CITY OF BEVERLY
BICYCLE NETWORK + PEDESTRIAN PRIORITY PLAN
January 2015

METROPOLITAN AREA PLANNING COUNCIL
Smart Growth & Regional Collaboration

Acknowledgements

This report documents the City of Beverly Bicycle Network and Pedestrian Priority Plan. This project was a joint effort between the City of Beverly, its residents, and MAPC. This project was undertaken with funding provided by the City of Beverly and from the Boston Metropolitan Area Planning Organization (MPO) Unified Planning Work Program (UPWP).

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INTRODUCTION

The Metropolitan Area Planning Council (MAPC) is assisting the City of Beverly in advancing bicycle network and pedestrian prioritization planning with a focus on short-term and low-cost solutions. At its most basic level, this plan concentrates on encouraging more people in Beverly to choose to walk and bike for everyday trips, for accessing the commuter rail and bus lines, and for fun and fitness. The primary goals of this effort are to:

1. Develop a culture where residents, students, and commuters choose to walk and bike to schools, retail areas, beaches, and other points of interest and are able to do so safely and conveniently.

2. Develop a bicycle and pedestrian network plan connecting these city-wide destinations and surrounding communities.

3. Begin to institutionalize the implementation of pedestrian and bicycle accommodations at the local level as part of all roadway projects.

4. Reinforce the culture of walking and bicycling with initiatives to support the infrastructure improvements.

The plan builds upon the emerging bicycle and pedestrian culture that exists in the Beverly. Among other proactive steps, the City is implementing a "complete streets" reconstruction of Rantoul Street, has several bicycle shops, an active bicycle group, numerous bicycle-related events throughout the year, and an administration committed to advancing these goals.

This planning effort identified existing conditions and potential opportunities for all major roads and routes within the City.[1] It further identifies a network of on- and off-road connections and routes, including proposed bicycle and pedestrian accommodations, and how those accommodations may fit within the existing roadway width (i.e., allocation of the curb-to-curb space).

This report is organized into several sections. First, it provides a snapshot of Beverly's attributes that set the stage for creating a pedestrian and bicycle friendly environment. Second, the bulk of this report concentrates on improving the comfort, safety, and desirability of bicycling in the City. Much of the focus is on near-term solutions utilizing existing curb-to-curb space with no changes to on-street parking. In addition, the plan highlights several "bold" initiatives to help Beverly achieve its goal of being a truly bicycle friendly city. Complementing infrastructure investments are additional initiatives to continue to build upon the budding bicycling culture in the City. Finally, the Plan provides a prioritization for investments in the pedestrian infrastructure, focusing on filling key gaps in the sidewalk network.

[1]Major roads were identified by examining the MassDOT functional roadway classification for the City of Beverly (see Appendix B). Local roads were excluded from the analysis unless the City identified them as an important connection.

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WALKING AND BICYCLING IN BEVERLY TODAY

Beverly contains a number of the attributes that position it to be among the most walkable and bikeable communities located north of Boston. The administration, led by Mayor Michael P. Cahill, is committed to realizing this vision. In addition, Beverly has the benefit of a strong and active Beverly Bike Committee. This grassroots organization works to create a bicycle-friendly community through cycling awareness, education, safety, advocacy, and the promotion of bicycling for fun, fitness, and meeting transportation needs in lieu of single occupancy vehicles.[2]

Beverly also has an interesting and varied community character, strong transit access, is a part of the 85 mile Essex Coastal Scenic Byway, and is in the process of creating a local complete streets policy to strengthen its commitment to providing multimodal transportation options. The following sections describe these attributes in more detail.

Community Character

The character of Beverly and its associated amenities help set the stage for creating a walkable and bikeable community. Broadly speaking, the City can be generally divided into three areas characterized by their development and transportation patterns (although there is substantial overlap throughout the City):

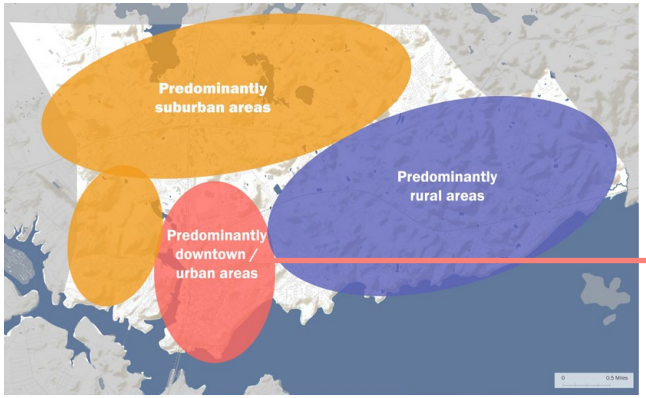
1. A vibrant and walkable **downtown urban** core
2. **Rural areas** with lower volume roads and lower density development
3. **Suburban areas** with single family and multi-family housing developments dotted with auto-oriented businesses and employment centers.

The following provide a brief summary of these character-types, as well as some of the specific opportunities for providing bicycle and pedestrian solutions in these varying contexts.

[2]For additional information visit www.facebook.com/BeverlyBike

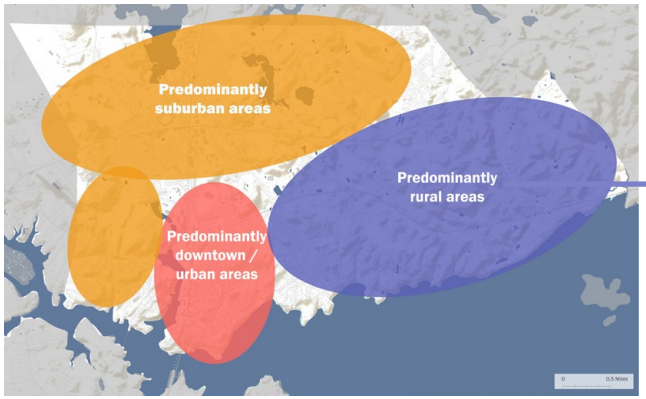
Beverly's **downtown area**, focused on Rantoul Street and Cabot Street, is a highly walkable area with a robust mix of uses and numerous points of interest. Housing options range from single family homes to small apartment buildings to larger residential complexes. Rantoul Street and Cabot Street both boast a number of restaurants and stores that not only draw residents in Beverly, but also visitors from around the North Shore and beyond. The area provides easy access to both the beaches and the Bass River. In addition, Rantoul Street will undergo a reconstruction that will include new sidewalks, trees and lighting, as well as five foot bicycle lanes along the majority of the street. The downtown also contains the heavily utilized Beverly Depot commuter rail station. Working with MAPC, the City recently set forth a vision for future development in this area, with particular focus on the area along the Bass River. During that planning process, a key component coming from the community was the inclusion of multimodal transportation options to make the area more accessible to pedestrians, cyclists, and transit users.

Opportunities: Ensure sidewalks and streetscape are in good condition; increase on-street bicycle facilities, including bold, "high profile" opportunities to showcase Beverly as a bicycle-friendly city; invest in additional wayfinding; find appropriate areas for increased bicycle parking; ensure urban design of future developments reflects that of a walkable, mixed use downtown.



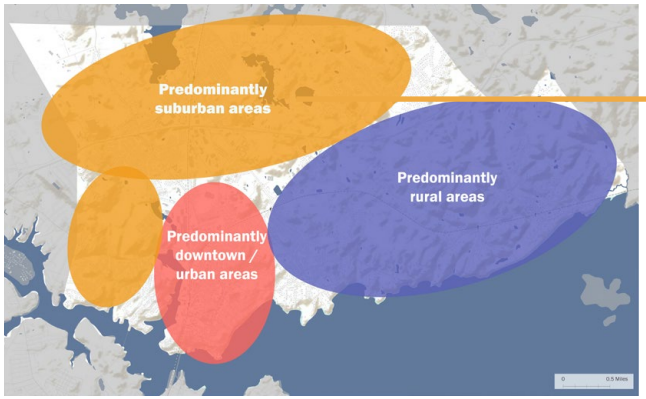
In contrast to the downtown area, the **rural areas** have lower density development and generally have a very different character when compared to Downtown Beverly. These areas have many lower volume roadways, single family homes, and large wooded areas and open spaces. In addition, Prides Crossing is a small, quaint retail area serving surrounding neighborhoods and the nearby Gordon College runs along Route 127, a scenic roadway popular with cyclists.

