are only a couple of curb extensions in the downtown area across Broadway.

There are several signalized pedestrian crossings, one of which, Washington Street near Fifth Street, has a countdown signal. All of the pedestrian phases are adequate in length.

Few streets adequately accommodate on-street bicycling. Broadway, one-way to the southwest, is wide enough, but is not striped for bicyclists. Park and Hawthorn Streets are one-way to the northeast, but are too narrow for bicycle lanes as currently configured. If a parking or travel lane were removed, on-street bicycling would be a viable option. The multi-street intersections along Park Street pose an extra difficulty for bicyclists, who need to be aware of multiple approaches. In regard to streets crossing Broadway, Williams and Fifth Streets are wide enough to accommodate bicyclists, but have no striping for a shoulder or a bicycle lane.

Many of the roadways have on-street parking, which increases the risks to bicyclists, forcing them to use caution when moving past parked cars. The roadway edges generally do not have significant cracks or large pieces of debris, and the drainage grates are set back from the roadway. See Figure 5-2 for more information on the bicycle network.

There is bicycle parking in front of Roca, the community center, on Park Street at Cross Street.

Figure 5-3 indicates bicycle and pedestrian crashes within the study area from 2002 through 2006. During those five years, there were 65 crashes involving a pedestrian, including one fatality, and 19 involving bicyclists (no fatalities). The following intersections had more than five crashes:

- Broadway, Everett Avenue, and Winnisimmet Street: 6 pedestrians, 3 bicyclists
- Broadway and Congress Avenue: 4 pedestrians, 4 bicyclists
- Broadway at Hawthorne and Bellingham Streets: 7 pedestrians, 1 bicyclist
- Shurtleff Street at Central Avenue: 5 pedestrians, 1 bicyclist
- Broadway at Fourth Street: 4 pedestrians, 1 bicyclist

There were also crashes quite close to many of these intersections, as seen in the figure. The only fatality in the study area during those five years occurred on Broadway, just east of Congress Avenue. There was another pedestrian crash just west of that same intersection. At Broadway and Fourth Street, there were two additional pedestrian crashes just east of the intersection. There were 10 additional locations in Chelsea with multiple crashes.

The following general recommendations pertain to the entire study area:

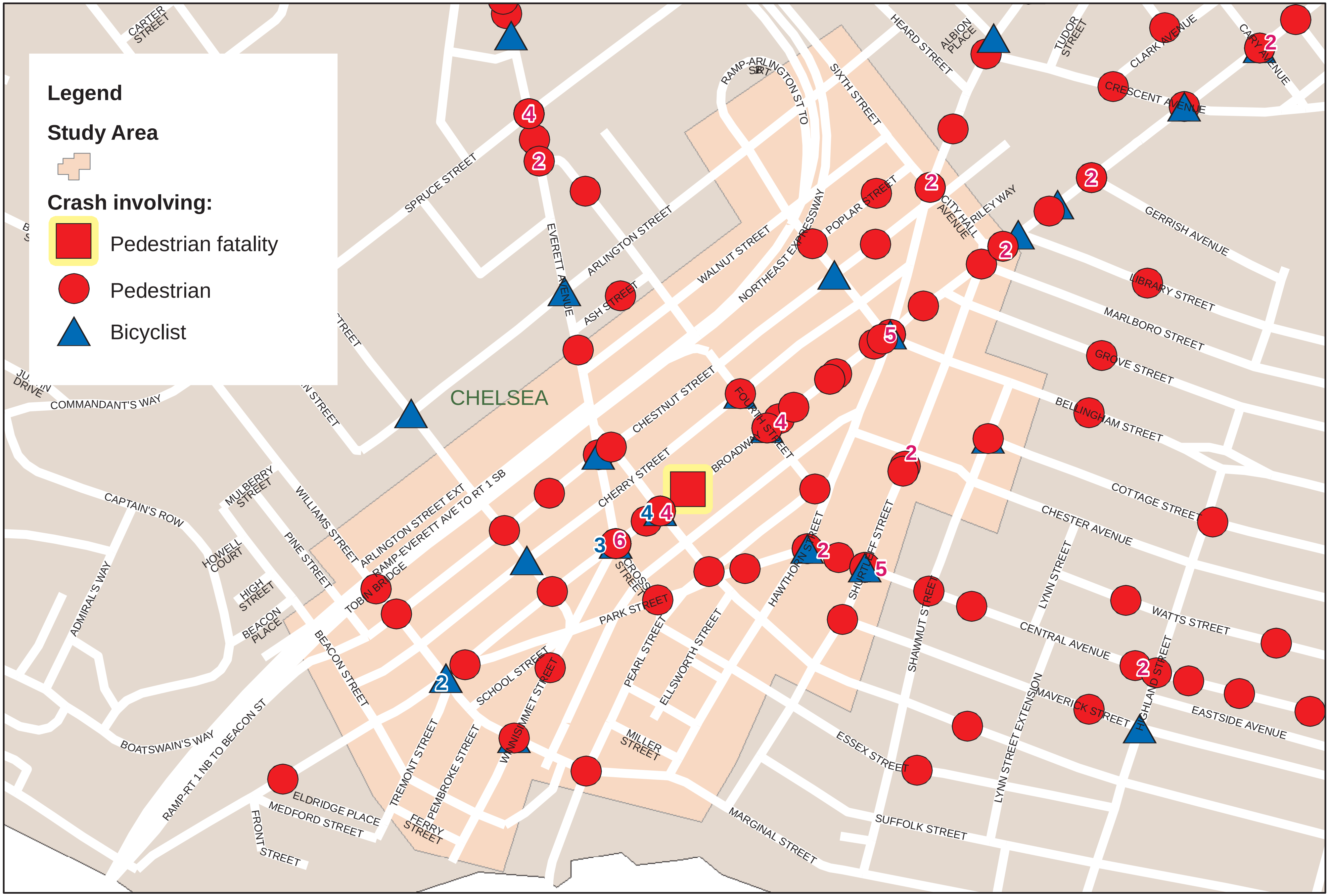
- Stripe crosswalks across all alleys (Cherry, Division, Pine, Miller, Ferry, Ellsworth, and School Streets, and Luther Place) and provide curb ramps on each side.
- Align all crosswalks with the corner of a street, and, where not already present, construct two curb ramps at each crosswalk—one on each end—instead of having a crosswalk sharing a curb ramp with a perpendicular crosswalk.
- Test all pedestrian signals and ensure that all of the pushbutton activators work.

The subsequent sections of the chapter include more detail on existing conditions as well as recommendations; the latter are shown in Figure 5-4.

5.2.1 BROADWAY

Broadway connects City Hall and the library on the northeast with the courthouse to the southwest. Between these two points are stores, offices, apartments, a post office, and a police station. Broadway underwent streetscape improvements in 1998, from Bellingham Square southwest to Everett and Cross Streets. Improvements to Broadway from Williams Street to Bellingham Square were made in 2000. There is a brick plaza in front

FIGURE 5-3
Downtown Chelsea
Crashes in 2002-2006 Involving Pedestrians and Bicyclists



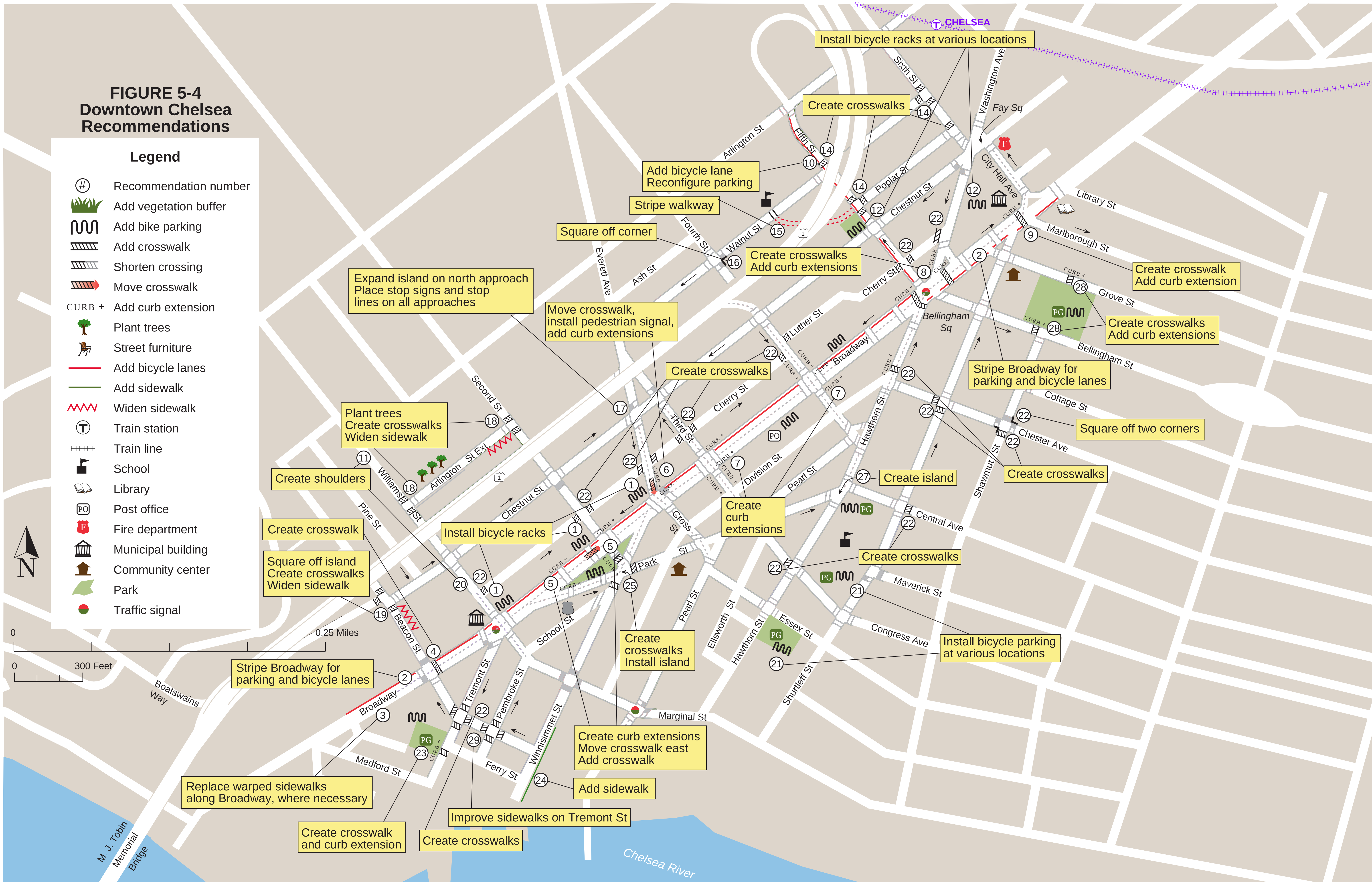


FIGURE 5-4
Downtown Chelsea
Recommendations

of City Hall. There is a park area (Chelsea Square) with benches, and a fountain near Broadway and Second Street.

Bicycling

Existing Conditions

Broadway is a two-lane, one-way road from City Hall southwest to the courthouse. It is approximately 42 feet wide, curb to curb, with parking on both sides and no striping. The roadway surface is mostly smooth, with no major impediments. Aside from the occasional double-parked vehicle, the roadway edge is clear of obstructions that would inhibit the safety of bicyclists. More than half of the 19 crashes involving bicyclists occurred on Broadway. As noted above, there were four crashes involving bicyclists at Congress Avenue, three at Everett Avenue and Winnisimmet Street, two at Williams and Tremont Streets, one at Bellingham Street, and one at Fourth Street.

There is no bicycle parking along this corridor.

Recommendations

1. Provide bicycle parking at various locations, under cover where possible. In addition to the commercial area, include some near Chelsea Square.

2. Stripe Broadway as follows: 7-foot marked parking lanes on both sides, two 11-foot travel lanes, and a 6-foot bicycle lane to the right of the travel lanes.

Walking

Existing Conditions

Sidewalks extend along both sides of all of the roadways in this area. The sidewalks are greater than five feet wide, and much wider in some areas. All of the sidewalks are made of brick, with granite curbs. Though there is some unevenness inherent in most brick sidewalks, the surfaces are relatively smooth and free of significant bumps. While there is no buffer between the sidewalk and the roadway, there are street trees throughout the area. Some of these trees are in poor health, and some tree wells are vacant.

There are numerous crosswalks along the corridor. Those in the most recently improved area are zebra-style and are highly visible. The brick crosswalks between Everett/Cross and Williams Streets are warped in areas. There are two curb extensions along Broadway.

There is a flashing traffic signal at the Broadway/Everett Avenue/Cross Street intersection. The signal, which is not pedestrian activated, flashes yellow on Broadway and red on the cross streets. The curb ramps on three of the corners are exclusive; there is a shared curb ramp on the southeast corner.

The Broadway and Williams Street intersection has a five-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 6-second "Walk" and an 11-second flashing "Don't Walk" signal. There are crosswalks across each approach of the intersection, all zebra-style. Clockwise, they are 36, 43, 58, 30, and 52 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is barely adequate for the lengths of the crossings.

Bellingham Square is a multi-way intersection, with six one-way streets: three are entering the intersection, and three are exiting. There are pedestrian-activated crossing signals across Washington Avenue and Hawthorn Street. The pedestrian phase includes a countdown signal. There are zebra-style crosswalks on each side. Clockwise, they are 40 and 30 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is adequate for the lengths of the crossings.

A pedestrian crossing at Bellingham Square.

Recommendations

3. Throughout the Broadway corridor, repair warped brick crosswalks by placing bricks flat or with brick-pattern pressed concrete.

4. Create a crosswalk across Broadway on the northeast side of the intersection of Broadway and Beacon Street.

5. Chelsea Square
    - Construct curb extensions on the northwest side of Broadway and on the northwest side of Park Street for the crosswalks connecting to the western tip of the square.
    - Create a crosswalk across Second Street to connect the east and west parts of the square closer to the intersection of Second, Park, School, and Winnisimmet Streets and construct a curb extension on the west side of the crosswalk.
    - Move the crosswalk that crosses Broadway east to the southwest side of the intersection with Second Street.
    - Install a curb extension on the northeast corner of the square.

6. Broadway, Everett Avenue, and Cross Street
   - Install a pedestrian signal.
   - Construct curb extensions at Everett Avenue and Broadway for the crosswalks on the north and east approaches.
   - Move the Everett Avenue crosswalk on the north approach closer to the intersection.

7. Construct curb extensions at:
   - Third Street and Broadway for the crosswalks on the south and east approaches.
   - Fourth Street and Broadway for crosswalks on the north and east approaches.

8. Create an "inner ring" of crosswalks in Bellingham Square. These crosswalks would span Broadway from the northwest corner at Fifth Street to Hawthorn Street and across Hawthorn to the southeast corner at Bellingham Street. The other crosswalks would span Broadway to the island at Washington Avenue and then span Washington Avenue to the northwest corner. Construct curb extensions on the corner of Broadway.

9. Create a crosswalk across Broadway between Marlboro and Shurtleff Streets with the sidewalk in front of City Hall. Install a curb extension on the City Hall side.

5.2.2 The Area Northwest of Broadway

This area includes the middle school on Walnut Street, the commuter rail station, a fire station, and high-density residences. There are also surface parking lots and a small park at the corner of Chestnut and Fifth Streets.

Bicycling

Existing Conditions

The roadways in this neighborhood are generally in good condition. Chestnut and Walnut Streets run one-way to the southwest. These one-lane streets have parking on both sides, except in front of the school on Walnut Street, where parking is limited. City Hall Avenue and Fifth and Third Streets run one-way to the northwest, with one or two travel lanes. Everett and Fourth Streets run one-way to the southeast. Everett Street has two travel lanes and parking on both sides. Fourth Street has one travel lane and parking on one side. Beacon, Williams, and Second Streets are two-way, with one travel lane in each direction, and parking on one side, neither side, and both sides, respectively.

The Massachusetts Port Authority's temporary closure of the Beacon Street off-ramp from Route 1 forced all traffic to Fourth Street. In response, the City eliminated all parking on Fourth Street between the off-ramp and Broadway, striped a through lane and a right-turn lane, and changed Chestnut Street between Third and Fourth Streets from northeastward to southwestward. The Beacon Street off-ramp re-opened in late 2008, and the City is debating whether or not to keep the new configuration.

The intersection of Chestnut Street, Washington Avenue, Sixth Street, and City Hall Avenue (Fay Square) is a daunting expanse of asphalt, unaccommodating for bicyclists and pedestrians, and, with no striping, essentially a “free-for-all” for motorists.

Fay Square.

Many of these streets have either no striping or faded striping. The roadway edges are generally clear of obstructions that would negatively impact the safety of bicyclists.

Williams Street, with a width of 36 feet, is a designated truck route. Two businesses that generate significant truck traffic are located nearby. The New England Produce Center is less than a mile to the north, on Beacham Street (same street as Williams, but the name changes in the vicinity of the U.S. Naval Hospital). One of the major sources of road salt in New England is located in the southeast corner of Williams and Pearls Streets.

Fifth Street, with a width of 27 to 28 feet, could accommodate bicycle lanes. There is not enough width to accommodate bicycle lanes on the rest of the streets in the neighborhood without either removing parking or making two-way streets one-way.

There is no bicycle parking along this corridor.

Recommendations

10. Given Fifth Street’s 27- to-28-foot width, create a 7-foot parking lane on the east side and a 6-foot bicycle lane on the west side. This still leaves a 14- to 15-foot-wide traffic lane. While this is much wider than necessary, the street is a few feet too short to allow the installation of back-in angle parking on one side. A longer-term alternative would be to widen the sidewalk on one or both sides of the street.

11. With a width of 36 feet, mark six-foot shoulders along both sides of Williams Street. This leaves two 12-foot travel lanes. Given the high truck volumes, this road could not serve as a preferred bicycle route.

12. Install bicycle parking in various locations, under cover where possible.

Walking

Existing Conditions

Sidewalks in the neighborhood are generally in good condition. Most are concrete, with granite curbs. The sidewalks along the west side of Sixth Street approaching the commuter rail station are asphalt, with granite curbs, and are in poor condition. The sidewalks along Fifth Street have brick details and are inlaid with student art. There are curb extensions on the east side between Broadway and Walnut Street.

The sidewalks on both sides of Beacon Street between Chestnut and Cherry Streets are too narrow. A fence along half of Arlington Street Extension prevents pedestrians from walking on the south side. There are no sidewalks adjacent to and under the bridge on the west side of the intersection of Boatswains Way and Beacon Street. Mobility in this area is complicated by the off-ramp from Route 1.

Very narrow sidewalk along Beacon Street (but keep the trees!).

While there are no vegetation buffers between the sidewalks and the roads in this neighborhood, there are trees on most of the streets. However, a few areas, noted below, have few, if any, street trees. In general, the sidewalks in the area slope down to the level of intersecting driveways.

There are several crosswalks along this corridor, all zebra-style. Most are highly visible, but a few are faded. While most crosswalks follow the natural path for pedestrians, the crosswalks at Fay Square are underutilized. A couple of crosswalks have no curb ramps, and a couple of crosswalks share one. There are two curb extensions.

Pedestrians crossing near Fay Square.

At the intersection of Third, Everett, and Chestnut Streets there are stop signs on Chestnut Street eastbound and on Third Street northbound. There are crosswalks across each approach of the intersection, all zebra-style. The crosswalk on the north approach is very long: 94 feet. There is a median 57 feet from the west side, but it barely reaches the crosswalk.

