

bicycle and pedestrian improvements in town centers

Author

Jared Fijalkowski

Contributors

Mark Abbott
Jonathan Church
Kathy Jacob

Design

Maciej Citowicki

Photography

Jared Fijalkowski

The preparation of this document was supported by the Massachusetts Highway Department through 3C contracts #42456 and #48696.

Central Transportation Planning Staff

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

May 2007

ABSTRACT

This study identifies relatively low-cost, easy-to-implement improvements to the pedestrian and bicycle environments in six small town centers in the Boston region: Duxbury (Hall's Corner), Essex, Holbrook, Lynnfield, Norfolk, and Southborough. The recommendations aim to improve pedestrian and bicyclist access and safety in these town centers by making connections to activity centers, including residential and commercial areas, schools, libraries, churches, and recreation areas, and by improving the quality of existing infrastructure. Also included is a set of general recommendations and a discussion of best practices in planning and designing improvements to the pedestrian and bicycle networks.

TABLE OF CONTENTS

		LIST OF FIGURES
INTRODUCTION	1	Fig. 1 Sidewalk Surface Treatments 6 Fig. 2 Sidewalk Surface Condition Scale 6 Fig. 3 Crosswalk Treatments 8 Fig. 4 Crosswalk Condition Scale Signs 8 Fig. 5 Signs 9 Fig. 6 Common Bicycle Racks 11 Fig. 7 Estimated Costs of Pedestrian and Bicycle Recommendations 12
GENERAL FINDINGS AND BEST PRACTICES	5	
DUXBURY	15	Fig. 8 Study Area, Duxbury 16 Fig. 9 Pedestrian and Bicycle Network: Land Use and Activity Generators, Duxbury 17 Fig. 10 Hypothetical Hall's Corner Intersection Layout 19 Fig. 11 Pedestrian and Bicycle Network: Conditions, Duxbury 21 Fig. 12 Study Recommendations, Duxbury 27
ESSEX	29	Fig. 13 Study Area, Essex 30 Fig. 14 Pedestrian and Bicycle Network: Land Use and Activity Generators, Essex 31 Fig. 15 Pedestrian and Bicycle Network: Conditions, Essex 35 Fig. 16 Study Recommendations, Essex 41
HOLBROOK	43	Fig. 17 Study Area, Holbrook 44 Fig. 18 Pedestrian and Bicycle Network: Land Use and Activity Generators, Holbrook 45 Fig. 19 Hypothetical Plymouth Street/Abington Avenue Intersection Layout 1 47 Fig. 20 Hypothetical Plymouth Street/Abington Avenue Intersection Layout 2 47 Fig. 21 Pedestrian and Bicycle Network: Conditions, Holbrook 51 Fig. 22 Study Recommendations, Holbrook 57
LYNNFIELD	59	Fig. 23 Study Area, Lynnfield 60 Fig. 24 Pedestrian and Bicycle Network: Land Use and Activity Generators, Lynnfield 61 Fig. 25 Pedestrian and Bicycle Network: Conditions, Lynnfield 65 Fig. 26 Study Recommendations, Lynnfield 71
NORFOLK	73	Fig. 27 Study Area, Norfolk 74 Fig. 28 Pedestrian and Bicycle Network: Land Use and Activity Generators, Norfolk 75 Fig. 29 Pedestrian and Bicycle Network: Conditions, Norfolk 79 Fig. 30 Study Recommendations, Norfolk 85
SOUTHBOROUGH	87	Fig. 31 Study Area, Southborough 88 Fig. 32 Pedestrian and Bicycle Network: Land Use and Activity Generators, Southborough 89 Fig. 33 Pedestrian and Bicycle Network: Conditions, Southborough 93 Fig. 34 Study Recommendations, Southborough 99

introduction

A walkable and bikeable town center is an asset to a community, supporting economic vitality and improving safety. Better conditions for walking and bicycling improve the quality of life in cities and towns by encouraging exercise, reducing congestion, and improving air quality. Pleasant, safe, and convenient access for pedestrians and bicyclists within a town center can make those modes more attractive. These pedestrian and bicycle networks also provide alternatives to the automobile for trips within a community.

Traditional New England town centers were built in a pedestrian-oriented era, and therefore include many destinations within walking distance of each other, including municipal offices, fire and police stations, libraries, churches, and schools. Single-family homes are sometimes interspersed between the public buildings, but mainly lie in the immediate outskirts of the center. Multifamily housing for elderly and low-income populations is often located in town centers. These residents are less likely to own a car and therefore need to walk, bicycle, or use transit to get to the places they need to go. Town centers with this dense development pattern often have a comprehensive sidewalk network but have narrow roads constrained in width by existing development. This limits the ability to construct new sidewalks or stripe bicycle lanes in these areas.

Many communities in the Boston region do not have areas that resemble the traditional New England town centers: commercial development is dispersed in strip developments, and housing is spread out in low-density developments on the outskirts of town. It can be very difficult or unsafe to walk or bicycle in these automobile-oriented areas. Towns with a less dense development pattern often lack a comprehensive sidewalk network but often have wider roads to accommodate more automobile traffic.

This study includes recommendations for relatively low-cost, easy-to-implement improvements to the pedestrian and bicycle environments in six selected small town centers to improve pedestrian and bicycle access and



safety within those centers. The recommendations are intended to improve the connectivity of these environments.

BACKGROUND

The Boston Region Metropolitan Planning Organization (MPO) is committed to improving the transportation network for pedestrians and bicyclists. The MPO's most recent policies support projects for improving the pedestrian and bicycle environments. These policies are under the categories of system preservation, modernization, and efficiency; mobility; environment; safety and security; and land use and economic development.

This study was created as a result of a recommendation in the MPO's 2004 report of the Congestion Management System (CMS), now known as the Mobility Management System (MMS). The MMS is an ongoing program whose purpose is to provide the MPO and other transportation planners with timely information about transportation system performance in the region and make recommendations in the areas where congestion and other mobility deficiencies are found. The MMS



- *Regional Bicycle Plan* (prepared by the Metropolitan Area Planning Council for the Boston Region MPO, March 2007)

OBJECTIVES

In order to improve the pedestrian and bicycle environments in town centers, the MPO articulated three objectives for this study. The first objective was to identify small town centers to include in this study, with a focus on those communities that had not hosted a Walkable Community Workshop or had not fully examined pedestrian or bicycle issues. The second objective was to identify opportunities to improve pedestrian and bicycle access and safety within those town centers. The third objective was to recommend measures to take advantage of opportunities that could serve as a model for other communities in the region.

The tasks of this study were as follows:

1. Select six small town centers to include in the study.
2. Gather data related to bicycle and pedestrian accommodations in the selected town centers through field observations, community officials, and secondary sources.
3. Analyze the bicycle and pedestrian environments in the selected town centers and make recommendations to improve those environments.

SELECTION OF TOWN CENTERS

The criteria for site selection were organized into two tiers. The criteria for the first tier consisted of a town's geographic location within the region and its population and population density. Towns with a population of less than 20,000 were given preference. Towns that had hosted a Walkable Community Workshop were not considered for inclusion in this study.

The first-tier criteria produced a list of towns to be considered for the study. Thereafter, second-tier criteria were applied to help make the final selection of towns to be studied. In seeking to select a set of town centers with distinct characteristics, staff considered the following factors:

- The number of people and jobs within the town
- The availability of transit services
- The current status of pedestrian and bicycle characteristics of the town center and surrounding area

documents how the region's transportation network accommodates bicycling and walking.

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

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

- Boston Region MPO Policies (adopted January 2006)
- *Massachusetts Pedestrian Transportation Plan* (1998)
- MetroFuture, the Metropolitan Area Planning Council's long-range land use plan for the Boston region
- MassHighway's Bicycle Route and Share the Road Signing Policy (Policy Directive P-98-003, August 25, 1998)
- The Executive Office of Transportation's *A Framework for Thinking – A Plan for Action*, the State-wide Transportation Plan
- *Massachusetts Bicycle Plan Update* (in development)

- Whether the local municipality or the MBTA may be planning transit-oriented development areas and/or mixed-use zoning overlay districts, or may be considering revitalization of the town center under a Downtown Streetscape Plan
- The location of services, such as town libraries, post offices, town halls, banks, and parks
- The availability of parking and vehicular access in the town center



The above criteria yielded six town centers as candidates for consideration for this study. Staff contacted municipal officials in the six towns to determine whether there was sufficient interest in participating in the study. Each of the towns expressed strong interest, and those town centers were approved by the MPO's Transportation Planning and Programming committee for inclusion in the study.

The selected town centers are: Duxbury (the Hall's Corner area), Essex, Holbrook, Lynnfield, Norfolk, and Southborough.

PEDESTRIAN AND BICYCLIST SAFETY

Pedestrians and bicyclists are very vulnerable when motor vehicle traffic is present. Between 1995 and 2001, pedestrians were involved in 1.79 percent of all traffic-related crashes, but made up 25.41 percent of all traffic-related fatalities, in the Boston Region MPO area. In the same period, bicyclists were involved in 0.82 percent

of all traffic-related crashes, but made up 2.31 percent of all traffic-related fatalities.¹ Safety is a very important component of planning and designing improvements to the pedestrian and bicycle networks in the region.

SUMMARY

Improving the pedestrian and bicycle environments in town centers enhances a community's character, strengthens economic vitality, and improves safety. Safe bicycle and pedestrian networks serve as attractive alternatives to the automobile, further enhancing these benefits. Improving bicycling and walking in a town center can be a relatively low-cost way to revitalize activity in a community.

The six case studies presented in this report describe, for each town center, the particular issues that need to be addressed and the measures that are appropriate for addressing them. Before the individual cases are discussed, the study's general findings are summarized in the next chapter.

¹ Massachusetts Registry of Motor Vehicles crash data, 1995–2001

general findings and best practices

For each of the six town centers evaluated in this study, the subsequent chapters of this report describe the specific issues related to the pedestrian and bicycle environments to be addressed and include recommendations of specific measures for addressing them. This chapter summarizes some of the general pedestrian and bicycle issues encountered in the six town centers and the types of measures that can be implemented to address those issues. Estimated costs of these measures are also included in this chapter, as well as potential sources of funding to finance these measures.

MassHighway's *Project Development and Design Guide* (January 2006), which is referenced frequently in this chapter, provides a framework for incorporating context-sensitive design and multimodal elements into transportation improvement projects. Elements of the Guide can be applied to all transportation projects in Massachusetts.

PEDESTRIAN ENVIRONMENT

SIDEWALKS

An interconnected, comprehensive sidewalk network provides pedestrians with the mobility they need to access the activity centers in a community. Sidewalks should be constructed in all areas where pedestrian traffic exists or is desirable. Sidewalks should be located strategically to connect centers of activity, including residential and commercial areas, schools, libraries, churches, and recreation areas. A well-maintained, attractive sidewalk can induce more people to walk in a given area.

SURFACE TREATMENT

The sidewalks in the town centers included in this study are made of concrete, brick, or asphalt. These treatment materials are shown in Figure 1. Asphalt is considered by many to be a suburban or rural treatment, whereas brick and concrete are often considered urban treatments. Each of these treatments wears differently over time, and the installation costs vary considerably. Cost



and durability are often the main factors considered when deciding which treatment to employ.

SURFACE CONDITION

Sidewalks can become very uneven over time. Freezing and thawing of the soil can cause cracking and buckling of a sidewalk's surface. Some trees situated near sidewalks have roots that push upward on a sidewalk, causing large bumps and cracks to form, and general wear over time causes surface deterioration. All sidewalk surface materials require periodic maintenance, some more frequently than others. The condition of sidewalk surfaces in the town centers was evaluated using the five categories described in Figure 2. More detailed descriptions of sidewalk conditions in a given town are discussed in the chapter devoted to that town.

WIDTH

Sidewalks should be at least five feet wide to allow pedestrians to pass one another. It is considered acceptable for a sidewalk to be narrowed to three feet wide in order to bypass obstructions. Where there is no buffer between the sidewalk and the roadway, it is desirable for the sidewalk to be six feet wide in residential areas and eight feet wide in commercial areas. If the sidewalk is

Figure 1
SIDEWALK SURFACE TREATMENTS



Wide sidewalk

Narrow sidewalk

adjacent to the wall of a building or a fence, the sidewalk should be wide enough to allow pedestrians to walk comfortably along the wall or fence.¹

CURB CUT RAMPS

Curb cut ramps are constructed where sidewalks meet intersecting roadways or driveways to provide a smooth transition for pedestrians. Curb cut ramps, when constructed according to the Project Development and Design Guide, are accessible for those with limited mobility. However, pedestrians must go up and down two curb cut ramps at each intersecting roadway or driveway, and too many curb cut ramps can make a sidewalk difficult

¹ Massachusetts Highway Department, *Project Development and Design Guide*, January 2006, pp. 3–14 to 3–16.

Figure 2
SIDEWALK SURFACE CONDITION SCALE



to traverse. Sidewalks with asphalt surfaces often slope down to the level of intersecting roadways and driveways to make a smooth connection. An alternative to constructing curb cut ramps is to increase the height of the intersecting roadway or driveway to the height of the sidewalk, allowing pedestrians to cross the roadway or driveway without having to go up and down two curb cut ramps.

Most of the sidewalks evaluated for this study have either curb cut ramps or sloping asphalt at intersecting roadways and driveways. Some sidewalks lack such accommodations, making the sidewalks difficult to traverse for persons with limited mobility.



Sidewalks without curbs or buffers invite motorists to park on them.

CURBS

Curbs along the roadway deter motorists from parking on the sidewalk or on a buffer between the roadway and the sidewalk. They also improve a pedestrian's perceived sense of safety, forming a physical barrier between traffic and pedestrians. Curbs are usually made of granite,

concrete, or asphalt; each of these materials was used for curbing in the towns evaluated for this study.



Sidewalk with a buffer

BUFFERS

Buffers are sometimes installed between the sidewalk and the roadway to provide distance between vehicles and pedestrians. This distance increases a pedestrian's sense of safety on the sidewalk.

Buffers often make a roadway more aesthetically pleasing when landscaped with grass, brick, or plants, including trees. There are buffers along some of the sidewalks in each of the towns evaluated in this study.

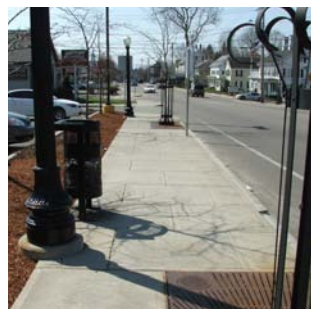


Sand and debris create an uneven sidewalk surface.

MAINTENANCE

Throughout the year, but primarily in the spring, sand and debris collect on sidewalks. Sidewalks should be cleared of debris at least seasonally to help maintain a safe surface for pedestrians. In the winter, sidewalks should be kept free of accumulated snow

and ice. In most cases, it is the responsibility of the adjacent landowner to clear the sidewalks that front their property. Many of the sidewalks evaluated for this study had collected sand and debris, making the sidewalk surfaces uneven and sometimes hazardous for pedestrians.



Street furniture

STREET FURNITURE

Street furniture, such as benches and lighting, enhances the pedestrian experience by offering a place to rest or making the sidewalk more aesthetically pleasing. Street furniture should be located in places where it is most

appropriate, and if it partially obstructs the sidewalk, it should not reduce the width of the sidewalk to less than three feet.²

CROSSWALKS

Crosswalks connect sidewalk segments across roadways and across some driveways. A well-designed crosswalk includes a highly visible treatment in the roadway (usually consisting of a painted pattern or inlaid brick), curb cut ramps on both sides, and signs that alert motorists to the crosswalk. 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. Depending on the treatment employed, crosswalk surfaces require maintenance every few years to ensure high visibility.



Crosswalk with curb cut ramp



Crosswalk without curb cut ramp

TREATMENT

There are several crosswalk treatments that make crosswalks visible to pedestrians and motorists. MassHighway allows three crosswalk marking patterns: ladder-style (the agency's most-preferred option), parallel-bar-style, and "zebra"-style.³ These markings are shown in Figure 3.

The majority of crosswalks in the town centers evaluated have a modified parallel-bar-style marking pattern. In

² Ibid., pp. 5–14 to 5–15.

³ Ibid., p. 6-62.

Figure 3
CROSSWALK TREATMENTS

	Ladder-style
	Parallel-bar-style
	Zebra-style

many cases, those crosswalks were accented by a solid paint color (yellow or green) or inlaid bricks between two parallel white lines.

CROSSWALK MARKINGS

The condition of the crosswalk markings in the town centers included in this study varies widely. Some crosswalks had recently been repainted and were highly visible, but others were very faded. Staff evaluated and ranked the condition of the crosswalks on a four-category scale, as described in Figure 4.

CURB CUT RAMPS

Curb cut ramps at the ends of crosswalks provide a smooth connection between the sidewalk and the crosswalk. The *Project Development and Design Guide* provides guidance regarding the slope, orientation, and other design elements of curb cut ramps at crosswalks.⁴

SIGNAGE

Signs are often installed near crosswalks to warn motorists of the presence of pedestrians. Several types of signs were observed in the town centers evaluated in this study: pedestrian-traffic, school, and state-law-

Figure 4
CROSSWALK CONDITION SCALE

	Highly visible
	Sufficiently visible
	Moderately faded
	Very faded

yield-to-pedestrians (with or without an indication of a fine for not yielding). Yield-to-pedestrian signs on moveable posts are often placed in, or are adjacent to, the roadway, particularly at crosswalks near schools. These signs are shown in Figure 5.



Stop line

STOP LINES

Stop lines indicate where vehicles should stop at a stop sign or traffic signal. They are particularly helpful when placed before crosswalks to remind motorists to look for pedestrian traffic as well as vehicular traffic. The stop line should

⁴ Ibid., pp. 6-61 to 6-67.

Figure 5
SIGNS

	<p>Pedestrian-traffic sign</p>
	<p>School sign</p>
	<p>State-law-yield-to-pedestrians sign</p>
	<p>Yield-to-pedestrians sign on a moveable post</p>

be positioned at least four feet before the crosswalk.⁵



Pedestrian signal activation button

SIGNALIZED PEDESTRIAN CROSSWALKS

Signalized pedestrian crosswalks are typically located at signalized intersections, but are sometimes located where there is significant pedestrian traffic or where it may be

unsafe to cross while automobile traffic is moving. They 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 moving in a parallel direction.

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 of the roadway.

Only two of the six towns evaluated for this study, Holbrook and Southborough, have signalized crosswalks. More information on those crosswalks can be found in the chapters for those towns.

BICYCLE ENVIRONMENT

ON-STREET BICYCLING

Roads in small towns can be ideal for bicycling: they have relatively low speeds and traffic volumes. While most lack bicycle lanes as exclusive accommodations for bicycles, roads in small towns can still be very safe to ride on. However, bicyclists and motorists must use caution, as conflicts can arise when sharing the road.

ROADWAY SURFACE

An uneven roadway surface can be a major deterrent to bicyclists. Large bumps and cracks can be uncomfortable and often dangerous for bicyclists. Bumps and cracks occur more often near the edge of a roadway, further detracting from bicyclist safety.



Smooth roadway surface



Uneven roadway surface

SHOULDERS

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 to partially avoid using the travel lane. Shoulders should be kept

⁵ Ibid, p. 6-61.

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



Wide shoulder



Narrow shoulder



Bicycle lane

them make for a smoother, safer bicycle ride.

BICYCLE LANES

Bicycle lanes are one-way facilities, usually delineated by striping, that usually accommodate bicycle traffic in the same direction as adjacent vehicle traffic. Bicycle

lane markings increase a bicyclist's confidence that motorists will not stray into their path of travel. Likewise, passing motorists are less likely to swerve to the left out of their lane to avoid bicyclists on their right, as often occurs when bicyclists ride in the travel lane. Bicycle lanes should have a minimum width of 4 feet, but a width of 5 feet is preferred in most situations.⁶ Many of the roadways in the town centers evaluated in this study are not wide enough to accommodate bicycle lanes.



On-street parking

ON-STREET PARKING

On-street parking can be very dangerous for bicyclists if motorists and bicyclists are not highly 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 to the left of on-street parking guide bicyclists to a safe location on the roadway. They also remind motorists to be alert for passing bicyclists.



Bicycle route sign

SIGNAGE

Bicycle-route and share-the-road signs serve two purposes: they imply a certain level of bicyclist comfort and safety, and they remind motorists to be on the alert for bicyclists along the roadway. None of the

town centers evaluated in this study has bicycle-route or share-the-road signs. MassHighway sometimes installs these signs along state highways if several criteria are met. For more information, see MassHighway's Bicycle Route and Share the Road Signing Policy (Policy Directive P-98-003, August 25, 1998).



Children should be educated about bicycle safety.

EDUCATION

Bicycling can be a dangerous activity if bicyclists do not follow the rules of the road. Some common unsafe bicycling habits include riding against motor vehicle traffic in a roadway and riding without a helmet. Some bicyclists, including children, were

observed disobeying traffic laws in the town centers evaluated for this study. It is especially important for children to be educated about how to ride safely on and off the roads. Also, parents should model safe bicycling behavior to their children. Educating children about safe bicycling is one component of the commonwealth's Safe Routes to School program, which is described later in this chapter.

BICYCLE PARKING

Bicyclists seek safe and 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. Where possible, bicycle racks should be positioned so that bicycles are protected from rain and harsh weather.

Municipalities in the Boston region are eligible to participate in the Regional Bike Rack Program (described later

⁶ Ibid., pp. 5-20 to 5-21.

in this chapter), which allows them to be reimbursed for bicycle racks purchased according to the program’s guidelines.

Current bicycle parking guidelines⁷ recommend that providers of bicycle parking select bicycle racks that:

- Support the bicycle frame in two locations, enabling the frame and one or both wheels to be secured
- Allow both front-in and back-in parking
- Are compatible with today’s bicycle frames and locks

Common styles of bicycle parking racks are shown in Figure 6. Those that meet the above guidelines include: the inverted-U, “A” (an inverted-U with a horizontal bar), and post-and-loop (also known as bike hitch) racks, each of which supports two bicycles. Many manufacturers produce these or similar styles. These rack elements are often arranged in a row; the spacing between the rack elements should be a minimum of 30 inches (on centers), but preferably 36 to 42 inches.

POTENTIAL SOURCES OF FUNDING

The following programs are potential sources of state funding for the improvements to pedestrian and bicycle networks. In addition to these programs, municipalities can undertake pedestrian and bicycle improvements with their own municipal funds or resources.

CHAPTER 90

Some of the funds for transportation projects undertaken by municipalities is provided through the commonwealth’s Chapter 90 program. These funds, which are distributed by MassHighway, may be used for many types of transportation projects, including roadway re-surfacing, sidewalk construction, the installation of street lighting, and the construction and maintenance of bike-ways. Municipalities pay for the projects they choose to undertake and are reimbursed through the program for eligible expenditures.

In state fiscal year 2006, MassHighway made \$175 million in Chapter 90 funds available to municipalities for transportation projects. Funding is made available annually based on a municipality’s population, employ-

⁷ One reference is *Bicycle Parking Guidelines (2002)*, adopted by the Association of Pedestrian and Bicycle Professionals. For more information, visit www.bicyclinginfo.org/bikepark.pdf.







	“Inverted U” Recommended
	“A” Recommended
	“Post and Loop” (also known as “bike hitch”) Recommended
	“Ribbon” (two-loop rack shown) Not recommended
	“Toast” Not recommended
	“Comb” Not recommended

Figure 7
ESTIMATED COSTS OF PEDESTRIAN AND BICYCLE RECOMMENDATIONS

Improvement	Estimated Cost	Source
Install or resurface sidewalk	\$110,000 per mile (asphalt)	EOT construction project estimator
	\$350,000 per mile (concrete)	www.walkinginfo.org
Install curb along existing sidewalk	\$40/linear foot (granite)	EOT construction project estimator
	\$15/linear foot (concrete)	www.walkinginfo.org
Stripe crosswalk	\$100 for thermoplastic parallel-bar-style marking	EOT construction project estimator
	\$100 for paint marking	www.walkinginfo.org
	\$300 for thermoplastic ladder-style marking	www.walkinginfo.org
Resurface roadway	\$240,000 per mile (based on 24-foot-wide roadway)	EOT project cost estimator
Install sign	\$185 for sign and post	EOT project cost estimator
Install bicycle rack	\$60–\$150 per “inverted-U” rack, \$80–\$100 per “post and loop” rack, \$175–\$250 per two-loop ribbon rack (costs do not include installation)	MAPC Regional Bike Parking Program contract price list
Install curb cut ramp	\$800–\$1,500 per curb cut ramp	www.walkinginfo.org
Stripe bicycle lane	\$3,200 per mile	EOT project cost estimator
Stripe on-street parking	\$200 for 10 spaces	EOT project cost estimator
Replace pedestrian signal	\$15,000–\$100,000	EOT project cost estimator

ment, and number of miles of local roadways. For more information on the Chapter 90 program, visit www.mass.gov/mhd.

REGIONAL BIKE PARKING PROGRAM

The Regional Bike Parking Program provides municipalities in the Boston region with the opportunity to purchase bicycle racks and be fully reimbursed for the purchase. The program is administered by MAPC and is funded by the Boston Region MPO, the Executive Office of Transportation, and the Federal Highway Administration. The program has three participating vendors that provide a variety of styles of bicycle racks and other related products.

To participate in the program, municipalities must pay up front for their purchases and are reimbursed for the purchase price if certain criteria are met. The costs of

shipping and installation are the responsibility of the municipality and are not reimbursable. MAPC provides information on participating, and a location and installation guide on its Web site, www.mapc.org/transportation/bike_parking_program/intro.html.

TOD BOND PROGRAM

The Transportation-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 0.25 miles of a commuter rail station, subway station, bus station, bus rapid transit station, or ferry terminal. The program also funds the preliminary design

of pedestrian and bicycle facility projects near transit stations.

In state fiscal year 2006, \$7 million was allocated to four projects. All public entities, including municipal governments, are eligible for the program. For more information on the TOD Bond Program, visit www.mass.gov/tod.

SAFE ROUTES TO SCHOOL PROGRAM

Massachusetts' Safe Routes to School 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 related to walking and bicycling to school.

MassRIDES administers the Safe Routes to School program for the Executive Office of Transportation. The Safe Routes to School Manual has been sent to all elementary school principals in Massachusetts. The program is funded by the Federal Highway Administration, which has allocated \$2.2 million to Massachusetts for its Safe Rates to School program in state fiscal year 2007.⁸ For more information, or to download the manual, visit www.commute.com.

PUBLIC WORKS ECONOMIC DEVELOPMENT PROGRAM

The commonwealth's Public Works Economic Development (PWED) program 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 and the Fix-It-First and Communities First initiatives. The PWED program is administered by the Executive Office of Transportation. For more information on the program, visit www.mass.gov/eot.

⁸ Federal Highway Administration, Notice of Appointment of Fiscal Year 2007 Safe Routes to School Program Funds, October 3, 2006



duxbury

Duxbury is a residential community situated 33 miles south of Boston along the Atlantic Ocean. The town was incorporated in 1637 as a shipbuilding center. Duxbury's historic relationship to the sea is felt around Hall's Corner, where shops offer maritime memorabilia and a large nautical flagpole stands at the center of the Hall's Corner intersection.

Hall's Corner, located in the southeast area of Duxbury, is the main intersection in the largest commercial center in Duxbury. The Hall's Corner area includes the town's post office, many shops, a gas station, and restaurants, some of which are located at the main intersection. The areas just beyond the commercial center are largely residential. Duxborough Village, a senior housing development, is located within the study area, off of Chestnut Street. The town hall, the town manager's and selectmen's office, the fire department, the senior center, and two churches are located less than a mile away, along Tremont Street (Route 3A).

Duxbury is the largest and most populous town evaluated in this study. In 2000, there were 14,248 residents, a 2.5 percent increase from 1990.¹ The Metropolitan Area Planning Council (MAPC) projects that Duxbury is likely to grow to 16,798 by 2030, representing a 17.9 percent increase from 2000. Duxbury's employment, recorded at 2,347 jobs in 2000, is projected to increase by 19.1 percent by 2030.²

Duxbury is served by state routes 3, 3A, 14, 53, and 139, none of which is located within the study area. Route 3A runs north-south about 0.75 miles west of Hall's Corner. It is accessed from Hall's Corner by Chestnut and Depot streets. Route 3, a limited-access highway, is located further west of Hall's Corner.

The town's Ad Hoc Sidewalk Committee released a report in June 2001. It prioritizes roadways 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



Sidewalk and storefront in Hall's Corner, Duxbury

year for sidewalk construction along priority roadways. Staff considered these priorities when making recommendations.