Opportunities: Increase sidewalk coverage (depending upon sufficient right-of-way); explore feasibility of installing innovative "shared space" treatments such as advisory lanes; stripe bicycle lanes for key routes and destinations.



The **suburban areas** consist of single family neighborhoods, office parks, and auto-oriented retail centers. In addition, these areas provide access to Route 128. The arterial and collector roads accommodate higher volumes of vehicles but in some cases lack pedestrian and bicycle facilities and amenities.

Opportunities: Stripe bicycle lanes for key routes and destinations; ensure presence of sidewalks and that they are properly maintained, look for opportunities to reduce excess vehicular lanes to make intersection crossing safer for pedestrians and cyclists.



Transit

Beverly boasts five commuter rail stops along two lines throughout the City, as well as the Route 451 MBTA bus. The presence of transit, especially in denser, mixed-use settings, provides an opportunity to increase walking and biking. For example, a strong bicycle network increases the likelihood that people living within three miles of the station would choose to bike rather than drive there. In addition, a mix of types of residential developments located in a downtown, combined with an attractive, safe, and well-maintained pedestrian environment, could encourage more people to walk to a station, thus reducing reliance on vehicles. Developing and implementing a comprehensive bicycle and pedestrian network in Beverly will provide additional travel options for residents which in turn may help reduce congestion on local roadways in the City.

Table 1 provides a summary of the ways in which Beverly residents commute to work, along with comparisons for the MAPC region and for Massachusetts as a whole. As the data shows, Beverly residents commute by car more than the region and state. They also commute by transit (i.e., commuter rail and bus) less than both the MAPC region and state.

Beverly Depot is among the busiest stations in the MBTA system (see Figure 1). Increasing the walkability and bikeability of the surrounding areas may facilitate greater use not only by Beverly residents commuting to work, but also those commuting to Beverly for work. Prioritizing and funding the installation of additional bicycle and pedestrian facilities may increase the non-vehicular mode share, improve air quality in the City and increase physical activity of residents.

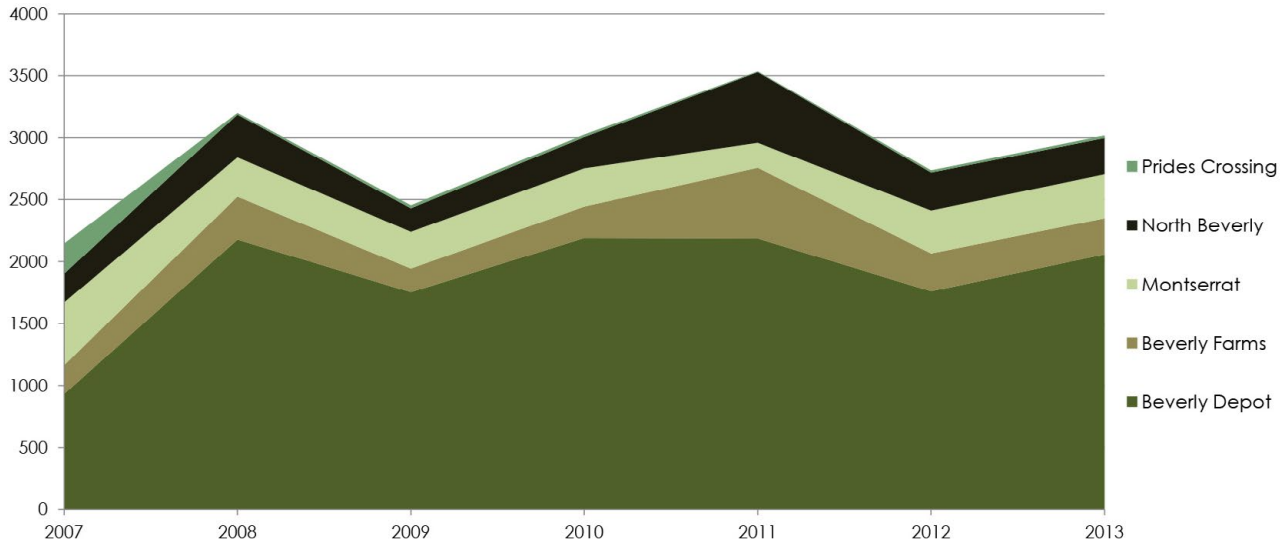
Many riders taking the commuter rail are already choosing to walk to the Beverly stations. Almost half of the daily commuters walk to the North Beverly station and more than a third walk to Prides Crossing (see Figure 2). The efforts of this plan are aimed at increasing the percentage of commuters who could walk to nearby stations, as well as those choosing to bike to the stations.

Table 1: Travel to Work Mode Share

Municipality	*Population*	*Workers (>16 years old)*	*Walk (%)*	*Bicycle (%)*	*Drive (%)*	*Transit (%)*	*Other (%)*
Beverly	39,500	20,830	6.4	0.3	81	6.5	5.8
MAPC	3,066,394	1,617,430	6.5	1.1	71	15.6	3
Massachusetts	6,587,536	3,231,820	4.7	0.7	80.3	9.1	5.2

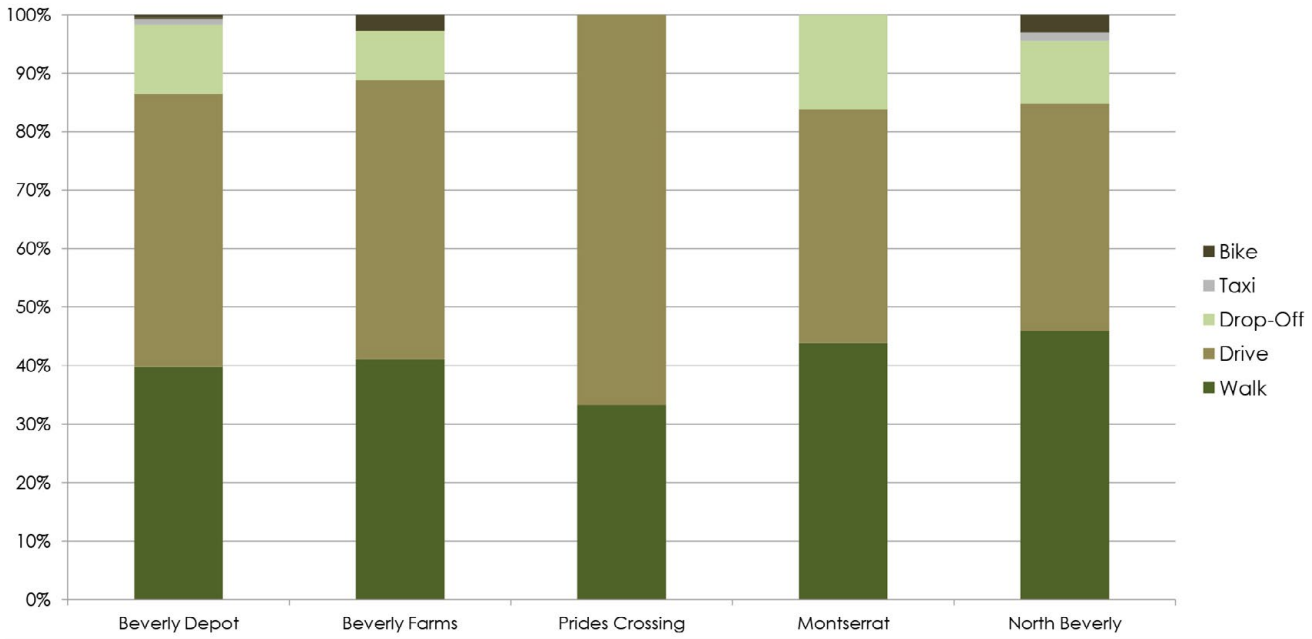
Source: 2008-2012 American Community Survey, 2010 Census