The north approach of Third, Everett, and Chestnut Streets

Recommendations

13. Fay Square: Chestnut Street, Washington Avenue, Sixth Street, and City Hall Avenue

- Mark a crosswalk on Chestnut Street on the east approach of the intersection
- Construct a curb extension for the crosswalk that crosses Washington Avenue on the north approach of the intersection
- Stripe lines through the intersection to delineate traffic movements
- Stripe a pattern or construct a low-profile brick area in the middle of the intersection to help guide motorists

14. Create crosswalks at the following locations:

- North approach of the intersection of Sixth and Poplar Streets

- All three approaches of the intersection of Sixth and Walnut Streets
- Across the north approach of Fifth Street at the intersection with Walnut Street
- All three approaches of the intersection of Fifth and Poplar Streets

15. Stripe a walkway through the parking lot under U.S. Route 1, from the school to the parking lot entrance on Fifth Street across from Poplar.

16. Square off the southeast corner of Fourth Street and Walnut Street.

17. At the intersection of Everett Avenue and Third and Chestnut Streets, expand the length and width of the island on the north side of the intersection to provide a refuge for pedestrians and to help slow traffic. Ensure that there are stop signs and stop lines on all approaches of the intersection. (Alternatively, allow only right turns for vehicles entering westbound from Chestnut Street. Use intersection space for parking or a park.)

18. Plant trees along the northwest side of Arlington Street Extension. Move the fence back from the southeast side to widen the sidewalk. Create crosswalks on both sides of the intersections with Second and Williams Streets.

19. Intersection of Chestnut and Beacon Streets, Boatswains Way, and U.S. Route 1 ramp. This area is a gateway for people walking to and from Admirals Hill.
    - Square off the island along the west side of Beacon Street between Boatswains Way and the off-ramp from U.S. Route 1 and construct sidewalks.
    - Create crosswalks on the south, west, and north approaches of the intersection of Chestnut and Beacon Streets with the ramp from U.S. Route 1.
    - Create a crosswalk across Boatswains Way.
    - Widen the sidewalk on the northeast side of Beacon Street from Chestnut Street to the Cherry Street alley.

5.2.3 THE AREA SOUTHEAST OF BROADWAY

This area includes the John Silber Early Learning Center, Roca, the YMCA, numerous small businesses, several playgrounds, high-density residences, and a few parking lots.

Bicycling

Existing Conditions

The roadways in this neighborhood are generally in good condition. Two major streets—Park and Hawthorne—continue the circular one-way traffic pattern, Broadway being the third approach of the triangle. Other major streets are Williams and Pearl. Minor streets include Beacon, Second, Cross, Essex, Fourth, Bellingham, Grove, Shawmut, Shurtleff, Pembroke, Pearl, Winnisimmet, and Tremont Streets, and Congress, Chester, and Central Avenues. School, Division, Ellsworth, Ferry, and Miller Streets are all alleys.

The roads are one-way, with the exception of Williams Street, Chester Avenue, and portions of Pearl and Winnisimmet Streets. All of the one-way streets have only one travel lane. The two-way roads have one travel lane in each direction. Depending on the roadway width, there is parking on either one or both sides, except for Williams Street, which has no parking. Williams Street is a designated truck route. As noted above, two businesses that are major generators of truck traffic are located nearby.

The intersection of Second, Park, School, and Winnisimmet Streets is a daunting expanse of asphalt, unaccommodating for bicyclists and pedestrians. Like Fay Square, this area is not striped, and is essentially a “free-for-all” for motorists.

Many of these streets have either faded striping or none at all. The roadway edges are generally clear of obstructions. With the exception of Williams Street, the roads are too narrow to create bicycle lanes without removing parking.

There is bicycle parking in front of Roca, on Park Street at Cross Street.

Recommendations

20. Mark six-foot shoulders along both sides of Williams Street, which is 36 feet wide. This leaves two 12-foot travel lanes. Given the high truck volumes, this road could not serve as a preferred bicycle route.

21. Install bicycle parking in various locations, covered where possible, including the playgrounds and the commercial areas.

Walking

Existing Conditions

With some exceptions, the sidewalks are in good condition. Most are concrete, with granite curbs. Sidewalks that are in fair and poor condition include some along Tremont and Winnisimmet Streets and a portion of Hawthorn Street. There are no sidewalks along Winnisimmet near the waterfront.

There are no vegetation buffers between the sidewalk and the roadways. There are trees on most of the streets, although a handful of areas, noted below, have few or none. Sidewalks in the area generally slope down to the level of intersecting driveways.

All of the crosswalks are zebra-style, and most are highly visible, although several are faded. Many crosswalks could be added in the area, particularly across the alleys and as connectors between the parks. Most crosswalks follow natural pedestrian paths, although walkers often do not use them at the following intersections: Cross, Park, and Pearl Streets; Park and Hawthorn Streets at Central Avenue; and Second, Park, School, and Winnisimmet Streets. The City recently eliminated parking on the northwestern side of Park and Hawthorn Streets at the intersection with Central Avenue to improve sight distances for pedestrians. A couple of crosswalks have no curb ramps, and several crosswalks share one. There are only a couple of curb extensions.

The intersection of Pearl and Williams Streets has a four-way stoplight with pedestrian-activated crossing signals. An exclusive pedestrian phase consists of a 10-second “Walk” and a 9-second flashing “Don’t Walk” signal. There are crosswalks across each approach of the intersection, all zebra-style. Clockwise, they are 39, 40, 42, and 39 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is adequate. A number of the pedestrian pushbuttons did not work.

Recommendations

22. Create crosswalks at the following locations:
    - All approaches of the Tremont-Beacon Street intersection
    - All approaches of the Pembroke-Beacon Street intersection
    - All sidewalks crossing the Cherry and Luther Street alleys
    - Across Congress Avenue on the northwest approach of the intersection with Hawthorn Street
    - Across Central Avenue on the east approach of the intersection with Shurtleff
    - Across Hawthorn Street on the north approach of the intersection with Chester Avenue with a curb extension on the west corner
    - Across Chester Avenue on the west side and across Shurtleff Street on the south side
    - Across Shawmut Street on the south side of the intersection with Chester Avenue, and square off the southwest and northeast corners

23. Create a mid-block crosswalk across Tremont Street to connect to the park. Create a curb extension in front of the park entrance.

24. Install new sidewalks on the east side of Winnisimmet Street from Ferry Street past Beacon Street. Repair the sidewalks on the west side between Ferry and Williams Streets.

25. Intersection of Second, Park, School, and Winnisimmet Streets
    - Either create crosswalks across Winnisimmet on the southwest and southeast approaches, or create a crosswalk along the west approach of the intersection that spans the merged portion of Park, School, and Winnisimmet Streets
    - Paint or install one or more low-profile islands in the middle of the intersection to guide traffic and to visually narrow the intersection

26. Expand the low-profile island in front of Roca at the intersection of Cross, Park, and Pearl Streets. Create crosswalks to this island to provide more visible crossings.

27. Paint a median area or install a low-profile island in the middle of the intersection of Hawthorn and Park Streets with Central Avenue.

28. Improve access to the park between Grove Street and Bellingham Street.

- Create crosswalks across Bellingham Street on the west and east sides of the intersection with Shawmut Street. Create curb extensions on the park side.
- Create a mid-block crosswalk on Grove Street connecting to the park entrance. Create a curb extension on the Grove Street side.

29. Create sidewalks that are distinct from the street along Tremont Street.

6 Framingham

The initial section of this chapter is a profile of the Town of Framingham. The second section describes existing bicycling and walking conditions and recommendations for improvements. The findings are based on meetings and correspondence with local staff, fieldwork, and review of previous studies. These include:

- *Preliminary Design Application for Pedestrian Improvements and/or Bicycle Facilities*, Transit Oriented Development (TOD), July 2006, the Town of Framingham.
- *The Downtown Visualization Project*, April 2007, by the Framingham Downtown Renaissance (FDR). FDR is a coalition of community groups in Framingham interested in the economic vitality of the downtown area.
- *Downtown Study*, August 2007, BETA Group, Inc., for the Town of Framingham.

6.1 COMMUNITY PROFILE

This section includes a short history of Framingham, a general description of land use, population and employment data, an overview of the transportation network, and crash data.

6.1.1 HISTORY

Settled in 1647 on the west bank of the Sudbury River along the Old Connecticut Path connecting Boston and Hartford, Framingham was incorporated as a town in 1700. Framingham was an outpost in the Abolitionist movement, with regular visits by William Lloyd Garrison, Sojourner Truth, Wendell Phillips, and Henry David Thoreau.

In 1871, the Lowell Railroad completed a stretch of rail through the town, establishing it as an exchange hub for eastern Massachusetts. Trolley connections along the Worcester Turnpike (State Route 9) in 1903 strengthened the town’s connection to rail. Following World War II, Framingham became a commercial hub for the MetroWest region between Boston and Worcester, attracting General Electric and Shoppers World in 1948 and 1951, respectively. To facilitate inter- and intrastate travel and economic development in the area, the Massachusetts Turnpike (Interstate 90) opened in 1957. The Massachusetts Turnpike bisects the town, with interchanges on the west side at Route 9 and on the east side at State Route 30.

6.1.2 LAND USE

Framingham, which is the most populous town in Massachusetts, is a collection of neighborhoods: Downtown Framingham, Framingham Center, Coburnville, Lokerville, Salem End, Nobscot, Pinefield, Ridgefield, and Saxonville. In addition to its large residential base, Framingham's economy is based on retail and office complexes. There are scatterings of small manufacturing facilities and commercial services, such as plumbing, mechanical, and electrical services, which are typical in communities of this size. Framingham has three major business districts, the "Golden Triangle," Downtown/ South Framingham, and West Framingham. Additionally, there are several business hubs that provide medical, retail, educational, office, and biotechnical services in the villages of Framingham Center, Saxonville, and Nobscot, and along the Route 9 corridor.

6.1.3 POPULATION AND EMPLOYMENT

The 2000 population of 66,911 people was an increase of 3.0 percent from 1990. The Metropolitan Area Planning Council (MAPC) projects the population to grow by 8.9 percent, to 72,841, by 2030, and projects employment to grow by 8.2 percent, increasing from 45,055 in 2000 to 48,758 by 2030.

TABLE 6-1
Population and Employment,
in Framingham in 2000, 2010, 2020, and 2030

Census Data	2000	2010	Change 2000-2010	2020	Change 2010-2020	2030	Change 2020-2030
Population	66,911	68,856	2.9%	71,040	3.2%	72,841	2.5%
Employment	45,055	46,610	3.5%	47,980	2.9%	48,758	1.6%

6.1.4 TRANSPORTATION

Several state highways travel through Framingham: Routes 9 and 30 bisect Framingham Center, both connecting Boston with points west. The north–south State Route 126 and the east–west State Route 135 connect Downtown Framingham with Concord, Massachusetts, and Woonsocket, Rhode Island, and with Dedham and Northborough, respectively. The Massachusetts Turnpike roughly parallels Route 9, connecting Boston with points west, and, as Interstate 90, continues to Washington State.

The Framingham commuter rail station, on the Worcester/Framingham Line, is located on Waverley Street on the southwest edge of downtown, within the study area. Service is provided between Worcester and Boston. Some runs begin and end in Framingham, the line's terminus until service to Worcester was restored in 1994. There is bicycle parking at the station. The town secured transit-oriented-development funding to improve the pedestrian connections between the station and the parking garage on Pearl Street.

The MetroWest Regional Transit Authority (MWRTA) provides bus service to the Town of Framingham and 10 other municipalities. All of the buses are equipped with bicycle racks. The six routes (2, 3, 4, 5, 6, and 7) originate from the central hub, the MWRTA offices at 160 Waverley Street, just east of the study area. The MWRTA also provides door-to-door service for eligible individuals who have physical, cognitive, or mental disabilities. This service, which runs 365 days a year, 6:00 AM to 1:00 AM, is similar to the MBTA's RIDE service. Previously to July 2009, the MWRTA contracted with the MBTA to provide RIDE service in the MWRTA area.

The Massachusetts Port Authority operates the Logan Express bus service from Shoppers World to Boston's Logan International Airport. A private bus carrier, Peter Pan, provides service between Worcester and Boston. CSX provides freight service through Framingham to Northeast Corridor destinations.

The Bay Circuit Trail passes through the northwest corner of Framingham. This facility, intended primarily for hiking, is a circumferential trail around the metropolitan Boston area, extending from Plum Island to Kingston Bay. On the eastern side of town is the proposed Cochituate Rail Trail, extending to Natick Center.

6.1.5 Crash and Usage Data

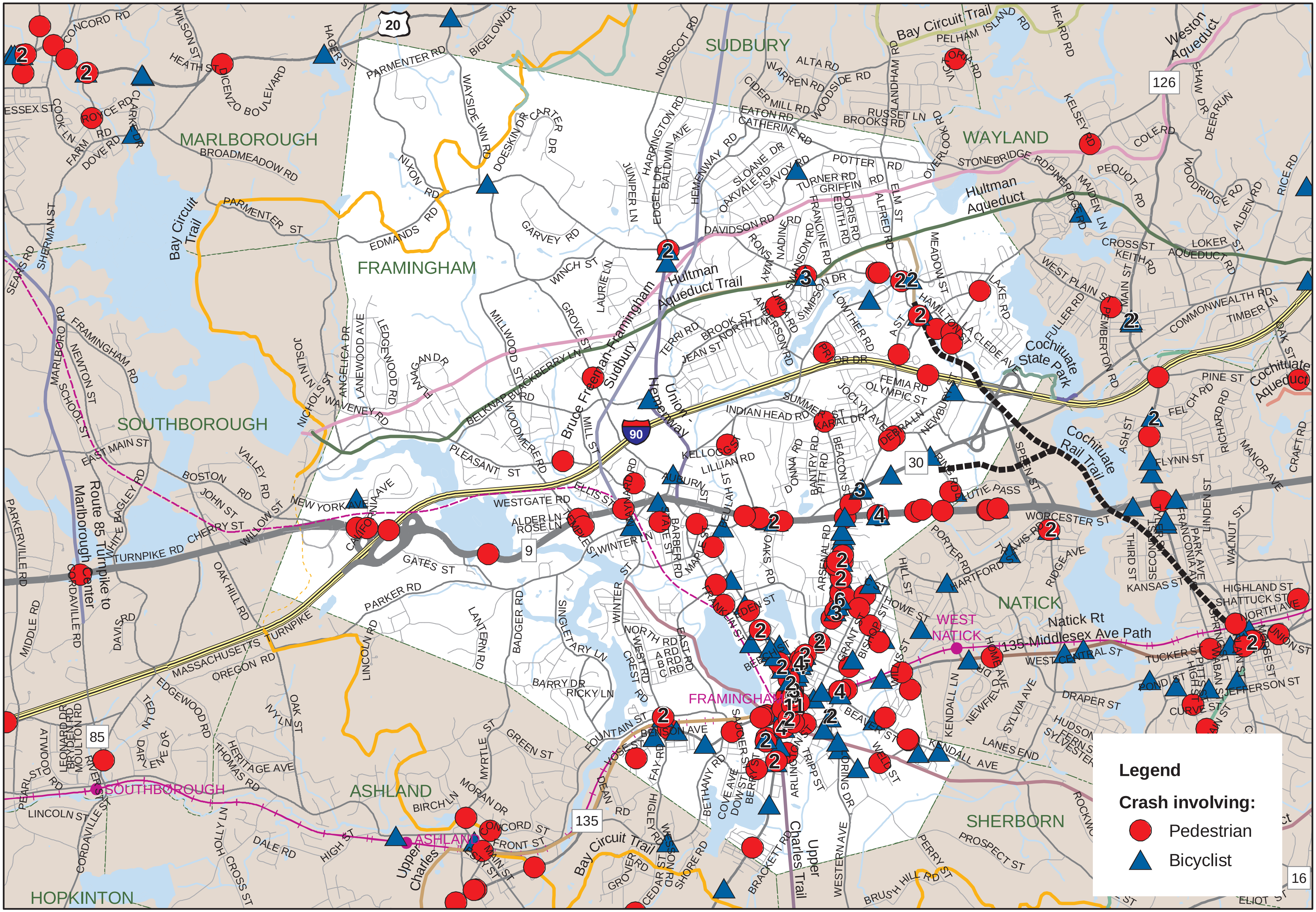
Between 2002 and 2006 there were 116 reported crashes involving pedestrians in Framingham, representing 1.4 percent of all crashes and resulting in four fatalities. In the same period there were 91 reported crashes involving bicyclists, representing 1.1 percent of all crashes, and no fatalities. These data are shown in Table 6-2, along with motor-vehicle crashes. The latter category refers to crashes involving motor vehicles only, as the bicycle and pedestrian crashes also involve motor vehicles.

TABLE 6-2
Bicycle, Pedestrian, Motor-Vehicle and Total Crashes and Fatalities in Framingham, by Number and Percentage, 2002-2006

	Crashes		Fatalities	
Mode	**Number**	**Percentage**	**Number**	**Percentage**
Bicycle	91	1.1%	0	0.0%
Pedestrian	116	1.4%	4	25.0%
Motor Vehicles	8,135	97.5%	12	75.0%
Total	8,342	100%	16	100%

Figure 6-1 indicates the location of the bicycle and pedestrian crashes throughout the town for the five years reported here. As noted in Chapter 1, some crashes may not have been reported. There is further discussion below of crashes within the study area.

FIGURE 6-1
Framingham: Crashes in 2002-2006 Involving Pedestrians and Bicyclists



6.2 STUDY AREA

The first part of this section of the chapter defines the study area and gives an overview of transit services and walking and bicycling conditions. Subsequent sections give more details on the different parts of the study area.

Downtown Framingham is a commercial area as well as the center of municipal services. The study area for Framingham (shown in Figure 6-2) is discussed in terms of the following sections:

- The Downtown “Double Y”
- The Neighborhood Northwest of Downtown
- The Neighborhood Northeast of Downtown
- The Neighborhood Southwest of Downtown
- The Neighborhood Southeast of Downtown

The Downtown “Double-Y” is so called because of the Y-split of Concord Street and Union Avenue in front of the Memorial Building and the upside-down Y-split of Irving and Hollis Streets (also known as Burkis Square).

There are 21 inbound trains to Boston leaving from the Framingham commuter rail station, between 6:05 AM and 12:30 AM, and 20 outbound trains from Boston, that leave Boston between 5:50 AM and 12:12 AM. The 166-space parking lot has 4 accessible spaces and 10 bicycle spaces.

All six of the MWRTA bus routes stop in Downtown Framingham, as well as other locations within the study area. Service runs between 6:30 AM and 7:00 PM.

Along the major roadways, the sidewalks are concrete, with granite curbs, and are in good condition. The sidewalks along moderately busy roadways are generally in decent condition, and most of them are concrete, with granite curbs, although some are asphalt with granite curbs. Some have weeds and minor cracking. Away from the main arterials, the sidewalks are usually asphalt, with granite curbs, and are in poor condition. Some of the minor roads have no sidewalks. Sidewalks without granite curbs generally blend in with the street whenever there is a driveway and are patched and uneven in places. The sidewalks that cross the railroad tracks along Concord Street and Claflin Street are in poor condition. Only sidewalks along Union Avenue and Concord and Hollis Streets in the downtown area have street trees.

The crosswalks in the study area are generally highly visible, with exclusive curb ramps for each crosswalk. However, crosswalks should be added at many locations, particularly in the neighborhood northeast of downtown. Almost all of the existing crosswalks extend along the most logical path for pedestrians. Many of the crosswalks are zebra-style; some are ladder-style, with yellow rungs and white parallel bars. Crosswalks near the Memorial Building, where the only curb extensions are found, are brick. The crosswalks to the north of the roundabout there intersect islands, providing refuge for crossing pedestrians.

FIGURE 6-2
Downtown Framingham Existing Conditions

Long crosswalks exist at the southern fork of Burkis Square, across Hollis and Irving Streets.

There are several signalized pedestrian crossings. None have countdown signals. The pedestrian phases at some are short, while others are adequate in length. There are no pedestrian countdown signals.