Between 1995 and 2001, there were 20 reported crashes involving pedestrians in Duxbury, representing 1.02 percent of all crashes, and 9 reported crashes involving bicyclists, representing 0.46 percent of all crashes. None of these crashes resulted in fatalities. The pedestrian and bicyclist crash rates in Duxbury are lower than the region's average of 1.79 percent and 0.82 percent, respectively.³

STUDY AREA

The study area for Duxbury (shown in Figure 8) includes:

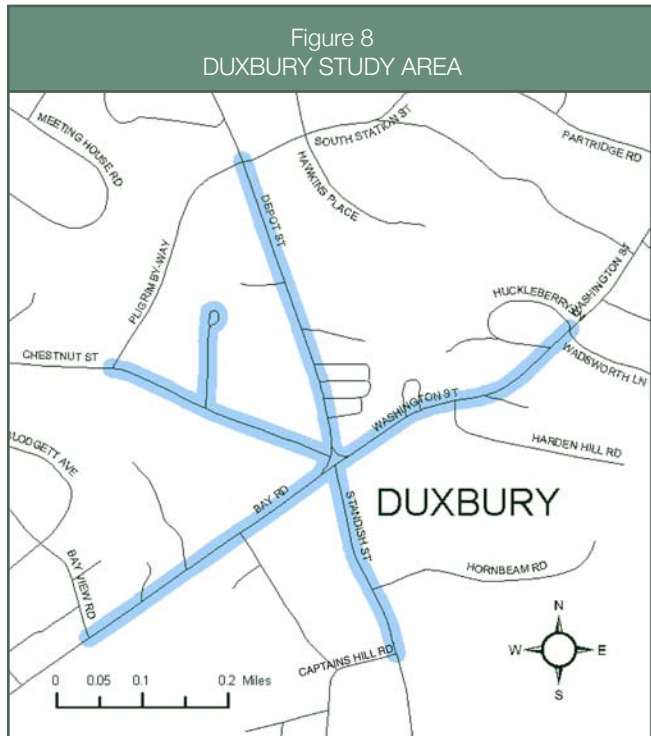
- Chestnut Street from Hall's Corner to Pilgrim By-way
- Depot Street from Hall's Corner to South Station Street
- Washington Street from Hall's Corner to Huckleberry Lane

¹ U.S. census

² MAPC population and employment projections, January 2006

³ Massachusetts Registry of Motor Vehicles crash data, 1995-2001

- Standish Street from Hall's Corner to Crescent Street
- Bay Road from Hall's Corner to Bayview Road
- The unnamed roadway leading to Duxborough Village



This crosswalk is faded and does not have curb cuts.

intersection: one across Washington Street and one across Bay Road. Some crosswalks in the study area are faded but are visible to motorists and pedestrians, and others have been recently repainted, making them highly visible. Some crosswalks lack curb cut ramps, which

would connect the crosswalks to the sidewalks. The limited number of crosswalks in the Hall's Corner area severely restricts pedestrian mobility, as many connections cannot be made safely. See Figure 9 for a map of the pedestrian network.

SIGNALIZED PEDESTRIAN CROSSINGS

There are no signalized pedestrian crossings in the Hall's Corner area.



Cars parked along the street can be dangerous to bicyclists.

ON-STREET BICYCLING

The five roadways entering the Hall's Corner intersection are two-lane roads with relatively narrow widths. Washington Street and Bay Road are the only roads with marked shoulders, but the shoulders are not wide enough to fully

accommodate bicyclists. The edges of the roadway do not have significant cracks or large debris, with a few exceptions and some of the drainage grates are set back from the roadway. The Hall's Corner intersection is surrounded by on-street parking spaces, which increases the risks to bicyclists, forcing them to use extreme caution when moving by parked cars. See Figure 9 for more information on the bicycle network.

BICYCLE PARKING

There is no bicycle parking in the Hall's Corner area.

TRANSIT

There is no transit service in the Hall's Corner area.

SIDEWALKS



The limited sidewalk network does not include all connections that pedestrians want to make.

Although some sidewalks in Hall's Corner are in good repair, others are uneven and narrow. There are several corridors without sidewalks or with gaps between sidewalk segments, which limits pedestrian mobility and safety. Chestnut and Washington

streets have sidewalks on one side of the street for their entire length within the study area. Depot and Standish streets have sidewalks on one or both sides in areas with commercial activity near the Hall's Corner intersection, but they end shortly thereafter. The sidewalks in the Hall's Corner area have either asphalt or brick surfaces. Bay Road does not have a sidewalk on either side. See Figure 9 for a map of the pedestrian network.

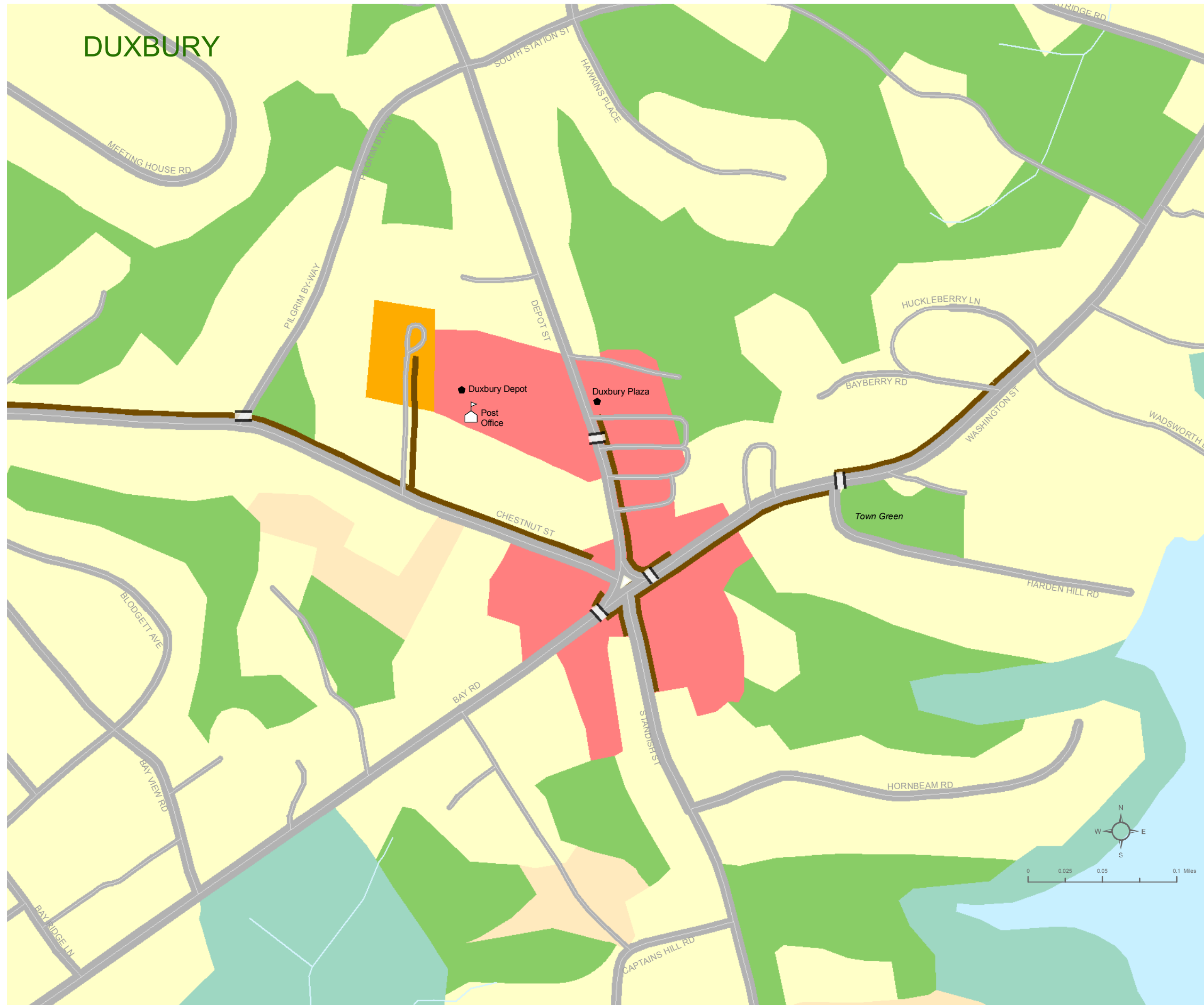
CROSSWALKS

There are only two crosswalks at the Hall's Corner



FIGURE 9

Pedestrian and Bicycle Network: Land Use and Activity Generators

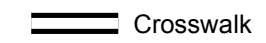

Duxbury








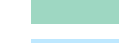

Activity Center

-  Post office
-  Shopping area

Pedestrian Accommodations

-  Crosswalk
-  Sidewalk

Land Use

-  Commercial
-  Multifamily residential
-  Single-family residential
-  Agricultural
-  Forest, open land
-  Saltwater wetland
-  Water

MAJOR INTERSECTION

HALL'S CORNER

Hall's Corner is a five-legged intersection where Depot Street, Washington Street, Standish Street, Bay Road, and Chestnut Street meet. The intersection functions as a traffic circle with an island in the middle. Four of the five roads have stop signs at the intersection; only Chestnut Street does not have a stop sign. The roadway width in the intersection varies from 43 feet to 76 feet, not including on-street parking areas. There are about 50 on-street parking spaces within 100 feet of the intersection. They are a mixture of parallel, angled, and head-in parking spaces. It is difficult to determine by observation whether the parking spaces are on public or private property, as there are no distinct boundaries between some of the parking spaces and the travel lanes.

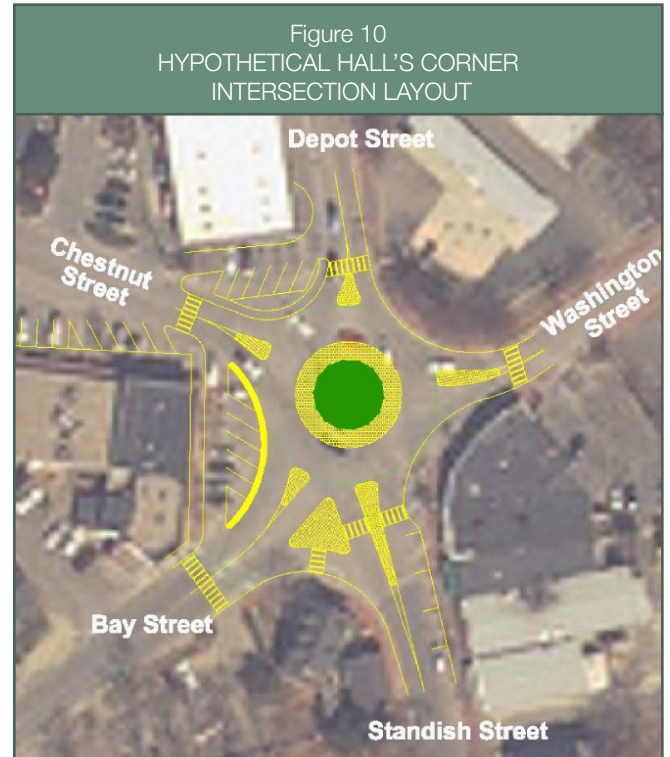
With only two crosswalks, the sidewalks around the intersection are not well connected. The sidewalks have multiple surface treatments, contributing to the discontinuity:

- Between Chestnut Street and Depot Street: striped asphalt sidewalk along storefront, no curb
- Between Depot Street and Washington Street: brick sidewalk with granite curb
- Between Washington Street and Standish Street: brick sidewalk with granite curb
- Between Standish Street and Bay Road: brick sidewalk with granite curb
- Between Bay Road and Chestnut Street: concrete sidewalk under awning along store fronts, concrete curb

The intersection's unusual design may confuse pedestrians and bicyclists unfamiliar with the configuration. Furthermore, the gaps in the pedestrian network at this location also pose a safety threat.

Staff developed a hypothetical layout for the intersection based on the geometry of the intersection, shown in Figure 10. This layout is meant to show only one potential approach to improving the intersection. Traffic volumes and patterns were not taken into account, because such work goes beyond the scope of this study. In this layout, the intersection functions as a five-legged with a single travel lane. Brick would be installed around the existing island to decrease the width of the travel lane, while allowing large vehicles (fire trucks, for example) to make the turn. Brick islands would be installed at the corners

to channelize the movement of vehicles and to provide refuge for pedestrians at some crosswalks, and crosswalks with curb cut ramps would be installed to provide pedestrian connections at all approaches to the intersection. Additional analysis, including the consideration of pedestrian and traffic counts and patterns, would be needed to determine a final set of recommendations to improve the intersection for pedestrians.



MAJOR CORRIDORS

CHESTNUT STREET: HALL'S CORNER TO PILGRIM BY-WAY

Corridor Length: 0.28 miles

ROADWAY

The two travel lanes on Chestnut Street are each 12 feet wide, and there are no marked shoulders or bicycle lanes. The posted speed limit is 30 mph in both directions. The travel lanes are divided by a single solid yellow line. The roadway surface is smooth, with no major impediments. The roadway edge is clear of obstructions that would inhibit the safety of bicyclists. (Figure 11 indicates that there are no rough roadway surfaces in the study area.)

SIDEWALKS

The June 2001 report of the Ad Hoc Sidewalk Committee identifies Chestnut Street as a priority corridor for pedestrians. Since then, a sidewalk has been constructed on the north side of the street from Hall's



Chestnut Street, looking west



Depot Street, looking north

Corner to Tremont Street (Route 3A). The sidewalk is 4.75 feet wide; it is made of asphalt with granite curbs. The surface is smooth and free of significant bumps or cracks (see Figure 11 for more details on sidewalk conditions). There is no buffer between the sidewalk and the roadway from Hall's Corner to Pilgrim By-way. There is a 2-foot-wide grass/dirt buffer extending from Pilgrim By-way to beyond the study area. The asphalt sidewalk slopes down to the level of intersecting roadways and driveways.

Duxborough Village, a senior housing development, is located off of Chestnut Street. There is an asphalt sidewalk leading to the development. There are some significant bumps and cracks in the sidewalk's surface in the portion of the sidewalk closest to Chestnut Street.

CROSSWALKS

There is one crosswalk along this corridor:

- Across Pilgrim By-way at Chestnut Street

This crosswalk has a highly visible pavement marking (see Figure 11 for more details on crosswalk condition).

BICYCLE PARKING

There is no bicycle parking along this corridor.

DEPOT STREET: HALL'S CORNER TO PRIOR FARM ROAD

Corridor Length: 0.37 miles

ROADWAY

Depot Street has two 10-foot-wide travel lanes. The posted speed limit is 30 mph heading north and is not posted in the southbound direction. The travel lanes are divided by a single solid yellow line. The roadway surface is mostly smooth, with a few sections of minor bumps and cracks. There are no marked bicycle lanes

or shoulders. The roadway edge is relatively clear of obstructions that could inhibit bicyclist safety. (Figure 11 indicates that there are no rough roadway surfaces in the study area.)

SIDEWALKS

There is a sidewalk on the east side of the street from Hall's Corner to the Duxbury Marketplace shopping center. The sidewalk is five feet wide and has a brick surface with granite curbs. The sidewalk surface is fairly smooth, with some sections of minor unevenness that are not likely to decrease pedestrian safety (see Figure 11 for more details on sidewalk conditions). There is no buffer between the sidewalk and the roadway. At the driveway to the gas station in Hall's Corner, the brick surface crosses the driveway to meet the sidewalk on the other side.

The June 2001 report of the Ad Hoc Sidewalk Committee identifies Depot Street as a priority corridor for pedestrians. A sidewalk could be constructed along the east side of the street from the shopping center to South Station Street and beyond. This sidewalk would connect residents of Depot Street to the town offices to the north and the stores in the Hall's Corner area. If a sidewalk were to be constructed, a crosswalk across South Station Street would be necessary.

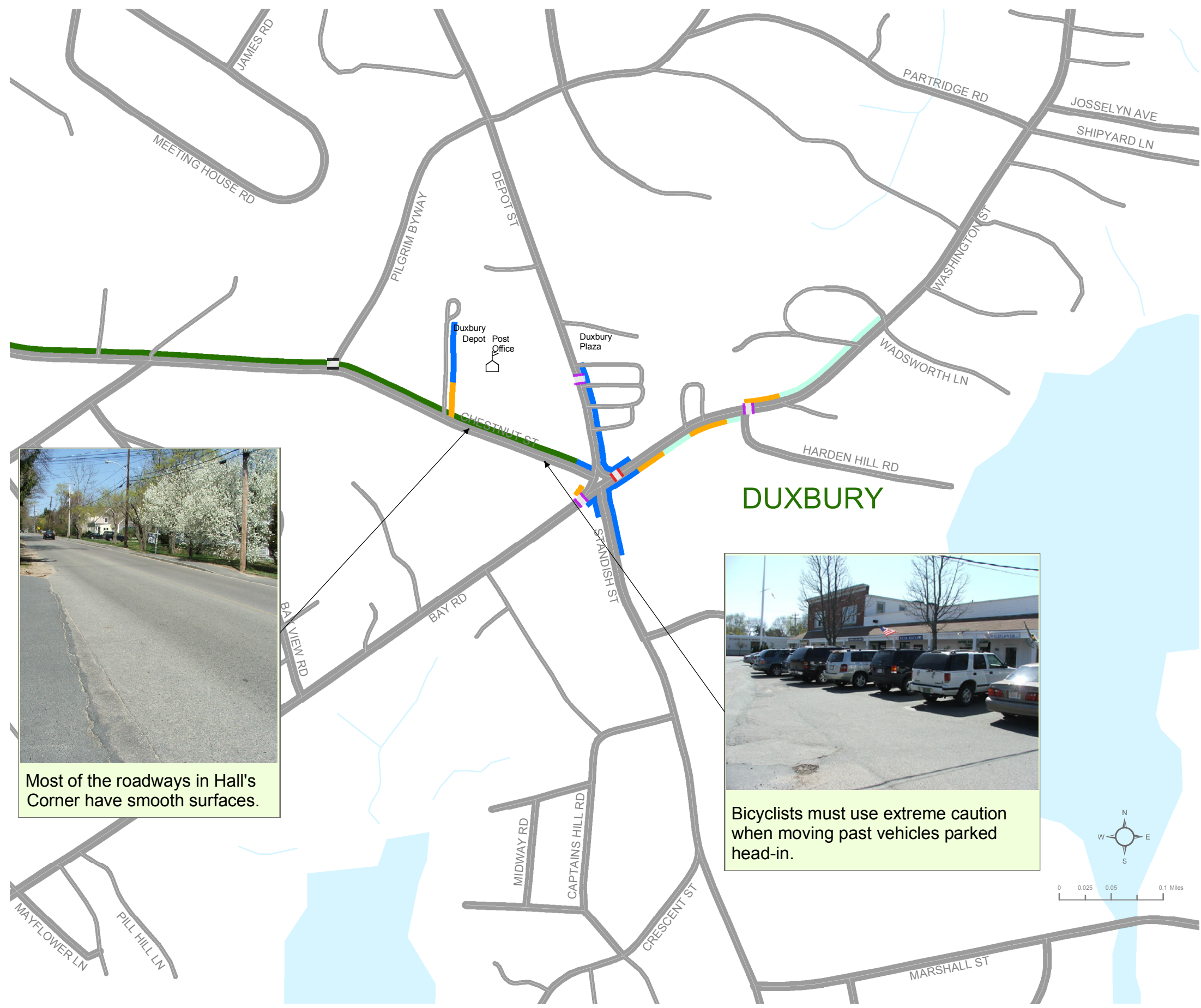
CROSSWALKS

There is one crosswalk along this corridor:



- Across Depot Street at the two shopping centers

This crosswalk has a moderately faded pavement marking (see Figure 11 for more details on crosswalk conditions). It should be relocated so that the crosswalk meets the sidewalk that leads to the shopping center on the west side of Depot Street.






FIGURE 11
Pedestrian and Bicycle
Network: Conditions
Duxbury



Crosswalk Markings

-  Highly visible
-  Sufficiently visible
-  Moderately faded
-  Very faded

Sidewalk Surface

-  Smooth
-  Some small bumps and/or cracks
-  Some medium-sized bumps and/or cracks
-  Significant bumps and/or cracks
-  In serious disrepair



Most of the roadways in Hall's Corner have smooth surfaces.



Bicyclists must use extreme caution when moving past vehicles parked head-in.

There are no crosswalks across South Station Street or the four driveways to the shopping center on the east side of Depot Street. Crosswalks at these locations could serve as a reminder for motorists to look for pedestrians and could guide pedestrians across the driveways.

BICYCLE PARKING

There is no bicycle parking along this corridor. A bicycle rack should be installed at each of the shopping centers on Depot Street.

WASHINGTON STREET: HALL'S CORNER TO HUCKLEBERRY LANE

Corridor Length: 0.33 miles



Washington Street, looking southwest

ROADWAY

Washington Street has two travel lanes that are 12 feet wide. The posted speed limit is 30 mph in both directions. The travel lanes are divided by a double solid yellow line. The roadway surface is mostly smooth, with a few sections of small bumps, cracks, and patches. There are no marked bicycle lanes or shoulders. Storm drain grates, sand, and gravel obstruct the roadway edge. (Figure 11 indicates that there are no rough roadway surfaces in the study area.)

SIDEWALKS

The June 2001 report of the Ad Hoc Duxbury Sidewalk Committee identifies Washington Street as a priority corridor for pedestrians. There are several sidewalk segments along Washington Street: on the north side of the street, in front of the gas station (a continuation of the Depot Street sidewalk); on the south side of the street from Hall's Corner to Harden Hill Road; and on the north side of the street from Harden Hill Road to Huckleberry Lane.

In front of the gas station, the sidewalk is 5 feet wide and has a brick surface with granite curbs. The sidewalk surface is smooth, with no major impediments affecting the safety of pedestrians (see Figure 11 for more details on sidewalk conditions). There is a narrow grass buffer between the sidewalk and the roadway. At the driveway to the gas station, the brick surface crosses the driveway to meet the sidewalk on the other side. The sidewalk ends, without any other connections, at the northern edge of the gas station property.

Along the east side of the street from Hall's Corner to Harden Hill Road, the sidewalk begins as a continuation of the Standish Street sidewalk, with a brick surface and granite curbs. In that section, it is about 5 feet wide. The brick surface crosses several driveways, meeting the sidewalk on the opposite side. At 21 Washington Street, the sidewalk surface becomes asphalt, with a concrete curb. In that section, the sidewalk is about 4 feet wide, with bumps, cracks, and patches that could make the sidewalk unsafe for some pedestrians. Several trees partially obstruct the right-of-way in some locations, and there is no buffer between the sidewalk and the roadway. The asphalt sidewalk slopes down to meet the level of intersecting driveways.

The sidewalk along the west side of the street begins at a crosswalk across Washington Street at Harden Hill Road, and continues north beyond the study area. The sidewalk begins with a width of 2.75 feet, but soon widens to 4.5 feet, and is made of asphalt, with a concrete curb. The surface has bumps, cracks, and patches that could make the sidewalk unsafe for some pedestrians. Utility poles and fire hydrants on the sidewalk partially obstruct passage in several locations. There is no buffer between the sidewalk and the roadway. The asphalt sidewalk slopes down to meet the level of intersecting driveways.

CROSSWALKS

There are two crosswalks along this corridor:

- Across Washington Street at Hall's Corner
- Across Washington Street at Harden Hill Road

These crosswalks have very faded and moderately faded pavement markings, respectively (see Figure 11 for more details on crosswalk conditions). The crosswalk at Harden Hill Road is striped at a sharp angle to the roadway. It should be restriped to be perpendicular to the roadway. Doing so shortens the length of the

crossing and positions pedestrians at a better angle to look both ways before crossing the roadway.

BICYCLE PARKING

There is no bicycle parking along this corridor. A bicycle rack should be installed at the Town Green along Washington Street.

STANDISH STREET: HALL'S CORNER TO CAPTAINS HILL ROAD

Corridor Length: 0.23 miles



Standish Street, looking south

ROADWAY

The travel lanes on Standish Street are each approximately 10 feet wide and have no marked shoulders or bicycle lanes. The posted speed limit is 30 mph in both directions. The two travel lanes are divided by a single solid yellow line. The roadway surface is mostly smooth, with a few cracks that are not safety concerns for bicyclists. The roadway edge is clear of obstructions that could pose a significant safety threat to bicyclists. (Figure 11 indicates that there are no rough roadway surfaces in the study area.)

There are 13 on-street parallel parking spaces on the east side of Standish Street near the Hall's Corner intersection, and 4 on-street, angle-in parking spaces on the east side of the street at the intersection. There are signs on the east side of the street south of the marked on-street parking spaces that indicate no parking between 8:00 AM and 5:00 PM Monday–Saturday. Cars are allowed to park at the edge of the roadway in this area at all other times. This narrows the width of the usable roadway usable for moving vehicles and bicyclists. Town officials should consider not allowing parking along the roadway at this location.

SIDEWALKS

The June 2001 report of the Ad Hoc Sidewalk Commit-

tee does not identify Standish Street as a priority corridor for pedestrians. There are two sidewalk segments along Standish Street.

Along the east side of Standish Street, the sidewalk is a continuation of the Washington Street sidewalk, ending before 27 Standish Street. It has a brick surface, and is separated from the roadway with a granite curb. The sidewalk surface is smooth, though it has some uneven sections that could decrease pedestrian safety (see Figure 11 for more details on sidewalk conditions). The sidewalk, which is 13 feet wide, has trees, benches, and utility poles that serve as buffers between the sidewalk and on-street parking along Standish Street. The brick surface crosses two driveways to meet the sidewalk on the other side. Where the sidewalk ends, a path continues in front of a few houses, showing potential demand for a sidewalk that would connect the residential areas of Standish Street to the shops at Hall's Corner.

Along the west side of Standish Street, the sidewalk has a brick surface and a granite curb. The sidewalk surface is smooth, with some uneven sections that may detract from pedestrian safety. The sidewalk is about 5.5 feet wide, widening as it approaches Hall's Corner. The sidewalk ends just after 8 Standish Street, but there is a worn path on the edges of lawns that continues past a few houses. This shows demand for a sidewalk that would connect the residential areas to Hall's Corner.

CROSSWALKS

There are no crosswalks along this corridor.

A crosswalk could be striped across Standish Street where the sidewalk on the west side of the street ends in order to provide a connection from that sidewalk to the shops on the other side of the street.

BICYCLE PARKING

There is no bicycle parking along this corridor. A bicycle rack should be installed in front of the shops on the east side of Standish Street.

BAY ROAD: HALL'S CORNER TO BAYVIEW ROAD

Corridor Length: 0.35 miles

ROADWAY

The roadway's two travel lanes are approximately 10 feet wide, for a combined width of 20 feet. The shoulder varies from 1 to 9 feet wide on the west side of the street and 3 to 7 feet wide on the east side. The posted speed limit is 30 mph heading west, but there is no

posted speed limit in the eastbound direction. The travel lanes are divided by a double solid yellow line, and solid white lines delineate the shoulders. The roadway surface is smooth, with a few cracks that do not pose a safety threat to bicyclists. However, the shoulders have a large amount of debris within 100 feet of Hall's Corner, making bicycling conditions very dangerous in that area. (Figure 11 indicates that there are no rough roadway surfaces in the study area.)



Bay Road, looking northeast

SIDEWALKS

The June 2001 report of the Ad Hoc Sidewalk Committee does not identify Bay Road as a priority corridor for pedestrians. There are no sidewalks along Bay Road. There is a short sidewalk connecting the west end of the crosswalk across Bay Road at the Hall's Corner intersection to the covered sidewalk in front of the shops at the intersection between Bay Road and Chestnut Street. This short segment is made of concrete and has significant cracks that make the surface very uneven.

CROSSWALKS

There is one crosswalk along this corridor:

- Across Bay Road at Hall's Corner

This crosswalk has moderately faded pavement markings (see Figure 11 for more details on crosswalk conditions).

RECOMMENDATIONS

Below is a set of recommendations for improvements to the pedestrian and bicycle environments in the Hall's Corner area. See Figure 12 for a map of these recommendations.