Figure 1: City of Beverly Commuter Rail Ridership



Source: 2014 MBTA Blue Book

Figure 2: City of Beverly Commuter Rail Station Access By Travel Mode



2008-2009, http://www.ctps.org/Drupal/data/pdf/studies/transit/MBTA_Passenger_Survey/North_Side_Volume.pdf)

Complete Streets

Complete streets refer to roadways that are safe, comfortable, and accessible for all users of the roadway – including pedestrians, bicyclists, motorists, and bus riders – regardless of age, ability or income level. In conjunction with this bicycle and pedestrian plan project, the City of Beverly is pursuing adoption of a complete streets policy through its City Council. The policy is not a design prescription for required facilities on specific roadways; rather, it directs the City to consider and look for opportunities to incorporate the needs of all users during both routine maintenance and roadway reconstruction projects. This bicycle and pedestrian plan report is intended to provide specific recommendations to assist with planning and implementation of the complete streets policy. Working with the Planning Department, Engineering Department, and the City's Parking-Traffic Commission, MAPC is concurrently drafting a complete streets policy tailored to meet the City's goals.

Essex Scenic Byway

A scenic byway is a road recognized for having special qualities that its local communities wish to preserve and promote. Scenic byways are designated for the defining qualities that make them distinctive and provide a unique and appealing travel experience to explore and experience the scenery, culture, history and special features of an area.

The 85-mile Essex Coastal Scenic Byway (the Byway) follows state and local roadways between Lynn in the south and Newburyport in the north curving along the coast and looping around Cape Ann, including through Beverly.

There are a number of sites within Beverly along the Byway representing historic places of interest, former marine-based industries, grand estates, and historic villages, including:

- Lynch Memorial Park - Originally known as Woodbury's Point, during the Revolutionary War a fort was located here to protect Beverly Harbor.
- Fish Flake Hill Historic District - This small waterfront neighborhood has historic connections to marine and fishing industries. The name is a reference to the fish flaking tables that were used to dry fish.
- Beverly Farms and Pride's Crossing - These small villages along the rail line historically provided services and housing for staff to serve the large estates of summer residents.
- Two campuses located along the byway route, Endicott College and the Landmark School, have converted some of the former grand estate properties to academic buildings and residences.

The Byway is intended to provide multimodal access, including biking and walking. The Essex Coastal Scenic Byway Management Plan (2011) notes that consideration could also be given to the creation of a companion bikeway route to the Essex Coastal Scenic Byway.

The recommendations in this report provide bicycle facilities along the Byway Route: Cabot Street, Stone Street, Lothrop Street, and Hale Street (See Figure 3). Appropriate signage acknowledging the Byway can accompany the bicycle facilities.

Figure 3: Essex Coastal Scenic Byway (Beverly portion)

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A BIKE AND PEDESTRIAN-FRIENDLY COMMUNITY

BRINGING IT ALL TOGETHER

Becoming a city where people of various ages, abilities and comfort levels choose to walk or ride a bicycle requires a multi-pronged effort. Because Beverly is already highly walkable throughout much of the City, this section concentrates first on developing a strong bicycle culture, followed by recommendations to further improve the safety and comfort of pedestrians.

The "5 E's," developed by the League of American Bicyclists, is one approach to creating a safe and strong bicycle culture.[3] The 5 E's is a framework comprised of five elements that are essential to creating great places for bicycling. Beverly is building upon pieces of these elements that already exist within the City. The 5 E's are:

- Evaluation & Planning
- Enforcement
- Education
- Encouragement
- Engineering

The following sections describe Beverly's bicycle plan within this context.

Evaluation & Planning:

Planning for bicycling as a safe and viable transportation option

First and foremost is developing a plan. Crucial to the future success of the plan is "evaluation," i.e., metrics. Tracking progress will allow Beverly to better understand successful areas, as well as areas that could use improvement. Metrics can vary from relatively easy elements to others that require more effort to track. These metrics could include:

- Tracking miles of new bicycle facilities such as bicycle lanes
- Counting the number of bikes parked at bicycle parking facilities
- Counting the number of people bicycling, including the number of children who bike to school
- Tracking the increase in people accessing commuter rail stations by bicycle
- Tracking changes in vehicle-bicycle collision rates
- Tracking dollar amounts or percentages spent on bicycle infrastructure improvements

The City of Beverly's pending complete streets policy charges the City of Beverly's Transportation Task Force, a group comprised of city staff, elected officials, and volunteers, with tracking metrics related to the success of complete streets, including bicycling.

[3]http://bikeleague.org

Enforcement:
Ensuring safe roads for all users

Laws and regulations exist to govern bicycling and the interaction of vehicles that can affect cyclists' safety. These rules ensure safety for all road users. These regulations, however, are only effective to the extent that they are enforced. Police and traffic control officers must understand these laws, know how to enforce them, and apply them equitably to ensure public safety.

The Massachusetts Bicycle Coalition (MassBike) is an advocacy group dedicated to promoting a bicycle-friendly environment throughout the Commonwealth. The coalition recently created an 11-minute video targeted to police officers to help them better understand state laws regarding bicyclist safety. The video can be accessed at this link: https://www.youtube.com/watch?v=hhkEb0ie7Cg&feature=youtu.be

In addition, MassDOT, in conjunction with MAPC and other stakeholders, have created a brochure that police officers can provide to motorists, bicyclists, and pedestrians during traffic stops which summarizes the rules of the road and guidance to ensure that a community's streets are safe for all users. See Figure 4.

Figure 4: Bicycle-Pedestrian Safety Brochure (MassDOT)

The Benefits of Walking and Bicycling

By walking or bicycling you can:

- Improve your mood.
- Control your weight.
- Reduce your risk of cardiovascular disease.
- Reduce your risk for type 2 diabetes and metabolic syndrome.
- Reduce your risk of some cancers.
- Strengthen your bones and muscles.
- Improve the quality of your sleep.
- Increase your chances of living longer.

- It's free!
- A 15-minute bicycle ride to and from work five times a week burns off 11 lbs of fat in a year and walking an extra 20 minutes each day will burn off 7 lbs of fat in a year.
- Inactivity is a factor in 10% of all deaths and 25% of chronic disease related-deaths.
- People who bicycle for 30 minutes, five days a week take about half as many sick days as those who don't.
- Employees who exercise before work or at lunchtime improve their time and workload management, and boost their motivation and ability to deal with stress.
- People who walk or bicycle to work report greater feelings of freedom, relaxation, and excitement than car commuters.

massDOT
Massachusetts Department of Transportation

EOPSS

LOOK!
Sharing the Road:
A Guide for Bicyclists, Pedestrians and Motorists

Bicycle Safety

- Bicyclists may use the full travel lane or choose to ride to the right of other traffic.
- Bicyclists must obey all traffic laws, signs, and signals. Remember that when you are on the road you are considered a vehicle.
- Pass other vehicles with care. Avoid passing trucks and buses on the right. Pass on the left or wait for them to move.
- Ride in the same direction as other traffic, not against it, unless you are in a bicycle lane specially marked for riding in the opposite direction.
- Stay far enough away from parked cars to avoid doors as they are opening.
- LOOK before turning or changing lanes, and use hand signals unless both hands are needed for bike operation.
- Ride in a straight, predictable line and do not weave between lanes or around parked cars.
- Yield to pedestrians and use a bell or give an audible shout out.
- Use lights at night–white light in front, red light in back. Add reflectors and bright clothing to increase visibility.
- Helmets are required for bicyclists age 16 and younger, and are recommended for adults.
- Bicyclists may ride two abreast, but should get into single file to help faster traffic pass when it is safe to do so.