There are no bicycle lanes, although some of the roadways are wide enough to accommodate them. Many of the roadways have on-street parking, which increases the risks to bicyclists. The edges of the roadway generally do not have significant cracks or large pieces of debris, and the drainage grates are set back from the roadway. See Figure 6-2 for more information on the bicycle network.

The only bicycle parking are two ribbon racks located under the station platform at the MBTA Framingham commuter rail station.

During the five-year period 2002 through 2006, 30 of the 91 bicycle crashes in Framingham occurred in the study area. For crashes involving pedestrians, 34 of the 116 town-wide occurrences were in the study area. None of these 64 crashes resulted in a fatality. As seen in Figure 6-3, most crashes occurred on Hollis, Concord, and Waverley Streets and on Union Avenue. This is possibly due to the higher incidence of walking and bicycling on these roadways. On Tuesday, August 26, 2008, there were 128 bicyclists and 934 pedestrians counted from 2:00 PM to 6:00 PM on Concord Street between Kendall and Park Streets. There are no counts available in other areas of town, so relative walking and bicycling rates cannot be determined.

The intersection with the highest number of crashes is Waverley and Concord Streets, where 11 occurred. There were five crashes at several intersections on Concord Street: at Lincoln Street, Clinton Street, and Howard Street. There were five crashes on Hollis Street, in the vicinity of Hollis Court and Gordon Street. There were four crashes at the following locations: Hollis and Claflin Streets, and Concord and Park Streets. There were three crashes at the following locations: Concord and Kendall Streets; Concord Street at Union Avenue; and Union Avenue at Pearl Street.

The following sections give more details on existing conditions and list recommendations, which are illustrated in Figure 6-4.

6.2.1 DOWNTOWN "DOUBLE-Y"

This area, particularly the Y-split in front of the Memorial Building, has undergone a number of improvements over the years, including the addition of street trees, narrowing of the roadway, a brick plaza in front of the Memorial Building, and an improved roundabout. Besides the Memorial Building, which is Framingham's town hall, the police department is located here, as well as numerous businesses and residences, both single and multifamily.

FIGURE 6-3
Downtown Framingham
Crashes in 2002-2006 Involving Pedestrians and Bicyclists

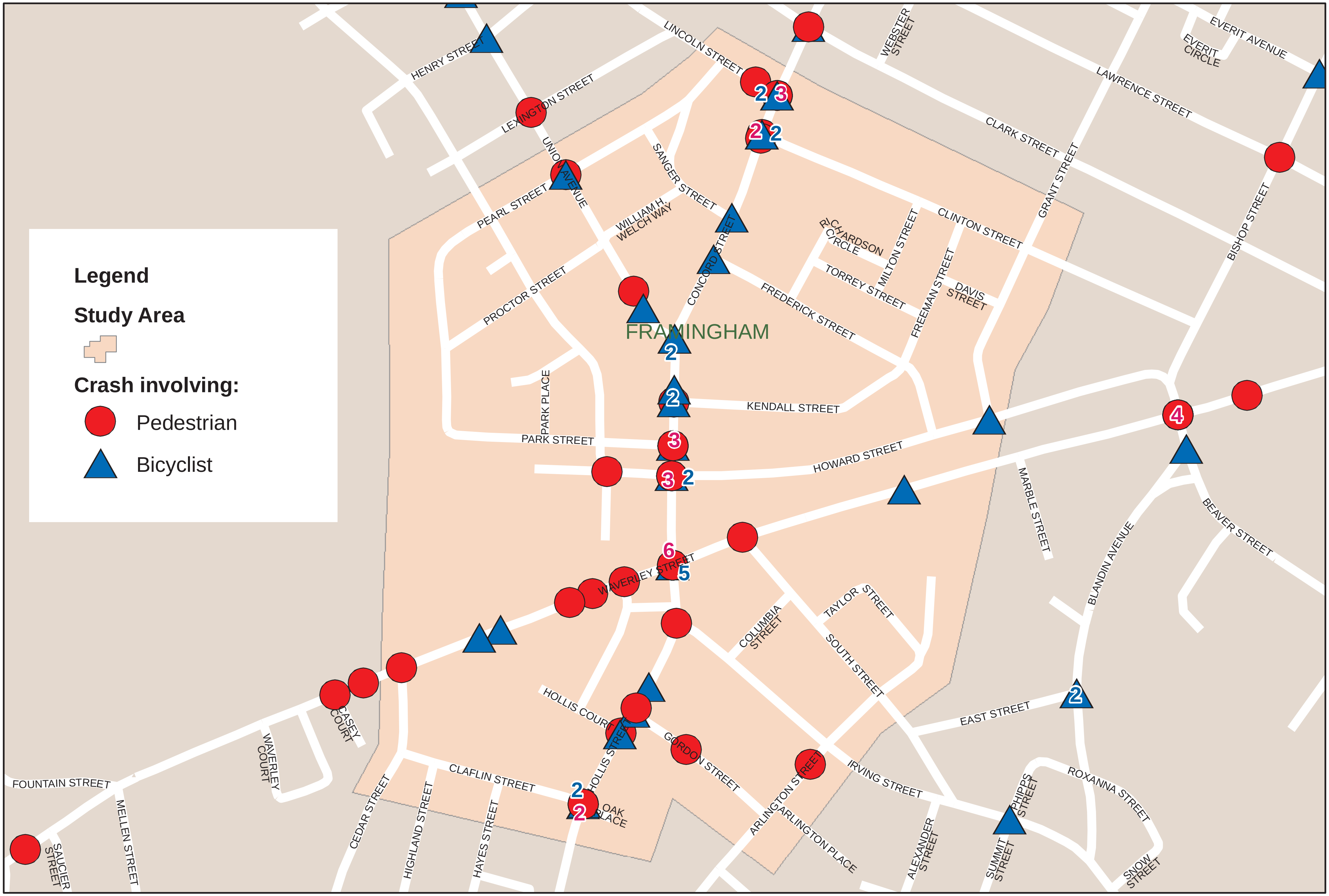



FIGURE 6-4
Downtown Framingham
Recommendations
Legend
Recommendation number
Add bike parking
Add crosswalk
Shorten crossing
Move crosswalk
Add curb extension
Remove parking
Plant trees
Street furniture
Add vegetation buffer
Add bicycle lanes
Add sidewalk
Improve sidewalk
Widen walk area
Train station
Train line
School
Library
Post office
Fire department
Playground
Community center
Park
Traffic signal
Farm Pond
FRAMINGHAM
Create crosswalks
Create vegetated buffer
Create two crosswalks, eliminate a crosswalk
Trim vegetation
Update signal
Tighten corners
Mark shoulders
Improve sidewalks
Create bicycle lanes
Improve existing sidewalks on Pearl and Franklin Sts
Create vegetation buffer, switch angle parking to back-in
Create crosswalks
Create sidewalks
Mark lanes and install Bicycle Share the Road signs
Create vegetated buffers on both sides, and create a mid-block crossing
Stripe lanes
Create crosswalks
Plant trees
Install vegetation and improve walking surface
Create sidewalks
Mark bicycle lanes or shoulders
Improve intersection
Mark parking and travel lanes
Create crosswalks
Add curb extensions
Create crosswalk with curb extensions
Improve or construct sidewalks
Mark lanes
No turn on red, no blocking the intersection
Create bicycle lanes
Create crosswalks
Widen walking area
Create bicycle lanes
Create crosswalk. Consider roundabout
Create crosswalks
Add curb extensions
Create bicycle lane and shoulder
Mark bicycle lanes or add Bicycles Share the Road signs
Improve sidewalks
Create crosswalks
Square off intersection
Install pedestrian countdown signals
Add pedestrian phase to signal
Charter School
General Recommendations
7 Install pedestrian countdown signals
23 Install vegetation and pathways in parking lots
36 For minor roads maintain regular street-cleaning program, and improve roadway edges
50 Create buffers between sidewalks and roadways where feasible
6 15 28 37 45 Provide bicycle parking
Union Ave
Lexington St
Franklin St
Lincoln St
Thompson St
Sanger St
Pearl St
William H. Welch Wy
Clinton St
Grant St
Proctor St
Concord St
Frederick St
Richardson Cir
Torrey St
Milton St
Freeman St
Davis St
Kendall St
Park Pl
Park St
Howard St
Waverley St
Marble St
South St
Taylor St
Columbia St
Irving St
Hollis Ct
Hollis St
Gordon St
Claflin St
Cedar St
Highland St
Hayes St
Avon St
Pine St
Waushakum Ave
Arlington St
Arlington Pl
Alexander St
East St
0 0.25 Miles
0 300 Feet
N

Bicycling

Existing Conditions

The four major roadways feeding into the downtown area, Union Avenue, Concord Street, Irving Street, and Hollis Street, are two-lane and two-way, except the Concord/Hollis Street spine, which is four lanes wide. All have parking on both sides except Irving Street, which has parking only on the west side. The Concord/Hollis Street spine is 59 feet wide. The width of the feeder routes are the following: Union Avenue, 44 feet wide; Concord Street, 41 to 42 feet; Irving Street, 31 to 32 feet; and Hollis Street, 38 feet.

A single dashed white line divides the travel lanes moving in the same direction along the spine of Concord and Irving Streets, and a double yellow line separates the lanes moving in opposite directions throughout the area. The roadway surface is mostly smooth, with no major impediments. The roadway edge is clear of obstructions that would negatively impact the safety of bicyclists.

Recommendations

1. For the Concord/Irving spine, with a width of 59 feet, mark 7-foot parking lanes, 12.5-foot outside travel lanes, and 10-foot inside travel lanes.

2. For Union Street, with a width of 44 feet, mark two 7-foot parking lanes, two 5-foot bicycle lanes, and two 10-foot travel lanes.

3. For the two-lane section of Concord Street, with a width of 41 to 42 feet, mark two 7-foot parking lanes, two 10-foot travel lanes, and two 3.5-foot shoulders.

4. On Irving Street, with a width of 31 to 32 feet, mark an 11-foot travel lane in the southbound direction, where there is no parking allowed, and a 13-foot lane in the northbound direction, with “Bicycles Share the Road” signs.

5. Given that Hollis Street is 38-feet wide, create a 7-foot parking lane on one side, an adjacent 5-foot bicycle lane, two 11-foot travel lanes, and a 4.5-foot outside lane. Alternatively, create two 7-foot parking lanes and two 10-foot travel lanes, leaving two 2-foot marked shoulders, and install “Bicycles Share the Road” signs.

6. Provide bicycle parking near the Memorial Building, the town square between Park and Howard Streets, the Danforth Art Museum, the community center on Hollis Street, and commercial areas downtown.

Walking

Existing Conditions

Sidewalks extend along both sides of all of the roadways in this area. The sidewalks are greater than five feet wide along the four roadways feeding the downtown corridor and along the spine. All sidewalks are concrete, with granite curbs, with some brickwork around the Memorial Building. With one exception, the surface is smooth and free of significant bumps or cracks. The exception is where the railroad tracks cross the sidewalks along Concord Street, on both sides of the street. Here the sidewalk is patchy asphalt, with no curbs. In general, there are no buffers between the sidewalks and roadways but there are street trees throughout the area.

There are numerous crosswalks but only the two crosswalks in Burkis Square share a curb ramp. All of the crosswalks are zebra-style and are highly visible.

Concord and Howard Streets – The intersection has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 6-second “Walk” signal and a 12-second flashing “Don’t Walk” signal. There are crosswalks across each side of the intersection, and all are zebra-style. Clockwise, they are 59, 40, 59, and 29 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is barely adequate for the lengths of the crossings. It should be noted that traffic that is stopped at the railroad tracks frequently blocks this crosswalk.

Irving/Concord/Waverley Streets – This intersection is located just south of the mainline railroad tracks that carry the MBTA commuter rail service and CSX freight trains. There is a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 7-second “Walk” signal and a 16-second flashing “Don’t Walk” signal. There are crosswalks across each side of the intersection, all zebra-style. Clockwise, they are 66, 48, 69, and 54 feet long. Using a 3.5-foot-per-second standard, the pedestrian phase is adequate for the lengths of the crossings.

Recommendations

7. Install pedestrian countdown signals throughout the study area.

8. Create a crosswalk across Concord Street, about halfway between Kendall Street and the splitter island south of the roundabout.

9. Construct curb extensions for all the crosswalks across Concord Street.

10. Plant vegetation, either in the ground or in barrels, where the railroad tracks cross Concord Street, between the street and the sidewalk. Improve the sidewalk and other walking surfaces in this area and consider installing bollards.

11. In the short term, create a crosswalk across Irving Street, with a refuge island, to the north of the intersection with Hollis Street. Narrow the roadway width and turning radii where possible. For the longer term, consider creating a traffic roundabout here, similar to the one in front of the Memorial Building.

12. At the Concord-Howard Street intersection, prohibit right-turns-on-red from Howard Street eastbound, and install signs on Howard Street eastbound and Concord Street southbound that prohibit blocking the intersection.

6.2.2 The Neighborhood Northwest of Downtown

This neighborhood has several activity centers, including the Danforth Museum, library, Registry of Motor Vehicles, post office, and parking garage. There are several commercial businesses along Franklin Street and Union Avenue, and residences along Pearl, Proctor, and Lexington Streets. There are several surface parking lots. There is a small park a couple of blocks north of the Memorial Building, close to the library.

Bicycling

Existing Conditions

The roadways in this neighborhood are generally in fair condition. The two major streets, Franklin Street and Union Avenue, run parallel to each other northwest from the downtown. The minor streets, Lexington, Pearl, Proctor, Park, Howard, and Thompson, generally run east–west. Sanger and Lincoln Streets run north–south. William H. Welch Way is essentially a roadway through a parking lot. The major streets are two-way; most of the minor streets are one-way.

The two major streets have parking on both sides. Franklin Street, currently being reconstructed with an expected completion date of 2010, is 33 to 37 feet wide. Union Avenue is approximately 44 feet wide. Both of these streets have only a double yellow centerline. Many of the minor streets do not have any striping. The roadway edges of these streets are generally clear of obstructions that would impact the safety of bicyclists. There is parking at the library for 10 bicycles.

Recommendations

13. Stripe traffic lines on Howard and Franklin Streets around the town square.

14. See Recommendation 2 above for Union Avenue. For Franklin Street, for sections wider than 36 feet, mark two 7-foot parking lanes and two travel lanes of 11.0 to 11.5 feet wide, and install “Bicycles Share the Road” signs. For sections that are less than 36 feet in width, consider eliminating parking on one side. Which side allows parking can be alternated.

15. Install bicycle parking within the parking garage on Pearl Street and across the street at the Registry of Motor Vehicles.

Walking

Existing Conditions

Sidewalks in the neighborhood range from being in good condition to being nonexistent. The sidewalks along Union Avenue are concrete, with granite curbs, and are in good condition. Most of the sidewalks along Franklin Street are asphalt, with granite curbs, and are in fair condition. There are no sidewalks along the south side of William H. Welch Way, the north–south portion of Pearl Street, the east side of Howard Street, the west side of Howard Street as it approaches the train station, or the south side of Proctor Street. There is a sidewalk bisecting the park that runs along Thompson Street, but it does not safely connect the sidewalk network in the area, due in part to the absence of crosswalks.

There are no vegetation buffers between sidewalks and roadways in this corridor, nor are there street trees. Few front yards have large trees that provide shade for the street. There is no buffer between the sidewalk and paved areas, primarily parking lots, along Franklin Street between Park and Proctor Streets, the east side of Union Avenue between the Memorial Building and William H. Welch Way, and the north side of Pearl Street next to the Danforth Museum. Sidewalks slope down slightly to the level of intersecting roadways and driveways.

There are several crosswalks, but only one along Franklin Street. Some of the crosswalks are zebra-style, others yellow-and-white ladder-style. Most are highly visible. Some crosswalks share a curb ramp.

There is no signalized pedestrian crossing in this corridor.

Recommendations

16. Create curbed sidewalks along both sides of Pearl Street, the south side of Proctor Street, and on Franklin Street as it approaches the parking lot for the commuter rail station (south of the town square).

17. Improve the existing sidewalks along Pearl Street and Franklin Street. (Note: This is part of the Franklin Street improvements.)

18. Create crosswalks for the following intersections:
    - Franklin and Lexington Streets
    - Franklin and Pearl Streets
    - Franklin and Proctor Streets
    - Pearl and Proctor Streets
    - Franklin and Howard Streets
    - The south leg of Franklin and Park Streets
    - Park Place and Park Street
    - The north leg of Union Avenue and Pearl Street

- The north leg of Union Avenue and Lexington Street
- The north and south legs of Lexington and Lincoln Streets

19. Plant trees along Franklin Street as it approaches the commuter rail parking lot

20. Create vegetation buffers on the west and east sides of Franklin Street between the sidewalk and the parking lots between Proctor and Park Streets, and create a mid-block crossing.

21. Create a vegetation buffer between the sidewalk and the parking lots on the east side of Union Avenue between William Welch Way and the Memorial Building. Change the direction of angle parking to back-in.

22. Create a vegetation buffer on the north side of Pearl Street next to the Danforth Museum.

23. Install planters and medians and plant trees in parking lots to beautify the lots and provide pedestrians with pathways through these areas.

24. Keep the vegetation trimmed along the east side of Sanger Street.

25. At the park at Pearl, Sanger, and Thompson Streets:
    - Create a crosswalk on Pearl Street, on the west side of Sanger Street
    - Eliminate the crosswalk on the northeast side of the park that crosses Pearl Street
    - Create a crosswalk across Thompson Street that connects to the walking path in the park, which is already connected to a crosswalk across Pearl Street

6.2.3 THE NEIGHBORHOOD NORTHEAST OF DOWNTOWN

There are businesses along Concord and Howard Streets, a charter school on Clinton Street, and numerous small multi-family buildings. There are a few parking lots. The large, remodeled, mainly residential Dennison Triangle is just east of this neighborhood.

Bicycling

Existing Conditions

The roadways are generally in fair condition. The major streets, Concord, Grant, and Howard, are two-way, as are many of the minor streets–Frederick, Kendall, Richardson, Torrey, and Freeman. Clinton, Milton, and Davis Streets are one-way.

The three major streets have parking on both sides, except for Grant Street south of Clinton. The width of Concord Street is 41 and 42 feet, Grant Street is 29 to 38 feet, and Howard Street is 39 to 41 feet. The only striping on these streets is a double yellow centerline. Many of the minor streets have no striping. The roadway edges are generally clear of obstructions that would affect the safety of bicyclists.

There is no bicycle parking in this part of the study area.

Recommendations

26. On Howard Street, mark 7-foot parking lanes and 10-foot travel lanes, leaving marked shoulders of 2.5 to 3.5 feet. See Recommendation 3 above for Concord Street.

27. Where Grant Street is only 29-feet wide, prohibit parking and stripe 10-foot travel lanes and 4.5-foot bicycle lanes. Alternatively, mark a 7-foot parking lane on one side, a 12-foot travel lane adjacent to the parking lane, and a 10-foot travel lane on the non-parking side, with “Bicycles Share the Road” signs. Where Grant Street is 38-feet wide, create a 7-foot parking lane on one side, an adjacent 5-foot bicycle lane, two 11-foot travel lanes, and a 4.5-foot outside lane. Alternatively, create two 7-foot parking lanes and two 10-foot travel lanes, leaving two 2-foot marked shoulders, and install “Bicycles Share the Road” signs.

28. Place bicycle racks at the school on Clinton Street.

Walking

Existing Conditions

The conditions of the sidewalks in the neighborhood range from good to poor. The sidewalks along Concord, Kendall, Grant, and Freeman Streets, and the north side of Howard Streets, are concrete, with granite curbs, and are in good condition. The sidewalks along most of Frederick, Torrey, and Milton Streets, and the south side of Howard Street, are asphalt, with granite curbs, and are in fair or poor condition. There are no sidewalks along the south side of Howard Street in the vicinity of Grant and Frederick Streets.