PEDESTRIAN ENVIRONMENT

CONSTRUCT SIDEWALKS

- Along the east side of Depot Street from the shopping center to South Station Street and beyond
- Along the east side of Standish Street from the end of the existing sidewalk to Hornbeam Road

RESURFACE SIDEWALKS

- Along the east side of the Duxborough Village driveway near Chestnut Street
- Along the east side of Washington Street in two short segments between Hall's Corner and Harden Hill Road
- Along the west side of Washington Street in a short segment between Harden Hill Road and Huckleberry Lane; widen to at least 4.5 feet
- Along the west side of Bay Road at the Hall's Corner intersection

INSTALL CROSSWALKS

- Across the four driveways to the shops on Depot Street
- Across South Station Street at Depot Street
- Across Standish Street at 8 Standish Street

RELOCATE CROSSWALK

- Across Depot Street at the shopping center; relocate the crosswalk so it meets the sidewalk that leads to the shopping center; and install curb cut ramps

IMPROVE CROSSWALK

- Across Washington Street at Harden Hill Road; make the crosswalk perpendicular to the roadway, install curb cut ramps

BICYCLE ENVIRONMENT

ROADWAY RESURFACE

- Clear debris from the shoulders on Bay Road near the Hall's Corner intersection

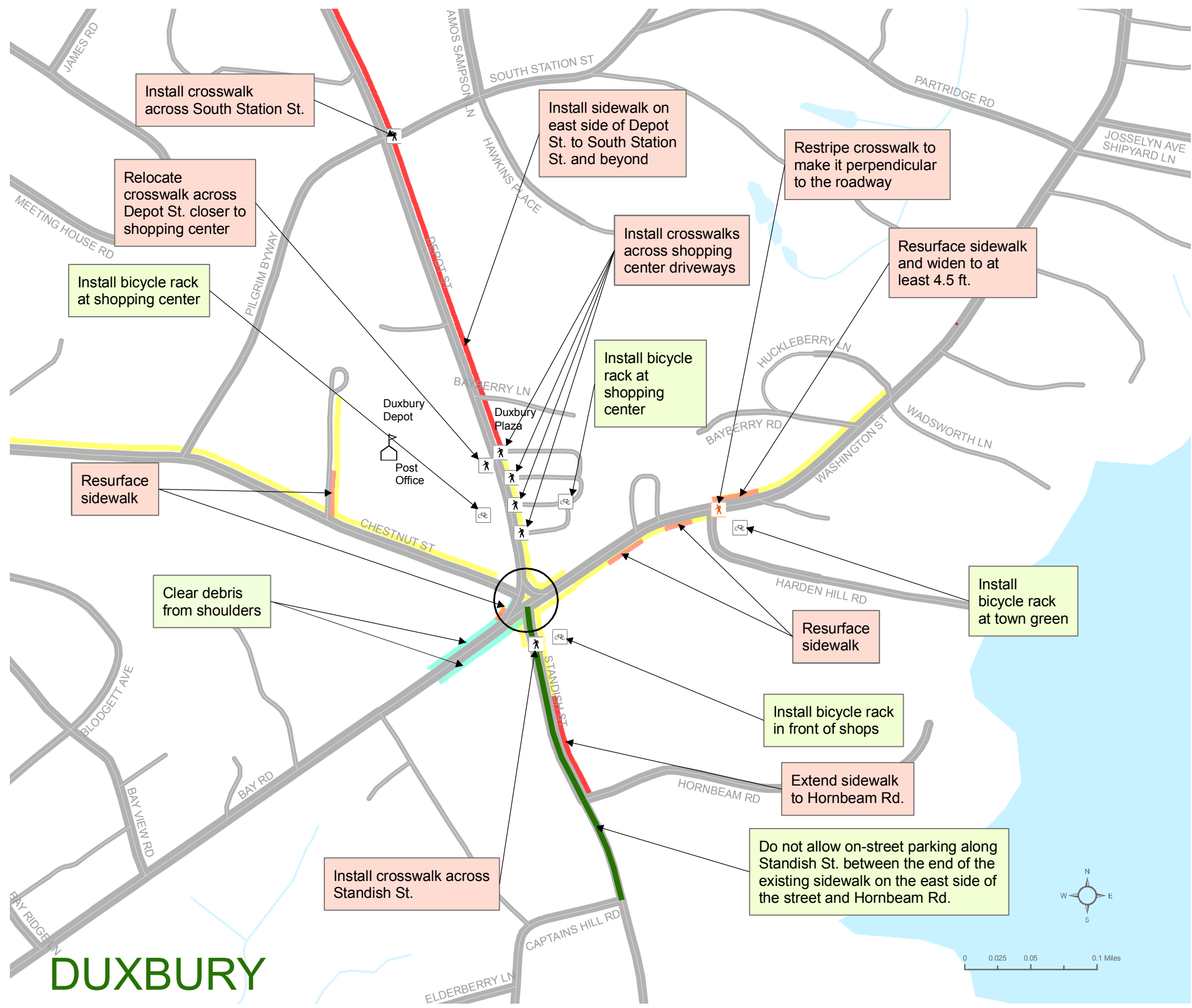
SIGNAGE

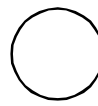










- Do not allow on-street parking along Standish Street between the end of the existing sidewalk on the east side of the street to Hornbeam Road; the roadway is not wide enough to safely accommodate on-street parking in this segment.

INSTALL BICYCLE RACKS

- At the two shopping centers on Depot Street
- At the town green at the corner of Washington Street and Harden Hill Road
- In front of the shops along Standish Street

FIGURE 12
Recommendations
Duxbury



-  Improvements detailed in Figure 10
-  Install crosswalk
-  Restripe crosswalk
-  Install bicycle rack
-  Install sidewalk
-  Resurface sidewalk
-  Install no-parking signs
-  Remove debris
-  Existing sidewalk
-  Pedestrian recommendation
-  Bicycle recommendation

DUXBURY

Essex is a small seaside community on the Boston region's North Shore. During the summer months, its antique shops, restaurants, and recreational activities make Essex a very popular tourist destination. Essex has the smallest population and the lowest population density of the six towns evaluated in this study. The town hall, library, police and fire departments, an elementary school, several churches, the Essex Shipbuilding Museum, and many shops and restaurants are located in the town center. There are also several residential areas in the study area.

Essex had 3,267 residents in 2000, representing a 0.2 percent decrease from 1990.¹ MAPC projects that Essex's population is likely to grow to 3,634 by 2030, representing an 11.2 percent increase from 2000. Essex's employment, recorded at 1,249 jobs in 2000, is projected to increase by 17.7 percent by 2030.²

Essex is indirectly served by Route 128 to the south (in Manchester-by-the-Sea) and east (in Gloucester). Route 22 terminates at Route 133 in the town center. Route 133, the main corridor through town, connects Ipswich and Gloucester, and experiences higher traffic volumes during the summer months.

There is a project in the federal fiscal year (FFY) 2007 element of the Boston Region MPO's FFYs 2007–2010 Transportation Improvement Program (TIP) for the reconstruction of Route 133 in the town center of Essex. The project will reconstruct the roadway, within its current right-of-way, between Western Avenue and Water Street. The project includes constructing concrete sidewalks on both sides of the street, striping crosswalks at their current locations, and installing curb cut ramps. These improvements are expected to address most of the recommendations of the study that fall within the project area. MassHighway's project design firm has submitted 100 percent design plans for the project, which are under review by the MassHighway District 4 engineer. The project may be advertised for construction bids by September 30, 2007.

¹ U.S. census

² MAPC population and employment projections, January 2006



The Essex town center

Between 1995 and 2001, there were three reported crashes involving pedestrians in Essex, representing 0.86 percent of all crashes, and three reported crashes involving bicyclists, representing 0.86 percent of all crashes. None of these crashes resulted in fatalities. The pedestrian crash rate in Essex is lower than the region's average of 1.79 percent, but the bicyclist crash rate is higher than the regional average of 0.82 percent.³

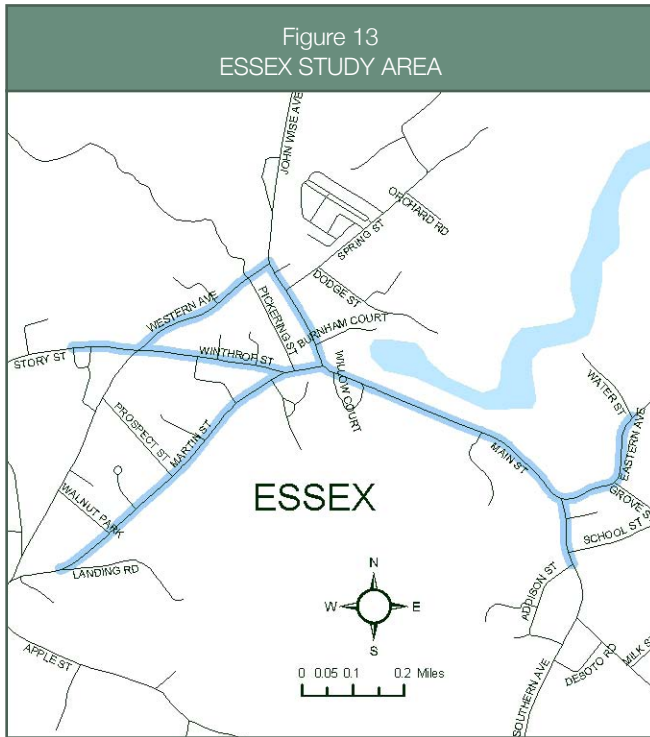
STUDY AREA

The study area for Essex (shown in Figure 13) includes:

- Main Street/Eastern Avenue from Western Avenue to Water Street
- Martin Street from Landing Road to Main Street
- Western Avenue from Winthrop Street to Main Street
- Winthrop Street from Western Avenue to Martin Street
- Story Street from Western Avenue to Essex Elementary School

³ Massachusetts Registry of Motor Vehicles crash data, 1995–2001

- Southern Avenue from Main Street to Addison Street



SIDEWALKS

Each of the roadways evaluated in this study has sidewalks on one or both sides of the street. However, the north side of Main Street has two sections without sidewalks, forcing pedestrians to walk on the shoulder. The sidewalks in the study area are made of asphalt or concrete, and some sections have large bumps and cracks, making the surface very uneven. See Figure 14 for a map of the pedestrian network in the town center.



Most sidewalks have bumps and cracks, making them uneven.



The crosswalks in the town center have recently been restriped.

CROSSWALKS

All crosswalks in the town center have recently been restriped and have highly visible pavement markings. The crosswalks connect sidewalks across roadways in logical places, but many sidewalks lack curb cut ramps that

would provide smooth connections to the crosswalks. There are some pedestrian signs alerting motorists to the crosswalks on Martin Street near Main Street. There are crosswalk signs located near crosswalks at other locations in the study area as well. There is no stop sign on Pickering Street where it ends at Martin Street. See Figure 14 for a map of the pedestrian network in the Essex town center.

SIGNALIZED PEDESTRIAN CROSSINGS

There are no signalized pedestrian crossings in Essex.



On-street parking along Main Street is a hazard to bicyclists.

ON-STREET BICYCLING

Main Street, a popular bicycle route between Ipswich and Gloucester, has large bumps and cracks that are a hazard to bicyclists. While Main Street is wide enough to safely accommodate bicyclists and motorists,

on-street parking along the roadway makes bicycling very dangerous during peak traffic periods. Martin Street and Western Avenue have recently been resurfaced and are very smooth. Several of the drainage grates on Western Avenue are set back from the roadway, improving bicyclist safety. There are no bicycle lanes in Essex. See Figure 14 for a map of the bicycle network in the town center.

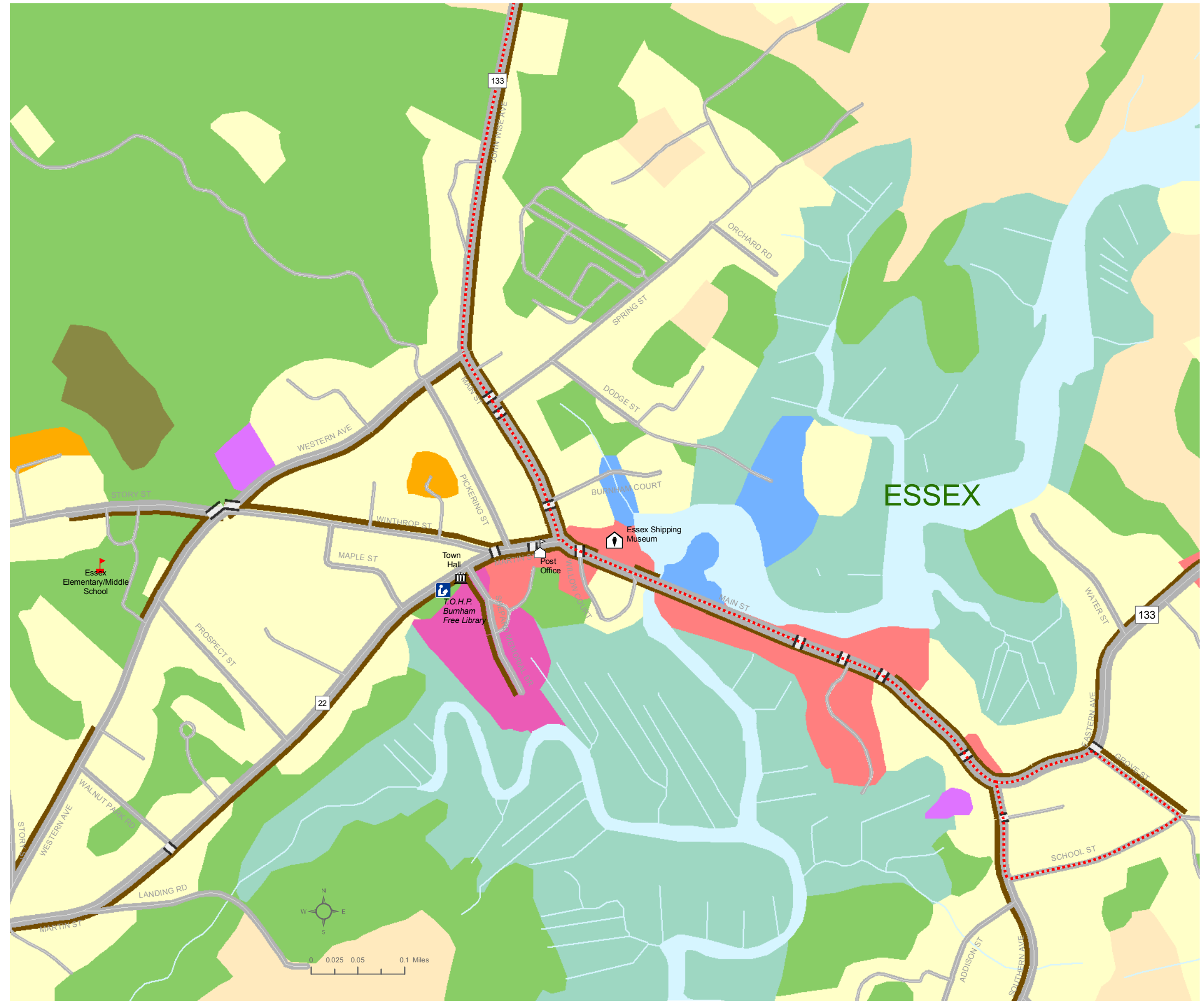
BICYCLE PARKING

There is no bicycle parking in the town center.

TRANSIT SERVICE

The Ipswich-Essex Explorer is a summer shuttle service that is operated by the Cape Ann Transit Authority (CATA) and funded by the Boston Region MPO and the Massachusetts Office of Travel and Tourism. The Explorer's route to Essex begins at the Ipswich commuter rail station and stops along Main Street at major destinations in the town center. The shuttle operates on weekends and holidays in the summer.

FIGURE 14
Pedestrian and Bicycle Network: Land Use and Activity Generators
Essex



- Activity Center**
- Post office
 - Town hall
 - Essex Shipping Museum
 - Public school
 - Library
- Pedestrian Accommodations**
- Crosswalk
 - Sidewalk
- Transit**
- Explorer Bus Route (seasonal)
- Land Use**
- Commercial
 - Multifamily residential
 - Single-family residential
 - Participation recreation
 - Water-based recreation
 - Agricultural
 - Industrial mining, waste disposal
 - Forest, open land
 - Saltwater wetland
 - Freshwater wetland
 - Water

MAJOR CORRIDORS

MAIN STREET/EASTERN AVENUE: WESTERN AVENUE TO WATER STREET

Corridor Length: 1.03 miles



Main Street, looking west

ROADWAY

The roadway's two travel lanes range in width from 15 to 17 feet each and are divided by a double solid yellow line. A solid white line marks the shoulders, which range in width from 1 foot to 8.25 feet. Where the shoulder width permits, cars are parked at the roadway edge, forcing bicyclists to use the travel lanes. Heading east, the posted speed limit is 25 mph. Heading west, the posted speed limit is 30 mph. The roadway surface is uneven, with significant bumps, cracks, and holes that pose a serious threat to bicyclist safety. The shoulders have rough surfaces that could be unsafe for bicyclists. See Figure 15 for more information on bicycling conditions.

SIDEWALKS

There is a sidewalk along the south side of the street from Western Avenue to Southern Avenue, except in front of the parking lot for The Village restaurant. The sidewalk ranges in width from 4.25 feet to 8.5 feet and has many cracks and bumps, some of which may decrease pedestrian safety (see Figure 15 for more details on sidewalk conditions). There is no buffer between the sidewalk and the roadway. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations. The asphalt sidewalk surface slopes down to the level of intersecting roadways.

There is a sidewalk along the north side of the street from Western Avenue to just east of Saint John the Baptist Church. The sidewalk ends at the church, and the roadway shoulder is used as a sidewalk from there

to the bridge over the Essex River. There is a concrete sidewalk on the bridge, but it ends a short distance from the bridge. The shoulder is again used as a sidewalk to 114 Main Street, where there is a sidewalk that continues to beyond Water Street. The sidewalk segments range in width from 4.25 feet to 8.5 feet and have many cracks and bumps, some of which may reduce pedestrian safety. There is no buffer between the sidewalk segments and the roadway. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations. The asphalt sidewalk slopes down to the level of intersecting roadways.

CROSSWALKS

There are nine crosswalks along this corridor:

- Across Main Street at Spring Street (at the north side of the intersection)
- Across Main Street at Spring Street (at the south side of the intersection)
- Across Main Street at Burnham Court
- Across Main Street at Willow Court
- Across Main Street at Riverside Restaurant
- Across Main Street at Woodman's Restaurant
- Across Main Street at 114 Main Street
- Across Main Street at Richdale Convenience Store
- Across Eastern Avenue at Grove Street

All of these crosswalks has highly visible pavement markings (see Figure 15 for more details on crosswalk conditions). Each of these crosswalks lacks one or both of the curb cut ramps that would connect the sidewalk to the crosswalks.

MARTIN STREET: LANDING ROAD TO MAIN STREET

Corridor Length: 0.68 miles

ROADWAY

The roadway's travel lanes range in width from 11 to 18 feet each. The shoulders range in width from 1 to 5 feet. Heading south, the posted speed limit is 35 mph. Heading north, the posted speed limit is 25 mph. The two travel lanes are divided by a double solid yellow line, and white solid lines delineate the shoulders. There are no marked bicycle lanes. The roadway was recently repaved and has a smooth surface. In some locations, the shoulder is wide enough to fully accommodate bicyclists. There are several places where the dirt buffer between the sidewalk and the roadway is occupied by parked cars. There is 30-minute parking in front of TD



Martin Street, looking east

BankNorth, near Pickering Street. See Figure 15 for more details on bicycling conditions.

SIDEWALKS

There is an asphalt sidewalk along the east side of Martin Street from Shephard Memorial Drive to Landing Road, continuing beyond the study area. The sidewalk ranges in width from 3.5 feet to 5 feet. In most locations, the sidewalk is in fair to poor condition, with dirt and cracks creating an uneven surface (see Figure 15 for more details on sidewalk conditions). The buffer between the roadway and the sidewalk alternates between a grass and dirt surface, and ranges in width from 3 feet to 10 feet. The asphalt sidewalk in front of the town hall and library was recently repaved and is very smooth. At this location, there is no buffer between the roadway and the sidewalk.

From just north of Shephard Memorial Drive to Main Street, the sidewalk on the east side of Martin Street continues at the level of the roadway and is bound by two thick parallel lines, resembling a crosswalk. There are several driveways for accessing the businesses on this side of the road. There are also several head-in parking spaces in front of the businesses, and cars cross the sidewalk to access them.

There is an asphalt sidewalk on the west side of Martin Street from Main Street to Winthrop Street. From Main Street to Pickering Street, the sidewalk surface is very uneven in some places (see Figure 15 for more details on sidewalk conditions). The sidewalk segment is raised 2 to 3 feet above the roadway and is separated from the roadway by a 2.5-foot to 4-foot-wide sloping dirt buffer. The sidewalk in front of the bank between Pickering and Winthrop streets was recently constructed and is in excellent condition; however, there is no buffer between the roadway and the sidewalk.

CROSSWALKS

There are three crosswalks along this corridor:

- Across Martin Street at the post office
- Across Martin Street at Pickering Street
- Across Martin Street at Walnut Park Road

Each of these crosswalks has highly visible pavement markings (see Figure 15 for more details on crosswalk conditions). There is no crosswalk across Pickering Street at Martin Street or across Shepard Memorial Drive at Martin Street.

WESTERN AVENUE: WINTHROP STREET TO MAIN STREET

Corridor Length: 0.31 miles



Western Avenue, looking northeast

ROADWAY

The roadway's two travel lanes are each 12 feet wide. The shoulders range in width from 1 foot to 2 feet. The travel lanes are divided by a double solid yellow line, and solid white lines delineate the shoulders. Heading east, the posted speed limit is 25 mph. The speed limit is not posted heading west within the study area. The shoulders are not wide enough to fully accommodate bicyclists. There are no marked bicycle lanes. The drainage grates are set back slightly from the shoulder, improving bicyclist safety. The roadway was recently repaved and has a smooth surface. See Figure 15 for more details on bicycling conditions.

SIDEWALKS

There is an asphalt sidewalk on the south side of the street from Story Street to Main Street. This sidewalk is between 4.5 feet and 5 feet wide and the surface is smooth, with only a few sections of cracks and bumps that may make the sidewalk unsafe for some pedestrians (see Figure 15 for more details on sidewalk condi-

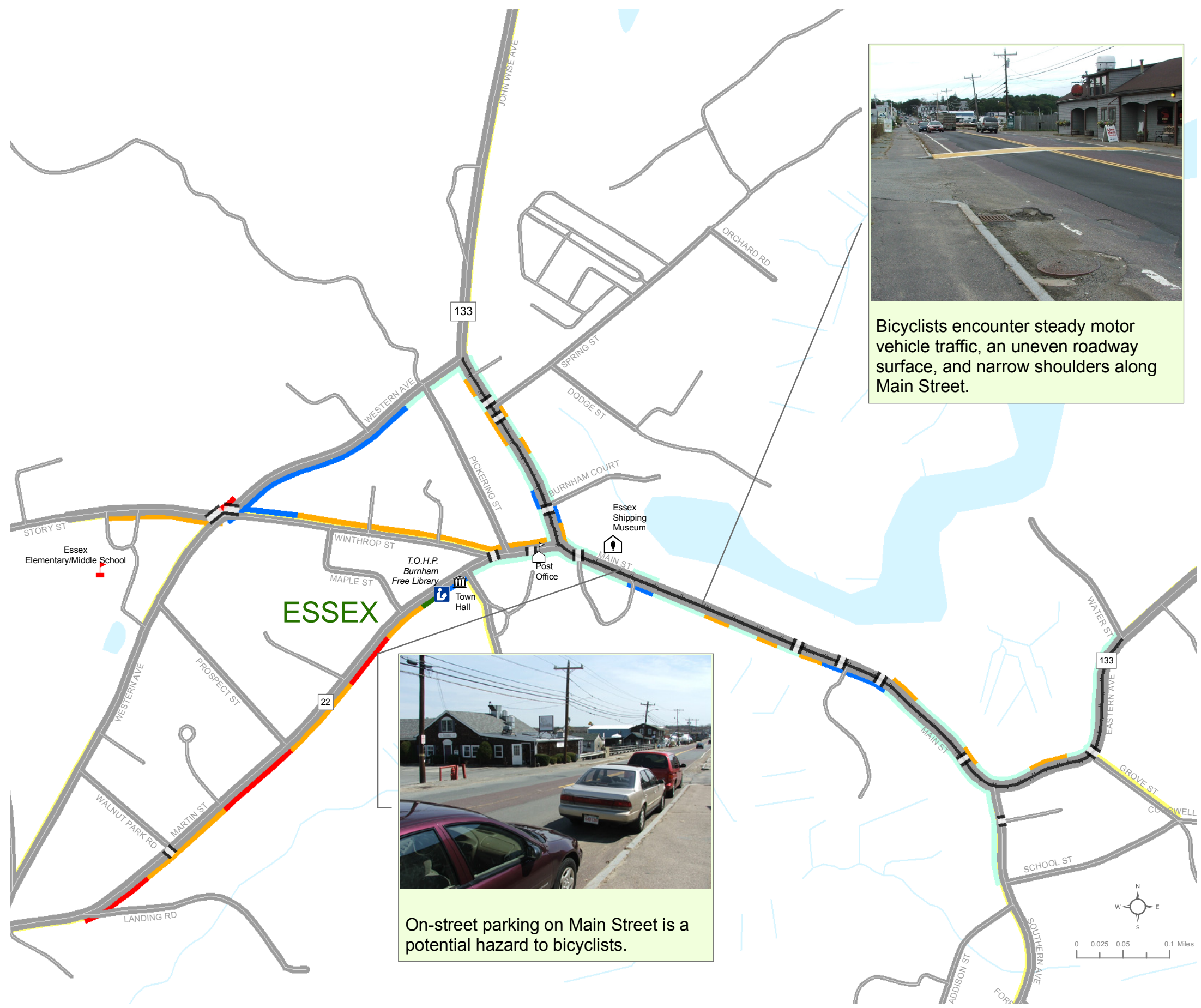
FIGURE 15
Pedestrian and Bicycle Network: Conditions
Essex



Bicyclists encounter steady motor vehicle traffic, an uneven roadway surface, and narrow shoulders along Main Street.



On-street parking on Main Street is a potential hazard to bicyclists.



- Crosswalk Markings**
- Highly visible
 - Sufficiently visible
 - Moderately faded
 - Very faded

- Sidewalk Surface**
- Smooth
 - Some small bumps and/or cracks
 - Some medium-sized bumps and/or cracks
 - Significant bumps and/or cracks
 - In serious disrepair
 - Sidewalk not evaluated

- Roadway Surface**
- Rough roadway surface

tions). There is no buffer between the roadway and the sidewalk. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations.

CROSSWALKS

There is one crosswalk along this corridor:

- Across Western Avenue at Story and Winthrop streets

This crosswalk has highly visible pavement markings but lacks curb cut ramps (see Figure 15 for more details on crosswalk conditions). There is no crosswalk across Pickering Street at Western Avenue.

There is a short sidewalk segment at the north corner of the intersection of Western Avenue and Story Street. It provides a pedestrian connection between the two crosswalks at this intersection. However, it is uneven and contains cracks and bumps that make the sidewalk unsafe for pedestrians.

WINTHROP STREET: MARTIN STREET TO WESTERN AVENUE

Corridor Length: 0.29 miles



Winthrop Street, looking west

ROADWAY

The roadway is 24 feet wide and has no lane or shoulder markings. Heading north, the posted speed limit is 25 mph. The speed limit is not posted in the southbound direction within the study area. The roadway surface is smooth, with a few cracks and bumps that are not likely to pose a safety threat to bicyclists, and the drainage grates are not likely to affect bicyclist safety. There are no curbs or bicycle lanes. See Figure 15 for more details on bicycling conditions.

SIDEWALKS

There is an asphalt sidewalk on the north side of the street for the entire length of the roadway. The sidewalk ranges in width from 4 feet to 5 feet. The grass buffer between the roadway and the sidewalk ranges in width from 5 feet to 8 feet. The sidewalk is uneven, including some sections with large bumps and cracks. There are several trees that protrude into the sidewalk area (see Figure 15 for more details on sidewalk conditions). The sidewalk dips to meet the level of the driveways that it crosses. Approaching Western Avenue, the grass buffer ends and the sidewalk is adjacent to the roadway. This portion of the sidewalk is smooth, with small bumps that are not likely to pose a safety threat to pedestrians.

CROSSWALKS

There are no crosswalks along this corridor.

STORY STREET: WESTERN AVENUE TO ESSEX ELEMENTARY SCHOOL

Corridor Length: 0.12 miles



Story Street, looking west

ROADWAY

Story Street is 30 feet wide and has no lane markings, marked shoulders, or bicycle lanes. Heading west, the posted speed limit is 25 mph. The speed limit is not posted heading east in the study area. The roadway was recently repaved and has a smooth surface. See Figure 16 for more details on bicycling conditions.