Pedestrian Safety

LOOK!

- Before you cross a roadway, stop at the curb, LOOK left, LOOK right, and LOOK left again for traffic. Be especially alert at intersections that allow vehicles to turn right on red and crossing multiple lanes of traffic where drivers in adjacent lanes may not see you.
- If you must enter the street from between parked cars, stop and LOOK both ways before crossing.
- State law requires you to use a crosswalk when one is available. If an intersection has a traffic signal, wait for the WALK signal to activate. Do not cross if the signal says DON'T WALK. Keep in mind that nearly one in five road user deaths involves a pedestrian!
- Use a sidewalk when one is available. When there is no sidewalk, you should walk on the shoulder and face traffic so you can see vehicles approaching.
- When walking or running at night wear light colors, lights and/or reflective strips so that drivers can see you better.

Safety for Motorists Sharing Roadways with Bicyclists and Pedestrians

- You must yield to pedestrians entering or using a crosswalk in your travel path.
- You must yield to pedestrians and bicyclists when turning into a driveway or parking lot.
- Drivers and passengers should LOOK before opening a door–hitting a bicyclist or pedestrian with a door, or even causing them to swerve out of the way, could result in a $100 ticket.
- Never let your vehicle block a crosswalk.
- Never pass a vehicle that is stopped or slowing for a pedestrian.
- Be careful when backing up. Blind spots can hide people or objects behind your vehicle.
- LOOK carefully and yield to approaching pedestrians and bicyclists before turning left. Always LOOK for pedestrians and bicyclists on your right before pulling over or turning right.
- Slow down and give bicyclists at least 3 ft. of space when passing. If you cannot pass safely, switch lanes or wait for a safe opportunity to pass. Bicyclists do not have to move over for motorists when it is unsafe to do so.
- Bicyclists are not required to ride to the right of the road, in bike lanes, or on the sidewalk. Riding too far to the right can be unsafe, and riding on the sidewalk is illegal and dangerous in many places.

Road Markings and Signals

Shared Lane Markings (Sharrows) indicate that the travel lane must be shared by bicycles and motor vehicles. Everyone should be cautious and patient in shared lanes.

Bicycle Lanes are pavement markings designating that portion of the roadway for preferential use by bicyclists. Protected Bicycle Lanes (or Cycletracks) may be separated from the roadway by a curb, barriers, or even parked cars–use extra care at intersections and driveways.

Bike Boxes are pavement markings that enhance the visibility of bicyclists at intersections and reduce the risk of turning conflicts between motorists and bicyclists by allowing bicyclists to position themselves ahead of vehicles. Motorists should stay behind a Bike Box until the light turns green and any bicyclists clear the intersection.

Flashing Signals with Countdowns give pedestrians and drivers an indication of the remaining crossing time. Pedestrians who are already in the crosswalk when the countdown reaches zero have the right-of-way.

Education:

Giving people of all ages and abilities the skills and confidence to ride

Offering ways for people to get the skills and confidence to ride is important in creating a great place for bicycling. Beverly, in conjunction with the Beverly Bike Committee, should consider programs and events that can engage and educate new riders of all age groups. In addition, the colleges located within the City, Endicott College, Montserrat College of Art, and North Shore Community College, can be engaged to encourage their students to safely ride throughout campus and across the City. Activities may include brown bag lunch presentations, online trainings and tips, and on-bike training opportunities. Education can work in tandem with the Enforcement to ensure that part of the education is focused on understanding the rights and obligations of cyclists, pedestrians, and motorists.

Beverly has the following education activities:

- Past: The Traffic Safety Officer presented bicycle safety at multiple North Shore Transportation Management Association events in the recent years, as well as at two local employers: Axcellis Technologies and Cell Signaling.
- Future: The Traffic Safety Division will present on bicycle safety in the City's elementary schools, the recreation department, and local scouting organizations over the next year.
- Ongoing: The annual George Robertson Bicycle Rodeo is held at Lynch Park. During the event there will be safety inspections performed by local bicycle shops. There will be a skills course laid out and children will be instructed on bicycle safety. Bicycle helmets will be given to any child that needs one.

Encouragement:

Creating a strong bike culture that welcomes and celebrates bicycling

The City and other stakeholders can play a critical role in encouraging people to ride by giving them a variety of related opportunities and programs. In addition to the safety-focused events listed above, the City hosts the following:

- During the last week in July, the City hosts an annual Beverly "grand prix" where an urban cycle route is cordoned off through downtown. During this event there is a children's bicycle parade. People are encouraged to bike to the event and "bike valet parking" is provided.
- Several benefit rides that travel through Beverly, including Tour De Cure and Reid's Ride.
- A Mayor's Ride is hosted annually in early May. The Mayor leads this ride and the route travels through the downtown, to beaches, and to parks.

The North Shore Transportation Management Association, of which Beverly is a dues-paying member, coordinates the following:

- North Shore TMA Biking Awareness & MassCommute Bicycle Challenge Registration Luncheon - Held at North Shore TMA member work sites during April, the focus of the luncheon is to provide education and safety information to employees and promote registration for the May MassCommute Bicycle Challenge.
- MassCommute Bicycle Challenge (MCBC) - Sponsored in Beverly by the North Shore TMA and held annually during National Bike Week (the 2nd week in May) - the MCBC encourages residents and employees working in Beverly to bike to work, for errands, and/or for recreation.
- North Shore TMA Bike Breakfasts - Sponsored by the North Shore TMA at TMA member work sites during National Bike Week, this event celebrates the accomplishments of employees who bike to work.
- Beverly Parklet - Sponsored by the North Shore TMA in cooperation with the City, the parklet was held in 2014 during National Bike Week on Cabot Street. The goal of the parklet was to promote options to driving alone to work, shopping, dining, etc. by showing the opportunity to create a green space out of parking spaces and utilize the space to create awareness and encourage people to bike to downtown Beverly.

In addition to programming, wayfinding (i.e., signage) can further encourage people to bike throughout the City. Wayfinding signage does exist today in and around the Downtown area, and the City should ensure that the signage remains visible and in good condition, as well as look for additional locations where signage may be appropriate.

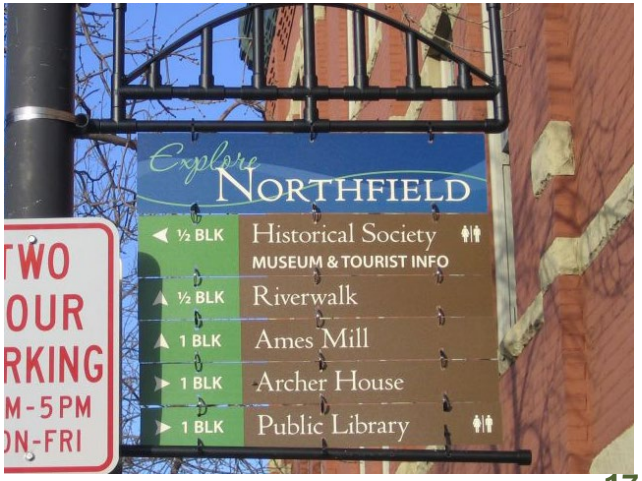
One way to improve existing and future signage could be to include distances to key destinations specified for both bicyclists and pedestrians. MAPC recommends the City identify a list of destinations for inclusion on signs based upon the importance of the location or frequency of visitors to that location. Potential locations include:

- Bikeways
- Downtown / retail areas
- Transit stations
- Schools
- Civic/community destinations
- Local or regional parks and trails
- Hospitals

Locations of higher importance would have a higher frequency of signs, and those signs should be placed along routes further from those key destinations. Locations that are deemed by the community to have a lower frequency of visitation could lessen the number of signs along designated routes, and in the short-term have the focus be placed on those primary destinations. For example, key destinations with higher visitation may have signs along routes as far as three miles away directing cyclists to the end destinations. Destinations with lower visitation may have signage that starts one or two miles out. In Downtown Beverly, these types of wayfinding signs already exist as shown in the images below. Secondary locations (e.g., transit) would have signs up to two miles away. Tertiary locations that are more local (e.g., a park) would have signage up to one mile away.