There are no vegetation buffers between the sidewalk and the roadways, nor are there street trees. Few front yards have large trees that provide shade along the street. The sidewalks slope down slightly to the level of intersecting roadways and driveways.

There are a number of highly visible, zebra-style crosswalks, but no crosswalks in the residential areas. A couple of crosswalks share a curb ramp.

Lincoln and Concord Streets – The intersection has a three-way stoplight with three pedestrian-activated crossing signals. The signal post on the east side is not situated conveniently, being about 10 yards south of the crosswalk. The two signal posts on the west side are hard to operate. The signal is not the standard “Walk” and “Don’t Walk” type, but is an antiquated simultaneous yellow and red light to indicate the pedestrian crossing phase. Furthermore, the signals cannot be viewed from all sidewalks. Pedestrians crossing eastbound on Concord Street cannot tell whether they have the right of way. There is an exclusive pedestrian phase of 12 seconds, which is inadequate for the crosswalks, even for pedestrians starting at the beginning of the phase. But with no flashing signal, pedestrians have no idea whether the walk phase has just begun or is ending soon.

Recommendations

29. Improve the sidewalks along Frederick, Torrey and Milton Streets.

30. Create crosswalks for the following intersections:
    - All legs at Clinton and Milton Streets intersection
    - All legs at Freeman and Clinton Streets
    - All legs at Davis and Freeman Streets
    - All legs at Davis and Grant Streets
    - All legs at Torrey and Milton Streets
    - All legs at Torrey and Freeman Streets
    - All legs at Frederick and Howard Streets
    - All legs at Frederick Street and Richardson Court
    - The east, west, and north legs at Grant and Clinton Streets
    - The east and west legs at Grant and Howard Streets

31. Improve, and construct where necessary, a sidewalk along the south side of Howard Street from Concord Street to the Dennison Triangle.

32. Improve the signal at Lincoln and Concord Streets to include traditional pedestrian signals ("Walk" and "Don't Walk"). Ensure that these signals are installed in a manner convenient to users at all legs of the intersection and that there is enough time for pedestrians to cross safely.

33. Tighten the corner for right turns from Concord Street to Lincoln Street and from Lincoln Street to Concord Street by widening the sidewalks or by adding curb extensions. Install a curb extension on the east side of Concord Street at the crosswalk north of Lincoln Street.

34. Improve the intersection of Freeman, Frederick, and Kendall Streets.
    - Add crosswalks across all streets.
    - Consider striping a pattern or constructing a low-profile brick or textured concrete area in the middle of the intersection to decrease the travel area and help guide motorists

6.2.4 THE NEIGHBORHOOD SOUTHWEST OF DOWNTOWN

This neighborhood includes the commuter rail station on Waverley Street, businesses along Hollis and Waverley Streets, the Boys and Girls Club on Hollis Street at Claflin, numerous small multi-family buildings, and a few parking lots.

Bicycling

Existing Conditions

All the roads are two lanes wide and two-way, with the exception of Waverley Street near the intersection with Concord and Irving Streets. On the east side of this intersection there is one lane heading eastbound; heading westbound there is a left-turn lane, a through lane, and a right-turn lane. On the eastbound approach, there is one lane heading westbound and two lanes heading eastbound, one of which is left-turn-only. The major streets, Hollis and Waverley, are in good condition. Two minor streets, Claflin and Cedar, are in poor condition.

Hollis Street, which is approximately 38 feet wide, has parking on both sides. Waverley Street, which is approximately 43 feet wide, has parking for a short section on the north side, west of the intersection with Concord and Irving Streets. Both streets have a double yellow centerline. There are marked shoulders on Waverley Street. The minor streets generally do not have any striping. The roadway edges of the major streets are generally clear of obstructions, but the minor streets have obstructions—mainly litter and uneven paved surfaces–that would impact the safety of bicyclists.

The two ribbon racks at the commuter rail station, located under the station platform roof, hold ten bicycles.

Recommendations

35. Given the 43-foot width of Waverley Street at the intersection with Irving and Concord Streets, create a 10-foot left-turn lane eastbound, and 11-foot travel lanes and 5.5-foot bicycle lanes in each direction. For Hollis Street, see Recommendation 5.

36. For the minor roads, maintain a regular street-cleaning program and improve the edges, either through reconstruction or re-paving.

37. Install bicycle lockers at the MBTA commuter rail station and bicycle parking at the Boys and Girls Club and in commercial areas.

Walking

Existing Conditions

Sidewalks in the neighborhood range from being good to nonexistent. The sidewalks along Hollis and Waverley Streets are concrete, with granite curbs, and are in good condition. Those along Calflin and Cedar Streets generally are asphalt, with granite curbs, and are in fair to poor condition. There is no distinction between the sidewalk, the street, and the railroad tracks along Claflin Street. There are no sidewalks along the west side of Cedar Street just south of Waverley Street.

There are no vegetation buffers between the sidewalk and the roadways. There are street trees only along Hollis Street. Few front yards have large trees that provide shade for pedestrians. There is no buffer between the sidewalk and paved areas along most of Waverley Street. The sidewalks slope down slightly to the level of intersecting roadways and driveways.

There are a few crosswalks along this corridor, on Waverley, Cedar, Claflin, Hollis, Avon, and Gordon Streets, and on Hollis Court and Waushakum Avenue. All of the crosswalks have two curb ramps each. The crosswalk across Avon Street is yellow-and-white ladder-style. All the other crosswalks are zebra-style.

There is a traffic signal at Hollis and Pine Streets and Waushakum Avenue, but no pedestrian phase.

Recommendations

38. Improve the sidewalks along Claflin and Cedar Streets, including the area where the railroad tracks cross Claflin Street. This area should be kept free of litter. Also, improve the sidewalks on Hollis Street between Claflin and Pine Streets to better define the separation between the street and the sidewalk near the railroad tracks, and between parking lots and the sidewalk north of the tracks on the west side of the street.

39. Create crosswalks for the following intersections:
    - All legs at Claflin and Hayes Streets
    - All legs at Claflin and Highland Streets
    - All legs at Claflin and Cedar Streets
    - The east and west legs at Cedar and Waverley Streets
    - The north leg at Claflin and Hollis Streets
    - The north leg at Hollis Street and Hollis Court

40. Create curb extensions on the Waverley Street crosswalks.

41. Add a pedestrian phase at the signalized intersection of Hollis and Pine Streets and Waushakum Avenue.

42. Just north of this intersection, square off the intersection of Avon Street as it intersects Hollis Street. Currently, the crosswalk is unnecessarily long.

6.2.5 THE NEIGHBORHOOD SOUTHEAST OF DOWNTOWN

This neighborhood is characterized by commercial businesses along Irving and Waverley Streets, a park, and a playground on the corner of Arlington and Gordon Streets, numerous small multi-family buildings, and a few small parking lots.

Bicycling

Existing Conditions

The roadways are generally in fair condition. The major streets, Irving, South, and Waverley, are in good condition. The minor streets, Arlington, Gordon, and Columbia, are in fair condition. All of the streets are two-way except for Gordon and Columbia.

South Street, which is approximately 35 feet wide, has parking on both sides. Irving Street, with a width of 31 to 32 feet, has parking on the west side. Waverley Street is approximately 48 feet wide and has no parking. All have a double yellow centerline and no other striping. The minor streets have no striping. The roadway edges of these streets are generally clear of obstructions that would impact the safety of bicyclists.

There is no bicycle parking in the neighborhood.

Recommendations

43. For South Street, with a width of 35 feet, alternate a 7-foot parking lane from one side to the other. Adjacent to the parking lane, create a 5-foot bicycle lane. Mark two 10-foot travel lanes and a 3-foot shoulder on the non-parking side.

44. Given the 48-foot width of Waverley Street, mark two 12-foot travel lanes and two 6-foot bicycle lanes, allowing extra room for a parking lane where desired, or left-turn storage lanes. Alternatively, mark a 16-foot back-in angle-parking lane on the south side, a 6-foot bicycle lane, two 10.5-foot travel lanes, and a 5-foot bicycle lane. Eliminate the parking lane wherever a storage lane is desired. A longer-term alternative is to expand the area south of the railroad tracks and create a tree and vegetation border.

45. Provide bicycle parking at the playground and in commercial areas.

Walking

Existing Conditions

The sidewalks along Irving, South, and Waverley Streets are concrete, with granite curbs, and are in good condition. There is no sidewalk on the north side of Waverley Street. Most of the sidewalks along the minor streets are asphalt, with granite curbs, and are in fair to poor condition. The sidewalk along the south side of Columbia Street is too narrow, especially because it has poles and other obstructions.

There are no vegetation buffers between the sidewalk and the roadways, nor are there any street trees. Few front yards have large trees that provide shade along the street. The sidewalks along the west side of Gordon Street have little to distinguish them from the street, since there is no curb. The sidewalks slope down slightly to the level of intersecting roadways and driveways.

There is only one crosswalk along South Street, and none near the park on Arlington Street. Most of the crosswalks are highly visible, some zebra-style and some yellow-and-white ladder-style. None of the crosswalks share a curb ramp.

The intersection of Irving and Arlington Streets has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of an 8-second “Walk” signal and a 7-second flashing “Don’t Walk” signal. There are crosswalks on all but the northwest leg of the intersection, all ladder-style with yellow rungs. Clockwise, they are 31, 32, and 33 feet long. Using a 3.5-foot-per-second standard for pedestrians crossing a roadway, the pedestrian phase is adequate for the lengths of the crossings.

Recommendations

46. Improve the sidewalks along Gordon and Arlington Streets, including better curbs along Gordon Street, to demarcate the street from the sidewalk.

47. Widen the sidewalk and/or move the obstructions along the southeast side of Columbia Street.

48. Create crosswalks for the following intersections:
    - All legs at South and Arlington Streets
    - All legs at Arlington and Gordon Streets adjacent to the park
    - All legs at South and Columbia Streets
    - The northwest leg at Columbia and Irving Streets
    - The northwest leg at Arlington and Irving Streets
    - The southeast and northeast legs at Arlington Street and Arlington Place
    - All legs at Taylor and South Streets
    - All legs at East and South Streets
    - All legs at Irving, Alexander, and South Streets

49. Create a curb extension for the crosswalk across Irving Street at Columbia Street, on the southeast side of the intersection.

50. Create buffers wherever feasible between the sidewalks and the roadways.

7 Franklin

The first section of this chapter provides a profile of the town. The second section describes existing bicycling and walking conditions in the study area, Franklin Center and environs, and recommendations for improvements. The findings are based on meetings and correspondence with local staff, fieldwork, and review of previous studies.

The studies consulted in the preparation of this report are the following:

- *Franklin Center Downtown Revitalization Initiative*, Weston and Sampson, 2002/2003
- *Franklin Center Transit Oriented Development (TOD) Study*, The Cecil Group and Peter Smith Associates, December 2006
- *Franklin Community Development Plan*, The Cecil Group, May 2004,
- *Town of Franklin Downtown Parking Assessmen*t, Town of Franklin Department of Planning and Community Development, July 2008
- Memo: "Downtown Parking Study," Bryan Taberner, Director of Town of Franklin Department of Planning and Community Development, March 25, 2008
- Memo: "Welcome to Downtown Franklin Sign and Related Cultural Corridor Map for the Downtown Common," Bryan Taberner, Director of Town of Franklin Department of Planning and Community Development, March 11, 2008
- Memo: "Downtown Manager Projects," Bryan Taberner, Director of Town of Franklin Department of Planning and Community Development, March 7, 2008
- Memo: "Parking," Franklin Downtown Partnership Board of Directors, March 14, 2008
- *Downtown Franklin Goals and Objectives*, Franklin Downtown Partnership, February 13, 2008
- *100 best places to live and launch*, money.cnn.com, March 2008

Of these materials, four were particularly pertinent to this study: the *Downtown Revitalization Initiative*; the *Franklin Center TOD Study*; the *Franklin Community Development Plan*; and the *Town of Franklin Downtown Parking Assessment*.

7.1 COMMUNITY PROFILE

Included in this section are a short history of Franklin, a general description of land use, population and employment data, an overview of the transportation network, and crash data.

7.1.1 HISTORY

Settled in 1676, the town was part of its eastern neighbor, Wrentham, until 1778. It became the first community in the nation named after Benjamin Franklin, who showed his appreciation by sending over a hundred books, forming the core of "America's First Public Library." With waterpower, industry flourished in this initially agrarian community. Providing a blend of open space, affordability, job opportunities, good schools and intangible charm, *Family Circle* magazine recently named Franklin as one of the best towns in the nation in which to raise a family.

7.1.2 LAND USE

Franklin is located about 30 miles southwest of Boston and 20 miles north of Providence, Rhode Island. Land uses are primarily residential, retail, and manufacturing. Franklin State Forest is located in the west central part of town. The well-defined central business district is composed of retail shops, the library, a commuter rail station, an elementary school, and Dean College.

Dean College, Downtown Franklin

7.1.3 POPULATION AND EMPLOYMENT

As shown in Table 7-1, according to the 2000 census, 29,798 people called Franklin home. That was up from 22,095 in 1990 – a 34.9 percent boom. The Metropolitan Area Planning Council (MAPC) forecasts the population to grow another 15.4 percent to 34,385 from 2000 to 2030. Recorded at 13,596 in 2000, MAPC projects employment in Franklin to grow by 18.4 percent to 16,091 from 2000 to 2030.

TABLE 7-1
Population and Employment,
in Franklin–2000, 2010, 2020 and 2030

	2000	2010	Change 2000-2010	2020	Change 2010-2020	2030	Change 2020-2030
Population	29,798	31,186	4.7%	32,964	5.7%	34,385	4.3%
Employment	13,596	14,613	7.5%	15,510	6.1%	16,091	3.7%

7.1.4 TRANSPORTATION

Since 1849 Franklin has enjoyed rail access, which initially extended from Boston, south through Franklin, to New York. The line was later shortened to Hartford, then to Blackstone, Massachusetts, and was finally terminated at Downtown Franklin in 1966. In 1989, the MBTA extended the Franklin Line of the commuter rail system to Forge Park just west of Interstate 495 (I-495).

State Route 140 bisects the town, running east-west between Foxborough and Bellingham and points beyond. The town is linked via two interchanges to the circumferential I-495, which runs from northwest to southeast through Franklin.

7.1.5 CRASH AND USAGE DATA

As shown in Table 7-2, between 2002 and 2006, there were six reported crashes in Franklin that involved bicyclists, none of which were fatalities, representing 0.3 percent of all crashes. In the same period there were 16 reported crashes involving pedestrians, representing 0.9 percent of all crashes. Two of these were fatalities.

TABLE 7-2
Bicycle, Pedestrian, Motor-Vehicle, and Total Crashes and Fatalities in Franklin, By Number and Percentage–2002-2006 Inclusive

	Crashes		Fatalities	
Mode	**Number**	**Percentage**	**Number**	**Percentage**
Bicycle (Bike)	6	0.3%	0	0.0%
Pedestrian (Ped)	16	0.9%	2	22.2%
Motor Vehicles (MV) only	1,824	98.8%	7	77.8%
All Crashes (Bike, Ped & MV)	1,846	100.0%	9	100%

On West Central Street between Emmons and Cottage Streets on Tuesday, August 26, 2008, there were 15 bicyclists and 276 pedestrians counted from 6:00 AM to 10:00 AM.

Figure 7-1 shows the location of the above bicycle and pedestrian crashes. As noted in Chapter 1, some crashes may not have been reported.

7.2 STUDY AREA

The first part of this section of the chapter defines the study area (shown in Figure 7-2) and gives an overview of transit service and walking and bicycling conditions. Subsequent sections provide more details on the different parts of the study area.

The study area for Franklin includes five corridors:

- Central Street from King/Chestnut Streets to Union Street
- Main Street from Central Street to Pleasant Street
- Union Street from Beaver/Pleasant Streets to Cottage Street
- Cottage Street from Union Street to Central Street
- Emmons Street from Main Street to West Central Street

The heart of the downtown is sometimes described as the downtown triangle. The three streets creating the triangle, Emmons on the northwest, West Central on the south, and Main on the northeast, are all one-way counterclockwise.

One of Franklin's two commuter rail stations is located in the study area. Franklin Station is adjacent to the downtown triangle. There are 16 inbound trains to Boston between 5:15 AM and 11:57 PM and 15 trains arriving from Boston between 4:40 AM and 12:44 AM, with the greatest frequencies during rush hour. There is a 173-space parking lot with three accessible spaces and seven official bicycle spaces. Only one or two bicycles were observed parked on the racks when conditions around the station were evaluated. The other MBTA commuter rail station in town, Forge Park, is located near I-495.

Bicycle parking at the Franklin Commuter Rail Station

The Greater Attleboro Taunton Regional Transit Authority (GATRA) operates the Franklin Area Bus (FAB) shuttle service through the study area between Village Plaza

FIGURE 7-1
Franklin: Crashes in 2002-2006 Involving Pedestrians and Bicyclists

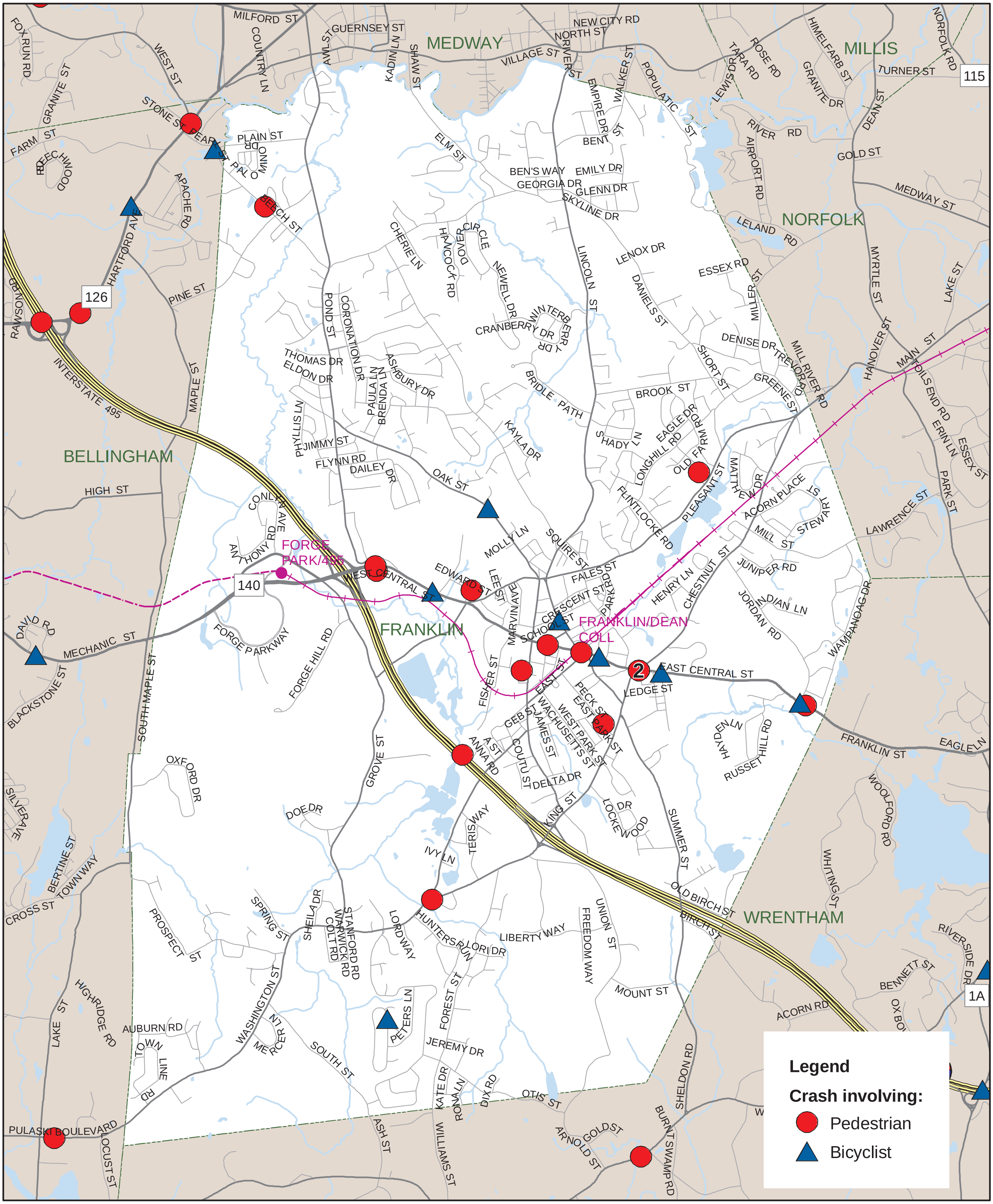


FIGURE 7-2
Downtown Franklin
Existing Conditions

and Jordan Road. There are several stops within the study area, including those at or near Dean College and Franklin Station. The GATRA FAB service connects the station to area employment, retail, and residential centers. The service runs 22 times on weekdays and 14 times on Saturday.