SIDEWALKS

There is an asphalt sidewalk on the south side of the street from Western Avenue to Essex Elementary School. The sidewalk is 4.5 feet wide and there are some significant bumps and cracks on the surface, some of which may make the sidewalk unsafe for some pedestrians (see Figure 15 for more details on sidewalk

conditions). There is a 3-foot-wide grass buffer between the sidewalk and the roadway.

CROSSWALKS

There is one crosswalk along this corridor:

- Across Story Street at Western Avenue

This crosswalk has highly visible pavement markings (see Figure 15 for more details on crosswalk conditions).

RECOMMENDATIONS

Below is a set of recommendations for improvements to the pedestrian and bicycle environments in the town center. See Figure 16 for a map of these recommendations.

PEDESTRIAN ENVIRONMENT

CONSTRUCT SIDEWALKS

- Along the north side of Main Street from Saint John the Baptist Church to the bridge over the Essex River
- Along the north side of Main Street from the bridge over the Essex River to 114 Main Street
- Along the south side of Main Street in front of the Village Restaurant

RESURFACE SIDEWALKS

- Along the north side of Main Street from Spring Street to 18 Main Street
- Along the north side of Main Street for a short segment between Spring Street and Burnham Court
- Along the north side of Main Street for a short segment near the intersection of Main and Martin streets
- Along the north side of Main Street from Richdale Convenience Store to 148 Main Street
- Along the north side of Eastern Avenue from 4 Eastern Avenue to 26 Eastern Avenue
- Along the south side of Main Street from just south of Western Avenue to Spring Street
- Along the south side of Main Street from just south of Spring Street to 29 Main Street
- Along the south side of Main Street across from Riverside Restaurant
- Along the south side of Main Street from 139 Main Street to 151 Main Street
- Along the south side of Martin Street from Landing Road to the town hall

- Along the north side of Martin Street from Main Street to Winthrop Street
- Along the north side of Winthrop Street from Martin Street to 28 Winthrop Street
- Along the west side of Story Street from Western Avenue to Essex Elementary School
- At the north corner of Story Street and Western Avenue, connecting the two crosswalks

INSTALL CROSSWALKS

- Across Willow Court at Main Street
- Across Pickering Street at Western Avenue
- Across Pickering Street at Martin Street
- Across Shepard Memorial Drive at Martin Street

INSTALL CURB CUT RAMPS

- At both ends of the crosswalk that crosses Main Street at Spring Street (at the north side of the intersection)
- At both ends of the crosswalk that crosses Main Street at Spring Street (at the south side of the intersection)
- At both ends of the crosswalk that crosses Main Street at Burnham Court
- At the north end of the crosswalk that crosses Main Street at Willow Court
- At the south end of the crosswalk that crosses Main Street at Riverside Restaurant
- At the south end of the crosswalk that crosses Main Street at Woodman's Restaurant
- At the south end of the crosswalk that crosses Main Street at 114 Main Street
- At both ends of the crosswalk that crosses Main Street at Richdale Convenience Store
- At the north end of the crosswalk that crosses Eastern Avenue at Grove Street
- At the west end of the crosswalk that crosses Story Street at Western Avenue
- At the south end of the crosswalk that crosses Western Avenue at Winthrop Street
- At the west end of the crosswalk that crosses Southern Avenue at Southern Heights

IMPROVE SIGNAGE

- Install a stop sign on Pickering Street at Martin Street

BICYCLE ENVIRONMENT

RESURFACE ROADWAY

- Resurface Main Street/Eastern Avenue from Western Avenue to Water Street

MANAGE ON-STREET PARKING

- Stripe on-street parking spaces on both sides of Main Street where on-street parking is allowed; post no-parking signs where on-street parking is not allowed

INSTALL SIGNAGE

- Install share-the-road signs along Main Street

INSTALL BICYCLE RACKS

- In front of the post office
- In front of the town hall/library
- At the playground and ball fields at the end of Shepard Memorial Drive
- At Essex Elementary School

holbrook

Holbrook is a dense suburban community located south of Boston and north of Brockton on the border of the MPO region. With an area of only 7.4 square miles, Holbrook is geographically the smallest town in this study, but it has the highest population density. Two state routes with high traffic volumes, Routes 37 and 139, intersect in Holbrook's town center, where the town hall, a pharmacy, restaurants, small businesses, and a playground and ball fields are located. Holbrook High School and Saint Joseph Elementary School are located on South Franklin Street, and residential buildings are interspersed with commercial buildings throughout much of the study area.

Holbrook had 10,785 residents in 2000, representing a 2.3 percent decrease from 1990.¹ MAPC projects that Holbrook's population is likely to grow to 11,308 by 2030, representing a 4.8 percent increase from 2000. Holbrook's employment, recorded at 2,783 jobs in 2000, is projected to increase by 7.8 percent by 2030.²

Holbrook is indirectly served by Route 24 to the west (in Avon), I-93 to the north (in Braintree), and Route 3 to the north and east (in Braintree and Weymouth). Routes 37 and 139 intersect at Holbrook's town center. The Claire Saltonstall Bikeway, an on-road bicycle route between Boston and Cape Cod, passes through Holbrook to the south of the study area.

The Town of Holbrook reconstructed the intersection of North/South Franklin Street (Route 37) and Union/Plymouth Street (Route 139) in 2002 with Chapter 90 funds. The project included resurfacing the roadway, adding turn lanes at each approach to the intersection, replacing sidewalks, and installing street furniture (lights, trees, and trash receptacles).

The intersection of North/South Franklin Street and Union/Plymouth Street in Holbrook is ranked 534 on the list of the top 1,000 crash locations in Massachusetts.³ Between 1995 and 2001, there were 61 crashes



Storefront in Holbrook's town center

at this intersection; 3 of them involved pedestrians and 1 involved a bicyclist. During that time, the entire town of Holbrook had 20 reported crashes involving pedestrians, representing 1.99 percent of all crashes, and 17 reported crashes involving bicyclists, representing 0.99 percent of all crashes. None of these crashes resulted in fatalities. The pedestrian and bicyclist crash rates in Holbrook are higher than the region's average of 1.79 percent and 0.82 percent, respectively.⁴

STUDY AREA

The study area for Holbrook (shown in Figure 17) includes:

- North Franklin Street from Belcher Street to Union Street
- South Franklin Street from Union Street to Longmeadow Drive
- Union Street from Cedar Hill Road to North Franklin Street

¹ U.S. census

² MAPC population and employment projections, January 2006

³ MassHighway's statewide list of the top 1,000 Crash Locations, 1999–2001

⁴ Massachusetts Registry of Motor Vehicles crash data, 1995–2001

- Plymouth Street from North Franklin Street to Abington Avenue
- Minor Roadways: Belcher Street, School Street, Linfield Street, Cottage Street, Summer Street, Winter Street, Card Crescent, Weston Avenue, Pleasant Street, Snell Street, Chandler Street, Garfield Road, Adams Street, and Norfolk Road

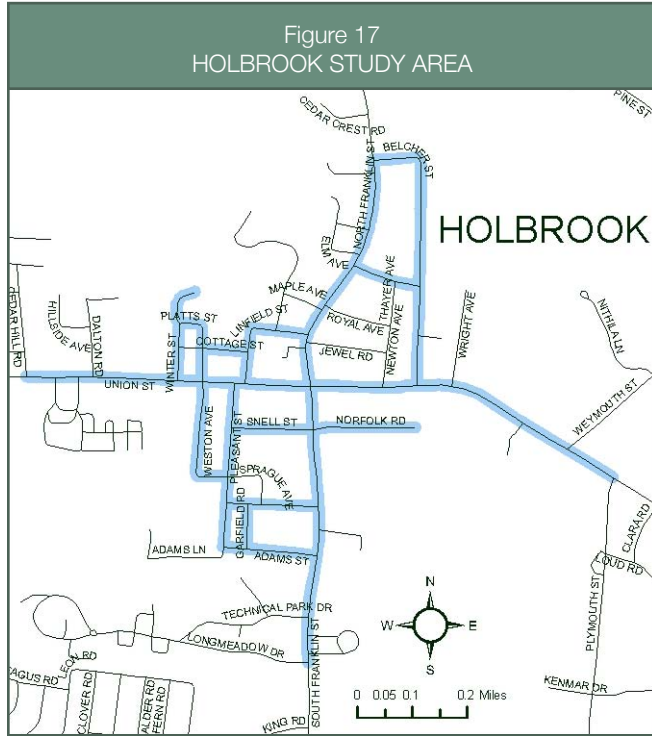


Figure 17
HOLBROOK STUDY AREA



Some of the sidewalks near the study boundary are in need of repair.

SIDEWALKS

Holbrook has a comprehensive sidewalk network in its town center. Within the study area, North Franklin, South Franklin, Union, and Plymouth streets all have sidewalks on both sides for most of their lengths, and many side streets have sidewalks.

The sidewalks that were reconstructed as part of the 2002 roadway project are made of concrete and have smooth surfaces. These sidewalks are wide enough to easily accommodate two pedestrians walking past one another. However, many of the sidewalks beyond the boundaries of that project and on side roads are narrow and uneven. There are some sections of sidewalk that are in serious disrepair. See Figure 18 for a map of the pedestrian network in the town center.



The crosswalk markings in the town center are moderately or very faded.

CROSSWALKS

All crosswalks in Holbrook's town center have moderately faded or very faded pavement markings. The crosswalks connect sidewalks across roadways in logical places. The crosswalks within the area of the 2002 roadway reconstruction project

have curb cut ramps, but many outside that area do not. There are signs identifying the crosswalks to motorists near Holbrook High School, but there are few signs elsewhere. Many minor roads do not have stop signs where they meet the main corridors. This poses a serious safety threat to pedestrians crossing at these crosswalks. See Figure 18 for a map of the pedestrian network in Holbrook's town center.



This intersection was reconstructed in 2002.



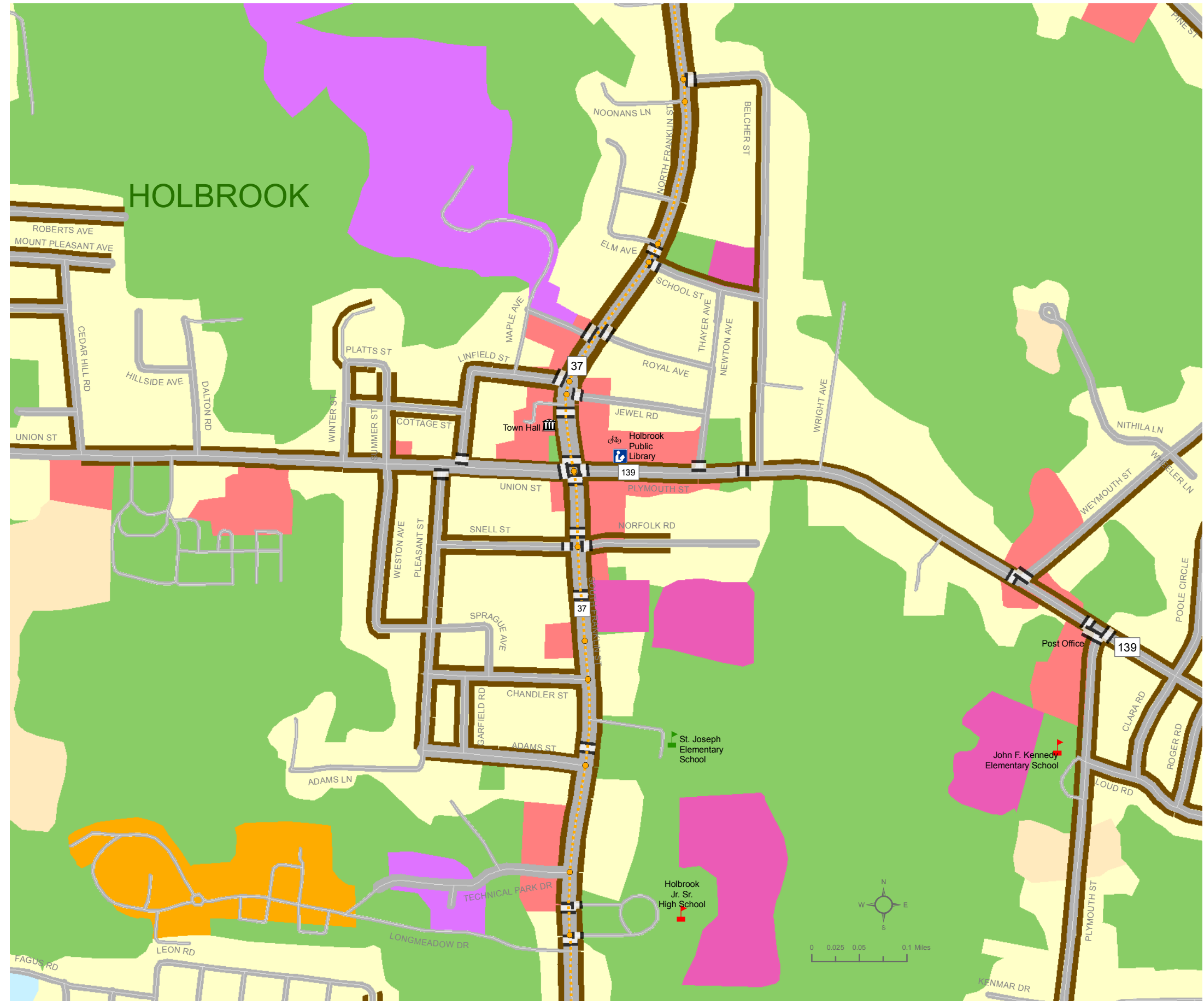
The pedestrian signal phase is too short for the long crosswalks at this intersection.

SIGNALIZED PEDESTRIAN CROSSWALKS






The intersection of North/South Franklin Street with Union/Plymouth Street has a four-way stoplight with pedestrian-activated crossing signals. The signal has an exclusive pedestrian phase consisting of a 10-second walk signal and a 16-second flashing don't-walk signal. There are crosswalks across North Franklin, South Franklin, Union, and Plymouth streets at the intersection. They are 64, 74, 48, and 51 feet long, respectively. Using a 3.5-foot-per-second standard for pedestrians crossing a roadway, the pedestrian phase is adequate for the lengths of the crossings.

The intersection of Plymouth Street and Abington Avenue has a flashing beacon traffic light. Traffic heading east on Plymouth Street and heading west on Abington Avenue is controlled by a flashing yellow signal, and traffic on Plymouth Street is controlled by a flashing red



FIGURE 18
Pedestrian and Bicycle Network: Land Use and Activity Generators
Holbrook




Activity Center

-  Post office
-  Town hall
-  Public school
-  Private school
-  Public library

Pedestrian Accommodations

-  Crosswalk
-  Sidewalk

Bicycle Racks:

-  One rack

Transit

-  MBTA Bus Route

Land Use

-  Commercial
-  Multifamily residential
-  Single-family residential
-  Participation recreation
-  Industrial
-  Agricultural
-  Forest, open land
-  Water

Figure 19
HYPOTHETICAL PLYMOUTH STREET-ABINGTON
AVENUE INTERSECTION LAYOUT



Figure 20
HYPOTHETICAL PLYMOUTH STREET-ABINGTON
AVENUE INTERSECTION LAYOUT



signal. There are pedestrian-activated signals at the ends of the crosswalks in the intersection; when activated, all vehicular approaches to the intersection have a solid red light. The signal has an exclusive pedestrian phase consisting of a 7-second walk signal and a 6-second flashing don't-walk signal. There are crosswalks across Plymouth Street at the west and south sides of the intersection and across Abington Street at the east

side of the intersection. They are 38, 102, and 47 feet long, respectively. Using a 3.5-foot-per-second standard for crossing a roadway, the pedestrian phase (including the walk signals and the flashing don't-walk signals) is too short for pedestrians to safely use the crosswalks across Plymouth Street at the south side of the intersection, and across Abington Street at the east side of the intersection.

Staff developed two hypothetical layouts for improving pedestrian safety at this intersection based on the geometry of the intersection. These layout schemes are meant to show two potential approaches to improving pedestrian safety at the intersection. Traffic volumes and patterns were not taken into account because such work goes beyond the scope of the study. Additional analysis, including the consideration of pedestrian and traffic counts and patterns, would be needed to determine a final set of recommendations for improving the intersection for pedestrians.

Figure 19 shows a hypothetical intersection layout within the existing right-of-way. In this layout, a brick island and a brick median would be installed across Plymouth Street at the south side of the intersection to provide a refuge for pedestrians in the long crosswalk. The island and median would also channelize the movement of vehicles turning onto Plymouth Street southbound from Plymouth Street eastbound and from Abington Avenue westbound. The crosswalk across Plymouth Street at the west side of the intersection would be relocated to meet the brick island where Plymouth Street makes a right turn. The crosswalk across Abington Avenue would be relocated further east to meet the curb at a right angle on the south side of the street.

Figure 20 shows a hypothetical intersection layout that would require a small land taking. In this layout, two brick islands and a brick median would be installed across Plymouth Street at the south side of the intersection to provide refuge for pedestrians in the long crosswalk. The islands and median would also channelize the movement of vehicles turning onto Plymouth Street southbound from Plymouth Street eastbound and traffic turning right onto Abington Avenue eastbound from Plymouth Street northbound. The crosswalks across Plymouth Street at the west side of the intersection and across Abington Avenue would be relocated to meet the brick islands.



The roadway edges near the study boundary are uneven and contain debris.

ON-STREET BICYCLING

The main roadway corridors in Holbrook's town center are wide enough to comfortably accommodate bicyclists and motor vehicle traffic. Along North Franklin and South Franklin streets near the study area's northern and southern

end, recent utility work has left the roadway edges very uneven and dangerous for bicyclists. Along Union and Plymouth streets, the roadway surfaces are relatively smooth. There are no bicycle lanes in the town center. On-street parking, particularly in unmarked spaces on Union Street, is an impediment to bicyclists. See Figure 18 for a map of the bicycle network in Hollbrook's town center.



The Holbrook Public Library has one bicycle rack.

BICYCLE PARKING

There is one four-space bicycle rack in Holbrook's town center. It is located near the rear entrance to the library. Staff observed no bicycles utilizing the rack on a warm, sunny summer day.

SIGNAGE

Many of the streets that intersect Routes 37 and 139 do not have stop signs, though some have stop lines painted on the roadway. Stop signs require drivers to come to a complete stop at an intersection in order to look for other vehicles, bicyclists, and pedestrians. They should be placed before the crosswalks so that cars stop to allow pedestrians to cross the roadway.

TRANSIT SERVICE

The MBTA's Route 230 bus runs through Holbrook's town center along North and South Franklin streets, making connections to the Montello commuter rail station in Brockton, and three stations on the Red Line. The route operates every 20 minutes during rush hour on weekdays and once every hour during off-peak times and on weekends.

Holbrook/Randolph Station, located on the Middleborough/Lakeville commuter rail line, is located one mile west of the town center on Union Street. From this station, there are 12 round-trips to/from Boston on weekdays and 7 round-trips on weekends. The station has 362 parking spaces for motor vehicles and has bicycle parking that can accommodate eight bicycles.

THE RIDE, the MBTA's paratransit service, operates in Holbrook, providing door-to-door transportation to people who are unable to use general public transportation (subways, buses, and trains), all or some of the time, because of a physical, cognitive, or mental disability. THE RIDE, which is operated in compliance with the federal Americans with Disabilities Act (ADA), operates 365 days a year, from 6:00 AM to 1:00 AM.

MAJOR CORRIDORS

NORTH FRANKLIN STREET: UNION/PLYMOUTH STREET TO BELCHER STREET

Corridor Length: 0.45 miles



North Franklin Street, looking south

ROADWAY

The roadway's two travel lanes are each approximately 15 feet wide. The roadway widens at the intersection with Union/Plymouth Street to include a left-turn lane. There are marked shoulders from Union Street to just north of Royal Avenue. Where there are no on-street parking spaces, the shoulder is two feet wide. There are no shoulders from just north of Royal Avenue to Belcher Street. Heading south toward the intersection, the posted speed limit is 30 mph at Belcher Street and 25 mph at Royal Avenue. Heading north, the posted speed limit is 35 mph. The travel lanes are divided by a double solid yellow line. The roadway surface is smooth, with no impediments, from Union Street to just north of Royal

Avenue. North of Royal Avenue, the roadway surface is uneven, as recent utility work resulted in patches along the roadway, creating a safety hazard for bicyclists. On-street parking also poses a potential hazard to bicyclists. However, in some sections with on-street parking, the shoulder line is 1 to 2 feet to the left of the parking spaces, which may encourage bicyclists to ride at a safe distance from parked cars. See Figure 21 for more details on bicycle conditions.

BICYCLE PARKING

There is no bicycle parking along this corridor.

SIDEWALKS

There is a concrete sidewalk on both sides of North Franklin Street from its intersection with Union Street to Royal Avenue. These sidewalks range in width from 6 feet to 16 feet, and are smooth, with no impediments to pedestrians (see Figure 21 for more details on sidewalk conditions). There is a grass buffer between the roadway and the sidewalk on the east side of the street from just south of Jewel Avenue to Royal Avenue. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations. There are curb cut ramps where the sidewalk meets intersecting roadways.

The sidewalks continue north on both sides of North Franklin Street from Royal Avenue to Belcher Street and beyond the study area. These sidewalks range in width from 4.75 feet to 5.25 feet. They are made of asphalt, and the sidewalk surfaces are uneven, with bumps, cracks, and patches that make the sidewalk unsafe for pedestrians. There is a grass buffer on the west side of North Franklin Street between Royal Avenue and Belcher Street. The buffer on the east side of the street begins at the intersection with Union street and ends just south of School Street; it resumes just south of Belcher Street. The asphalt sidewalk slopes down to the level of intersecting roadways or driveways.

CROSSWALKS

There are eight crosswalks along this corridor:

- Across North Franklin Street at Town Hall
- Across Jewel Road at North Franklin Street
- Across Linfield Street at North Franklin Street
- Across Royal Avenue at North Franklin Street
- Across Maple Avenue at North Franklin Street
- Across School Street at North Franklin Street
- Across North Franklin Street at Elm Avenue
- Across Belcher Street at North Franklin Street

Each of these crosswalks has moderately faded or very faded pavement markings (see Figure 21 for more details on crosswalk conditions). There are no crosswalks across Noonan's Lane, Sunset Avenue, or Elm Avenue where they meet North Franklin Street.

SOUTH FRANKLIN STREET: UNION/PLYMOUTH STREET TO LONGMEADOW DRIVE

Corridor Length: 0.50 miles



South Franklin Street, looking south

ROADWAY

The roadway's two travel lanes are each approximately 19 feet wide. The roadway widens at the intersection with Union/Plymouth Street to include a left-turn-only lane and a right-turn-only lane. The shoulders range in width from 0.5 feet to 2.5 feet. There are two on-street parking spaces on the west side of the street just north of Union Street. Heading south from the intersection, the posted speed limit is 35 mph. Heading north, the posted speed limit is 25 mph. The travel lanes are divided by a double solid yellow line. The roadway surface is smooth, with no impediments to bicyclists, from Union Street to Dunkin' Donuts. South of Dunkin' Donuts, the roadway surface has several sections with significant cracks, bumps, and patches, as recent utility work has made the surface very uneven, especially at the edges of the roadway. There are no marked bicycle lanes, and the shoulders are not wide enough to accommodate bicyclists. See Figure 21 for more details on bicycling conditions.

SIDEWALKS

There is a concrete sidewalk on both sides of South Franklin Street from Union Street to Dunkin' Donuts. These sidewalks range in width from 6 feet to 7.75 feet and are smooth, with no impediments to pedestrians

(see Figure 21 for more details on sidewalk conditions). There is no buffer between the roadway and the sidewalk, but trees planted at the edge of the sidewalk next to the roadway provide a buffer between vehicles and pedestrians. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations. There are curb cut ramps where the sidewalk meets intersecting roadways.

The sidewalks, which range in width from 5 feet to 7.5 feet, continue south on both sides of South Franklin Street from Dunkin' Donuts to beyond Longmeadow Drive, outside of the study area. They have an uneven, asphalt surface; many sections have bumps, cracks, and patches that may significantly affect pedestrian safety. There is a 2.5-foot-wide sloping asphalt buffer between the sidewalk and the roadway on the east side of South Franklin Street from the playground to Saint Joseph Elementary School, and a 4.5-foot-wide grass buffer on the east side of South Franklin Street from 193 South Franklin Street to just before Holbrook High School. There is no buffer between the sidewalk and the roadway on the west side of the street. The asphalt sidewalk slopes down to the level of intersecting roadways and driveways.

CROSSWALKS

There are nine crosswalks along this corridor:

- Across South Franklin Street at Norfolk Street
- Across Norfolk Street at South Franklin Street
- Across Snell Street at South Franklin Street
- Across South Franklin Street at the playground
- Across South Franklin Street at Saint Joseph Church
- Across the Holbrook High School driveway (exit) at South Franklin Street
- Across South Franklin Street at the Holbrook High School driveway (exit)
- Across Holbrook High School driveway (entrance) at South Franklin Street
- Across South Franklin Street at the Holbrook High School driveway (entrance)

Each of these crosswalks has moderately faded pavement markings (see Figure 21 for more details on crosswalk conditions). There are no crosswalks across Chandler Street, the Saint Joseph Elementary School driveway, Adams Street, and Technical Park Drive where they meet South Franklin Street.

UNION STREET: NORTH FRANKLIN STREET TO CEDAR HILL ROAD

Corridor Length: 0.52 miles



Union Street, looking east

ROADWAY

The roadway's two travel lanes are each approximately 12 feet wide. The roadway widens at the intersection with North/South Franklin Street to include a right-turn-only lane. The shoulders range in width from 1 foot to 2.5 feet. Heading east, the posted speed limit is 35 mph. Heading west, the posted speed limit is 25 mph. The travel lanes are divided by a double solid yellow line. The shoulders are not wide enough to fully accommodate bicyclists, and there are no marked bicycle lanes. The roadway surface is smooth, with no impediments, from North Franklin Street to Pleasant Street. West of Pleasant Street, the roadway surface has several uneven sections, with cracks, bumps, and patches. Between North Franklin Street and Pleasant Street, the shoulders contain only minor obstructions that are not likely to affect bicyclist safety. Between Linfield and Pleasant streets, cars are allowed to park at the roadway edge and partially onto the sidewalk along the north side of Union Street between Linfield and Pleasant Streets, a potential hazard for bicyclists. See Figure 21 for more information on bicycle conditions.