Wayfinding signage in Beverly

Examples of wayfinding signage with distances



Engineering:

Creating safe and convenient places to ride and park

The most visible evidence of a great bicycling environment is the presence of infrastructure that supports it. The physical environment is a key determinant in whether people will choose to ride a bicycle. Bicycle-friendly communities create a connected bicycling network, consisting of quiet neighborhood streets, conventional and protected bike lanes, shared use trails, etc. Secure, convenient and readily available bike parking is also a key component.

Bicycle Facility Recommendations Overview

Working with the City and other stakeholders, MAPC examined the entire street network of non-local roads within the City of Beverly, collecting street width and existing conditions data, and identifying opportunities and constraints for providing bicycle accommodation along those roadways. A major focus of this effort has been to identify, based on the existing street widths, curb locations, and parking locations, the opportunity to provide bicycle facilities on these roads as part of the City's annual roadway maintenance program.. The recommendations detail the proposed roadway layout, including type of proposed bicycle facility, and proposed widths for bicycle lanes, parking, and travel lane widths, as appropriate.

Striping bicycle lanes and/or shared lane markings during scheduled repaving cycles are a low-cost way of achieving incremental change. Additionally, there are several opportunities to incorporate "bold" moves will truly create a bicycle-friendly environment. Achieving implementation of these facilities will require greater effort; however, the results will place Beverly at the forefront of being a bicycle-friendly city and an example for other municipalities in the Commonwealth.

These pending and potential projects, described in further detail in the following sections, include:

- Restriping using existing curb-to-curb space (i.e., low cost, short-term implementation)
- The Rantoul Street reconstruction project
- Brimbal Avenue Phase 1 redesign
- Reimagining Broadway for connecting the Bass River to and beyond the downtown
- Dashed bicycle lanes (advisory lanes)
- Restriping intersection north of the Salem-Beverly Bridge
- A "road diet" on Elliot Street near the Cummings Property office development

See Table 2 for a summary of these projects.

Table 2: Summary of Bicycle-Related Projects in the City of Beverly

Project	Level of Future Effort Required*			
	Low	Medium	High	Notes
Restriping using existing curb-to-curb	✓			Low-cost inclusion of bicycle facilities incorporated as a matter of routine
Rantoul Street reconstruction	✓			Project is scheduled for construction funding allocated
Brimbal Avenue interchange redesign (Phase 1)		✓		Project is in design phase and portion funding is allocated for Phase I
Broadway as key bicycle connection			✓	An advisory lane would be a high visibility, high impact statement at a k connection
Ober Street as advisory lane pilot, followed by other potential streets			✓	Several opportunities for this low cost innovative roadway treatment that tr the roadway as a shared space for cyc and motorists
Salem-Beverly bridge intersection restriping	✓			Moderate, low cost steps can improv safety for bicyclists
Connections to Cummings Center		✓		• A road diet on Elliot Street will requ additional study to determine feasibility • Off-road trails can be improved to provide a north-south connection

*Note that this refers to *future* effort required for implementation either for approval or funding. For example, because the Rantoul Street reconstruction is scheduled for construction in spring 2015, the level of effort required to accomplish this project is designated as "low"

Overview of Bicycle Facilities

The on-road bicycle accommodations that were considered in this network plan include bicycle lanes, buffered bicycle lanes, shared lane markings, and advisory lanes. In general, MAPC based its recommendations upon the design guidelines specified in the Massachusetts Department of Transportation's Project Development and Design Guide, as well as the National Association of City Transportation Officials' (NACTO) Urban Bikeway Design Guide, which MassDOT officially endorsed in 2014. Following the established guidance, MAPC recommends on-street parking lane widths of 7'-8' and travel lane widths of 10'-12', with 11' often being the preferred travel lane width. Travel lanes greater than 12' may encourage higher vehicle speeds, whereas 10' is adequate on many roads but may be less than optimal for bus routes and roadways with heavy or wide vehicles.

The following are brief descriptions of different types of bicycle facilities. The list is ordered by desirability, with facilities providing the highest separation between vehicles and bicycles listed first. Please see Appendix A – Pedestrian and Bicycle Facility Design Guidelines and References for resources containing complete descriptions, photos, and design guidance for these bicycles facilities.[4]

Cycle Track - A cycle track, illustrated in Figure 5, is an exclusive bicycle facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bicycle lane. A cycle track is physically separated from motor vehicle traffic and is distinct from the sidewalk. A cycle track may be placed at the street level, sidewalk level, or in between.

Figure 5: Cycle track (Source: NACTO)

[4]The illustrations below depicting the various bicycle facilities are from the NACTO Urban Bikeway Design Guide, accessible online at http://nacto.org/cities-for-cycling/design-guide/

Buffered Bicycle Lane - Buffered bicycle lanes, illustrated in Figure 6, are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Pavement markings usually provide this buffer, and there is generally no physical separation between vehicles and cyclists.

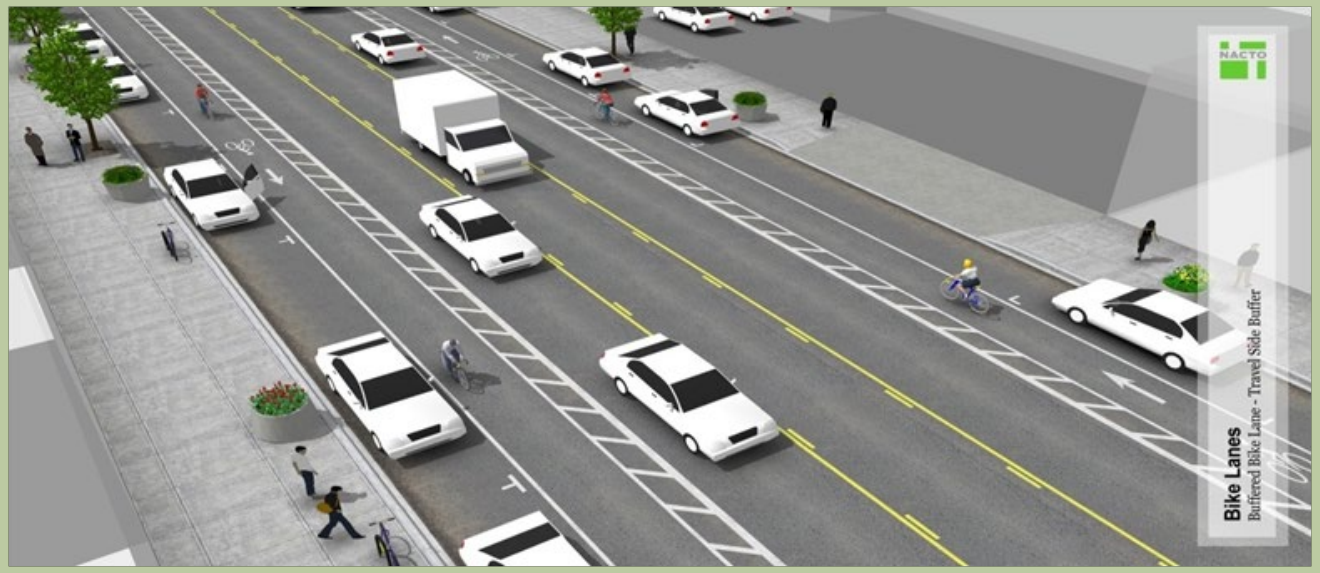


Figure 6: Buffered bicycle lane (Source: NACTO)

Bicycle Lane - A bicycle lane, illustrated in Figure 7, is defined as a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists.