The town recently installed new sidewalks along Union and Cottage Streets. The sidewalks in the other areas are generally in good condition with only minor cracking and weeds growing sporadically. A major exception is the sidewalk on the south side of Depot Street from Main Street to the train station, which is in poor condition.

The sidewalks are primarily concrete with granite curbs, although there are some sidewalks with no curbs along Main Street between School Street and High Street and some brick sidewalks along Union Street and brick details along Main Street downtown. While only the sidewalks along Main Street in the downtown area and East Central Street between Alpine Row and the railroad tracks have street trees, trees growing in the front yards of homes and businesses shade many of the sidewalks throughout the study area.

Recent studies support planning strategies that will accommodate and likely increase pedestrian mobility in Downtown Franklin. Produced by the Cecil Group, the *Franklin Community Development Plan* includes creating a special zoning overlay district to encourage mixed uses, expanding the efficiency of the central business district, as well as implementing new streetscape and pedestrian improvements to encourage reinvestment and initiating transportation studies to improve traffic circulation and pedestrian safety. Also conducted by the Cecil Group, the *Franklin Center TOD Study* contends that “a new parking garage located on nearby MBTA property would offer great convenience to shoppers, visitors, commuters, and employees who enjoy so many services within walking distance… A new garage would greatly support this walking convenience and ambience that will make downtown Franklin even more attractive.”

In the *Downtown Revitalization Initiative*, Weston & Sampson Engineering, Inc., offered several suggestions for improving pedestrian safety and mobility, including streetscape improvements in Franklin Center. Finally, the Town of Franklin Department of Planning and Community Development, in the *Town of Franklin Downtown Parking Assessment*, urges local officials to consider signage, pedestrian linkages, pedestrian-scale lighting, bicycle racks, bicycle lockers, and handicapped accessibility.

The crosswalks in the study area are generally highly or sufficiently visible with exclusive curb ramps for each crosswalk. However, crosswalks should be added, particularly across East Central Street and parts of Cottage and Main Streets. Consistent with this recommendation, the *Downtown Revitalization Initiative* recommends mid-block crosswalks on Dean, Depot, and East Streets.

Almost all of the existing crosswalks extend along the most logical path for pedestrians, although some need minor realignments. The crosswalks in the downtown area are ladder style; many of the others in the study area are either zebra or parallel-bar style.

There are curb extensions in the downtown area for crosswalks across busy streets. Islands are present at signalized intersections where motorists have dedicated right turns, namely King/Chestnut Streets at East Central Street, Central and Main Streets, Main and Pleasant Streets, and Emmons and West Central Streets.

There are a few signalized pedestrian crossings in the study area. The pedestrian phases at some of the intersections are adequate, but at some, too short. All of the pedestrian phases are exclusive. There are no pedestrian countdown signals.

Most of the five roadways in the study area are wide enough to accommodate on-street bicycling and many have marked shoulders. East Central and Union Streets have striped shoulders of various widths, which sometimes accommodate parking. West Central and Cottage Streets are narrow but have striped shoulders of a few feet that help accommodate on-street bicycling. Main Street could better accommodate on-street bicycling, particularly north of Emmons Street where the shoulders are wide but unmarked. Emmons Street is too narrow to safely accommodate on-street bicyclists. All of the roadways have two lanes. The roadways around the downtown triangle (Main-Emmons-West Central) are two-lane, one-way streets.

Approximately a quarter of the roadways in the study area have on-street parking, which increases the risks to bicyclists. The edges of the roadway generally do not have significant cracks or large debris, and drainage grates are set back from the roadway.

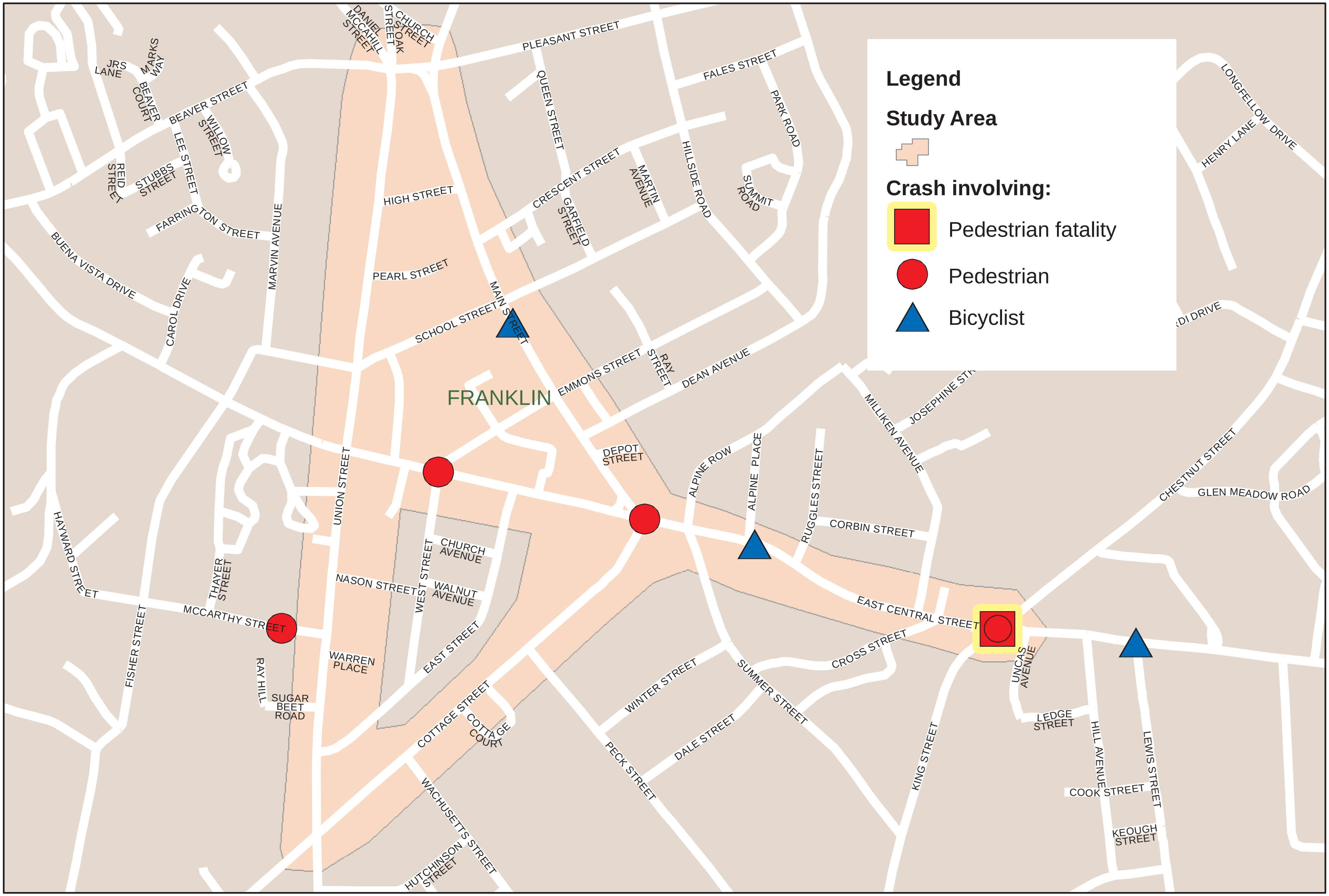
The *Downtown Revitalization Initiative* supports traffic-calming measures at Franklin Center's three gateways at the intersections of Main, Central and Emmons Streets. Slower traffic speeds resulting from such efforts to calm traffic would support increased on-road bicycling in Downtown Franklin.

There is bicycle parking at the commuter rail station and the library. However, the parking at the library is on grass with no access walkway and does not conform to current design guidance.

Bicycle parking at the library

Figure 7-3 indicates bicycle and pedestrian crashes within the study area from 2002 through 2006. During those five years, there were four crashes involving a pedestrian and

FIGURE 7-3
Downtown Franklin
Crashes in 2002-2006 Involving Pedestrians and Bicyclists



two involving bicyclists. Two of those four pedestrian crashes occurred at the same location, East Central/King/Chestnut Streets, and one was a fatality. The two other pedestrian crashes were on West Central Street, one at Main and Cottage Streets and one at West Street. One bicycle crash occurred on East Central Street, near Alpine Street. The remaining bicycle crash was on Main Street near School Street. Two other crashes occurred near the study area: one involving a pedestrian on McCarthy Street near Union Street and one involving a bicyclist on East Central and Lewis Streets.

The subsequent sections of the chapter include more detail on existing conditions as well as recommendations, which are shown in Figure 7-4.

7.2.1 Central Street: King/Chestnut Streets to Union Street

The Central Street corridor includes West Central Street from Union to Cottage/Main Streets and East Central Street from there to King/Chestnut Streets. Included here are a commercial area at King/Chestnut Streets, residences, the downtown, the Davis Thayer Elementary School and Dean College.

Bicycling

Existing Conditions

There are two travel lanes on East Central, one in each direction, separated by double yellow lines. There are left-turn lanes at Summer Street and at Cottage Street. Between Main Street and Alpine Place, there is parking on both sides of the street. Solid white lines mark the parking lanes, which are 8 feet wide. The travel lanes are 13 and 14 feet wide, eastbound and westbound respectively, and the left-turn lanes are 12 feet wide.

Between Alpine Place and King/Chestnut Streets, there is no parking. Marked shoulders abut the 12-foot travel lanes. With the roadway width ranging from 35 to 39 feet, the shoulder width ranges between six and eight feet. The roadway surface is smooth, with no major impediments. The roadway edge is clear of obstructions that would inhibit the safety of bicyclists.

There are two travel lanes on West Central Street—both in the same direction between Main and Emmons Streets and one in each direction between Emmons and Union Streets. There is no on-street parking on West Central Street. The 28-foot right-of-way includes two 13-foot travel lanes and two one-foot shoulders. A single dashed white line that becomes solid at the approaches to and exits from the intersections with Main and Emmons Streets divides the travel lanes. A double yellow line divides the travel lanes between Emmons and Union Streets. The roadway surface is smooth, with no major impediments. The roadway edge is clear of obstructions that would inhibit the safety of bicyclists.

There is no bicycle parking along this corridor.

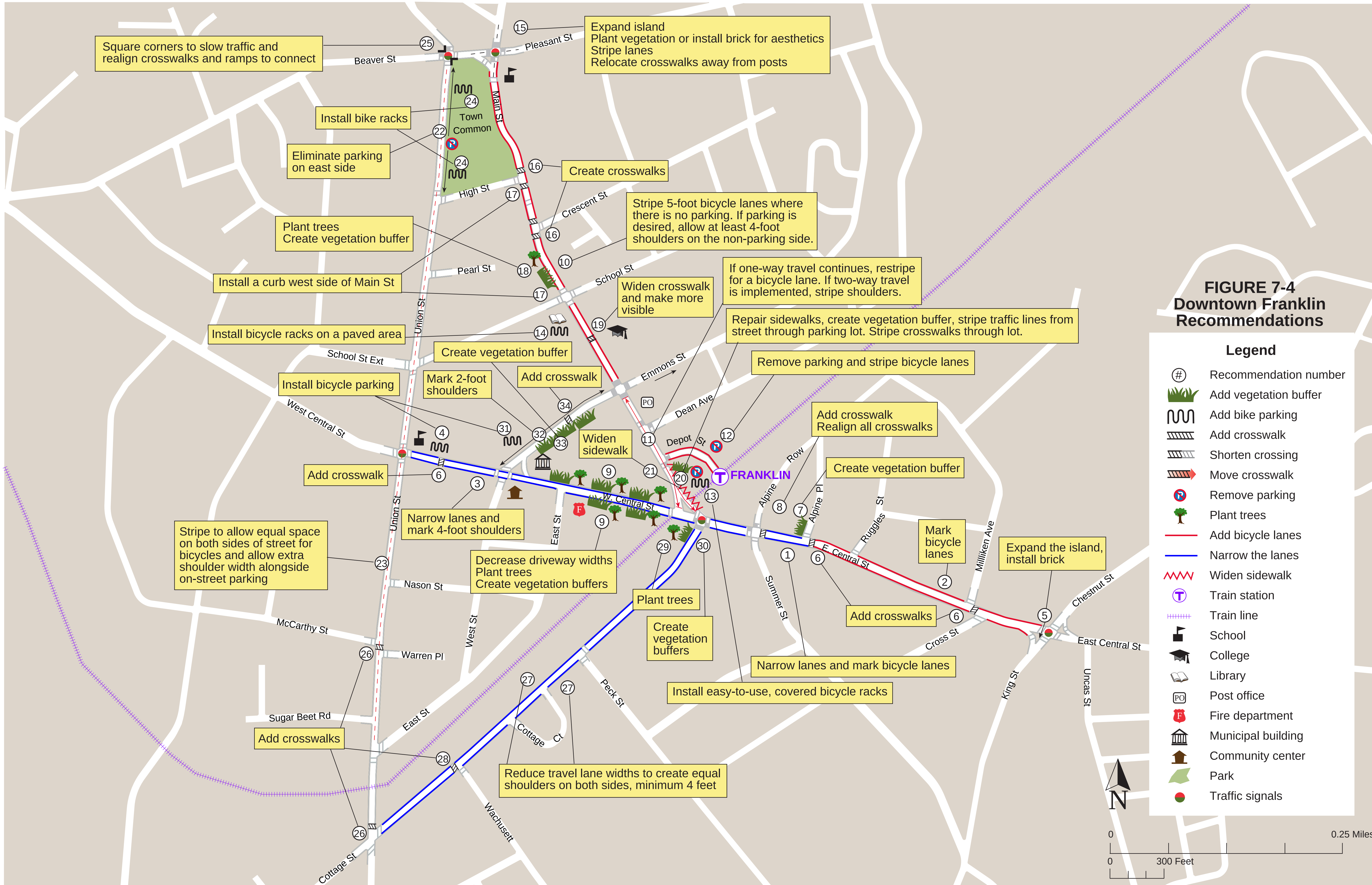


FIGURE 7-4
Downtown Franklin
Recommendations
Square corners to slow traffic and realign crosswalks and ramps to connect
Expand island
Plant vegetation or install brick for aesthetics
Stripe lanes
Relocate crosswalks away from posts
Install bike racks
Eliminate parking on east side
Create crosswalks
Stripe 5-foot bicycle lanes where there is no parking. If parking is desired, allow at least 4-foot shoulders on the non-parking side.
Plant trees
Create vegetation buffer
Install a curb west side of Main St
If one-way travel continues, restripe for a bicycle lane. If two-way travel is implemented, stripe shoulders.
Widen crosswalk and make more visible
Repair sidewalks, create vegetation buffer, stripe traffic lines from street through parking lot. Stripe crosswalks through lot.
Install bicycle racks on a paved area
Create vegetation buffer
Remove parking and stripe bicycle lanes
Mark 2-foot shoulders
Add crosswalk
Install bicycle parking
Widen sidewalk
Add crosswalk
Realign all crosswalks
Create vegetation buffer
Add crosswalk
Narrow lanes and mark 4-foot shoulders
Mark bicycle lanes
Expand the island, install brick
Stripe to allow equal space on both sides of street for bicycles and allow extra shoulder width alongside on-street parking
Decrease driveway widths
Plant trees
Create vegetation buffers
Plant trees
Create vegetation buffers
Add crosswalks
Narrow lanes and mark bicycle lanes
Install easy-to-use, covered bicycle racks
Add crosswalks
Reduce travel lane widths to create equal shoulders on both sides, minimum 4 feet
Town Common
FRANKLIN
Beaver St
Pleasant St
Main St
High St
Crescent St
Pearl St
School St
Union St
School St Ext
Emmons St
Dean Ave
Depot St
West Central St
W. Central St
E. Central St
East Central St
East St
West St
Nason St
McCarthy St
Warren Pl
Sugar Beet Rd
Cottage St
Cottage Ct
Peck St
Wachusett
Alpine Row
Alpine Pl
Ruggles St
Summer St
Milliken Ave
Cross St
Chestnut St
King St
Uncas St
Legend
Recommendation number
Add vegetation buffer
Add bike parking
Add crosswalk
Shorten crossing
Move crosswalk
Remove parking
Plant trees
Add bicycle lanes
Narrow the lanes
Widen sidewalk
Train station
Train line
School
College
Library
Post office
Fire department
Municipal building
Community center
Park
Traffic signals
0
0.25 Miles
300 Feet
N

Recommendations

1. On East Central Street between Main Street and Alpine Place, narrow the parking lanes to 7 feet, the travel lanes to 11 feet, and the left-turn lane to 10 feet, thereby providing 4.5-foot lanes for bicyclists.

2. On East Central Street, between Alpine Place and Chestnut/King Streets, with the existing roadway width ranging from 35 to 39 feet, mark the shoulders as bicycle lanes on both sides of the street.

3. On West Central Street, with a width of 28 feet, narrow the travel lanes to 10.5 feet and mark 3.5-foot shoulders.

4. Install bicycle parking, covered where possible, at various locations, including the elementary school, the commercial area, and the municipal parking lot.

Walking

Existing Conditions

Sidewalks extend along both sides of Central Street. The sidewalks are more than five feet wide and are made of concrete with granite curbs. The surface is smooth and free of significant bumps or cracks. There is no vegetation buffer between the sidewalk and the roadway. There are no street trees along the roadway, but many front yards have large trees that provide shade along the street, except between Emmons Street and Alpine Place. The sidewalk slopes down to the level of intersecting roadways and driveways.

There are numerous crosswalks along this corridor. Some share a curb ramp, but many have exclusive cuts. Almost all of the Central Street crosswalks are ladder style; some of those that cross intersecting streets are parallel-bar style.

The intersection of West Central and Union Streets has a four-way stoplight with pedestrian-activated crossing signals. The exclusive pedestrian phase consists of a 6-second “Walk” signal and a 15-second flashing “Don’t Walk” signal. There are crosswalks across each side of the intersection, all parallel-bar style. Clockwise from the north, they are 41, 36, 48, and 44 feet long. Using a 3.5-foot-per-second standard for pedestrians crossing a roadway, the total pedestrian phase is adequate for the lengths of the crossings.

At the East Central and King/Chestnut Streets intersection, from 2002 to 2006, there were two pedestrian crashes, including a fatality. The intersection has a four-way stoplight with pedestrian-activated crossing signals. There is an island with connecting crosswalks on the southwest approach of the intersection. The exclusive pedestrian phase consists of a 6-second “Walk” signal and a 12-second flashing “Don’t Walk” signal. There are crosswalks across each approach of the intersection, and the crosswalks are ladder style across East Central Street and parallel-bar style across King/Chestnut Street. Clockwise from the north, they are 48, 47, 56, and 58 feet long. Using a 3.5-foot-per-second standard for pedestrians crossing a roadway, the total pedestrian phase is adequate for the lengths of the crossings.