SIDEWALKS


There is a concrete sidewalk on both sides of Union Street from North Franklin Street to Pleasant Street. On the east side of the street, the sidewalk is 8 feet wide, with no buffer between the roadway and the sidewalk. There are utility poles in the sidewalk in this area. On the west side of the street, the sidewalk is 4.5 feet wide, with no buffer between the roadway and the sidewalk. The sidewalk surfaces are smooth, with no impediments to pedestrians (see Figure 21 for more information on bicycle conditions). Driveways are raised to meet the level

FIGURE 21





Pedestrian and Bicycle Network: Conditions

Holbrook







Bicycle Racks

 One rack


Crosswalk Markings

-  Highly visible
-  Sufficiently visible
-  Moderately faded
-  Very faded

Sidewalk Surface

-  Smooth
-  Some small bumps and/or cracks
-  Some medium-sized bumps and/or cracks
-  Significant bumps and/or cracks
-  In serious disrepair
-  Sidewalk not evaluated

Roadway Surface

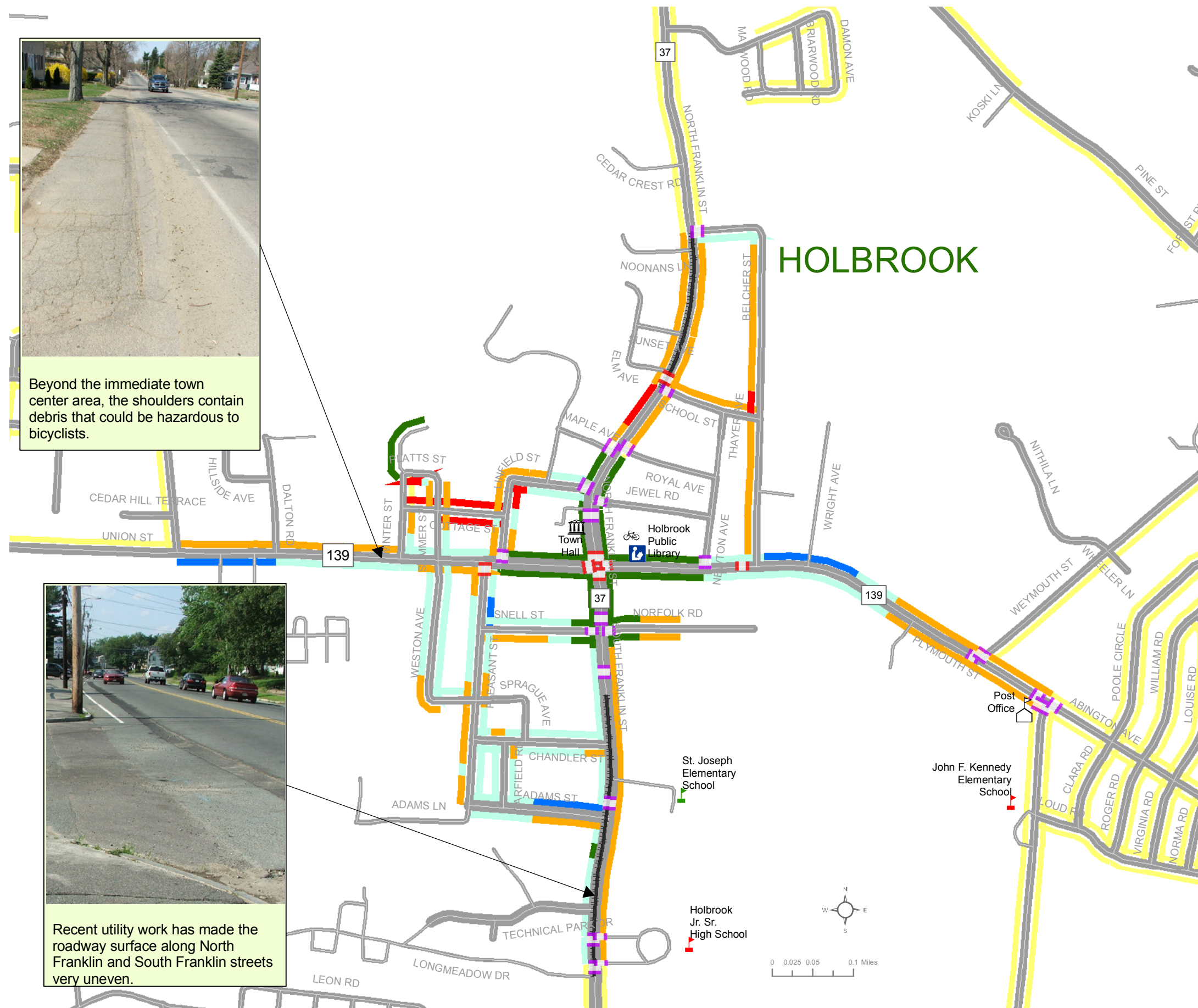
-  Rough roadway surface



Beyond the immediate town center area, the shoulders contain debris that could be hazardous to bicyclists.



Recent utility work has made the roadway surface along North Franklin and South Franklin streets very uneven.



of the sidewalk, eliminating the need for curb cut ramps at these locations. There are curb cut ramps where the sidewalk meets intersecting roadways.

The sidewalk on the north side of Union Street continues west from Pleasant Street to beyond the study area, leading to the Holbrook/Randolph commuter rail station. This sidewalk ranges in width from 5 feet to 6 feet. It is made of asphalt and has an uneven surface in places due to bumps, cracks, and patches, which could significantly affect pedestrian safety. There is a dirt and gravel buffer between this sidewalk and the roadway from 100 Union Street to Dalton Street. The asphalt sidewalk slopes down to the level of intersecting roadways and driveways.

The sidewalk on the south side of Union Street continues west from Pleasant Street to just beyond Union Cemetery. This sidewalk ranges in width from 4.5 feet to 5.75 feet. The sidewalk surface is uneven in places due to sections with a significant number of bumps, cracks, and patches that could significantly affect pedestrian safety. There is a grass and dirt buffer between the sidewalk and the roadway from 121 Union Street to 145 Union Street. The asphalt sidewalk slopes down to the level of intersecting roadways and driveways.

CROSSWALKS

There are two crosswalks along this corridor:

- Across Linfield Street at Union Street
- Across Pleasant Street at Union Street

These two crosswalks have moderately faded and very faded pavement markings, respectively (see Figure 21 for more details on crosswalk conditions). There are no crosswalks across Dalton Road, Winter Street, Summer Street, or Weston Avenue where they meet Union Street.

PLYMOUTH STREET: NORTH FRANKLIN STREET TO ABINGTON AVENUE

Corridor Length: 0.60 miles

ROADWAY

The roadway's two travel lanes are each approximately 15 feet wide. The roadway widens at the intersection with North/South Franklin Street to include a right-turn-only lane. The shoulders are 2 feet wide from this intersection to Newton Avenue, and 1 foot wide from Newton Avenue to the intersection of Plymouth and Abington streets. There are two on-street parking spaces, with very faded pavement markings, on the south side of the street near the intersection with North/South Franklin



Plymouth Street, looking west

Street. Heading west toward that intersection, the posted speed limit is 35 mph. The speed limit is not posted for eastbound traffic. The travel lanes are divided by a double solid yellow line. There are no marked bicycle lanes along Plymouth Street, and the shoulders are not wide enough to fully accommodate bicyclists. The roadway surface is smooth, with no impediments, from the intersection with North/South Franklin Street to Newton Avenue. East of there, the roadway surface is smooth, with only a few cracks that do not pose a safety threat to bicyclists. The shoulders have minor obstructions that are not likely to inhibit bicyclist mobility. See Figure 21 for more details on bicycling conditions.

SIDEWALKS

There is a 6-foot concrete sidewalk on both sides of Plymouth Street from North Franklin Street to Newton Avenue. The surfaces are smooth, with no impediments to pedestrians (see Figure 21 for more details on sidewalk conditions). There is no buffer between the roadway and the sidewalk. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations. There are curb cut ramps where the sidewalk meets intersecting roadways.

These sidewalks continue east on both sides of Plymouth Street from Newton Avenue to the intersection of Plymouth and Abington streets. In this segment, sidewalks are made of asphalt, with smooth surfaces only slightly marred by minor cracks and bumps that are not likely to pose a safety hazard to pedestrians. The sidewalks are 4 feet to 8 feet wide, with no buffer between the sidewalk and the roadway, on both sides of the street. The asphalt sidewalk slopes down to the level of intersecting roadways and driveways.

CROSSWALKS

There are seven crosswalks along this corridor:

- Across Newton Avenue at Plymouth Street
- Across Plymouth Street at Temple Beth Shalom
- Across Plymouth Street at Weymouth Street
- Across Weymouth Street at Plymouth Street
- Across Plymouth Street at Abington Avenue (at the west side of the intersection)
- Across Plymouth Street at Abington Avenue (at the south side of the intersection)
- Across Abington Avenue at Plymouth Street (at the east side of the intersection)

These crosswalks have moderately faded or very faded pavement markings (see Figure 21 for more details on crosswalk conditions). There are no crosswalks across Belcher Street or Wright Avenue where they meet Plymouth Street.

RECOMMENDATIONS

Below is a set of recommendations for improvements to the pedestrian and bicycle environment in Holbrook's town center area. See Figure 22 for a map of these recommendations.

PEDESTRIAN ENVIRONMENT

INSTALL CROSSWALKS

- Across Noonan's Lane at North Franklin Street
- Across Sunset Avenue at North Franklin Street
- Across Elm Avenue at North Franklin Street
- Across Chandler Street at South Franklin Street
- Across the Saint Joseph Elementary School driveway at South Franklin Street
- Across Adams Street at South Franklin Street
- Across Technical Park Drive at South Franklin Street
- Across Dalton Road at Union Street
- Across Winter Street at Union Street
- Across Summer Street at Union Street
- Across Weston Avenue at Union Street
- Across Belcher Street at Plymouth Street
- Across Wright Avenue at Plymouth Street

RESTRIPE CROSSWALKS

- Restripe all existing crosswalks in the study area, using a more visible paint pattern

CONSTRUCT SIDEWALK

- Along the south side of Weston Avenue from the end of the existing sidewalk to Pleasant Street

RESURFACE SIDEWALKS

- Along the east side of North Franklin Street from Royal Avenue to Belcher Street
- Along the west side of North Franklin Street from Maple Avenue to Belcher Street
- Along the north side of School Street from North Franklin Street to Belcher Street
- Along the west side of Belcher Street from 152 Belcher Street to Plymouth Street
- Along the north and west sides of Linfield Street from North Franklin Street to Union Street
- Along the north side of Cottage Street from Winter Street to Linfield Street
- Along the south side of Cottage Street from Summer Street to Linfield Street
- Along the west side of Summer Street from Cottage Street to Platts Street
- Along the east side of Summer Street from Cottage Street to Platts Street
- Along the south side of Platts Street from Winter Street to Summer Street
- Along the east side of Winter Street from Cottage Street to just north of Union Street
- Along the west side of Weston Avenue from 3 Weston Avenue to the end of the sidewalk
- Along the west side of Pleasant Street from just north of Weston Avenue to Adams Street
- Along the east side of Pleasant Street from just south of Snell Street to Sprague Avenue
- Along the south side of Snell Street from Pleasant Street to 38 Snell Street
- Along the north side of Chandler Street from just east of Pleasant Street to Sprague Avenue
- Along the south side of Chandler Street for a short segment just west of South Franklin Street
- Along the east side of Garfield Road for a short segment just south of Chandler Street
- Along the south side of Adams Street from 62 Adams Street to South Franklin Street
- Along the north side of Norfolk Road from the Walgreens driveway to the end of the sidewalk
- Along the south side of Norfolk Road from the Mutual gas station to the end of the sidewalk
- Along the north side of Plymouth Street from 154 Plymouth Street to the beginning of Abington Avenue

- Along the south side of Plymouth Street from 154 Plymouth Street to the beginning of Abington Avenue

INSTALL STOP SIGNS

- On Belcher Street at Plymouth Street
- On Newton Avenue at Plymouth Street
- On Noonans Lane at North Franklin Street
- On Sunset Avenue at North Franklin Street
- On Elm Avenue at North Franklin Street
- On School Street at North Franklin Street
- On Royal Avenue at North Franklin Street
- On Maple Avenue at North Franklin Street
- On Jewel Road at North Franklin Street
- On Dalton Road at Union Street
- On Winter Street at Union Street
- On Summer Street at Union Street
- On Linfield Street at Union Street
- On Weston Avenue at Union Street
- On Pleasant Street at Union Street
- On Norfolk Road at South Franklin Street
- On Snell Street at South Franklin Street
- On Chandler Street at South Franklin Street
- On the Saint Joseph Elementary School driveway at South Franklin Street
- On Technical Park Drive at South Franklin Street
- On Longmeadow Drive at South Franklin Street
- On the Holbrook High School driveway (exit) at South Franklin Street

BICYCLE ENVIRONMENT

RESURFACE ROADWAY

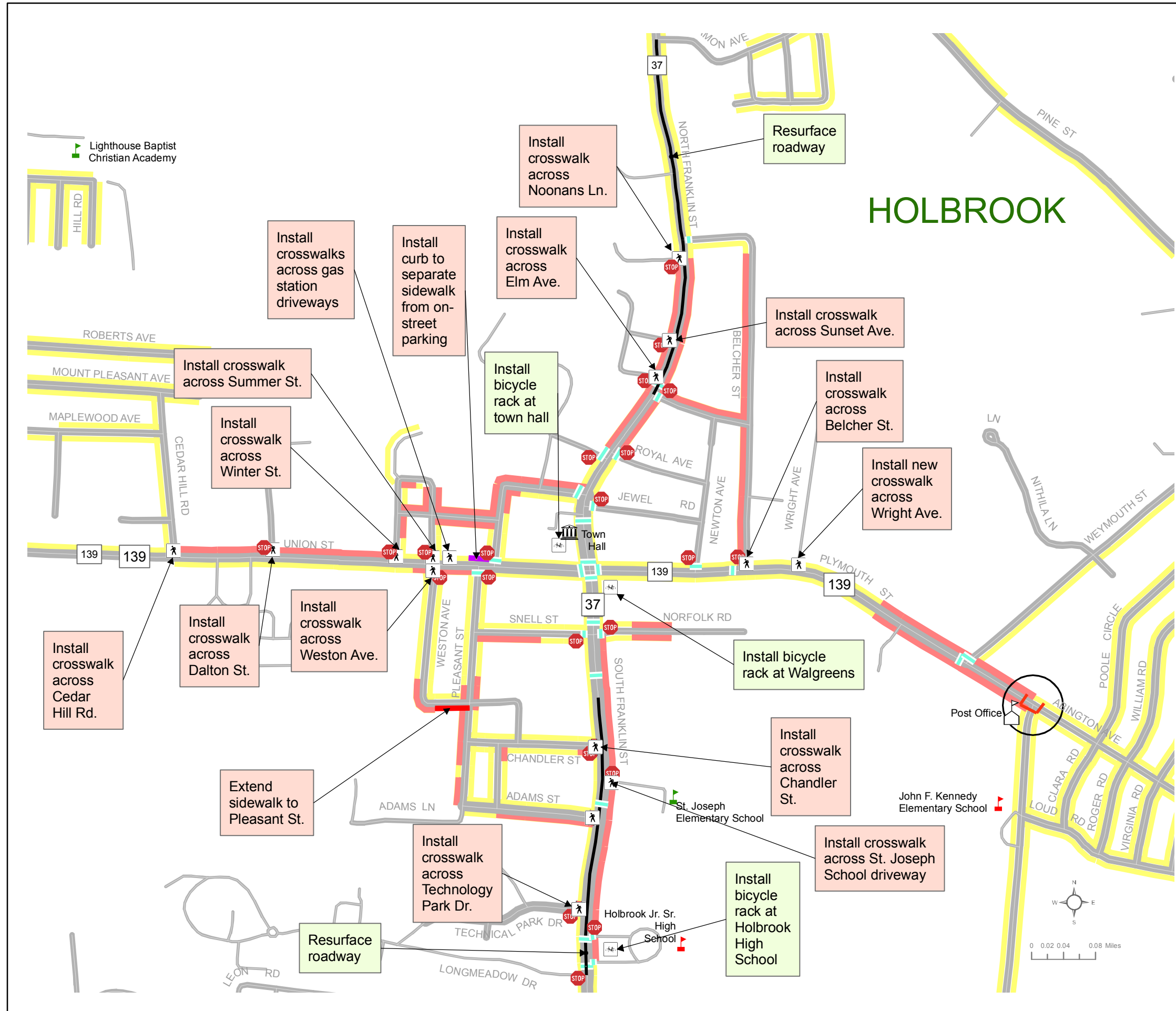
- Resurface North Franklin Street from Royal Avenue to beyond Belcher Street (outside of the study area)
- Resurface South Franklin Street from just south of Norfolk Road to beyond Longmeadow Drive (outside of the study area)













INSTALL BICYCLE RACKS

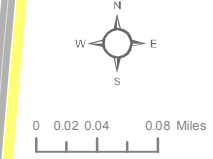
- At the town hall
- At Holbrook High School
- At Walgreens



FIGURE 22
Recommendations
Holbrook



-  Improvements detailed in Figures 19 and 20
-  Install stop sign
-  Install crosswalk
-  Install bicycle rack
-  Install sidewalk
-  Resurface sidewalk
-  Restripe crosswalk
-  Install curb
-  Resurface roadway
-  Existing sidewalks
-  Pedestrian recommendation
-  Bicycle recommendation



lynnfield

Lynnfield is a relatively dense suburban community located north of Boston, just outside the Route 128 belt. Lynnfield Center, once the commercial center of town, contains the components of a typical New England village, such as a town common, town offices, a church, cemetery, post office, library, several shops, and residences. The area just beyond the center is largely residential. Three schools, Lynnfield Middle School, Summer Street School, and Lynnfield High School, are within walking or biking distance of the town center. Center Village, a senior housing community, is located on Main Street in Lynnfield Center.

Lynnfield had 11,542 residents in 2000, representing a 2.4 percent increase from 1990.¹ The Metropolitan Area Planning Council (MAPC) projects that Lynnfield's population is likely to grow to 12,483 by 2030, representing an 8.2 percent increase from 2000. Lynnfield's employment, recorded at 4,794 jobs in 2000, is projected to increase by 16 percent by 2030.²

Lynnfield is served by Route 128 to the south and Route 1 to the east; both are a short driving distance from Lynnfield Center. Route 129 runs through South Lynnfield near Routes 1 and 128, but there are no state routes that traverse Lynnfield Center. The MBTA owns an unused railroad right-of-way in Lynnfield just south of Lynnfield Center; it extends to Wakefield and Peabody and beyond.

Lynnfield developed a master plan for the town in September 2002. The Lynnfield Master Plan addresses the issues of transportation; housing; economic development; land use, open space and recreation; and natural, historic, and cultural resources. It includes recommendations of potential transportation improvements and studies, including several in Lynnfield Center.

Between 1995 and 2001, there were 6 reported crashes involving pedestrians in Lynnfield, representing 0.26 percent of all Lynnfield crashes, and 10 reported crashes involving bicyclists, representing 0.43 percent of



Lynnfield's town common

all crashes. None of these crashes resulted in fatalities. The pedestrian and bicyclist crash rates in Lynnfield are lower than the region's average rates of 1.79 percent and 0.82 percent, respectively.³

STUDY AREA

The study area for Lynnfield (shown in Figure 23) includes:

- Main Street from Chestnut Street to Summer Street
- Main Street from Summer Street to Essex Street
- Summer Street from Main Street to Todd Lane
- South Common Street from Main Street to Summer Street

SIDEWALKS

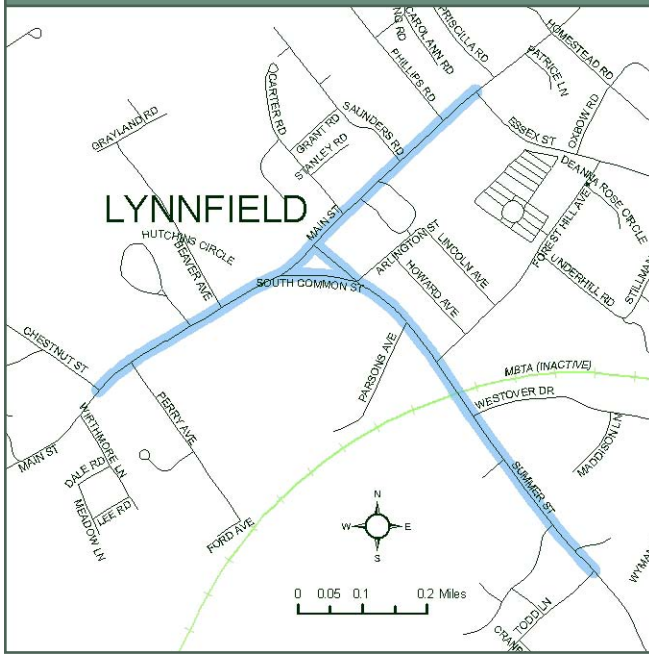
Lynnfield has a comprehensive sidewalk network in its town center. In the study area, Main Street has sidewalks on both sides for most of its length, and South Common and Summer streets have a sidewalk on one

¹ U.S. census

² MAPC population and employment projections, January 2006

³ Massachusetts Registry of Motor Vehicles crash data, 1995–2001

Figure 23
LYNNFIELD STUDY AREA



SIGNALIZED PEDESTRIAN CROSSWALKS

There are no signalized pedestrian crosswalks in Lynnfield Center. However, the 2003 Lynnfield Master Plan recommends a study of the intersection of Main Street and South Common Street to develop recommendations for safety improvements. A study may or may not result in recommendations for signalized crosswalks at this location.

MULTIUSE PATHS

Currently there are no multiuse paths in Lynnfield Center. The MBTA owns an unused railroad right-of-way, located just south of Lynnfield Center, that intersects Summer Street. The town is examining the possibility of converting the right-of-way into a multiuse trail, along with the adjoining Town of Wakefield and City of Peabody.

ON-STREET BICYCLING

Main Street and Summer Street are wide enough for bicyclists and motorists to safely share the road, but the roadway surfaces have some bumps and cracks that limit bicyclist safety. Staff observed several bicyclists riding against the traffic on the road, and also riding on the sidewalk. There is some debris along the edge of the roadway that might be hazardous to bicyclists on the road. Drainage grates are set back from the roadway, which improves bicyclist safety. See Figure 24 for a map of the bicycle network in Lynnfield Center.

side along most of their lengths. The sidewalks are made of asphalt and are generally smooth; however, there are several sections that have bumps, cracks, and patches that could significantly impact pedestrian safety. See Figure 24 for a map of the pedestrian network in Lynnfield Center.



Lynnfield Center has a comprehensive sidewalk network.



Crosswalks in Lynnfield Center have sufficiently visible pavement markings.

CROSSWALKS

The majority of crosswalks in Lynnfield Center are visible to motorists and pedestrians and connect sidewalks across roadways in logical places. Most have curb cut ramps connecting them to the sidewalks. There are several signs identifying the crosswalks to motorists, particularly near the schools. See Figure 24 for a map of the pedestrian network in Lynnfield Center.



Drainage grates are set back from the roadway.



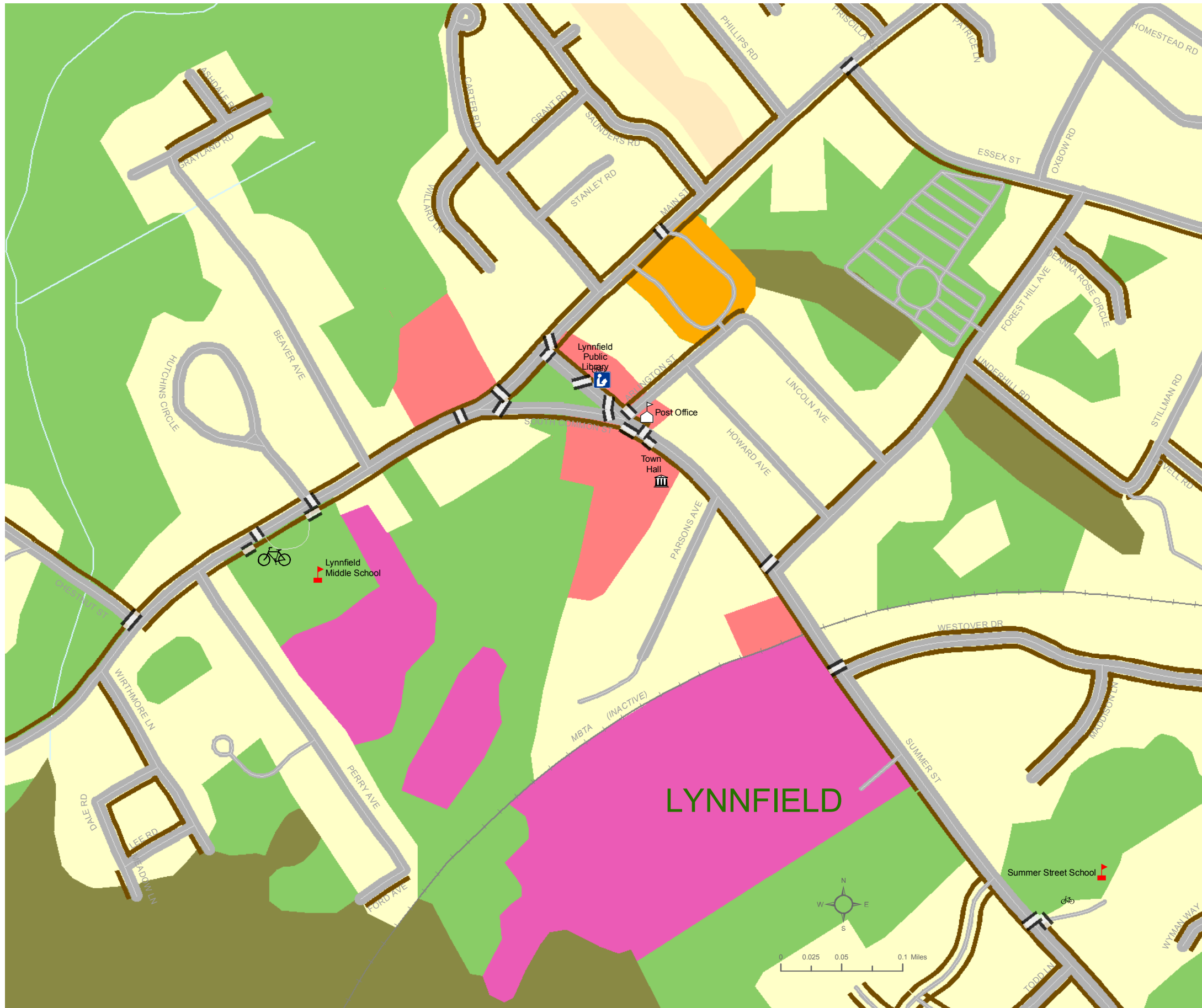
The Summer Street School has a bicycle rack.

BICYCLE PARKING





There are several bicycle racks located at important activity centers in Lynnfield Center:

- Bicycle racks with 34 spaces at Lynnfield Middle School



FIGURE 24
Pedestrian and Bicycle Network: Land Use and Activity Generators
Lynnfield





Activity Center

-  Post office
-  Town hall
-  Public school
-  Public library








Pedestrian Accommodations

-  Crosswalk
-  Sidewalk

Bicycle Racks:

-  One rack
-  Three racks

Land Use

-  Commercial
-  Multifamily residential
-  Single-family residential
-  Participation recreation
-  Agricultural
-  Forest, open land
-  Freshwater wetland

- A bicycle rack with 8 spaces at Summer Street School
- A bicycle rack with 6 spaces at the town library

TRANSIT SERVICE

THE RIDE, the MBTA's paratransit service, operates in Lynnfield, providing door-to-door transportation to people who are unable to use general public transportation (subways, buses and trains), all or some of the time, because of a physical, cognitive, or mental disability. THE RIDE, which is operated in compliance with the federal Americans with Disabilities Act (ADA), operates 365 days a year, from 6:00 AM to 1:00 AM.

Greater Lynn Senior Services (GLSS) provides Lynnfield's elderly residents with door-to-door transportation service for medical appointments in Lynn, Lynnfield, Salem, Saugus, and Swampscott. Rides are provided Monday–Friday from 6:00 AM to 6:00 PM. GLSS also transports customers to Peabody from 9:30 AM to 6:00 AM.

MAJOR CORRIDORS

MAIN STREET: CHESTNUT STREET TO SUMMER STREET

Corridor Length: 0.41 miles



Main Street, looking northeast

ROADWAY

The roadway's two travel lanes each range in width from 14 to 17 feet. The posted speed limit is 25 mph in both directions. The travel lanes are divided by a double solid yellow line. The roadway surface is smooth, with a few sections of small bumps, cracks, and patches. The edge of the roadway is relatively clear of obstructions, and most drainage grates are set back from the roadway. There are no marked bicycle lanes or shoulders. See Figure 25 for more details on bicycle conditions.

BICYCLE PARKING

There are four 6-space ribbon-style bicycle racks and one 10-space comb-style bicycle rack at Lynnfield Middle School. On a warm, sunny spring school day, staff observed 11 children's bicycles near the bicycle racks. None of the bicycles were locked to the racks.

SIDEWALKS

There are sidewalks on both sides of Main Street in this corridor. The sidewalks are made of asphalt and are generally smooth. At several locations, however, tree roots and sand make the sidewalk uneven (see Figure 25 for more details on sidewalk conditions). There are grass buffers between the sidewalk and roadway throughout much of the corridor, ranging in width from 2 feet to 9 feet. The asphalt sidewalk slopes down to the level of intersecting roadways. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations.

The sidewalk on the west side of the Lynnfield Middle School driveway could be extended to the entrance to the parking area in order to provide access to the bicycle racks and tennis courts. This would require curb cut ramps and a crosswalk across the parking area entrance.

CROSSWALKS

There are seven crosswalks along this corridor:

- Across Chestnut Street at Main Street
- Across the Lynnfield Middle School parking lot driveway at Main Street
- Across Main Street just east of the Lynnfield Middle School parking lot
- Across Main Street at the Lynnfield Middle School main driveway
- Across the Lynnfield Middle School main driveway at Main Street
- Across Main Street at The Centre at Lynnfield shopping plaza (near South Common Street)
- Across Main Street at South Common Street

Each of these crosswalks has sufficiently visible or moderately faded pavement markings (see Figure 25 for more details on crosswalk conditions). There are no crosswalks across the three driveways at The Centre at Lynnfield shopping plaza at Main Street and across Perry Avenue at Main Street. The existing crosswalk across Main Street just east of the Lynnfield Middle School parking lot lacks curb cut ramps connecting the sidewalk to the crosswalk. On the north end of the crosswalk, there is a grass buffer between the crosswalk

and sidewalk. The sidewalk could be widened here to connect the crosswalk to the sidewalk.