Figure 7: Bicycle lane (Source: NACTO)

Shared Lane - Shared lane markings (SLMs), or "sharrows," illustrated in Figure 8, are road markings that indicate a shared lane environment for bicycles and automobiles. Among other benefits, shared lane markings reinforce the legitimacy of bicycle traffic on the street and mark the recommended position within the roadway for bicyclists. Sharrows should be marked as frequently as 100' apart and not greater than 250' apart, as well as immediately after intersections.

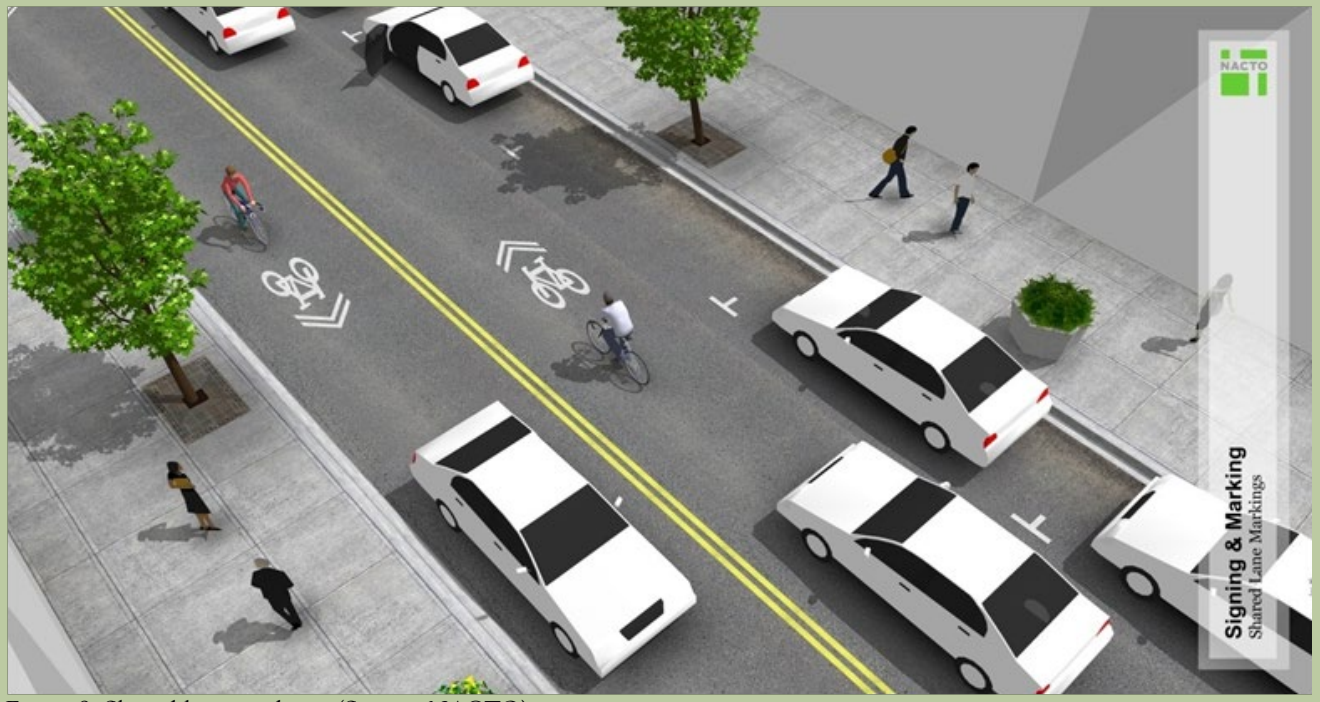


Figure 8: Shared lane markings (Source: NACTO)

Dashed Bicycle Lanes (Advisory Lane) – Advisory lanes consist of one motor vehicle traffic lane in the middle of the street and two bicycle (or shared use with pedestrian) lanes, one on each side of street. As shown in Figure 9, The traffic lane and bicycle lanes are separated with white dashed lines, which indicate that both bicycles and vehicles can use the shared space under certain circumstances. Motor vehicles must yield to pedestrians or cyclists in the advisory lanes (as they must do without special lane markings).

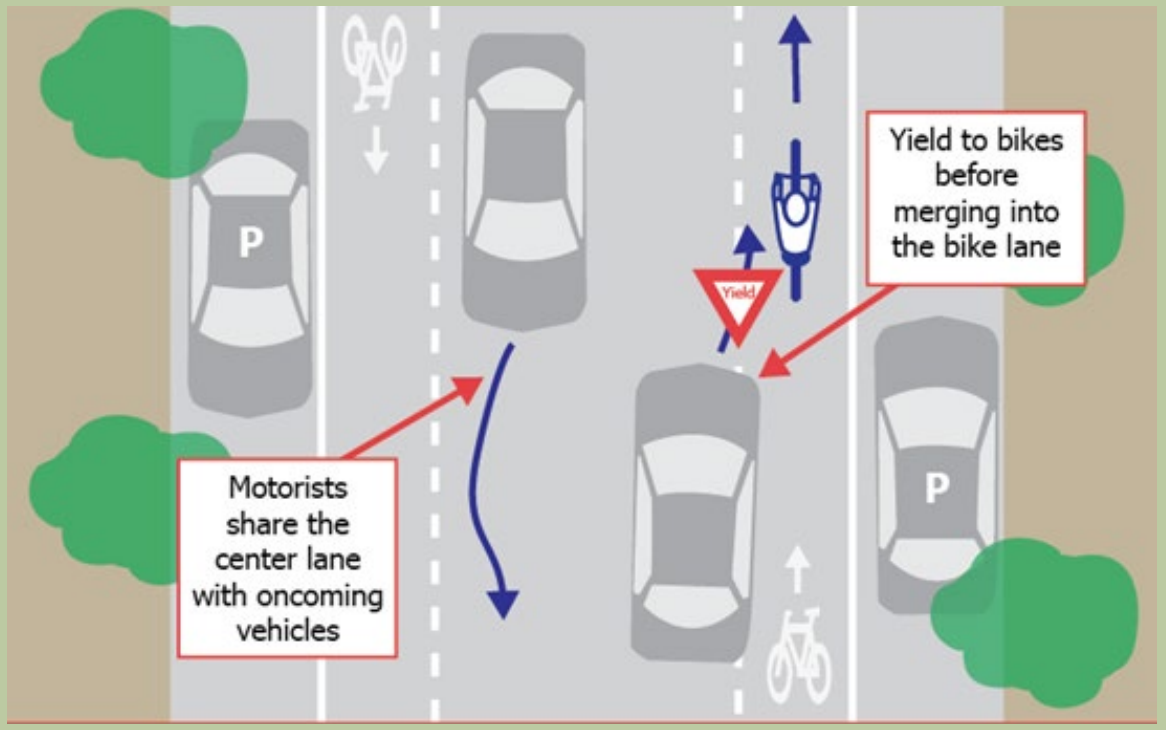


Figure 9: Diagram illustrating an advisory lane

Signage - Signs can complement the pavement markings, further alerting motorists to the presence of bicyclists and encouraging all users to share the road. On quiet residential streets with good connections and low traffic volumes or low speeds, signs can be used as a means of connecting the bicycle network through these areas without the need to install pavement markings. Signs can also be used for wayfinding purposes to direct cyclists to off-road paths and various points of interest.