The Central and Cottage Streets intersection has a three-way stoplight with pedestrian-activated crossing signals. The exclusive pedestrian phase consists of a 5-second "Walk" signal and a 10-second flashing "Don't Walk" signal. There are ladder-style crosswalks on each approach of the intersection. Clockwise from the north, they are 52, 47, and 49 feet long. Using a 3.5-foot-per-second standard for pedestrians crossing a roadway, the total pedestrian phase is barely adequate for the lengths of the crossings.

Recommendations

5. Intersection of East Central, King, and Chestnut Streets
   - Expand the islands at the northeast and southwest approaches of this intersection so that they nearly fill the space within the current striped area. This will slow turning traffic through this intersection and provide more protection for pedestrians. If the town decides to add a traffic lane to King Street, then make the island smaller.
   - Consider planting or installing brick on the island at the entrance of the downtown area to both enhance the aesthetics and provide visual cues to help slow down motor vehicles.
6. Add crosswalks at the following locations:
   - Across East Central Street between Cross Street and Milliken Avenue
   - Across East Central Street at Alpine Place (at least one)
   - Across West Central Street, from the elementary school to Dean College's Bourret Hall
7. Create a vegetation buffer between the sidewalk and the paved area surrounding the gas station on the northwest corner of East Central Street and Alpine Place.
8. Intersection of East Central Street, Summer Street, and Alpine Row
   - Create a crosswalk across East Central Street on the east approach of the intersection
   - Realign all crosswalks to go straight across the streets

Misaligned crosswalk across Summer Street

9. West Central Street between Cottage and East Streets
   - Where possible, decrease driveway widths
   - Create vegetation buffers between the sidewalk and parking lots
   - Plant street trees

7.2.2 MAIN STREET: CENTRAL STREET TO PLEASANT STREET

Main Street extends northward from downtown near the train station past Dean College, the town library, and some residences, to the Benjamin Franklin Public Charter School, the Franklin Federated Church, and the Town Common.

Bicycling

Existing Conditions

There are two travel lanes on Main Street—both northwest-bound between Central and Emmons Streets and one in each direction between Emmons and Pleasant Streets. There is parking on both sides of the street between Central Street and Emmons Street. No marked shoulders abut the travel lanes except between Emmons and School Streets. The roadway in the downtown area is between 44 to 45 feet wide; from Emmons Street north, the width ranges between 34 and 41 feet.

In the downtown area, eight-foot parking lanes on both sides of the street are striped, leaving 14-foot travel lanes. A single dashed white line, which divides the travel lanes, becomes solid at the approach to and exit from the intersections with Emmons Street and Central Street respectively. A double yellow line divides the travel lanes between Emmons and Pleasant Streets. The roadway surface is smooth, with no major impediments. The roadway edge is clear of obstructions that would inhibit the safety of bicyclists.

There is a bicycle rack at the library.

Recommendations

10. On Main Street from Emmons Street to Pleasant Street, with the existing roadway width ranging between 34 and 41 feet, where there is no parking, stripe at least 5-foot bicycle lanes on both sides of the street. The narrowest travel lane would then be 12 feet wide in these areas. If parking is provided on one side in areas where Main Street is wider, allow at least 4-foot shoulders on the non-parking side. On the parking side, allow at least 5 feet between the outermost edge of the marked 7-foot wide parking spaces and the travel lane.

11. On Main Street between Central and Emmons Streets, with a roadway width of 44 to 45 feet (two feet having been taken for a widened sidewalk on the east side of Main

Street, per Recommendation 21 below), stripe as follows, from the west to the east side of Main Street:

- If the current one-way travel continues: 7 feet for parking, 12.0 feet for a travel lane, 12.0 feet for a travel lane, 6 feet for a bicycle lane, and 7 feet for parking
- If two-way travel is implemented: 7.0 feet for parking (marking spaces with a "T"), a solid line 12.0 feet from the curb, two 10.0-foot travel lanes, a solid line 12.0 feet from the curb, and 7.0 feet for parking (marking spaces with a "T")

12. Remove parking on the north side of Depot Street to allow for the striping of bicycle lanes on both sides of the street to the commuter rail station.

13. Install racks at the commuter rail station that are easier to use and under cover.

14. Install racks at the library on a paved area that is easier to access.

Walking

Existing Conditions

Sidewalks extend along both sides of Main Street. Between Central and Emmons Streets in the downtown area, the sidewalks are very wide on the east side except between Central and Depot Streets, where they are only a few feet wide. The sidewalks on the west side are wider than five feet. Outside of the downtown area, the sidewalks are more than five feet wide. All of the sidewalks are made of concrete with granite curbs except for the west side of Main Street between School and High Streets where the sidewalk has no curb. The surface is smooth and free of significant bumps or cracks.

Narrow sidewalk on Main Street

There is a vegetation buffer between the sidewalk and the roadway between Emmons and School Streets and High and Pleasant Streets. A partial buffer extends along the west side of Main Street north of School Street. There are no street trees along the roadway except between Central and Emmons Streets, but many front yards, the Town Common, and the college have large trees that provide shade and aesthetics along the street. The sidewalk slopes down to the level of intersecting roadways and driveways.

There are numerous crosswalks along this corridor, including a mid-block crossing at Dean College between Emmons and School Streets. Some crosswalks have exclusive curb ramps, but many have shared curb ramps.

The intersection of Pleasant and Main Streets has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 7-second "Walk" signal and a 10-second flashing "Don't Walk" signal. There are parallel-bar-style crosswalks across each approach of the intersection, which are, clockwise from the north, 43, 45, 44, and 48 feet long. Using the 3.5-foot-per-second standard for walking, the total pedestrian phase is adequate. There is also an island with connecting crosswalks on the southwest corner of the intersection.

Recommendations

15. Intersection of Main and Pleasant Streets:
    - Expand the island to provide a safer refuge for pedestrians and to slow down turning traffic
    - Plant vegetation or install brick on the island for aesthetics
    - Stripe approaching lanes to better separate traffic
    - Make sure curb ramps are in the middle of the crosswalks
    - Ensure that no signal posts are interfering with any crosswalks

Intersection of Main and Pleasant Streets:
no curb ramp, pole obstructing crosswalk.

16. Create crosswalks on Main Street at the intersections of High and Crescent Streets.

17. Install a curb on the west side of Main Street between School and High Streets.

18. Plant street trees and continue the vegetation buffer on the west side of Main Street.

19. Widen and increase the visibility of the mid-block crossing of Main Street between School and Emmons Streets.

20. Depot Street to Commuter Rail Station
    - Repair the sidewalk on the south side of Depot Street
    - Create a vegetation buffer between this sidewalk and the parking lot behind the businesses on Main Street
    - Stripe traffic lines down Depot Street through the parking lot to the station
    - Stripe crosswalks and walkways for pedestrians traversing the station parking lot

21. Widen the sidewalk by at least two feet on the east side of Main Street between Central and Depot Streets.

7.2.3 UNION STREET: PLEASANT STREET TO COTTAGE STREET

Union Street, reconstructed in the summer of 2007, stretches south from the Town Common, past residences and the Davis Thayer Elementary School, to a commercial area south of downtown.

Bicycling

Existing Conditions

There are two travel lanes, one in each direction. There is parking on both sides of the street along the Town Common between Beaver and High Streets, no parking on either side between High and School Streets, parking and a school bus pull-in on the east side between School and West Central Streets, and parking on the east side, south of West Central Street. Marked shoulders abut the 11-foot travel lanes. The roadway width ranges between 28 and 34 feet. The shoulder width ranges between three and six feet except from Beaver Street to High Street where there are 10-foot wide parking lanes instead of shoulders. A double yellow line divides the travel lanes. The roadway surface is smooth, with no major impediments. The roadway edge is clear of obstructions that would inhibit the safety of bicyclists.

There is no bicycle parking along this corridor.

Recommendations

22. Eliminate parking on the east side of Union Street between Pleasant and High Streets.

23. Stripe Union Street so the space available to bicyclists is the same on both sides of the street and allow extra shoulder width alongside on-street parking.

24. Install covered bicycle parking in the town common area.

Walking

Existing Conditions

Sidewalks rebuilt as part of the roadway reconstruction extend along both sides of Union Street. The sidewalks are more than five feet wide and are made of brick with granite curbs along the Town Common and of concrete with granite curbs elsewhere. The surface is smooth and free of significant bumps or cracks. There is a vegetation buffer between the sidewalk and the roadway on both sides of the street from the intersection of Pearl Street north and no buffer from this intersection south. There are no street trees along the roadway, but many front yards have large trees that provide shade. The sidewalk slopes down to the level of intersecting roadways and driveways.

There are numerous crosswalks, each with exclusive curb ramps. The crosswalks are parallel-bar style, with the exception of the brick inlaid crosswalk across Union Street at High Street.

The intersection of Pleasant, Beaver, and Union Streets has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of an 8-second “Walk” signal and an 18-second flashing “Don’t Walk” signal. The parallel-bar-style crosswalks on each approach of the intersection are, clockwise from the north, 62, 51, 50, and 55 feet long. Using a 3.5-foot-per-second standard, the total pedestrian phase is adequate. The radii on the corners of this intersection allow vehicles to make right turns at too high a speed. Two crosswalks share a curb ramp. The crosswalks do not extend along the most logical path for pedestrians as they cross the street.

Recommendations

25. At the intersection of Union, Pleasant, and Beaver Streets, square off the southeast and northwest corners to slow turning traffic. Realign crosswalks and curb ramps to connect the corners of the new intersection.

26. Add crosswalks at the following locations:
    - Across Union Street between McCarthy Street and Warren Place
    - On the north approach of Union and Cottage Streets

7.2.4 COTTAGE STREET: UNION STREET TO CENTRAL STREET

Cottage Street runs north from the commercial area south of downtown past residences to the eastern point of the downtown triangle.

Bicycling

Existing Conditions

Cottage Street was reconstructed in 2006. There are two travel lanes, one in each direction, with two-hour parking allowed near the Central Street intersection. Marked shoulders abut the 12-foot travel lanes. The roadway width ranges between 28 and 33 feet and the shoulder width ranges between two and five feet. A solid double yellow line divides the travel lanes. The roadway surface is smooth, with no major impediments. The roadway edge is clear of obstructions that would inhibit the safety of bicyclists.

There is no bicycle parking along this corridor.

Recommendations

27. Reduce the travel lanes on Cottage Street to allow a minimum shoulder width of 4 feet. Mark the travel lanes and shoulders so that the shoulder width is equal on both sides, except where parking is allowed. In those areas, mark a 7-foot parking lane and mark a bicycle lane extending at least 5 feet from the parking lane.

Walking

Existing Conditions

Sidewalks extend along both sides of Cottage Street. More than five feet wide, they are made of concrete with granite curbs. The surface is smooth and free of significant bumps or cracks. There is no buffer between the sidewalk and the roadway. There are no street trees along the roadway, but many front yards have large trees that provide shade. The sidewalk angles up and down to the level of intersecting roadways and driveways.

Besides the crosswalks at the signalized crossings, there is an additional one at Peck Street. It is sufficiently visible, with exclusive curb ramps, and is parallel-bar style.

Recommendations

28. Create a crosswalk across Cottage Street at Wachusett Street, on the southwest approach of the intersection.

29. Plant trees along Cottage Street near the approach to Central Street.

30. Create vegetation buffers between the sidewalks and the area parking lots.

7.2.5 EMMONS STREET: MAIN STREET TO WEST CENTRAL STREET

Emmons Street forms one side of the downtown triangle, with commercial and civic buildings on the downtown side and Dean College across the street.

Bicycling

Existing Conditions

Emmons Street is 24 feet wide and is composed of two one-way travel lanes; there are no marked shoulders or bicycle lanes. A single dashed white line, solid at the approach to and exit from the intersections with West Central and Main Streets, divides the travel lanes. The roadway surface is smooth, with no major impediments. The roadway edge is clear of obstructions that would inhibit the safety of bicyclists.

There is no bicycle parking along this corridor.

Recommendations

31. Install bicycle parking in the downtown area.
32. Mark two-foot shoulders on both sides of Emmons Street.

Walking

Existing Conditions

Sidewalks extend along both sides of Emmons Street. The sidewalks, which are more than five feet wide, are concrete with granite curbs. The surface is smooth and free of significant bumps or cracks. There is no buffer between the sidewalk and the roadway. There is a guardrail but no other buffer between the sidewalk and the municipal parking lot on the corner of Emmons and West Central Streets. There are no street trees along the roadway. The sidewalk slopes down to the level of intersecting roadways and driveways.

According to the Town of Franklin *Downtown Parking Assessment*, design of a $5.0 million roadway and streetscape improvement project was to begin in 2008. Public parking, signage, pedestrian linkages, pedestrian-scale lighting and other amenities are part of the proposal.

There are three crosswalks along this corridor. The two at Main Street have highly visible pavement markings, but they share curb ramps with adjacent crosswalks. The crosswalk at West Central Street has highly visible pavement marking and exclusive curb ramps.

There are no signalized pedestrian crossings in this corridor.

Recommendations

33. Create a vegetation buffer between the sidewalk on the southeast side of Emmons Street and the parking lot surrounding the municipal building at West Central Street.
34. Create a mid-block crossing on Emmons Street between Main and West Central Streets.

8 Weymouth

The first section of this chapter provides a profile of the town. The second section describes existing bicycling and walking conditions in the study area and recommendations for improvements. The study area, Jackson Square and the adjoining neighborhoods south and west, is located in northeast Weymouth. The findings are based on meetings and correspondence with local staff, fieldwork, and a review of previous studies. The studies consulted in the preparation of this report are *East Weymouth Station: Preparation for Station Opening*, August 2005, prepared by the Town of Weymouth, and *Back River Trail: Master Plan and Design Guidelines,* August 2005, prepared by ICON for the Town of Weymouth.

8.1 COMMUNITY PROFILE

Included in this chapter are a short history of Weymouth, a general description of land use, population, and employment data, an overview of the transportation network, and crash data.

8.1.1 HISTORY

Weymouth is the second oldest town in Massachusetts, preceded only by Plymouth. Settled in 1622 as Wessagusset and incorporated in 1635, Weymouth enjoyed an economy based on fishing and agriculture into the 19th century, and then shoemaking until 1973. Today the town serves as a coastal suburb of Boston. Weymouth's proximity to Route 3 helps support a variety of commercial activities. In 1999 the residents voted to adopt a mayoral form of government, but the formal name remains the Town of Weymouth.

8.1.2 LAND USE

In 1940, with a population of just under 24,000, Weymouth had several dense, walkable retail districts. After World War II, significant changes in local demographics and regional economies profoundly affected the town. Dramatic increases in car ownership rates, coupled with highway expansion projects, led to a population boom, with the number of residents more than doubling between 1940 and 1960 to over 48,000. Commuter rail service on the Plymouth and Greenbush commuter rail lines of the Old Colony Railroad and the 1956 opening of Route 3 contributed to the town's development as a "bedroom community" within the greater Boston region. Three years later, in 1959, commuter rail service in Weymouth ended. At the same time that new expressways allowed residents to travel easily throughout the region, traditional industries such as shoe factories closed. The local economy became based largely on service, retail, and wholesale operations.

8.1.3 POPULATION AND EMPLOYMENT

The population of Weymouth declined slightly, from 54,063 in 1990 to 53,987 in 2000, but the Metropolitan Area Planning Council (MAPC) projects an 18.2 percent residential growth from 2000 to 2030, to 63,788. MAPC projects employment to grow at more than twice that rate during the same time period, increasing by 40 percent from 16,560 to 23,168. (See Table 8-1.)

TABLE 8-1
Population and Employment in Weymouth – 2000, 2010, and 2030

Weymouth	2000	2010	% Change 2000-2010	2020	% Change 2010-2020	2030	% Change 2020-2030
Population	53,987	58,435	7.6%	61,373	4.8%	63,788	3.8%
Employment	16,560	19,335	14.4%	21,780	11.2%	23,168	6.0%

8.1.4 TRANSPORTATION

Three MBTA commuter rail stations—Weymouth Landing and East Weymouth on the Greenbush Line, and South Weymouth on the Plymouth/Kingston Line—serve the town, as well as four MBTA bus routes: 220, 221, 222 and 225.

The only grade-separated highway in Weymouth is State Route 3, which runs east–west about midway through the town. The main north–south arterial is Route 18, which has the town's only interchange with Route 3, about a mile from the town's western border with Braintree. The other numbered arterial in town is Route 53, which runs north of Route 3 and roughly parallels it.

8.1.5 CRASH DATA

Between 2002 and 2006, of all reported crashes in Weymouth, 95 involved pedestrians, representing 1.5 percent of the total. Those 95 crashes resulted in three fatalities. In the same period there were 41 reported crashes involving bicyclists, representing 0.7 percent of all crashes; those resulted in one fatality. These data are shown in Table 8-2, along with motor-vehicle crashes. The latter category refers to crashes involving motor vehicles only; the reported bicycle and pedestrian crashes almost always involve a motor vehicle.

Figure 8-1 shows the location of the above bicycle and pedestrian crashes. As noted in Chapter 1, some crashes may not have been reported.

FIGURE 8-1
Weymouth: Crashes in 2002-2006 Involving Pedestrians and Bicyclists

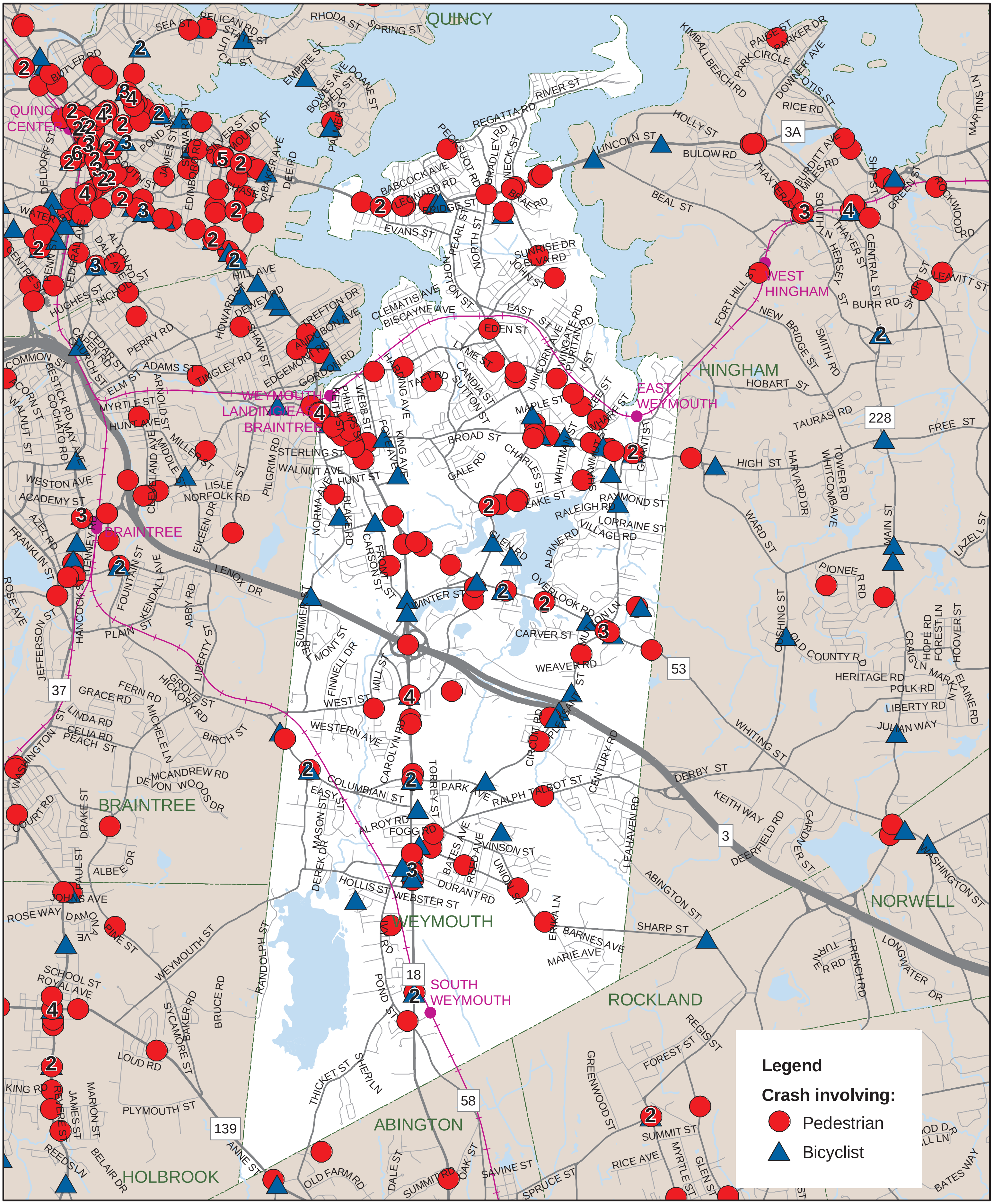


TABLE 8-2
Bicycle, Pedestrian, Motor-Vehicle, and Total Crashes and Fatalities in Weymouth, By Number and Percentage – 2002–2006 Inclusive

	Crashes		Fatalities	
Mode	**Number**	**Percentage**	**Number**	**Percentage**
Bicycle (Bike)	41	0.7%	1	12.5%
Pedestrian (Ped)	95	1.5%	3	37.5%
Motor vehicles (MV) only	6,170	97.8%	4	50.0%
All crashes (Bike, Ped, & MV)	6,306	100.0%	8	100.0%

8.2 STUDY AREA

The first part of this section of the chapter defines the study area and gives an overview of transit service and walking and bicycling conditions. Subsequent sections give more details on different parts of the study area.