There is no curb cut ramp on the south side of the crosswalk that crosses Main Street at the main driveway to Lynnfield Middle School. The crosswalk that crosses South Common Street at Main Street also lacks a curb cut ramp on its east side.

The two crosswalks that cross the two Lynnfield Middle School driveways are set back 20 to 30 feet from Main Street. In order for pedestrians to continue walking along Main Street, they must either turn toward the school and use the sidewalks that parallel the two school driveways to access a crosswalk, or cross where there is no crosswalk. Only one of the four sidewalks that parallel the driveways continues to the school (the easternmost sidewalk, which is closest to the school); the others stop at the crosswalks. Pedestrians going to or from the school need to use that one sidewalk or walk on or alongside the driveways. The setback of the crosswalks poses two safety concerns: the stop signs for vehicles exiting the driveways at Main Street are located beyond the crosswalks, creating a potential hazard to pedestrians, and, because the crosswalks are set back so far from the road, pedestrians in the crosswalks are less visible to drivers entering from Main Street.

MAIN STREET: SUMMER STREET TO ESSEX STREET

Corridor Length: 0.35 miles

ROADWAY

The roadway's two travel lanes are each approximately 14 feet wide. The posted speed limit is 30 mph heading east from the town center, and 25 mph westbound. The travel lanes are divided by a double solid yellow line. The roadway surface is smooth, with a few sections of small bumps, cracks, and patches, mostly at the edge of the roadway. Many of the drainage grates are set back from the roadway. There are no marked bicycle lanes or shoulders. See Figure 25 for more information on bicycle conditions.

BICYCLE PARKING

There is no bicycle parking in this corridor.

SIDEWALKS

There are sidewalks on both sides of the street along this section of Main Street. The sidewalk along the north side of Main Street continues from the town center and ends at Phillips Road, connecting to a sidewalk along that street. The sidewalk along the south side of Main

Street continues from the town center to beyond Essex Street. The sidewalks are made of asphalt and have impediments that could significantly impact the safety of pedestrians. At several locations, large tree roots and sand make the sidewalk very uneven (see Figure 25 for more details on sidewalk conditions). The sidewalks have grass buffers ranging in width from 2 feet to 7 feet. The asphalt sidewalk slopes down to the level of intersecting roadways. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations.



Main Street, looking northwest

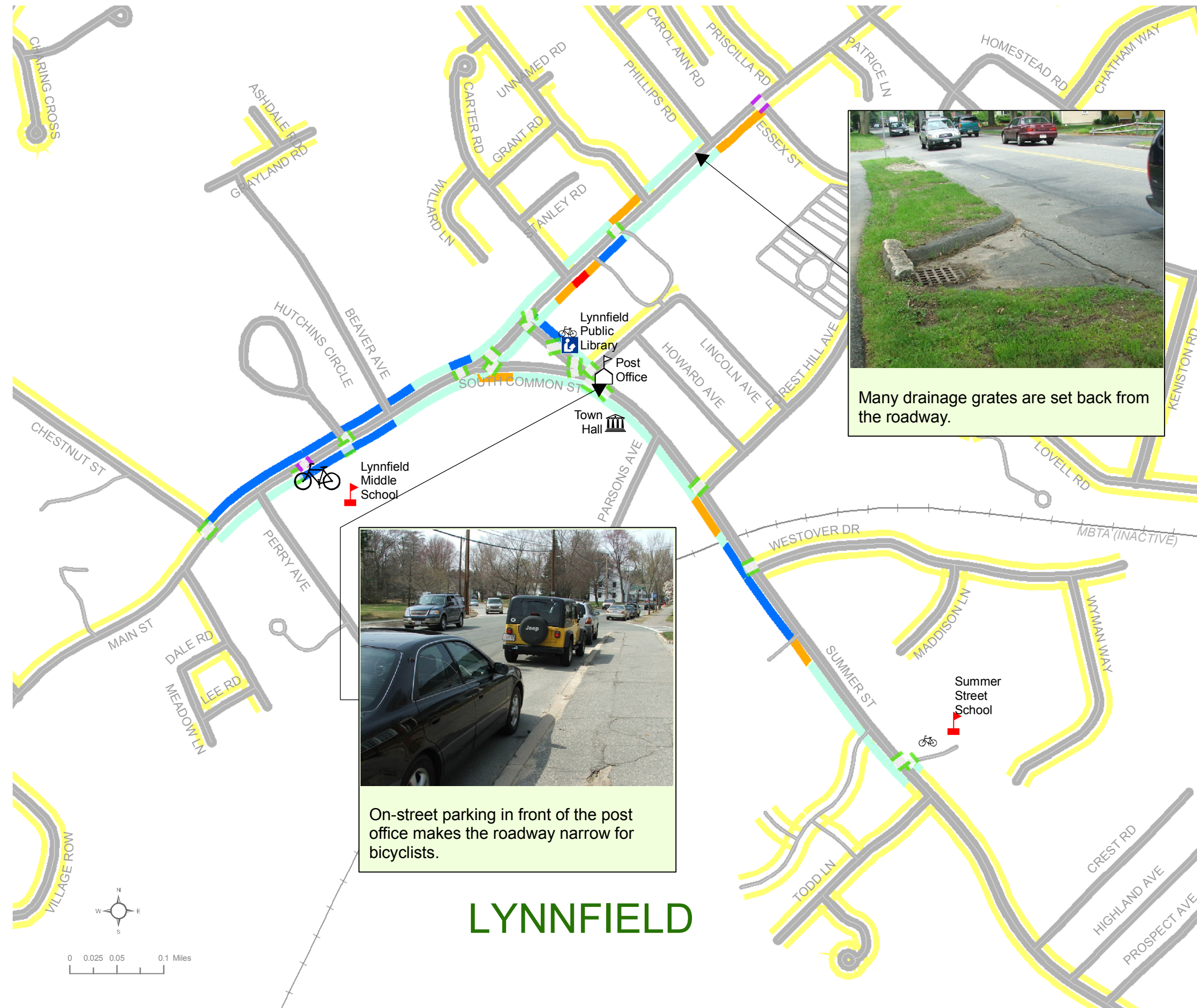
CROSSWALKS

There are three crosswalks along this corridor:



- Across Main Street at Summer Street
- Across Main Street at Center Village
- Across Essex Street at Main Street

Each of these crosswalks has sufficiently visible or moderately faded pavement markings (see Figure 25 for more details on crosswalk conditions). There are two sidewalks in the Center Village development that meet Main Street. Crosswalks could be installed across Main Street to connect to these sidewalks. Doing so would eliminate the need for the existing crosswalk across Main Street at Center Village. The sidewalk that crosses Main Street at Summer Streets lacks a curb cut ramp on its south side.


FIGURE 25
Pedestrian and Bicycle Network: Conditions
Lynnfield









Bicycle Racks

-  One rack
-  Three racks

Crosswalk Markings

-  Highly visible
-  Sufficiently visible
-  Moderately faded
-  Very faded

Sidewalk Surface

-  Smooth
-  Some small bumps and/or cracks
-  Some medium-sized bumps and/or cracks
-  Significant bumps and/or cracks
-  In serious disrepair
-  Sidewalk not evaluated

LYNNFIELD

SUMMER STREET: MAIN STREET TO TODD LANE

Corridor Length: 0.67 miles



Summer Street, looking southwest

ROADWAY

The roadway's two travel lanes are each approximately 15 feet wide. There are on-street parking spaces along the east side of Summer Street from the post office to Main Street and on the west side of the street opposite the post office. None of these parking spaces have pavement markings. The posted speed limit is 35 mph heading south from the town center and 20 mph as you approach Lynnfield Center from the south. The travel lanes are divided by a double solid yellow line. The roadway surface is smooth, with sections of bumps, cracks, and patches, mostly at the edge of the roadway. Many of the drainage grates are set back from the roadway so as not to obstruct the roadway. There are no marked bicycle lanes or shoulders. The roadway's edge is relatively clear of debris that could be hazardous to bicyclists. See Figure 25 for more details on bicycle conditions.

BICYCLE PARKING

There is a toast-style bicycle rack in front of the library that holds six bicycles. There is also an eight-space ribbon-style bicycle rack at Summer Street School.

SIDEWALKS

There is a sidewalk on the east side of Summer Street from Main Street to opposite the town hall. The sidewalk resumes on the east side of the road at Summer Street School. On the west side of the street, the sidewalk begins at South Common Street and continues south to beyond the study area. The sidewalks are all made of asphalt and range in width from 4.5 feet to 5.5 feet. The sidewalks are smooth in some locations and in other locations have impediments that could pose a significant safety threat to pedestrians (see Figure 25 for

more details on sidewalk conditions). The asphalt sidewalks slope down to the level of intersecting roadways. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations. There are buffers between the sidewalks and the roadway in all locations except on the east side of Summer Street between Arlington Street and the end of the sidewalk across from the town hall. The sidewalks dip to meet the level of roadway intersections. At most driveways, the sidewalk level and material are maintained.

There is a short section of sidewalk across from the post office that has no buffer and is at the level of the roadway. It is also used for on-street parking, which can obstruct the path of a pedestrian.

CROSSWALKS

There are eleven crosswalks along this corridor:

- Across Summer Street at Main Street
- Across Summer Street at Centre Congregational Church
- Across Summer Street at South Common Street
- Across Arlington Street at Summer Street
- Across the additional town hall parking lot at Summer Street
- Across Summer Street at the post office
- Across the town hall driveway at Summer Street
- Across Summer Street at Forest Hill Avenue
- Across Summer Street at the south side of Westover Drive
- Across Summer Street at Summer Street School
- Across the Summer Street School driveway at Summer Street

Each of these crosswalks has sufficiently visible pavement markings (see Figure 25 for more details on crosswalk conditions). There is no crosswalk across the wide driveway at the fire station. The crosswalk across Summer Street at the south side of Westover Drive lacks curb cut ramps on both sides. A crosswalk could be installed across Summer Street at the north side of Westover Drive to connect to the sidewalk on the north side of Westover Drive. The crosswalk across Arlington Street at Summer Street is positioned at an angle to the roadway and sidewalk. The crosswalk across Summer Street at South Common Street is positioned before the stop sign. In this case, it is not possible to relocate the crosswalk after the stop sign, but a sign warning drivers about the crosswalk could improve pedestrian safety. There are no stop signs at the driveways to Town Hall where they meet the crosswalks at Summer Street.

SOUTH COMMON STREET: MAIN STREET TO SUMMER STREET

Corridor Length: 0.11 miles



South Common Street, looking east

ROADWAY

The roadway's two travel lanes are each approximately 11.5 feet wide. The speed limit is not posted along this corridor. The travel lanes are divided by a single solid yellow line. The roadway surface is smooth, with a few cracks that do not pose a safety threat to bicyclists. The drainage grates are set back from the roadway so as not to obstruct the shoulder. There are no marked bicycle lanes or shoulders. The roadway edge is relatively clear of debris and other obstructions. See Figure 25 for more details on bicycle conditions.

BICYCLE PARKING

There is no bicycle parking along South Common Street.

SIDEWALKS

There is a sidewalk on the west side of the street for the entire length of the roadway. The sidewalk ranges in width from 4.5 feet to 5.5 feet. It is made of asphalt and contains some impediments that may decrease pedestrian safety (see Figure 25 for more details on sidewalk conditions). There is a grass buffer between the sidewalk and the roadway. The sidewalk connects to the sidewalks along the south side of Main Street and the west side of Summer Street, but does not cross any driveways or roadways.

CROSSWALKS

There are two crosswalks along this corridor:

- Across South Common Street at Main Street
- Across South Common Street at Summer Street

These crosswalks have sufficiently visible pavement markings (see Figure 25 for more details on crosswalk

conditions). The stop sign on South Common Street at Main Street is positioned after the crosswalk that crosses South Common Street.

RECOMMENDATIONS

Below is a set of recommendations for improvements to the pedestrian and bicycle environments in Lynnfield Center. See Figure 26 for a map of these recommendations.

PEDESTRIAN ENVIRONMENT

CONSTRUCT SIDEWALKS

- Along the west side of the main driveway to Lynnfield Middle School from Main Street to the bicycle parking area
- Along the west side of Summer Street between the two driveways at the town hall; separate the sidewalk from on-street parking

RESURFACE SIDEWALKS

- Along the south side of Main Street for a short segment between Summer Street and Center Village
- Along the south side of Main Street from Phillips Road to Essex Street
- Along the north side of Main Street from the eastern edge of Center Village to Saunders Road
- Along the south side of South Common Street for a short segment near Main Street
- Along the east side of Summer Street in front of the post office
- Along the west side of Summer Street from Forest Hill Avenue to St. Paul's Episcopal Church
- Along the west side of Summer Street for the short segment between Westover Drive and Elizabeth Way

INSTALL CROSSWALKS

- Across the parking lot driveway at Lynnfield Middle School (connecting the recommended sidewalk along the west side of the driveway to the bicycle parking area)
- Across the three driveways at The Centre at Lynnfield shopping plaza at Main Street
- Across Perry Avenue at Main Street
- Across Main Street at the sidewalk that leads to Center Village
- Across Summer Street at the south side of Westover Drive

- Across the fire department driveway at Summer Street

RELOCATE CROSSWALKS

- Across the main driveway at Lynnfield Middle School; relocate it 30 feet closer to Main Street and install curb cut ramps
- Across the driveway of the Lynnfield Middle School parking lot; relocate it 20 feet closer to Main Street and install curb cut ramps
- Across Main Street at Center Village; relocate so it will connect with the sidewalk that leads to Center Village
- Across Arlington Street at Summer Street; reposition it so that it meets the sidewalk on the south side of the crosswalk

INSTALL CURB CUT RAMPS

- At the south end of the crosswalk that crosses Main Street at the main driveway to Lynnfield Middle School
- On both sides of the crosswalk that crosses Main Street just east of the Lynnfield Middle School parking lot
- At the south end of the crosswalk that crosses Main Street at Summer Street
- On the east side of the crosswalk that crosses South Common Street at Main Street
- On both sides of the crosswalk that crosses Main Street at Westover Drive

IMPROVE SIGNAGE

- Relocate the stop sign at the main driveway to Lynnfield Middle School; place it before the crosswalk
- Relocate stop sign at the driveway to the Lynnfield Middle School parking lot; place it before the crosswalk
- Relocate stop sign on South Common Street at Main Street; place it before the crosswalk
- Install a sign to alert motorists to the crosswalk across Summer Street at South Common Street
- Install stop signs at the town hall driveways

BICYCLE ENVIRONMENT

MANAGE ON-STREET PARKING

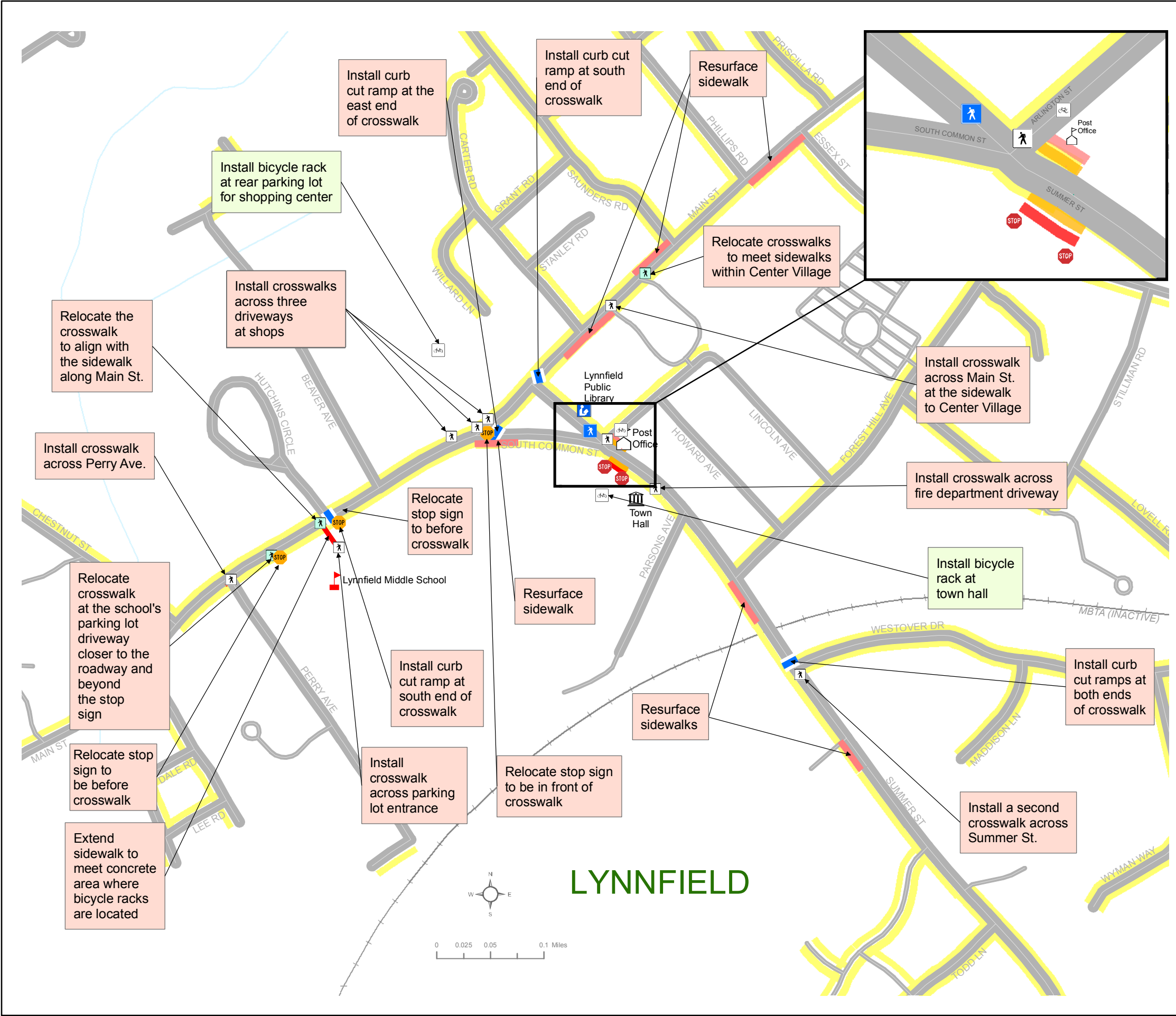
- Stripe on-street parking spaces on the east side of Summer Street in front of the post office














- Stripe on-street parking spaces on the west side of Summer Street between the two town hall driveways to separate the parking spaces from the sidewalk

INSTALL BICYCLE RACKS

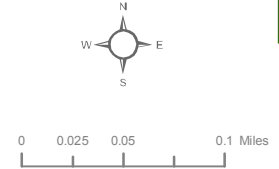
- Near the entrance to the post office
- At The Centre at Lynnfield shopping plaza in the rear parking lot
- At Town Hall

FIGURE 26
Recommendations
Lynnfield



-  Relocate stop sign
-  Install stop sign
-  Relocate crosswalk
-  Install crosswalk
-  Install crosswalk sign
-  Install bicycle rack
-  Install sidewalk
-  Resurface sidewalk
-  Install curb cut ramps
-  Stripe parking
-  Existing sidewalk
-  Pedestrian recommendation
-  Bicycle recommendation

LYNNFIELD



norfolk

Norfolk is a growing suburban town that is located 20 miles southwest of Boston. Its town center has had many improvements in the last few years. The town constructed a new town hall, and the town's library was renovated and expanded. Additionally, two four-way intersections were converted to roundabouts, and several roads were reconstructed, with high-quality pedestrian accommodations included in the design. A condominium development called Norfolk Town Center is under construction on a hill near the town center, and will increase the density of the growing town center. Norfolk Station, on the MBTA's Franklin commuter rail line, is located in the town center.

The growing town center consists primarily of town offices and small businesses. A supermarket is proposed for land adjacent to the town hall. Just beyond the town center, still within the study area, the land use is largely residential. An extensive sidewalk network connects residents to the town center and the commuter rail station. The town is in the process of implementing a 10-year, phased pedestrian walkway plan for installing additional sidewalks that will connect to the existing sidewalks in the town center.

Norfolk had 10,460 residents in 2000, representing a 12.8 percent increase from 1990.¹ MAPC projects that Norfolk's population is likely to grow to 12,439 by 2030, representing an 18.9 percent increase from 2000. Norfolk's employment, recorded at 3,246 jobs in 2000, is projected to increase by 22.3 percent by 2030.²

Norfolk is indirectly served by Route 1 to the east (in Foxborough). Route 115 traverses Norfolk center as North Street, Union Street, and Rockwood Road, connecting to Millis to the north and Wrentham and Foxborough to the south. Route 1A cuts through the southeastern corner of Norfolk, connecting to Walpole to the north and Wrentham to the south.

Between 1995 and 2001, there were five reported crashes involving pedestrians in Norfolk, representing



Sidewalk in Norfolk's town center

0.88 percent of all crashes, and two reported crashes involving bicyclists, representing 0.35 percent of all crashes. None of these crashes resulted in fatalities. The pedestrian and bicyclist crash rates in Norfolk are lower than the region's average of 1.79 percent and 0.82 percent, respectively.³

STUDY AREA

The study area for Norfolk (shown in Figure 27) includes:

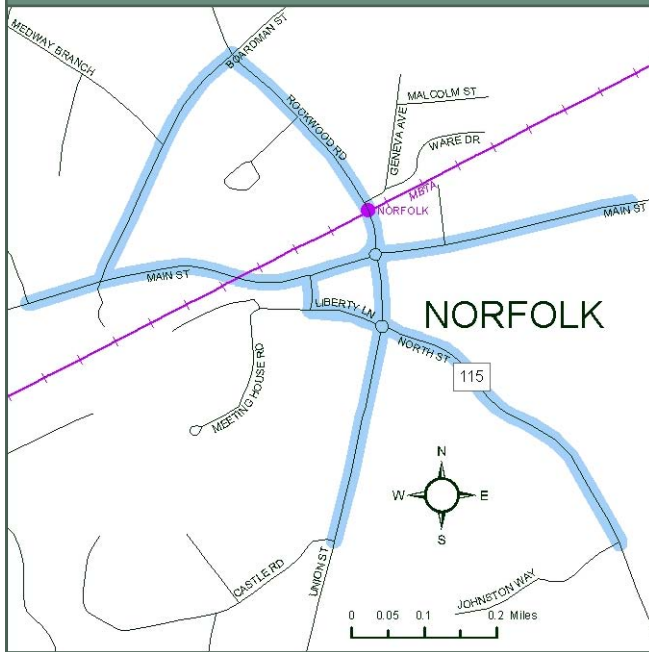
- Main Street from H. Olive Day School to 100 Main Street
- Rockwood Road from Main Street to Boardman Street
- Union Street from Main Street to Castle Road
- North Street from Union Street to Johnston Way
- Boardman Street from Main Street to Rockwood Road
- Liberty Lane and Independence Drive

¹ U.S. census

² MAPC population and employment projections, January 2006

³ Massachusetts Registry of Motor Vehicles crash data, 1995–2001

Figure 27
NORFOLK STUDY AREA



have brick surfaces with inlaid granite borders that are outlined with white paint. The crosswalks connect sidewalks across roadways with curb cut ramps in logical places. There are signs warning motorists about these crosswalks. Other crosswalks (along Rockwood Road and Boardman Street, for example) are marked only with paint and some have faded. (See Figure 28 for a map of the pedestrian network in Norfolk's town center.)



Two roundabouts were recently installed in the town center.

ROUNDBABOUTS

There is a roundabout at the intersection of Main Street, Rockwood Road, and Union Street. It was recently installed as part of the town-center roadway reconstruction project. There is a raised center island surrounded by a 10-foot brick buffer, allowing large trucks to traverse the roundabout safely, while guiding cars into the single travel lane at its perimeter.

The posted speed limit is 15 mph at each approach to the roundabout. There are crosswalks with median islands at each approach. Staff observed that motorists yielded for pedestrians in the crosswalks at the roundabout.

There is also a roundabout at the intersection of Liberty Lane/North Street and Union Street, which was also recently installed as part of the town center roadway reconstruction project. There is a raised center island surrounded by a 10-foot brick buffer, allowing large trucks to traverse the roundabout safely, while guiding cars into the single travel lane at its perimeter. The posted speed limit is 15 mph at each approach to the roundabout. There are crosswalks with median islands at the Liberty Lane and Union Street approaches to the roundabout. Staff observed that motorists yielded for pedestrians in the crosswalks at the roundabout.

ON-STREET BICYCLING

Main Street (from Boardman Street to 100 Main Street, continuing further east) and Union Street (between Main Street and North Street) have wide shoulders that can fully accommodate bicyclists. These roadways are smooth, with few impediments to bicyclists. North Street, Boardman Street, Rockwood Road, and the section of Union Street south of North Street have narrow shoulders or no shoulders. However, the roadways

SIDEWALKS



Most of the sidewalks in the town center have smooth surfaces.

Norfolk has a comprehensive sidewalk network in its town center. There are wide concrete sidewalks along Main Street, Liberty Lane, Independence Drive, and Union Street (between Main Street and North Street). These sidewalks were constructed as part

of the town center roadway reconstruction project mentioned earlier. Rockwood Road, Boardman Street, and North Street have sidewalks on only one side. These sidewalks are made of asphalt and have only a few bumps and cracks that are not likely to affect pedestrian safety. See Figure 28 for a map of the pedestrian network in Norfolk's town center.

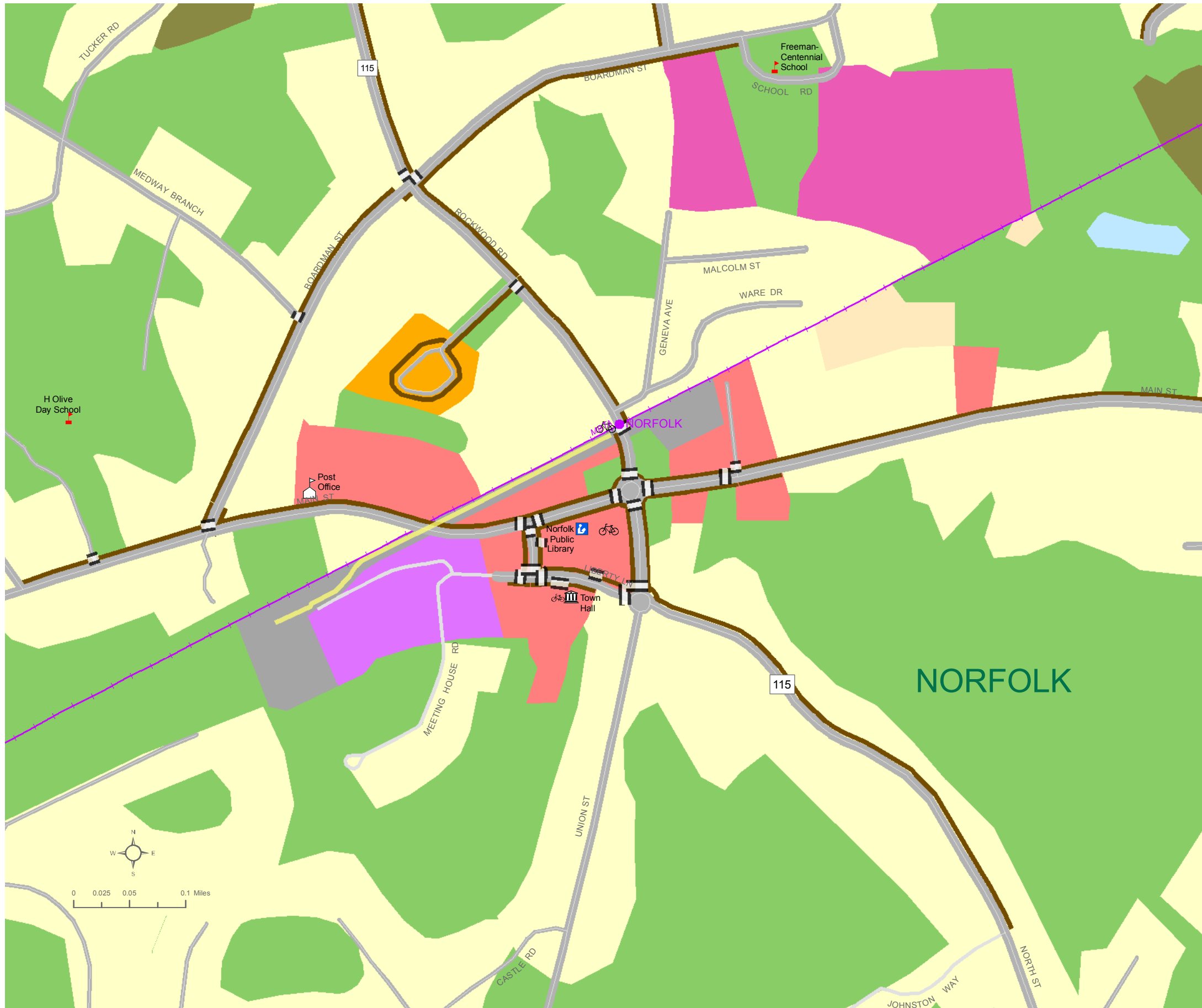
CROSSWALKS







Norfolk's town center has brick crosswalks that are highly visible.