Restriping using existing curb-to-curb space (short-term implementation)

Beverly has tremendous opportunity to include bicycle facilities utilizing the existing curb-to-curb widths with no changes to the number of vehicular lanes or existing on-street parking. These facilities can be installed during the routine repaving/restriping that typically occurs on a street every few years. These short-term solutions represent the majority of the proposed bicycle network through the City, comprising approximately 12.5 miles of proposed bicycle lanes. This network will be supplemented with shared lane markings and higher-effort facilities (detailed in the following sections) to create an integrated bicycle network.

There are a number of streets in Beverly identified on the Beverly Bicycle Network Map (Figure 10) and Beverly Bicycle Recommendations Table (Table 3) with potential for bicycle facilities in the short-term. The bicycle network creates connections to schools, commuter rail stations, downtown, residential areas, and to adjacent communities. Providing safe, comfortable, and connected bicycle facilities can improve the health of the City's residents, reduce reliance on automobiles for shorter trips, and reduce congestion in the City.

The table provides details on the recommendations for proposed striping along Beverly's main roadways. There is often flexibility in the recommendations regarding the allocation of roadway space while still following the guidance from MassDOT. For non-local roads, MassDOT recommends travel lane widths between 10-12 feet. For local roads, MassDOT recommends travel lane widths of 9-11 feet. This variation in acceptable lane widths allows for different roadway configurations. For example, a 30' foot road with no on-street parking could be configured with:

- Two 5' bicycle lanes and two 10' travel lanes;
- Two 4.5' bicycle lanes and two 10.5' travel lanes; or,
- Two 4' bicycle lanes and two 11' travel lanes

Working within the established guidance presented in this document, the City has the ability to make adjustments to the recommendations where appropriate. Where feasible, MAPC recommends providing at least 5 feet of width for each striped bike lane, especially along higher volume roadways and in locations where on-street parking is provided.