Jackson Square is the largest of Weymouth's four villages. The study area (shown in Figure 8-2) includes most of Jackson Square and adjoining areas west and south. In this report, the study area has been divided into the following categories:

- Broad Street from Middle Street east to Jackson Square
- Pleasant Street from Jackson Square to Riley Avenue/Raymond Street
- The neighborhood southwest of Jackson Square
- The corridor for the proposed Back River Trail

The East Weymouth commuter rail station, on the Greenbush Line, is located about a third of a mile north of the study area, off of Commercial Street. There are 12 inbound trains departing between 6:07 AM and 8:34 PM, and 12 outbound trains arriving between 7:23 AM and 10:28 PM. There is a 398-space parking lot with eight accessible spaces and three ribbon-style bicycle racks.

MBTA bus Route 222, Quincy Center Station–East Weymouth, serves the study area. The route, which provides service on Water, Pleasant, and Broad Streets, runs 45 times a day on weekdays, between 5:35 AM and 12:34 AM, most frequently during the morning and afternoon rush hours. The midday frequency is about every 30 minutes, and nighttime service is hourly. There are 34 trips on Saturdays, from 6:36 AM to 11:51 PM, hourly in the morning and evening, and more frequently from the early afternoon through the early evening. There is hourly service on Sundays, from 7:51 AM to 11:51 PM.

FIGURE 8-2
Weymouth – Jackson Square
Existing Conditions
Legend
Crosswalk
No curb ramp
Shared curb ramp
Sidewalk in good condition
Sidewalk in fair condition
Sidewalk in poor condition
Narrow sidewalk
Poor sidewalk/street distinction
Train station
Train line
School
Library
Post office
Fire department
Playground
Community center
Park
Traffic signal
N
0
0.25 Miles
0
300 Feet
Sidewalk and curb in disrepair
Potential for bike lanes
Unhealthy street tree
Narrow path to school
No crossings for pedestrians
Lack of separation leads to parking issues
No separation between the street, sidewalk, and parking lot
Large paved area
New curb ramps but no sidewalk separation
EAST
WEYMOUTH
Jackson
Square
Skate
Park
Fish
Ladder
Ballfield
Broad St
Middle St
Cain Ave
Putnam St
Madison St
Filomena St
Fairmount Ave
Whitman St
Hillcrest Rd
Randall Ave
Cottage St
Commercial St
Shawmut St
Shawmut Ave
Washburn St
Pleasant St
Off Lake St
Lake St
Iron Hill St
Water St
Riley Ave
Raymond St
School St
Skelly Ave
Russel Whiting St
Lakeside
PG
PO
F

Overall, sidewalks are in good condition in the commercial area in Jackson Square, and in fair to poor condition elsewhere. The sidewalks in the commercial area are concrete, with granite curbs. The sidewalks elsewhere are either asphalt with granite curbs, or asphalt with no curbs, which results in little distinction from the roadway. Many of the sidewalks have weeds and minor cracking. Some of the minor streets have no sidewalks. Only sidewalks in the commercial area in Jackson Square along Broad Street have street trees, but there are only a few and some are in poor health.

Many crosswalks are barely visible, and several have shared curb ramps. A few crosswalks have no curb ramps. Almost all of the existing crosswalks extend along the most logical path for pedestrians. The crosswalks are green with white parallel bars in Jackson Square, and parallel bar-style elsewhere. There are no curb extensions.

Sidewalk on Broad Street

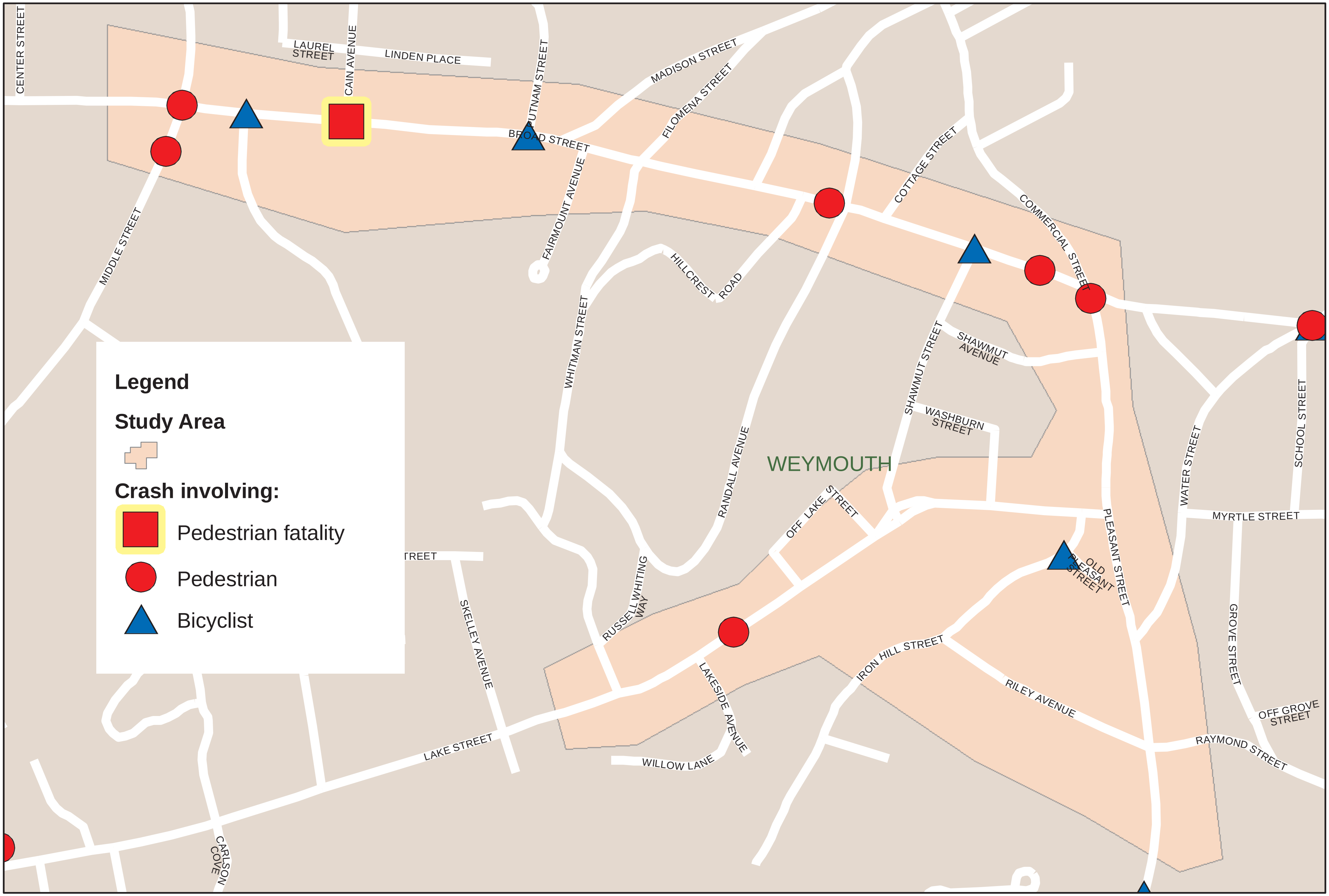
There are a few signalized pedestrian crossings, none of which have countdown signals. The pedestrian signal phases, all of which are exclusive, vary from too short in time to adequate for crossing.

Broad and Pleasant Streets accommodate on-street bicycling since they are wide enough and have marked shoulders. The shoulders along Broad Street accommodate parking; those along Pleasant Street do not, being only a few feet wide. The other streets are either not striped (Lake Street) or are too narrow (Shawmut Street between Lake and Pleasant Streets) to safely accommodate bicyclists.

All of the roadways are two lanes wide, except where there are turning lanes at some intersections. The edges of the roadway generally do not have significant cracks or large pieces of debris, and drainage grates are set back from the roadway. There is no formal bicycle parking in the study area. The closest bicycle parking is at the East Weymouth commuter rail station.

In the five-year period of 2002 through 2006, there were seven crashes within the study area involving a pedestrian and four involving a bicyclist (see Figure 8-3). One of the

FIGURE 8-3
Jackson Square, Weymouth
Crashes in 2002-2006 Involving Pedestrians and Bicyclists



pedestrian crashes, which occurred at Broad Street and Cairn Avenue, was fatal. As shown in the figure, although most crashes occurred on Broad Street, they were not concentrated at any particular locations. The number on Broad Street might be more of an indication that more bicycling and walking occurs there than that the conditions are relatively more hazardous than at other areas.

The following sections give more details on existing conditions and list recommendations, which are illustrated in Figure 8-4.

8.2.1 BROAD STREET: MIDDLE STREET TO PLEASANT/COMMERCIAL STREETS

Broad Street is an important east–west roadway that stretches across most of Weymouth. Within the study area, Broad Street connects a small commercial area located on Middle Street, in the western portion of the study area, with the commercial area of Jackson Square, to the east. In between, in addition to medium-density housing, there are several churches and a fire station.

Bicycling

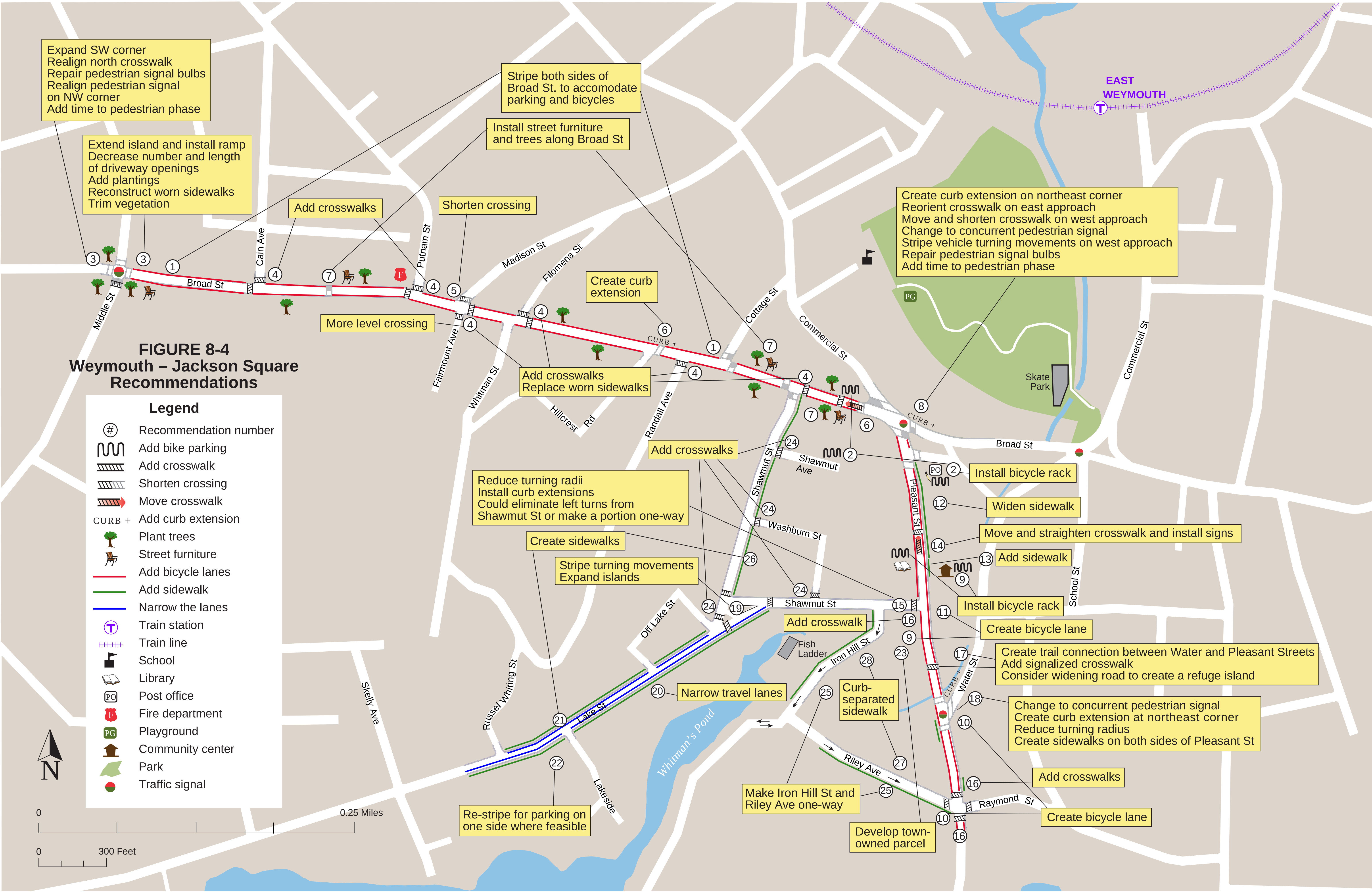
Existing Conditions

Broad Street is a two-way street and is two lanes wide in the study area. Parking is allowed on both sides, but few cars park between Middle Street and Randall Avenue. Broad Street's width ranges from 38 to 40 feet. Double yellow lines separate the east- and westbound travel lanes, and a single white line demarcates the parking areas. The roadway surface is mostly smooth, with no major impediments. The roadway edge is clear of obstructions that would have an impact on bicyclists. There is no bicycle parking.

Recommendations

1. With roadway widths ranging from 38 to 40 feet, stripe a single white line on both sides of Broad Street. This line could be painted 9 feet from the curb to accommodate parking and provide a guideline for bicyclists. The width of the travel lanes would vary between 10 and 11 feet.

2. Install bicycle racks in or near the intersection of Broad and Middle Streets. Also install racks in Jackson Square, possibly in or near the Korean War Memorial Park, which is northwest of the Broad/Pleasant/Commercial Streets intersection; the Edward W. Owens Jr. Memorial Park, in front of the post office; and in the municipal parking lot between Broad Street and Shawmut Avenue. Preferably, the racks should be sheltered from the elements.



Expand SW corner
Realign north crosswalk
Repair pedestrian signal bulbs
Realign pedestrian signal on NW corner
Add time to pedestrian phase
Extend island and install ramp
Decrease number and length of driveway openings
Add plantings
Reconstruct worn sidewalks
Trim vegetation
Add crosswalks
Stripe both sides of Broad St. to accomodate parking and bicycles
Install street furniture and trees along Broad St
Shorten crossing
More level crossing
Create curb extension
Add crosswalks
Replace worn sidewalks
Create curb extension on northeast corner
Reorient crosswalk on east approach
Move and shorten crosswalk on west approach
Change to concurrent pedestrian signal
Stripe vehicle turning movements on west approach
Repair pedestrian signal bulbs
Add time to pedestrian phase
EAST WEYMOUTH
Skate Park
Add crosswalks
Reduce turning radii
Install curb extensions
Could eliminate left turns from Shawmut St or make a portion one-way
Create sidewalks
Stripe turning movements
Expand islands
Install bicycle rack
Widen sidewalk
Move and straighten crosswalk and install signs
Add sidewalk
Install bicycle rack
Create bicycle lane
Add crosswalk
Create trail connection between Water and Pleasant Streets
Add signalized crosswalk
Consider widening road to create a refuge island
Change to concurrent pedestrian signal
Create curb extension at northeast corner
Reduce turning radius
Create sidewalks on both sides of Pleasant St
Narrow travel lanes
Curb-separated sidewalk
Fish Ladder
Whitman's Pond
Make Iron Hill St and Riley Ave one-way
Develop town-owned parcel
Add crosswalks
Create bicycle lane
Re-stripe for parking on one side where feasible
Broad St
Middle St
Cain Ave
Putnam St
Madison St
Filomena St
Fairmount Ave
Whitman St
Hillcrest Rd
Randall Ave
Cottage St
Commercial St
Shawmut St
Shawmut Ave
Washburn St
Pleasant St
School St
Iron Hill St
Water St
Off Lake St
Lake St
Russel Whiting St
Skelly Ave
Lakeside
Riley Ave
Raymond St
FIGURE 8-4
Weymouth – Jackson Square Recommendations
Legend
Recommendation number
Add bike parking
Add crosswalk
Shorten crossing
Move crosswalk
Add curb extension
Plant trees
Street furniture
Add bicycle lanes
Add sidewalk
Narrow the lanes
Train station
Train line
School
Library
Post office
Fire department
Playground
Community center
Park
Traffic signal
N
0 0.25 Miles
0 300 Feet

Walking

Existing Conditions

Sidewalks extend along both sides of the roadway and generally are more than five feet wide. Some sidewalks on Broad Street between Putnam Street and Randall Avenue are too narrow and, in some places, made even more so by overgrown vegetation. Between Hillcrest Road and Pleasant Street, the sidewalks are concrete, with granite curbs. The rest of the sidewalks are asphalt, and also have granite curbs. In general, the sidewalk surfaces are smooth and free of significant bumps or cracks. There are some sections of sidewalk, especially near Fairmount Avenue, that are in poor condition.

There are places where the driveways are either too wide or unnecessary. Two examples are a condominium complex, which has a driveway opening that is much wider than needed, and a church on the north side of Broad Street that has four driveways, all relatively wide. Just east of Middle Street, in front of a gas station, there is a sidewalk median with no curb ramps.

Lack of curb ramps along Broad Street;
the Middle Street intersection is in the background

There is no vegetation buffer between the sidewalk and the roadway, but many front yards have large trees that provide shade along the street, except between Randall Avenue and Pleasant Street where there are commercial fronts and only a few street trees. In general, the sidewalk along the street angles down to the level of intersecting driveways.

There are several crosswalks along this corridor. One at the intersection of Middle and Broad Streets does not have any curb ramps. There is no curb ramp on the north side of the mid-block crossing of Broad Street between Cain Avenue and Putnam Street. Three other pairs of crosswalks in the area share curb ramps. All of the crosswalks in the

Jackson Square area are white parallel lines filled in with green; most of the other crosswalks are parallel-bar style. There is a long crosswalk across Madison Street that lacks refuge points.