Norfolk's town center has an extensive crosswalk network connecting its sidewalks. Most of the crosswalks in the town center were reconstructed as part of the town center roadway reconstruction project. These crosswalks

FIGURE 28
Pedestrian and Bicycle Network: Land Use and Activity Generators
Norfolk





Activity Center

-  Town hall
-  Post office
-  Public school
-  Public library

Pedestrian Accommodations

-  Crosswalk
-  Pedestrian walkway
-  Sidewalk



Bicycle Racks:

-  One rack
-  Two racks

Transit

-  Commuter rail

Land Use

-  Commercial
-  Multifamily residential
-  Single-family residential
-  Participation recreation
-  Industrial
-  Agricultural
-  Forest, open land
-  Transportation
-  Freshwater wetland
-  Water

are wide enough for bicyclists and motorists to safely share the road. These roadways are relatively smooth, with some small cracks and bumps. There are on-street parking spaces on Union Street (between Main Street and North Street, and on Liberty Lane). See Figure 28 for a map of the bicycle network in Norfolk Center.



The shoulders along Main Street are wide enough to fully accommodate bicyclists.



There are bicycle racks at the town hall, library, and commuter rail station.

BICYCLE PARKING

There are several bicycle racks located at important activity centers in Norfolk's town center:

- A bicycle rack with 6 spaces at the town hall
- A bicycle rack with 12 spaces at the Norfolk Public Library
- Three bicycle racks with 11 spaces at the Norfolk commuter rail station



Norfolk commuter rail station

TRANSIT SERVICE

Norfolk Station, located on the MBTA's Franklin commuter rail line, is located in Norfolk's town center, on Rockwood Road. There are 14 round-trips to and from Boston on weekdays and 7 to 9 round-trips on weekends.

The station has 530 parking spaces for cars in three parking lots, and it provides bicycle parking that can accommodate 11 bicycles.

MAJOR CORRIDORS

MAIN STREET: H. OLIVE DAY SCHOOL TO 100 MAIN STREET

Corridor Length: 0.86 miles



Main Street, looking east

ROADWAY

The roadway's travel lanes are each approximately 16 feet wide. The shoulders range in width from 0.5 feet at the H. Olive Day School to 8 feet across from the post office. The shoulders are 5 feet wide from the bridge over the railroad tracks to 100 Main Street, which are wide enough to fully accommodate bicyclists. Heading east, the posted speed limit is 25 mph approaching the roundabout and is reduced to 15 mph at the roundabout. East of that, the posted speed limit is 35 mph. Heading west, the posted speed limit is 15 mph at the roundabout, and is 20 mph approaching H. Olive Day School. The travel lanes, both east and west of the town center, are divided by a double solid yellow line, and solid white lines delineate the shoulders. The roadway surface is very smooth from Boardman Street to 100 Main Street. Between Boardman Street and the H. Olive Day School, the roadway surface contains some bumps and cracks, but they do not significantly impact bicyclist safety (see Figure 29 for more details on bicycling conditions). The narrow shoulders west of Boardman Street do not accommodate bicyclists, but the wide shoulders from Boardman Street to 100 Main Street and further east do easily accommodate bicyclists. The roadway's edges are free of obstructions that would impact the safety of bicyclists.

BICYCLE PARKING

There is no bicycle parking along this corridor.

SIDEWALKS

There is a concrete sidewalk along the south side of Main Street from Independence Drive to the police station. It is 5 feet wide, with a grass buffer that ranges in width from 2.25 feet to 5 feet. The sidewalk surface is smooth, with no impediments (see Figure 29 for more details on sidewalk conditions).

There is also a concrete sidewalk along the north side of Main Street, from Boardman Street to 100 Main Street. It ranges in width from 4.75 feet to 5.25 feet and has a smooth surface, with no impediments to pedestrians. There is a 2.5-foot-wide grass buffer between the sidewalk and the roadway in all places, except at the bridge over the railroad tracks and in front of the parking lot at the Wayside Building, where there are no buffers. There is a 1.5-foot-wide brick buffer at the level of the sidewalk between the parking lot in front of the Wayside Building and the sidewalk.

West of Boardman Street, the sidewalk is made of asphalt, with a few bumps and cracks that are not likely to pose a safety threat to pedestrians. The sidewalk is 5.25 feet wide and the grass buffer between the sidewalk and the roadway is 4.5 feet wide.

CROSSWALKS

There are eight crosswalks along this corridor:

- Across the H. Olive Day School driveway at Main Street
- Across Boardman Street at Main Street
- Across Main Street at Independence Drive at the west side of the intersection
- Across Main Street at Independence Drive at the east side of the intersection
- Across Main Street at Union Street at the west side of the intersection
- Across Main Street at Union Street at the east side of the intersection
- Across Main Street at Dunkin' Donuts
- Across the driveway for the commuter rail parking lot at Main Street

Each of these crosswalks has highly visible pavement markings (see Figure 29 for more details on crosswalk conditions). There is no stop sign on the commuter rail parking lot's exit-only driveway at the crosswalk along Main Street.

ROCKWOOD ROAD: MAIN STREET TO BOARDMAN STREET

Corridor Length: 0.35 miles



Rockwood Road, looking north

ROADWAY

The roadway's two travel lanes are each approximately 12 feet wide. The shoulders are up to 2 feet wide. There is a yellow sign indicating a 30 mph speed limit at a curve in the roadway near Hillcrest Village, a residential community for the elderly and people with disabilities. The travel lanes are divided by a double solid yellow line, and white solid lines delineate the shoulders. From Main Street to just before Boardman Street, the roadway surface has cracks, bumps, and patches, some of which may make the roadway unsafe for bicyclists (see Figure 29 for more details on bicycling conditions). At the intersection with Boardman Road, the roadway surface is smooth, with no impediments, due to a recent repaving.

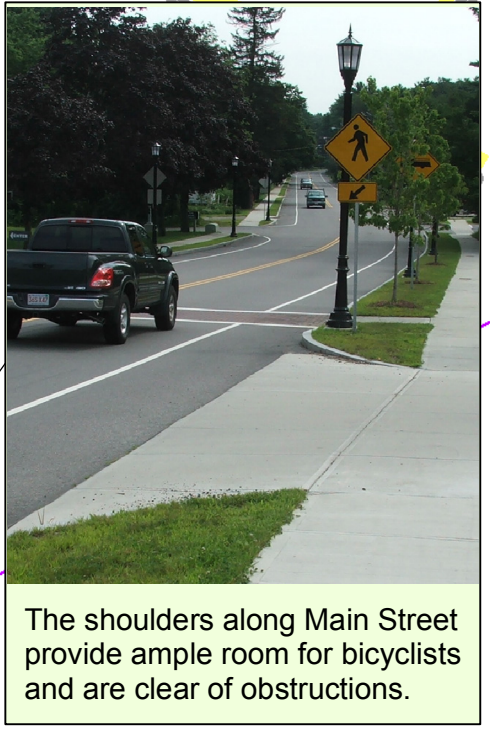
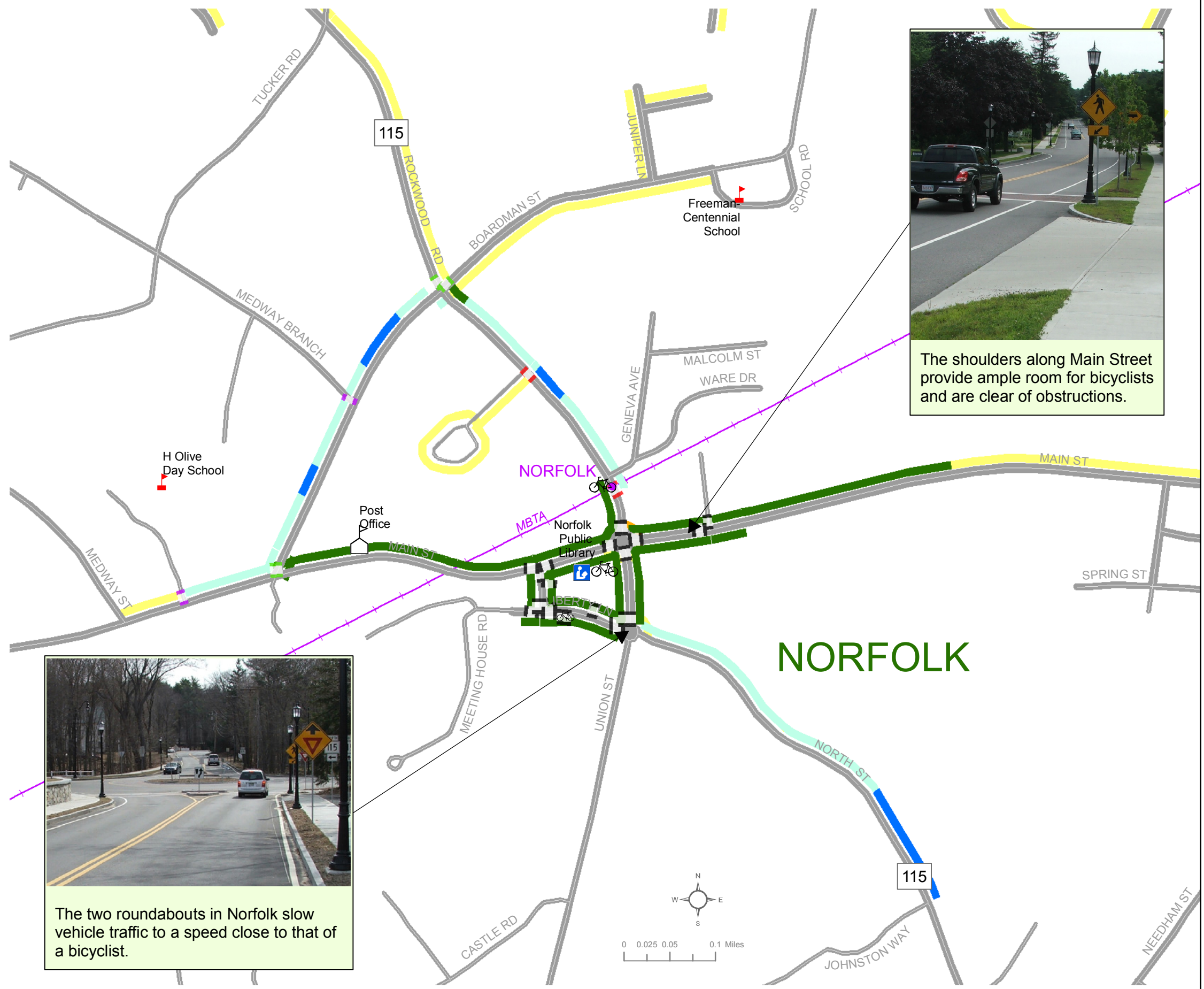
BICYCLE PARKING

There are four inverted-U-style bicycle racks and one six-space ribbon-style bicycle rack at the commuter rail station.

SIDEWALKS

There is an asphalt sidewalk on the east side of the street that begins at Ware Drive and continues beyond the study area. For most of the length of the sidewalk, there are bumps and cracks that could be dangerous to pedestrians. However, near Boardman Street, the sidewalk was recently repaved and has a smooth surface (see Figure 29 for more details on sidewalk conditions). The sidewalk ranges in width from 4.5 feet to 5.25 feet, and the grass buffer between the roadway and the sidewalk ranges from 4 feet to 8 feet wide. Driveways are raised to meet the level of the sidewalk, eliminating the need for curb cut ramps at these locations. There is also a sidewalk directly in front of the storefronts that

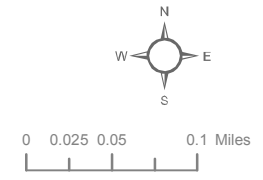
FIGURE 29
Pedestrian and Bicycle Network: Conditions
Norfolk



- Bicycle Racks**
- 🚲 One rack
 - 🚲🚲 Two racks

- Crosswalk Markings**
- ▬ Highly visible
 - ▬ Sufficiently visible
 - ▬ Moderately faded
 - ▬ Very faded

- Sidewalk Surface**
- ▬ Smooth
 - ▬ Some small bumps and/or cracks
 - ▬ Some medium-sized bumps and/or cracks
 - ▬ Significant bumps and/or cracks
 - ▬ In serious disrepair
 - ▬ Sidewalk not evaluated



are located across from the commuter rail station. It does not connect to any crosswalks or other sidewalks. Pedestrians wishing to walk to the shops from the town center must either cross Rockwood Road or walk on grass and across a wide driveway.

CROSSWALKS

There are five crosswalks along this corridor:

- Across Rockwood Road at Main Street
- Across Rockwood Road at the commuter rail station
- Across Rockwood Road at Hillcrest Village
- Across Boardman Street at Rockwood Road
- Across Rockwood Road at Boardman Street

Each of these crosswalks has either sufficiently visible or very faded pavement markings (see Figure 29 for more details on crosswalk conditions). There are no crosswalks across Ware Drive, the gas station driveway, or the driveway at the commuter rail parking lot at Rockwood Road. The very faded crosswalk across Rockwood Road at the commuter rail station is striped at a sharp angle to the roadway. Installing signs warning drivers about the crosswalks across Rockwood Road at Hillcrest Village and the Norfolk commuter rail station could improve pedestrian safety.

UNION STREET: MAIN STREET TO CASTLE ROAD

Corridor Length: 0.40 miles



Union Street, looking south

ROADWAY

Between Main Street and North Street/Liberty Lane, the roadway's two travel lanes are each 12 feet wide. There are 5-foot wide shoulders on each side of the roadway, wide enough to fully accommodate bicyclists. The posted speed limit is 15 mph approaching each roundabout. The travel lanes are divided by a double solid yellow

line, and solid white lines delineate the shoulders. The roadway surface is very smooth (see Figure 29 for more details on bicycle conditions). The shoulders are wide enough to safely accommodate bicyclists, although they have some loose dirt and some drainage grates that could pose a safety threat to bicyclists.

South of North Street/Liberty Lane, there are 0.5-foot shoulders that end just beyond the roundabout, where the travel lanes are each approximately 11 feet wide. The posted speed limit is 25 mph heading south from the roundabout. The travel lanes are divided by a double solid yellow line. There are some surface cracks and loose dirt at the edge of the roadway that would not significantly affect the safety of bicyclists.

BICYCLE PARKING

There is no bicycle parking in this corridor.

SIDEWALKS

There are sidewalks on both sides of the street along Union Street between Main Street and North Street/Liberty Lane. The sidewalks are 5 feet wide; they are made of concrete and are smooth, with no impediments to pedestrians (see Figure 29 for more details on sidewalk conditions). There are 2-foot-wide grass buffers on each side of the road, except in front of the church, where on-street parking spaces replace the grass buffer. The concrete sidewalks continue across driveways and dip slightly. There are curb cut ramps where the sidewalk meets intersecting roadways or driveways. Driveways are slightly raised to reduce the slope of the curb cut ramps. There are no sidewalks along Union Street south of North Street/Liberty Lane.

CROSSWALKS

There are two crosswalks along this corridor:

- Across Union Street at Main Street
- Across Union Street at North Street

These crosswalks have highly visible pavement markings (see Figure 29 for more details on crosswalk conditions).

NORTH STREET: UNION STREET TO JOHNSTON WAY

Corridor Length: 0.38 miles

ROADWAY

The two travel lanes along North Street are each 13 feet wide. The posted speed limit is 25 mph heading southeast from the roundabout. At 33 North Street, the speed limit increases to 35 mph. Heading northwest toward the roundabout, the posted speed limit is 15 mph. The

travel lanes are divided by a double solid yellow line. One-foot-wide shoulders marked by solid white lines end just east the roundabout. The roadway surface is smooth, with some cracks that would not make the roadway unsafe for bicyclists (see Figure 29 for more details on bicycle conditions). There are no marked bicycle lanes, and the shoulders near the roundabout are too narrow to fully accommodate bicyclists. There are some surface cracks and loose dirt at the edge of the roadway that do not make the roadway unsafe for bicyclists.



North Street, looking southeast

BICYCLE PARKING

There is no bicycle parking along North Street.

SIDEWALKS

There is a smooth concrete sidewalk on the north side of the street from Union Street to just east of the roundabout. The sidewalk is 4.5 feet wide and the grass buffer ranges in width from 3 to 11 feet. Heading east, the sidewalk surface changes to asphalt and is at the roadway grade; it has bumps and cracks that might pose a safety threat to pedestrians (see Figure 29 for more details on sidewalk conditions). This sidewalk segment ranges in width from 4 feet to 5.75 feet with no buffer and there is no delineation between the asphalt roadway and the asphalt sidewalk. Beginning at 41 North Street, a grass buffer separates the asphalt sidewalk from the roadway. The sidewalk ranges in width from 4 to 5 feet, with a 2-foot-wide buffer. The sidewalk meanders around trees and utility poles near Johnston Way. Where the sidewalk is raised above the grade of the roadway, the asphalt surface slopes down to the level of driveways.

CROSSWALKS

There are no crosswalks along this corridor.

BOARDMAN STREET: MAIN STREET TO ROCKWOOD ROAD

Corridor Length: 0.36 miles



Boardman Street, looking southwest

ROADWAY

The roadway's two travel lanes are each approximately 11 feet wide. There are 1-foot-wide shoulders on both sides of the roadway. The speed limit is not posted in either direction. The travel lanes are divided by a double solid yellow line, and solid white lines delineate the shoulders. The roadway surface is smooth, with only a few cracks, which are unlikely to affect the safety of bicyclists. The shoulder is not wide enough to fully accommodate bicyclists. The shoulder has some obstructions, such as drainage grates and small amounts of debris, which are not likely to significantly impact bicyclist safety (see Figure 29 for more details on bicycle conditions).

BICYCLE PARKING

There is no bicycle parking along this corridor.

SIDEWALKS

There is an asphalt sidewalk on the west side of the street. Its surface is smooth, with only a few cracks and bumps, which are not likely to affect the safety of pedestrians (see Figure 29 for more details on sidewalk conditions). The sidewalk ranges in width from 4.5 feet to 5 feet. There is a grass buffer between the sidewalk and the roadway, ranging in width from 2 to 3 feet. The asphalt sidewalk slopes down to the level of driveways.

CROSSWALKS

There is one crosswalk along this corridor:

- Across Medway Branch Road at Boardman Road

This crosswalk has very faded pavement markings (see Figure 29 for more details on crosswalk conditions).

LIBERTY LANE AND INDEPENDENCE DRIVE

Corridor Length: 0.14 miles



Liberty Lane, looking East

ROADWAY

Liberty Lane has 13-foot-wide travel lanes, with 0.5-foot-wide shoulders, and has a smooth surface (see Figure 29 for more details on bicycling conditions). There is space for an on-street parking area that could accommodate 10 parallel-parked cars on the north side of Liberty Lane in front of the library. The parking spaces have no pavement markings, but the distance between the shoulder line and the edge of the roadway is 11 feet at this location. The speed limit is 15 mph approaching the roundabout. The travel lanes are divided by a double solid yellow line, and solid white lines delineate the shoulders. An access road to the auxiliary commuter rail parking lot and the Norfolk Town Center development continues west past Liberty Lane. This portion of the roadway was not evaluated.

Independence Drive has two travel lanes in each direction and is divided in the middle by a median strip. Each side of the roadway is 28 feet wide, with two 14-foot travel lanes. There are 1-foot-wide shoulders at the edges of the roadway. There is no posted speed limit. The roadway surface is smooth. The travel lanes are divided by a solid white line on each side of the median strip. Solid white lines delineate the shoulders.

The shoulders along Liberty Lane and Independence Drive, while not wide enough to fully accommodate bicyclists, are clear of any obstructions that would inhibit the safety of a bicyclist.

BICYCLE PARKING

There are two 6-space ribbon bicycle racks at the library and one at the town hall.

SIDEWALKS

There is a concrete sidewalk with a smooth surface along the north side of Liberty Lane from the roundabout at Union Street to just beyond Independence Drive (see Figure 29 for more details on sidewalk conditions). There is a 1.75-foot-wide grass buffer between the sidewalk and the roadway. Adjacent to the on-street parallel parking area, there is a 2.5-foot-wide brick buffer in lieu of the grass buffer. On the south side of Liberty Lane, there is also a concrete sidewalk with a smooth surface. It too has a 1.75-foot-wide grass buffer. There is a break in the sidewalk after crossing the exit-only driveway at the town hall; beyond the driveway, the sidewalk continues until it ends at the roundabout.

The sidewalks on both sides of Independence Drive have smooth surfaces and are 5 feet wide, and the buffers are 3 feet wide. There is a crosswalk that is raised to the level of the sidewalk and the level of the exit-only driveway at the library.

CROSSWALKS

There are eight crosswalks along this corridor:

- Across Liberty Lane at Union Street
- Across the main driveway at the library at Liberty Lane
- Across the exit-only town hall driveway at Main Street
- Across the main entry-only driveway at the town hall at Main Street
- Across Liberty Lane at Independence Drive (at the east side of the intersection)
- Across Liberty Lane at Independence Drive (at the west side of the intersection)
- Across the exit-only driveway to the library
- Across Independence Drive at Main Street

These crosswalks all have highly visible pavement markings (see Figure 29 for more details on crosswalk conditions).

RECOMMENDATIONS

Below is a set of recommendations for improvements to the pedestrian and bicycle environments in Norfolk's town center.⁴ See Figure 30 for a map that illustrates these recommendations.

PEDESTRIAN ENVIRONMENT

CONSTRUCT SIDEWALKS

- Extend the sidewalk along the south side of Liberty Lane from the exit-only town hall driveway to connect with the sidewalk leading to the roundabout
- Extend the sidewalk along the east side of Rockwood Road in front of the gas station to the gas station driveway

IMPROVE SIDEWALKS

- Resurface the sidewalk along the east side of North Street from 25 North Street to 41 North Street and install a curb to separate the sidewalk from the roadway
- Resurface the sidewalk at the east corner of the intersection of Main Street and Rockwood Road (in front of the gas station)

INSTALL CROSSWALKS

- Across Ware Drive at Rockwood Road
- Across the gas station driveway at Rockwood Road
- Across the driveway at the commuter rail parking lot at Rockwood Road

RELOCATE CROSSWALK

- Across Rockwood Road at the Norfolk commuter rail station and reposition it so that it is perpendicular to the roadway

RESTRIPE CROSSWALKS

- Across Medway Branch Road at Boardman Street
- Across Rockwood Road at Hillcrest Village

IMPROVE SIGNAGE

- Install a stop sign at both of the town hall driveways

- Install a stop sign at the commuter rail parking lot's exit-only driveway at Main Street
- Replace the faded stop sign on Independence Drive to Main Street
- Install signs warning motorists of the crosswalk across Rockwood Road at Hillcrest Village
- Install signs warning motorists of the crosswalk across Rockwood Road at the Norfolk commuter rail station

BICYCLE ENVIRONMENT

STRIPE BICYCLE LANES

- Stripe the shoulders on Main Street east of Union Street as bicycle lanes
- Stripe the shoulders on Main Street between Boardman Street and Union Street as bicycle lanes
- Stripe the shoulders on Union Street between Main Street and North Street as bicycle lanes

IMPROVE SIGNAGE

- Post the speed limit on Boardman Street
- Install share-the-road signs on Main Street east of Union Street
- Install share-the-road signs on Main Street from Boardman Street to Union Street
- Install share-the-road signs on Union Street from Main Street and North Street

INSTALL BICYCLE RACKS

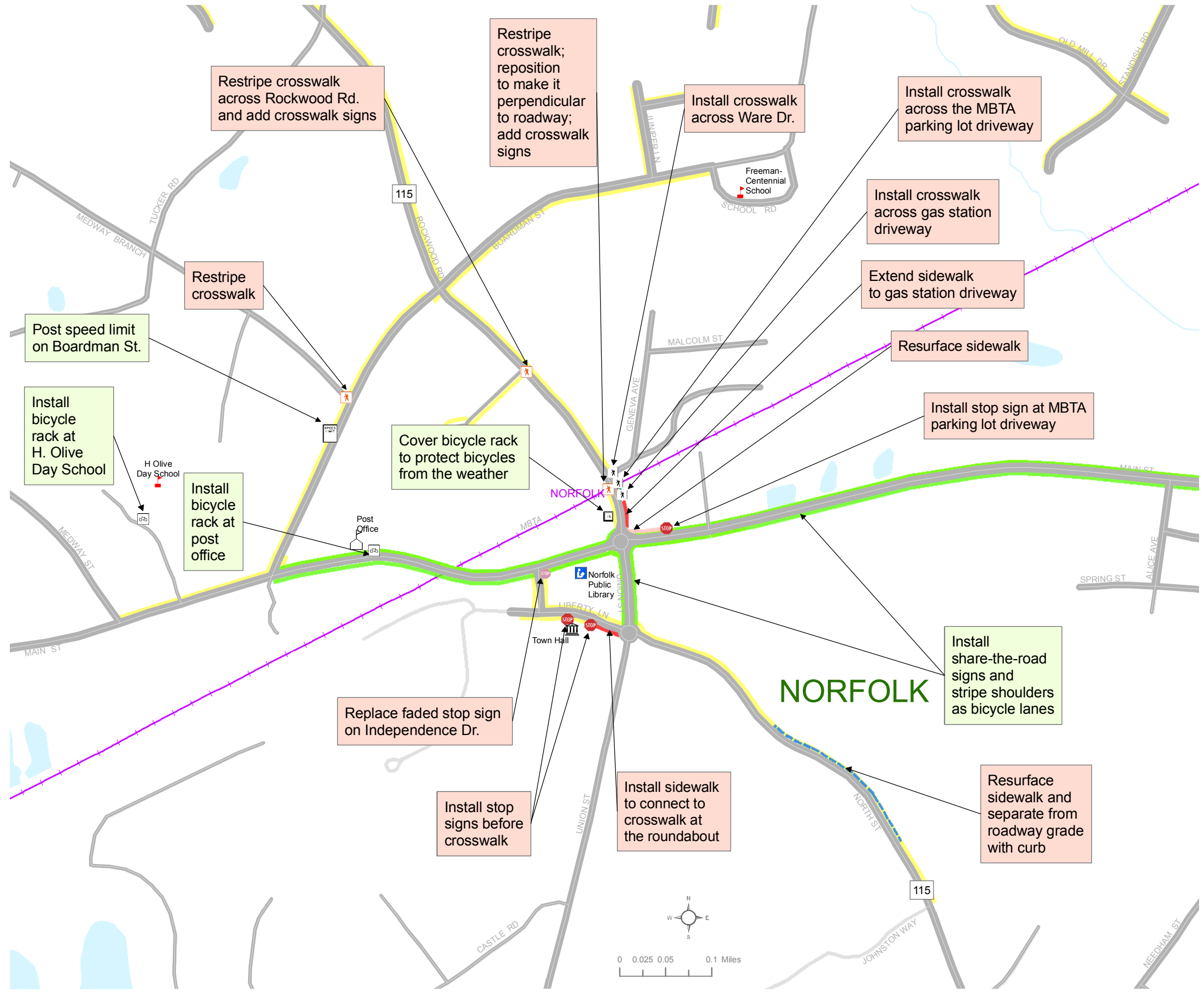
- At the H. Olive Day School
- At the post office















COVER BICYCLE RACK

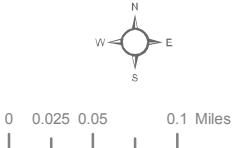
- Cover the existing bicycle parking at the Norfolk commuter rail station to protect bicycles from the weather

⁴ All new developments in Norfolk's town center should include pedestrian accommodations, such as sidewalks, crosswalks, signage, and bicycle parking.

FIGURE 30
Recommendations
Norfolk



-  Replace stop sign
-  Install stop sign
-  Install speed limit sign
-  Install bicycle rack
-  Install cover over bicycle rack
-  Restripe crosswalk
-  Install crosswalk
-  Install sidewalk
-  Resurface sidewalk
-  Resurface sidewalk and add curbs
-  Stripe bicycle lanes
-  Existing sidewalk
-  Pedestrian recommendation
-  Bicycle recommendation



southborough

Southborough is a small suburban town with a rural atmosphere at the western edge of the MPO region. The town has managed to maintain many of its rural characteristics, such as narrow scenic roads and stone walls. The town center includes the town common, town offices, the senior center, several churches and cemeteries, the library, several shops, and residences. The area just beyond the center is largely residential, with significant areas of open space. Three schools—Fay School, Saint Mark’s School, and Woodward Memorial School—are within walking distance of Southborough’s town center. Southborough has many recreational assets, including the walking trails, the Sudbury Reservoir Trail and the Bay Circuit Trail. The Sudbury Reservoir and the Sudbury Reservoir Trail lie just to the south of the town center.

The Town has recently completed a draft Open Space and Recreation Plan and is currently preparing a master plan for the town, which was last done in 1986. Southborough has been constructing new sidewalks in accordance with a 1992 sidewalk plan.

Southborough had 8,781 residents in 2000, representing a 32.5 percent increase from 1990.¹ MAPC projects that Southborough’s population is likely to grow to 10,933 by 2030, representing a 24.5 percent increase from 2000. Southborough’s employment, recorded at 5,666 jobs in 2000, is projected to increase by 21 percent by 2030.²

Southborough is served by Route 9, located to the south of the town center. I-495, which travels through the western part of Southborough, is accessed by an interchange at Route 9 in Westborough, just beyond the Southborough-Westborough line. State routes 85 and 30 intersect at Southborough Center.

Between 1995 and 2001, there were 11 reported crashes involving pedestrians in Southborough, representing 0.47 percent of all crashes, and 16 reported crashes involving bicyclists, representing 0.69 percent



Sudbury Reservoir Trail

of all crashes. There were two fatalities resulting from reported crashes involving bicyclists. The pedestrian and bicyclist crash rates in Southborough are lower than the region’s average of 1.79 percent and 0.82 percent, respectively.³

STUDY AREA

The study area for Southborough (shown in Figure 31) includes:

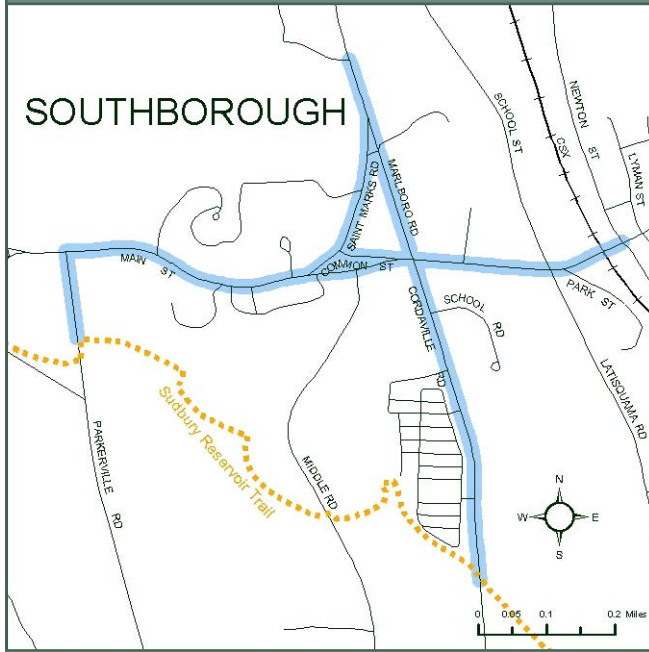
- Main Street from Parkerville Road to Marlboro Road
- Main Street from Marlboro Road to Boston Road
- Marlboro Road from the entrance to the West Campus of Saint Mark’s School to Main Street
- Cordaville Road from Main Street to the Sudbury Reservoir Trail
- Common Street
- Saint Mark’s Street
- Parkerville Road from Main Street to the Sudbury Reservoir Trail

¹ U.S. census. The Town of Southborough indicates that Southborough had 9,762 residents as of January 1, 2007.

² MAPC population and employment projections, January 2006

³ Massachusetts Registry of Motor Vehicles crash data, 1995–2001

Figure 31
SOUTHBOROUGH STUDY AREA



Some sidewalks are narrow and uneven.

SIDEWALKS

The existing sidewalks in Southborough's town center are in need of repair, and areas without sidewalks limit pedestrian mobility. Main and Common streets have sidewalks on one or both sides within the study area, but Saint

Mark's street, Cordaville Road, and Marlboro Road lack sidewalks. The sidewalks in the study area are made of asphalt or concrete, and some sections may be impassable to some pedestrians, as the surface is very uneven. In addition, there are some segments of sidewalk that are too narrow to accommodate two pedestrians walking past one another. See Figure 32 for a map of the pedestrian network in Southborough Center.

CROSSWALKS

Southborough Center has a comprehensive crosswalk network. Some crosswalks in the town center are faded, but are visible to motorists and pedestrians, and others have recently been repainted, making them highly visible. The existing crosswalks connect sidewalks across roadways in logical places. Some crosswalks lack curb cut ramps to connect the crosswalks to the sidewalks.

There are several warning signs identifying the crosswalks to motorists. See Figure 32 for a map of the pedestrian network in Southborough Center.



Several signs alert motorists to this crosswalk across Main Street.



Signalized pedestrian crosswalk across Marlboro Road

SIGNALIZED PEDESTRIAN CROSSWALKS

The intersection of Main Street and Marlboro/Cordaville Road has a four-way stop light with pedestrian-activated crossing signals. There are three crosswalks at the intersection, crossing Main Street (on the west side of the intersection), Marlboro Road, and Cordaville Road. Staff observed that pedestrian-activated signals were not operational at the time of observation.

There is a pedestrian-activated signal on Marlboro Road at the driveway to the West Campus of Saint Mark's School. The crosswalk and signal provide a safe pedestrian link between the east campus and west campus of the school. The signal has an exclusive pedestrian phase consisting of a 7-second walk signal and a 7-second don't-walk signal for a 27-foot crosswalk. Using a 3.5-foot-per-second standard for crossing a roadway, the pedestrian phase is adequate for the length of the crossing.

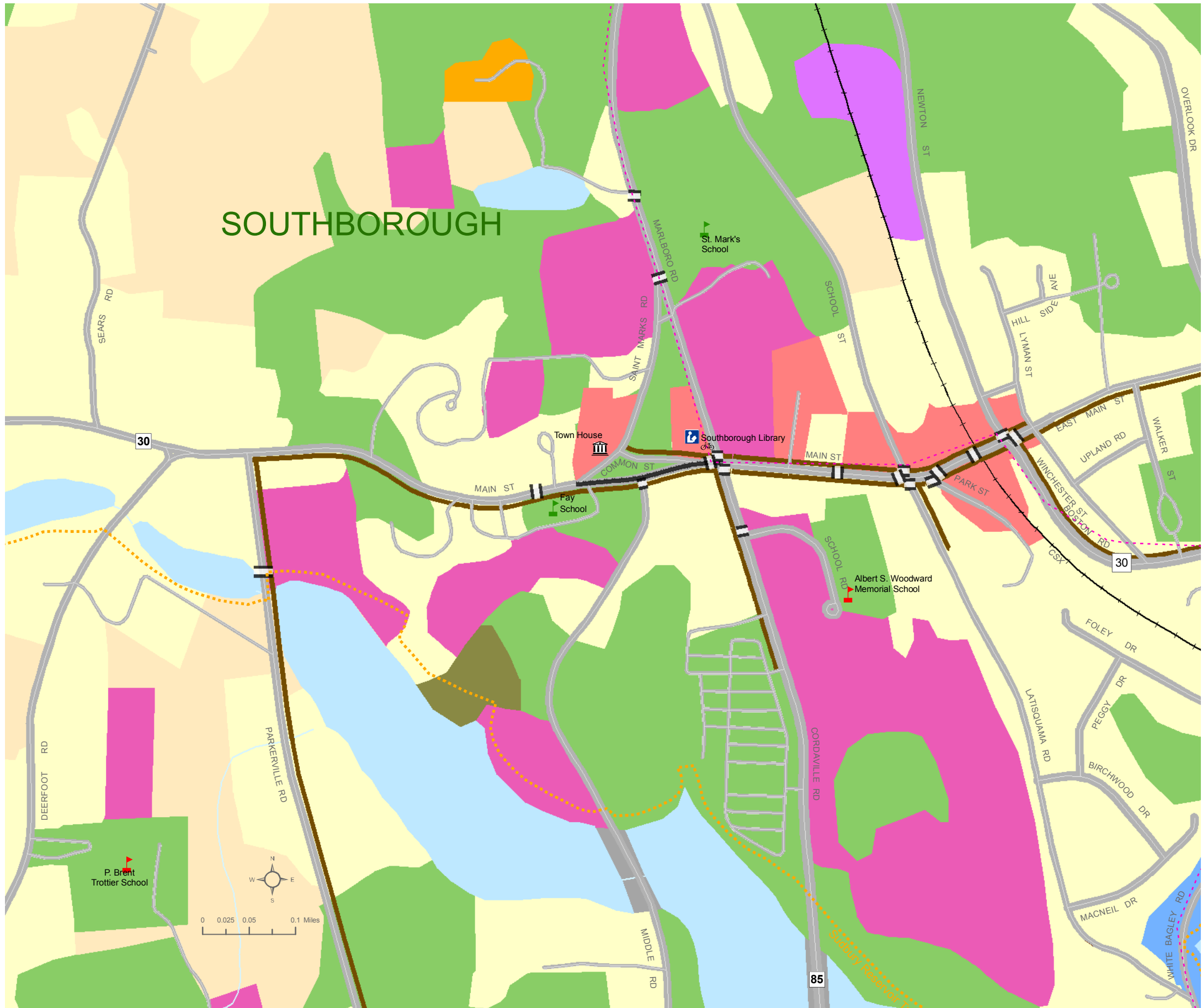
WALKING PATHS

There is a walking path connecting the Woodward Memorial School to Main Street. Also, the Sudbury Reservoir Trail, one of many recreational assets in Southborough, lies just south of Southborough Center.

ON-STREET BICYCLING

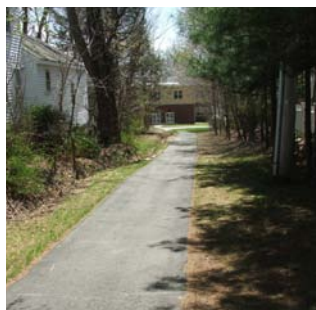
In most places, the edges of the roadway and the shoulders have cracks and debris that might be hazardous to bicyclists. In other places, the roadway's edges and shoulders are free of obstructions. There are some drainage grates, but they are set back from the roadway and do not affect bicyclist safety. Staff observed sev-

FIGURE 32
Pedestrian and Bicycle Network: Land Use and Activity Generators
Southborough



- Activity Center**
 - Town House
 - Public school
 - Private school
 - Public library
- Pedestrian Accommodations**
 - Crosswalk
 - Pedestrian walkway
 - Sidewalk
- Bicycle Racks:**
 - One rack
- Transit**
 - LIFT 7 route
- Land Use**
 - Commercial
 - Multifamily residential
 - Single-family residential
 - Participation recreation
 - Water-based recreation
 - Industrial, waste disposal
 - Agricultural
 - Forest, open land
 - Freshwater wetland
 - Water

eral vehicles parked on sidewalks and on the shoulders along Main Street, creating dangerous conditions for bicyclists. See Figure 32 for more details on bicycling conditions in Southborough Center.



Walking path to Woodward Memorial School



Car parked on the sidewalk and on the shoulder along Main Street

BICYCLE PARKING

There is one five-space, comb-style bicycle rack in Southborough center. It is located beneath a tree about 30 feet from the rear entrance of the library. Staff observed no bicycles utilizing the rack on a warm, sunny summer day.

TRANSIT SERVICE

Local Inter-Framingham Transit (LIFT) operates the LIFT 7 bus route through Southborough Center along Marlboro Road and Main Street and provides connections to commercial and business centers in Marlborough and Framingham. The bus utilizes the “flag down” system, which allows passengers to board the bus at any point along the route, as well as at designated stops. There are 11 weekday Framingham-bound trips and 11 weekday Marlborough-bound trips from Southborough. There is no weekend service.

The Local Connection (TLC) is a curb-to-curb, demand-response transit service that is operated by the Worcester Regional Transit Authority (WRTA). Funding for TLC is provided by the Boston Region MPO, the City of Marlborough, and the Town of Southborough. TLC provides local transportation for residents of Marlborough and Southborough, as well as commuters, with direct service to and from their destinations within both communities. Passengers are picked up at any location within Marlborough and Southborough and may be dropped off at any location within the TLC service area, which includes Southborough Center, Route 85, the Southborough commuter rail station, and locations in Marlborough. TLC is meant to complement MBTA commuter rail service, as well as LIFT 7 bus service.

Southborough Station, located on the Worcester commuter rail line, lies 2.75 miles south of Southborough Center. The station has 10 round-trips to Boston and Worcester on weekdays and 5 round-trips on weekends. The station has 364 parking spaces for cars and has no bicycle parking.

MAJOR CORRIDORS

MAIN STREET: PARKERVILLE ROAD TO MARLBORO/CORDAVILLE ROAD

Corridor Length: 0.52 miles



Main Street, looking west

ROADWAY

The roadway’s two travel lanes are each approximately 12 feet wide. The marked shoulder ranges in width from less than 1 foot to 3.75 feet. The posted speed limit is 25 mph in both directions on this portion of the road. The travel lanes are divided by a double solid yellow line, and white solid lines delineate the shoulders. There are no marked bicycle lanes. The roadway surface has cracks, bumps, and patches that make the edge of the roadway potentially unsafe for bicyclists. See Figure 33 for more details on bicycling conditions.

SIDEWALKS

There is an asphalt sidewalk on the south side of the road from Marlboro/Cordaville Road to Parkerville Road. For most of its length, the sidewalk’s surface has small bumps and cracks that are not likely to pose a serious threat to pedestrian safety. However, near the intersection with Marlboro/Cordaville Road, the sidewalk surface is broken and very uneven, creating a very dangerous situation for pedestrians (see Figure 33 for more details on sidewalk conditions). There is no buffer or curb between the sidewalk and the roadway on the segment between Marlboro/Cordaville Road and 54 Main Street; however, there is a grass buffer ranging in width from 2

to 7 feet between 54 Main Street and Parkerville Road. The asphalt sidewalk slopes down to the level of intersecting roadways and driveways.

There is a short asphalt sidewalk on the north side of Main Street that begins at Marlboro/Cordaville Road and, instead of continuing west along Main Street, continues up Common Street. The surface is smooth, with some small bumps and cracks that do not pose a safety threat for pedestrians.

CROSSWALKS

There are three crosswalks along this corridor:

- Across Main Street at Fay School
- Across Middle Road at Main Street
- Across Main Street at Marlboro/Cordaville Road

Each of these crosswalks has highly or sufficiently visible pavement markings (see Figure 33 for more details on crosswalk conditions).

MAIN STREET: MARLBORO/CORDAVILLE ROAD TO BOSTON ROAD

Corridor Length: 0.32 miles



Main Street, looking east

ROADWAY

The two travel lanes along this section of Main Street are each approximately 12.5 feet wide, and the shoulders are 1.5 feet wide. The posted speed limit is 20 mph heading east from Southborough Center and 30 mph heading west toward Southborough Center. The travel lanes are divided by a double solid yellow line, and solid white lines delineate the shoulders. The roadway surface has crack, bumps, and patches, some of which may impact bicyclist safety. The shoulders have obstructions, including parked cars, that might also impact bicyclist safety. However, most of the drainage grates are set back from the shoulder, so they do not have an impact

on bicyclists. See Figure 33 for more details on bicycling conditions.

SIDEWALKS

There is a sidewalk on both sides of the street along this section of Main Street. The sidewalks are made of asphalt and have many bumps and cracks, some of which are significant impediments to pedestrians (see Figure 33 for more details on sidewalk conditions). Along the north side of Main Street, the sidewalk is made of asphalt, with a grass buffer from Marlboro/Cordaville Road to Park Street, where it becomes a concrete sidewalk with no buffer in front of Firehouse Plaza. After the Plaza, it reverts back to an asphalt surface with no buffer. Along the south side of Main Street, the sidewalk is made of asphalt, with no buffer or curb from Marlboro/Cordaville Road to 10 Main Street. There is a 4-foot-wide grass buffer at 10 Main Street, and beyond there the sidewalk has an asphalt curb with no buffer. The asphalt sidewalk slopes down to the level of intersecting roadways and driveways.

CROSSWALKS

There are nine crosswalks along this corridor:

- Across Main Street at the path to Woodward Memorial School
- Across Main Street at Latisquama Road/School Street
- Across Latisquama Road at Main Street
- Across School Street at Main Street
- Across Park Street at Main Street
- Across Main Street at Park Street
- Across Main Street just west of the train tracks
- Across Newton Street at Main Street
- Across Main Street at Boston Road

Each of these crosswalks has sufficiently visible pavement markings (see Figure 33 for more details on crosswalk conditions). There are no crosswalks across the driveways to the police and fire stations.

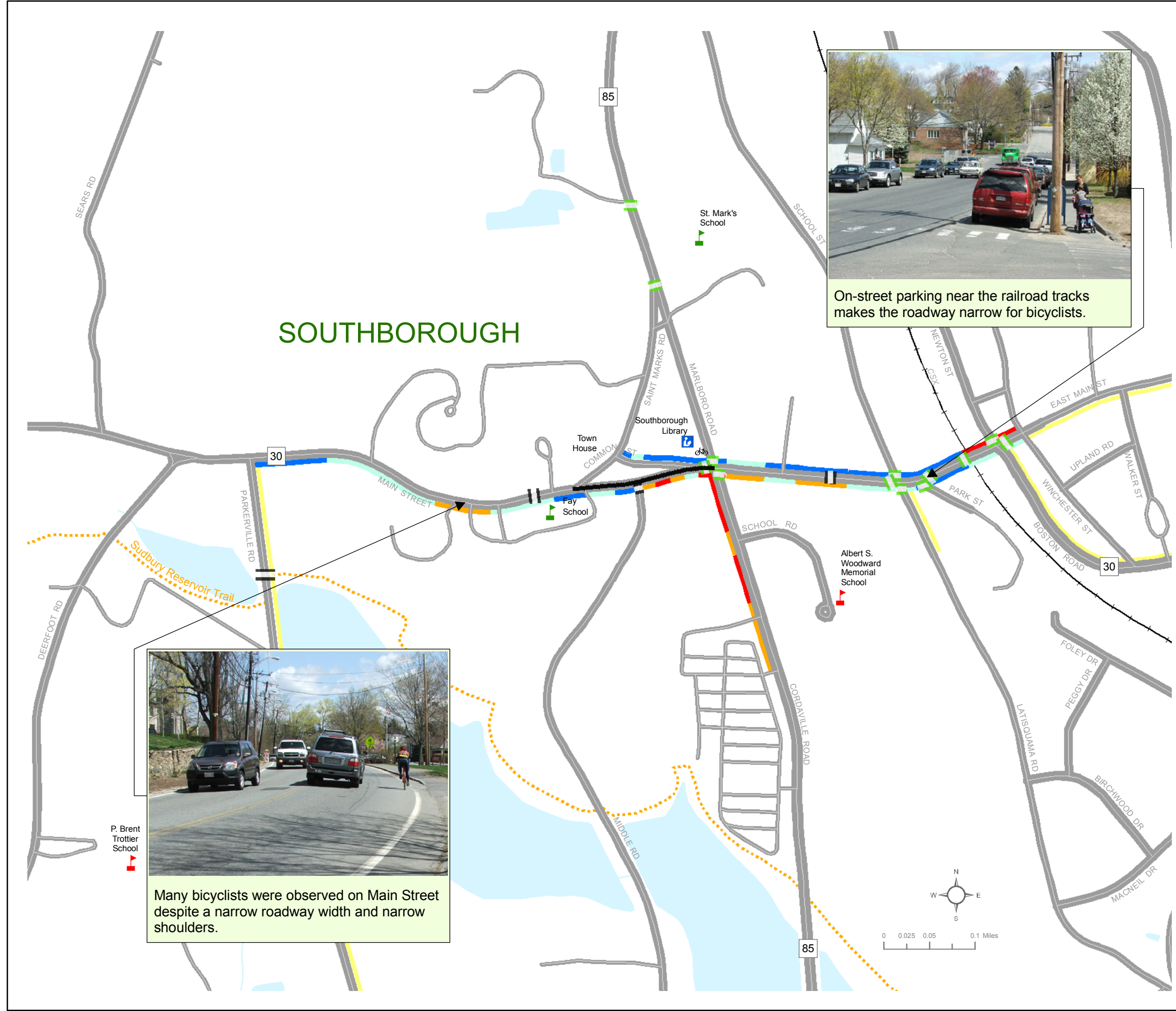
MARLBORO ROAD: MAIN STREET TO THE DRIVEWAY OF THE WEST CAMPUS OF SAINT MARK'S SCHOOL

Corridor Length: 0.30 miles

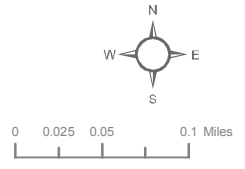
ROADWAY

The roadway's two travel lanes are each approximately 11.5 feet wide, and the shoulders range in width from 0.5 feet to 2 feet wide. The posted speed limit is 25 mph heading south toward Southborough Center. Heading north, there is a yellow sign marking a 30 mph speed

FIGURE 33
Pedestrian and Bicycle Network: Conditions
Southborough



- Bicycle Racks**
- Bicycle rack
- Crosswalk Markings**
- Highly visible
 - Sufficiently visible
 - Moderately faded
 - Very faded
- Sidewalk Surface**
- Smooth
 - Some small bumps and/or cracks
 - Some medium-sized bumps and/or cracks
 - Significant bumps and/or cracks
 - In serious disrepair
 - Sidewalk not evaluated
- Roadway Surface**
- Rough roadway surface





Marlboro Road, looking south



Cordaville Road, looking south

limit. The travel lanes are divided by a double solid yellow line, and solid white lines delineate the shoulders. The roadway surface is smooth, with some minor cracks that do not significantly affect bicyclist safety. The edge of the roadway is clear of obstructions that would impact bicyclist safety. There is a comb-style bicycle rack at the library that can accommodate five bicycles. See Figure 33 for more details on bicycling conditions.

SIDEWALKS

There are no sidewalks along this portion of Marlboro Road. In most places there is ample room for a sidewalk with a buffer. There are desire lines (worn paths) in certain sections of this corridor, indicating potential demand for sidewalks.

CROSSWALKS

There are two crosswalks along this corridor:

- Across Marlboro Road at the driveway to the West Campus of Saint Mark's School
- Across Marlboro Road at Saint Mark's Street

Each of these crosswalks has sufficiently visible pavement markings (see Figure 33 for more details on crosswalk conditions).

CORDAVILLE ROAD: MAIN STREET TO THE SUDBURY RESERVOIR TRAIL

Corridor Length: 0.50 miles

ROADWAY

The roadway's two travel lanes are each approximately 12.5 feet wide, and the shoulders are 3 feet wide. The posted speed limit is 25 mph heading north toward Southborough Center from the south. Heading south, away from the town center, the speed limit is 40 mph. The travel lanes are divided by double solid yellow lines, and the shoulders are delineated by solid white lines.

The roadway surface is smooth, with some cracks that do not affect bicyclist safety. The shoulders contain sand and drainage grates, which may detract from bicyclist safety. There is no bicycle parking along Cordaville Road. See Figure 33 for more details on bicycling conditions.

SIDEWALKS

There is a sidewalk on the west side of the street from Main Street to the northern end of the Southborough Cemetery. The sidewalk ranges in width from 2.75 feet to 5.5 feet. In some places, the sidewalk is completely obstructed by overgrown vegetation, forcing pedestrians to walk in the grass buffer, close to traffic. The buffer ranges in width from 6.5 to 9 feet. The sidewalk is made of asphalt and has bumps and cracks that, in some places, make the sidewalk impassable to some pedestrians (see Figure 33 for more details on sidewalk conditions). The sidewalk is at the same level of the driveways that it crosses. There is room to extend the sidewalk along the west side of Cordaville Road to the Sudbury Reservoir Trail. There is no sidewalk that leads to Woodward Memorial School from Main Street, despite a crosswalk across Cordaville Road connecting to the sidewalk along the west side of Cordaville Road.

CROSSWALKS

There is one crosswalk along this corridor:

- Across Cordaville Road at Woodward Memorial School

This crosswalk has sufficiently visible pavement markings (see Figure 33 for more details on crosswalk conditions). There is no crosswalk across the Southborough Cemetery driveway at Cordaville Road.

COMMON STREET AND SAINT MARK'S STREET: MARLBORO ROAD TO MAIN STREET

Corridor Length: 0.33 miles



Common Street, looking southeast

ROADWAY

The two travel lanes on Common Street and Saint Mark's Street are each approximately 10.5 feet wide, and there are no shoulders or lane markings. The roadway surface is smooth, with some cracks that do not detract from bicyclist safety. The edges of the roadways do not contain any significant impediments to bicyclists. There is no bicycle parking along Common Street or Saint Mark's Street (see Figure 33 for more details on bicycling conditions).

SIDEWALKS

There is a sidewalk on the north side of Common Street from Main Street to Saint Mark's Street. It ranges in width from 4.25 feet to 5.5 feet. The sidewalk is made of asphalt and contains only small bumps and cracks, which are not likely to pose a safety threat to pedestrians (see Figure 33 for more details on sidewalk conditions). There is a 2.25-foot-wide grass buffer between the sidewalk and the roadway for most of its length, ending just before Saint Mark's Street. The sidewalk connects to a sidewalk along the north side of Main Street in front of the library. The sidewalk does not cross any roadways or driveways.

There are also two short sidewalk segments in this area: one in front of the Pilgrim Congregational Church and one leading to the front entrance of the Town House, both on Common Street. These are not considered part of the sidewalk network for the purposes of this study. However, they could be connected to the sidewalk along Common Street if the sidewalk in front of the church were extended to the Town House driveway and

crosswalks were added across Saint Mark's Street at Common Street and across the driveway to the Town House at Saint Mark's Street.

CROSSWALKS

There are no crosswalks along this corridor.

RECOMMENDATIONS

Below is a set of recommendations for improvements to the pedestrian and bicycle environments in Southborough Center. See Figure 40 for a map of these recommendations.

PEDESTRIAN ENVIRONMENT

CONSTRUCT SIDEWALKS

- Along the east side of Marlboro Road from the driveway to the West Campus of Saint Mark's School to Main Street
- Along the west side of Cordaville Road from Southborough Cemetery to the Sudbury Reservoir Trail
- Along the north side of the driveway to Woodward Memorial School
- Along Common Street from Pilgrim Congregational Episcopal Church to the town hall

INSTALL CROSSWALKS

- Across the Southborough Cemetery driveway
- Across the police and fire station driveways
- Across the Town House driveway at Saint Mark's Street
- Across Saint Mark's Street at Common Street

IMPROVE SIDEWALKS

- Resurface the sidewalk along the west side of Cordaville Road from Main Street to Southborough Cemetery, and widen it to at least 5 feet
- Resurface the sidewalk along the south side of Main Street from just west of Middle Road to Latisquama Road, and install a curb to separate the sidewalk from the shoulder
- Resurface the sidewalk along the north side of Main Street from the train tracks to Newton Street

IMPROVE SIGNAGE

- Install a sign identifying the Sudbury Reservoir Trail at the access point on Parkerville Road
- Install a stop sign before the crosswalk on Middle

Road at Main Street

PEDESTRIAN SIGNAL

- Fix or replace the pedestrian signal at the intersection of Main Street and Marlboro/Cordaville Road

BICYCLE ENVIRONMENT

RESURFACE ROADWAY

- Resurface Main Street from Common Street to Marlboro/Cordaville Road

IMPROVE SIGNAGE

- Install no-parking signs along Main Street where there is insufficient room for on-street parking

INSTALL BICYCLE RACKS

- At the Town House
- At Woodward Memorial School
- At the access points to the Sudbury Reservoir Trail on Parkerville, Middle, and Cordaville roads

RELOCATE BICYCLE RACK

- Relocate bicycle rack at the library closer to the library's side entrance