There are two signalized intersections. The intersection of Middle and Broad Streets has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a seven-second “Walk” signal and an eight-second flashing “Don’t Walk” signal. These signals cannot be seen from all corners, however. Of the eight signals, one faces the wrong direction, one works for “Walk” but not for “Don’t Walk,” and one is not working. The parallel-bar-style crosswalks on the four approaches of the intersection are 54, 46, 53, and 48 feet long. Using the 3.5-foot-per-second standard, the pedestrian phase is barely adequate for the crossings.

The intersection at Broad and Commercial/Pleasant Streets has a four-way stoplight with a pedestrian-activated phase. Commercial and Broad Streets intersect at a skewed angle. The exclusive pedestrian phase consists of four-second “Walk” and 12-second flashing “Don’t Walk” phases. One of the pedestrian signals is not working. The crosswalks on each approach of the intersection are white parallel bars filled in with green paint and measure 70, 51, 64 and 62 feet long. Using the 3.5-foot-per-second standard, the pedestrian phase is not adequate for the lengths of the crossings.

Recommendations

3. Intersection of Broad and Middle Streets and east on Broad Street toward Jackson Square:
    - Expand the southwest corner to create more of a right angle.
    - The crosswalk on the north approach should be realigned so that it will be at a right angle across the street, thereby shortening the walking distance.
    - Fix the broken pedestrian signal bulbs and align the pedestrian signal on the northwest corner to face east.
    - Add more time to the pedestrian phase, unless the crossing distances are shortened.
    - Extend the island in front of the gas station and install curb ramps.
    - Visually emphasize the presence of sidewalks across the driveways of the gas station and the parking lots by raising the level of sidewalks or by striping.
    - Decrease the number and/or length of driveway openings, including the entrance to the condominium complex on the south side of Broad Street near Middle Street, and to the church on the north side of Broad Street.
    - Add street trees and other plantings.
    - The very worn sidewalks should be reconstructed. In the short term, remove or trim the vegetation growing through cracks and have property owners trim vegetation that obstructs the sidewalks.

4. Add crosswalks at the following locations:
    - Broad Street and Cain Avenue, across Cain Avenue and the west approach of Broad Street.

- At Putnam and Broad Streets, across Putnam Street and the west approach of Broad Street.
- At Broad Street and Fairmount Avenue, on the east approach across Broad Street and on Fairmount Avenue.
- Across Filomena Street and on the east approach of Broad Street.
- Across Randall Avenue; also consider regrading Randall Avenue to make the crosswalk more level.
- Across Broad Street on the east approach of the intersection with Shawmut Street.
- Mid-block across Broad Street, between Shawmut and Pleasant Streets, at the walkway leading to the parking area south of Broad Street.

5. Shorten the crosswalk on Madison Street by either (1) painting or installing an island or (2) squaring the northwest corner and aligning it closer to Fairmount Avenue.

6. Create a curb extension in front of the church on the north end of the crosswalk on Broad Street, between Hillcrest Road and Randall Avenue, and on the north end of the mid-block crossing of Broadway between Cain Avenue and Putnam Street.

Curb ramp and extension are needed on Broad Street

7. Install street furniture and trees along Broad Street between Middle and Commercial/Pleasant Streets.

8. Intersection of Broad, Commercial, and Pleasant Streets:
   - Create space for a curb extension on the northeast corner on Broad Street by narrowing the through and turning lanes at the intersection.
   - Reorient the crosswalk on Broad Street on the east approach, connecting it to the above-referenced curb extension, thereby shortening the crossing distance.
   - On the west approach of Broad Street, make the crosswalk perpendicular to the sidewalks, thereby shortening the crossing distance, and place it slightly farther back from the intersection than it is currently.
   - Change the pedestrian signals from exclusive to concurrent.
   - Stripe the turning movements for vehicles on the west approach of Broad Street.
   - Fix broken bulbs in pedestrian signal.

- Add at least four seconds to the pedestrian phase.

Intersection of Broad, Commercial, and Pleasant Streets

8.2.2 PLEASANT STREET: BROAD STREET TO RILEY AVENUE/RAYMOND STREET

Pleasant Street is an important north–south roadway through the east central portion of Weymouth. In the study area, Pleasant Street connects the commercial area of western Jackson Square south to Riley Avenue/Raymond Street. Along the roadway are some civic buildings, including a post office, a library, and the Weymouth Teen Center; commercial buildings; and multi- and single-family housing. Pope Towers, a senior-housing facility, is located on Water Street, just behind and south of the Teen Center.

Bicycling

Existing Conditions

Pleasant Street is two-way with two lanes and no parking. Its width ranges from 30 to 33 feet between Broad and Water Streets, and is approximately 44 feet wide farther south. Double yellow lines separate the north- and southbound travel lanes, and a single white line marks a shoulder of varying width. The roadway surface is mostly smooth, with no major impediments, and the edge is generally clear of obstructions. There is no bicycle parking.

Recommendations

9. Install bicycle racks at the Teen Center and library.

10. With roadway widths of around 44 feet south of Water Street, and parking on both sides, stripe 7-foot parking lanes and 5-foot bicycle lanes on each side. This leaves space for 10-foot travel lanes. Alternatively, allow back-in angle parking on one side only. Allow a 4.5-foot bicycle lane on the non-parking side, two 11-foot travel lanes, a 5.5-foot bicycle lane, and a 12-foot parking lane, with cars parked at a 45-degree angle.

11. With roadway widths ranging from 30 to 33 feet from Water Street north to Broad Street, stripe a bicycle lane on both sides of Pleasant Street. Travel lanes could be 11 feet in each direction. The bicycle lanes, using the remaining width, would range from 4 to 5.5 feet.

Walking

Existing Conditions

Sidewalks on both sides of the roadway are sometimes less than five feet wide. The sidewalks are asphalt, with granite curbs. Due to wide driveways and parking lots, there are numerous expanses where there is no distinction between the sidewalk and the roadway. The surface of the sidewalks is rough and contains some significant bumps and cracks. From Jackson Square to the Teen Center, the sidewalks are narrow and in poor condition. Most of the sidewalks slope down to the level of intersecting driveways.

There is no vegetation buffer between the sidewalk and the roadway, and there are no front yards with trees to provide shade and aesthetics. There is also no vegetation buffer between the sidewalk and adjacent parking lots, except in front of the library. Coupled with the wide driveways and lack of curbing, there is no distinction in some areas between the sidewalk, roadway, and parking lots.

The sidewalk is not clearly separated from the roadway at the intersection of Pleasant and Water Streets

There are several crosswalks along this corridor, but more are needed. At Riley Avenue/Raymond Street, new concrete curb ramps have been installed, but there are no crosswalks. The crosswalk between the Teen Center and library, which is zebra style, crosses at an oblique angle between the parking lots of the two buildings. The other crosswalks are white parallel bars filled in with green. All of the existing crosswalks are sufficiently to highly visible.

The recent reconstruction of the intersection of Pleasant and Water Streets included a three-way stoplight with pedestrian-activated signals. The exclusive pedestrian phase consists of a 7-second “Walk” signal and a 19-second flashing “Don’t Walk” signal. The parallel-bar-style crosswalks are 50, 65, and 82 feet long, clockwise from the north. The pedestrian phase is adequate for the lengths of the crossings.

Recommendations

12. Widen the sidewalk between Jackson Square and the Weymouth Teen Center.

A narrow sidewalk leading to the Teen Center

13. Construct a sidewalk with vegetation buffers in front of the Teen Center parking lot. Ideally, have a buffer on both the street and parking lot sides of the sidewalk.

14. Straighten and move the crosswalk on Pleasant Street that connects the Teen Center and the library to the northern edge of the Teen Center, both to increase the sight distance and to move it away from the parking lots; install signs alerting motorists to the crosswalk.

15. Reduce the turning radius for vehicles turning right from Shawmut Street onto Pleasant Street and vehicles turning right from Pleasant Street onto Shawmut Street. Install curb extensions on Shawmut Street. (Alternatively, consider eliminating all left turns out of Shawmut Street, given the limited sight distance, or prohibit traffic from exiting from Shawmut Street onto Pleasant Street by creating a one-way, westbound block for traffic entering from Pleasant Street.)

16. Add crosswalks at the following locations:
    - Across the west approach of Shawmut Street at Pleasant Street
    - At Pleasant/Riley/Raymond Streets, across all approaches

17. Create a trail connection between Water and Pleasant Streets on the walkway south of Pope Towers, and add a crosswalk across Pleasant Street. Install a signalized

crosswalk that flashes yellow to alert motorists. Consider widening the roadway here, using land in the town-owned lot on the west side of Pleasant Street, to allow the creation of a median island sufficiently wide to be a refuge for people to cross the road. This trail connection would be part of the Back River Trail, which is discussed in the next section.

18. Intersection of Pleasant and Water Streets:
    - Change the pedestrian signals from exclusive to concurrent
    - Create a curb extension on the north side of the east approach on Water Street to alter the turning radius and to provide pedestrians with a wider area to wait for the pedestrian signal. Realign crosswalks accordingly
    - Reduce the turning radius for vehicles turning right from Pleasant Street to Water Street
    - Create a curb-separated sidewalk along the west side of Pleasant Street in front of the car dealership, and on the east side of Pleasant Street in front of the convenience store, which is just north of Raymond Street

8.2.3 THE NEIGHBORHOOD SOUTHWEST OF JACKSON SQUARE

This area is primarily residential. A fish ladder with a small viewing platform is located just off Iron Hill Street. Southwest of the viewing platform is Whitman's Pond. There are some commercial developments on Lake Street and a ball field at Russel Whiting Street.

Bicycling

Existing Conditions

The roadways in this neighborhood, all two-way, are generally in fair condition. The relatively major streets in the neighborhood are Shawmut and Lake Streets. The minor roads are Riley Avenue and Iron Hill Street. The intersection of Lake and Shawmut Streets is confusing. There is a large, open parking area on the southwest corner of Shawmut and Pleasant Streets.

Parking is allowed on both sides of most portions of Lake Street, and on Shawmut Street between Lake and Broad Streets. There are no striped areas for parking, and because of the poorly defined sidewalks, motorists sometimes park on the sidewalk. The width of Lake Street ranges from 24 to 33 feet. Shawmut Street is approximately 24 feet wide between Lake and Pleasant Streets and approximately 25 feet wide between Lake and Broad Streets.

There are double yellow lines on Lake Street, thence on Shawmut Street to Pleasant Street, as well as fog lines on Lake Street. The roadway edges are generally clear of obstructions.

Recommendations

19. Intersection of Shawmut Street and Lake Street:
    - Stripe and sign the turning movements for vehicles.

- Expand the islands to better guide traffic or consider constructing a roundabout.

20. Reduce the width of travel lanes on Lake Street to 10 feet. This will allow more room for bicyclists and pedestrians, and will help slow traffic down to the 30 miles-per-hour speed limit that is signed in the northeast-bound direction. Add a similar speed limit sign in the other direction.

Walking

Existing Conditions

None of the sidewalks are in good condition. All are asphalt, some with granite curbs. The sidewalks along the southeast side of Iron Hill Street, the north side of Riley Avenue, and both sides of Shawmut Street between Lake and Pleasant Streets have curbs and are in fair condition. The sidewalks along the east side of Shawmut Street between Broad and Lake Streets have curbs and are in poor condition. There is little distinction between the roadway and the sidewalks on the west side of Shawmut Street between Broad and Lake Streets and along Lake Street since there are no curbs. There are no sidewalks along the south side of Riley Avenue and the northwest side of Iron Hill Street.

There are no vegetation buffers between the sidewalk and the roadway. There are no street trees in the neighborhood, but many front yards have trees that provide shade and aesthetics along the street, except along Lake Street. The sidewalks slope down to the level of intersecting roadways and driveways. There are no signalized pedestrian crossings or crosswalks in this corridor.

Recommendations

21. Create curb-separated sidewalks along both sides of Lake Street southwest of its intersection with Shawmut Street.

22. Re-stripe Lake Street to accommodate parking on one side of the street where space allows, and eliminate parking on sidewalks.

23. Redevelop the town-owned parking/open area on the southwest corner of Pleasant and Shawmut Streets. One option would be to create a park with either a fenced-in playground or simply an open area with trees and plantings. Some parking could be retained.

24. Add crosswalks at the following locations:
    - All approaches of the intersection of Shawmut and Lake Streets
    - Across Washburn Street and Shawmut Avenue where they intersect with Shawmut Street

25. Make Iron Hill Street one-way southwest from Shawmut Street to Riley Avenue, and make Riley Avenue one-way southeast toward Pleasant Street.

26. Construct a curb-separated sidewalk on the east side of Shawmut Street between Broad and Lake Streets.

27. Construct a curb-separated sidewalk along the south side of Riley Avenue between Pleasant and Iron Hill Streets

28. Construct a curb-separated sidewalk along the northwest side of Iron Hill Street between Riley Avenue and Shawmut Street.

8.2.4 THE ALIGNMENT OF THE PROPOSED BACK RIVER TRAIL

In August 2005, ICON Parks Design prepared the *Back River Trail: Master Plan and Design Guidelines* at the request of the Town of Weymouth. According to this plan, the proposed Back River Trail will connect Abigail Adams State Park in North Weymouth to the Iron Hill Fish Ladder site in the study area. Walkers, bicyclists, joggers, in-line skaters, people in wheelchairs, and walkers pushing strollers could use the trail system.

The Town requested that the Boston Region MPO staff comment on that plan for the portion of the trail from the East Weymouth commuter rail station to the Iron Hill Fish Ladder. According to the plan:

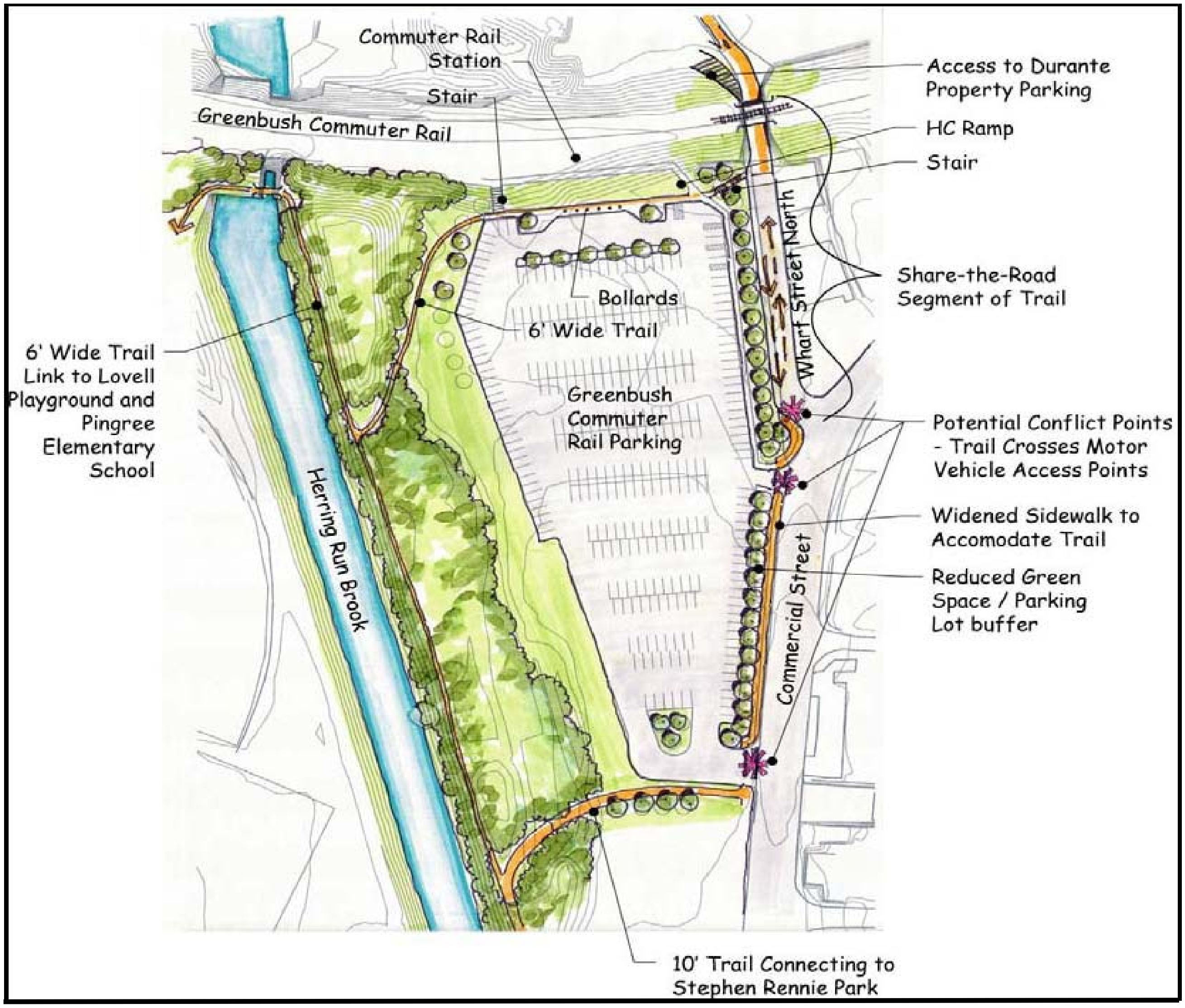
> The trail will turn and follow along the northernmost end of the new MBTA train station parking lot before turning to follow Herring Brook into Lovell Playground. From Lovell Playground the trail will become an on-road trail with dedicated bike lanes along Water Street up to and through the intersection with Pleasant Street. Intersection improvements at Pleasant Street will include user activated crossing signals and minor road realignments [Ed. note: these intersection improvements have been completed]. The trail will continue along Iron Hill Street to the site of the Iron Hill Fish Ladders, where site improvements will include a fish ladder, viewing improvements, picnic tables and playground. A network of on street "share the road" bicycle routes will connect the trail to other points of interest in the immediate neighborhoods and the surrounding communities.

Recommendations

Figure 8-5, which is Figure 13 in the ICON report, shows the area near the East Weymouth MBTA station.

A1. As the ICON report points out, Alternative A is more desirable than Alternative B at the commuter rail parking area because it keeps the trail away from the parking lot and street. Putting the trail between the drop-off area and the station would eliminate all conflicts with motor vehicles but would maximize conflicts with passengers. Therefore, require bicyclists on this portion of the trail to reduce speed, and install signage reminding them to yield to pedestrians.

Figure 8-5
Proposed Back River Trail through MBTA East Weymouth Station Parking Lot



A2. As the trail approaches the intersection of Broad, Commercial, and High Streets, it should use the path and bridge through Stephen Rennie Herring Run Park. The trail should be striped through the park.

A3. At Stephen Rennie Herring Run Park, one branch should continue to the Herring Run Pool (Branch A), and another branch should connect to the school (Branch B). Branch B could replace, or be an addition to, the proposed northern branch to the school from the commuter rail station. Branch B, according to the plan, would better accommodate users, including students, traveling to school, the ball fields, and Lovell Playground.

A4. Once Branch B passes over the bridge, it should follow the existing path along the skate park and around the ball fields to the school parking lot. This path should be expanded to 10 feet wide. From the parking lot, striping should guide people to the school entrance. Widen the sidewalks on both sides of the roadway up the hill. Additional striping and a crosswalk could then connect these sidewalks to the proposed bicycle lanes on both sides of Commercial Street.

A5. From the park, Branch A would follow the river to Pope Towers on Water Street and use an off-road connection to reach Pleasant Street (see Recommendation 17 above). A safe crossing must be provided across Pleasant Street for the path to continue through the parking lot and up Iron Hill Street to the proposed Iron Hill Park. The off-road connection between Water and Pleasant Streets would obviate the need for southbound trail users to backtrack north on busy Pleasant Street to reach Iron Hill Street.

A6. Having the path cross through the private parking lot at the intersection of Commercial, High, Broad, and Water Streets would be preferable to having it use roadways.

A7. Potential on-street connections to the Back River Trail, discussed elsewhere in this chapter, include bicycle lanes on Pleasant Street, and improved accommodations for bicycles on Broad Street.