Figure 10: Beverly Bicycle Network Map

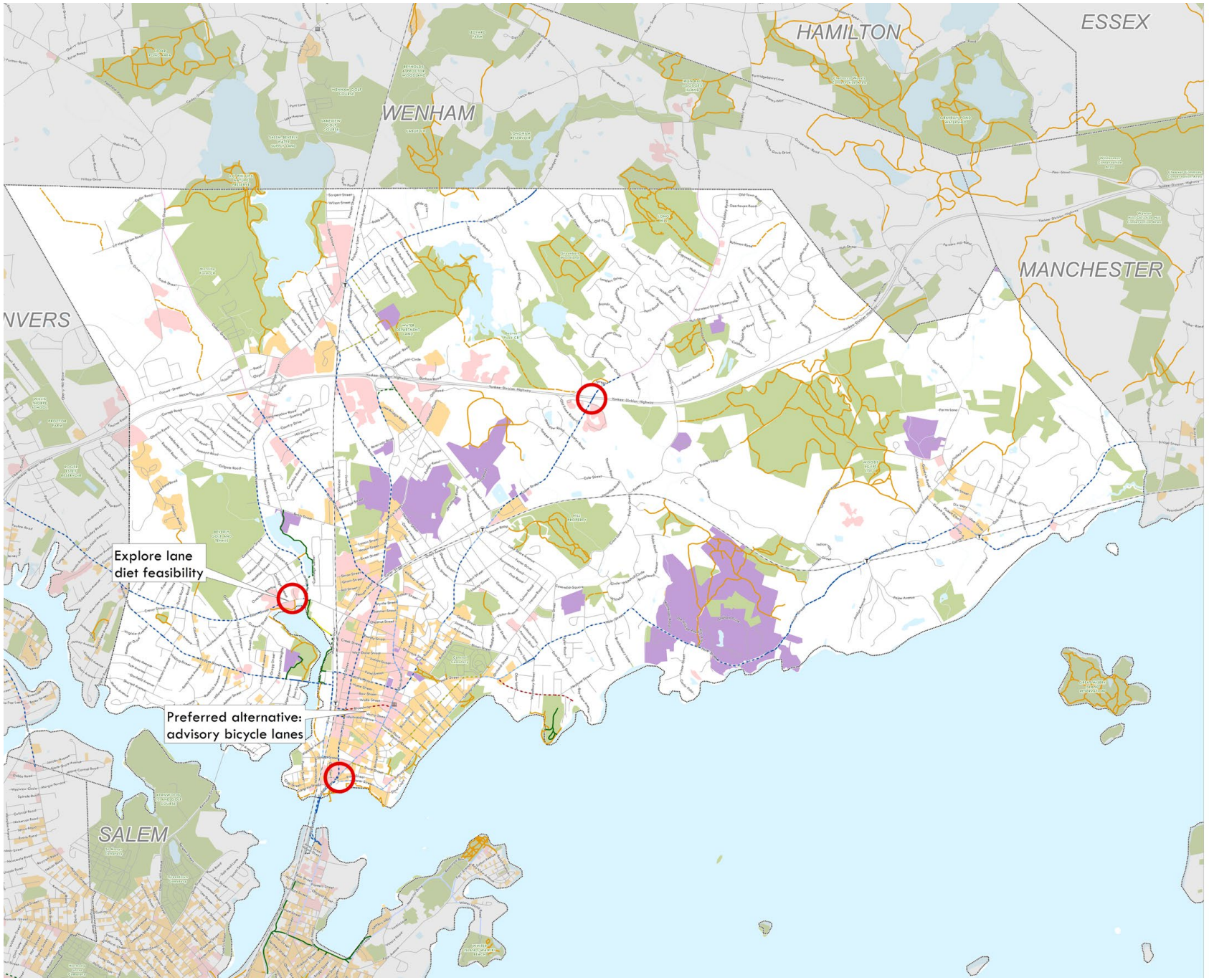


Table 3: Beverly Bicycle Recommendations

Feet

Street Name	From	To	Road classification	Roadway Existing Conditions								Recommendation	Recommendation - Details								
				Sidewalks	Travel Direction			Parking			Curb-to-Curb		Parking	Buffer or Shoulder	Bike Lane	Buffer	Travel Lane (s)	Travel Lane (s)	Buffer	Bike Lane	Buffer or Shoulder	Parking
				Number	Two-Way	One-Way	Multiple lanes?	None	Both	One Side	Width		WB/SB	WB/SB	WB/SB	WB/SB	WB/SB	EB/NB	EB/NB	EB/NB	EB/NB	EB/NB
BRIDGE STREET	RIVER ST	BASS RIVER	Urban Minor Arterial	2	X			X			30.5	Bicycle lanes			4.25		11	11		4.25		
BRIDGE STREET	BASS RIVER	BASS RIVER	Urban Minor Arterial	2	X			X			30.5	Bicycle lanes			4.25		11	11		4.25		
BRIDGE STREET	BASS RIVER	KERNWOOD AVE	Urban Minor Arterial	2	X					WB	37.5	Bicycle lanes	8		5		10.25	10.25		4		
BRIDGE STREET	KERNWOOD AVE	CITY LINE	Urban Minor Arterial	2	X			X			37.5	Bicycle lanes	8		5		10.25	10.25		4		
BRIMBAL AVENUE	WALNUT AVENUE	SOHIER RD / CONNECTOR RD	Urban Minor Arterial	1	X			X			32.0	Bicycle lanes			5		11	11		5		
BRIMBAL AVENUE	SOHIER RD / CONNECTOR RD	HERRICK ST	Urban Minor Arterial	1	X			X			27.0	Bicycle lanes and shared use paths as part of potential redesign project	See Report for additional information									
BROADWAY	PARK ST	RANTOUL ST	Urban Collector	2		X			X		35.0	Bicycle lane and contra flow bicycle lane			5	1.5	11	11	1.5	5		
BROADWAY	RANTOUL ST	CABOT ST	Urban Collector	2	X				X		38.0	Advisory lane (preferred) or shared lane markings	See Report for scenarios									
BUDLEIGH AVE	WALNUT AVENUE	LAUREL ST	Urban Minor Arterial	2	x			x			28.0	Shared lane markings					14	14				
CABOT STREET	CAILIN RD	TOWN LINE	Principal Arterial	0	X			X			24.0	Maximize shoulder width		2			10	10			2	
CABOT STREET	L.P. HENDERSON RD	CAILIN RD	Principal Arterial	0	X			X			24.0	Maximize shoulder width		2			10	10			2	
CABOT STREET	TRASK ST	L.P HENDERSON RD	Principal Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10			3	
CABOT STREET	CONANT ST	TRASK ST	Principal Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10			3	
CABOT STREET	PRISCILLA RD	CONANT ST	Principal Arterial	2	X			X			42.0	Buffered bicycle lane			5	4	12	12	4	5		
CABOT STREET	DOUGLAS AVE	PRISCILLA RD	Principal Arterial	2	X			X			42.0	Buffered bicycle lane			5	4	12	12	4	5		
CABOT STREET	TRAFALGAR DR	DOUGLAS AVE	Principal Arterial	2	X			X			42.0	Buffered bicycle lane			5	4	12	12	4	5		
CABOT STREET	BLAINE AVE	TRAFALGAR DR	Principal Arterial	0	X			X			36.0	Buffered bicycle lane			5	2	11	11	2	5		
CABOT STREET	RUSSELL ST	BLAINE AVE	Principal Arterial	2	X			X			36.0	Buffered bicycle lane			5	2	11	11	2	5		
CABOT STREET	KITTREDGE ST	RUSSELL ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	BALCH ST	KITTREDGE ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	HERRICK ST	BALCH ST	Principal Arterial	2	X					SB	42.0	Bicycle lanes			5.5		11.5	11.5		5.5		8
CABOT STREET	LYMAN ST	HERRICK ST	Principal Arterial	2	X					SB	48.0	Buffered bicycle lanes			5	3	12	12	3	5		8
CABOT STREET	MASON ST	LYMAN ST	Principal Arterial	2	X					SB	48.0	Buffered bicycle lanes			5	3	12	12	3	5		8
CABOT STREET	SWAN ST	MASON ST	Principal Arterial	2	X					SB	48.0	Buffered bicycle lanes			5	3	12	12	3	5		8
CABOT STREET	SIMON ST	SWAN ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	CHARLES ST	SIMON ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	BECKFORD ST	CHARLES ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	BENNETT ST	BECKFORD ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	COLON ST	BENNETT ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	LENOX ST	COLON ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	MYRTLE ST	LENOX ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	COLUMBUS AVE	MYRTLE ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	SUMMER ST	COLUMBUS AVE	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	HARRISON AVE	SUMMER ST	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	RANTOUL ST	HARRISON AVE	Principal Arterial	2	X					SB	36.0	Bicycle lanes			4		10	10		5		7
CABOT STREET	CHESTNUT ST	RANTOUL ST	Principal Arterial	2	X			X			36.0	Buffered bicycle lanes			5	2	11	11	2	5		
CABOT STREET	ELLIOTT ST	CHESTNUT ST	Principal Arterial	2	X				X		36.0	Shared lane markings	7				11	11				7
CABOT STREET	ROUNDY SY	ELLIOTT ST	Principal Arterial	2	X				X		36.0	Shared lane markings	7				11	11				7
CABOT STREET	CHARNOC ST	ROUNDY ST	Principal Arterial	2	X				X		36.0	Shared lane markings	7				11	11				7
CABOT STREET	WEST DANE ST	CHARNOC ST	Principal Arterial	2	X				X		36.0	Shared lane markings	7				11	11				7
CABOT STREET	CHURCH ST	WEST DANE ST	Principal Arterial	2	X				X		42.0	Shared lane markings	8				13	13				8
CABOT STREET	BOW ST	CHURCH ST	Principal Arterial	2	X				X		49.0	Shared lane markings	8				16.5	16.5				8
CABOT STREET	WALLIS ST	BOW ST	Principal Arterial	2	X					SB	42.0	Shared lane markings	8				17	17				
CABOT STREET	BROADWAY	WALLIS ST	Principal Arterial	2	X					SB	38.0	Shared lane markings	8				15	15				
CABOT STREET	MILTON ST	BROADWAY	Principal Arterial	2	X					SB	33.0	Shared lane markings	8				12.5	12.5				
CABOT STREET	WASHINGTON ST	MILTON ST	Principal Arterial	2	X					SB	35.0	Shared lane markings	8				13.5	13.5				
CABOT STREET	FRANKLIN PL	WASHINGTON ST	Principal Arterial	2	X					SB	31.0	Shared lane markings	8				11.5	11.5				
CABOT STREET	CENTRAL ST	FRANKLIN PL	Principal Arterial	2	X					SB	31.0	Shared lane markings	8				11.5	11.5				
CABOT STREET	HIGHLAND AVE	CENTRAL ST	Principal Arterial	2	X					SB	36.0	Shared lane markings	8				14	14				
CABOT STREET	BARTLETT ST	HIGHLAND AVE	Principal Arterial	2	X					SB	34.0	Shared lane markings	8				13	13				
CABOT STREET	PLEASANT ST	BARTLETT ST	Principal Arterial	2	X					SB	34.0	Shared lane markings	8				13	13				
CABOT STREET	FAYETTE ST	PLEASANT ST	Principal Arterial	2	X					SB	36.0	Shared lane markings	8				14	14				
CABOT STREET	UNION ST	FAYETTE ST	Principal Arterial	2	X					SB	33.0	Shared lane markings	8				12.5	12.5				
CABOT STREET	EDWARDS ST	UNION ST	Principal Arterial	2	X					SB	36.0	Shared lane markings	8				14	14				
CABOT STREET	SCHOOL ST	EDWARDS ST	Principal Arterial	2	X					SB	38.0	Shared lane markings	8				15	15				
CABOT STREET	CABOT ST	SCHOOL ST	Principal Arterial	2	X				X		44.0	Shared lane markings	8				14	14				8
CONANT STREET	ELLSWORTH AVE	MACARTHUR RD	Urban Minor Arterial	2	X			X			28.0	Bicycle lanes			4		10	10		4		
CONANT STREET	MACARTHUR RD	CHERRY HILL DR	Urban Minor Arterial	1	X			X			28.0	Bicycle lanes			4		10	10		4		
CONANT STREET	CHERRY HILL DR	TOWN LINE	Urban Minor Arterial	1	X			X			28.0	Bicycle lanes			4		10	10		4		
COUNTY WAY	MCKAY ST	DODGE ST	Local	2	X		1-2 in each direction	X			34.0	Shared lane markings					11, 11	12				
DODGE STREET	PUTNAM ST	ROY AVE	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	ROY AVE	NORTHWOOD RD	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	NORTHWOOD RD	OAKHURST RD	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	OAKHURST RD	BERRYWOOD LN	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	BERRYWOOD LN	RED ROCK LN	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	RED ROCK LN	ELNEW AVE	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	ELNEW AVE	WIRLING DR	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	WIRLING DR	WHITAKER WAY	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	WHITAKER WAY	MORNINGSIDE DR	Urban Minor Arterial	1	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	MORNINGSIDE DR	LONGHAM RD	Urban Minor Arterial	1	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	LONGHAM RD	NORWOOD'S POND RD	Urban Minor Arterial	0	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	NORWOOD'S POND RD	BEAVER POND RD	Urban Minor Arterial	0	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	BEAVER POND RD	CONIFER WAY	Urban Minor Arterial	0	X			X			34.0	Bicycle lanes			5		12	12		5		
DODGE STREET	CONIFER WAY	TOWN LINE	Urban Minor Arterial	0	X			X			34.0	Bicycle lanes			5		12	12		5		
ELLIOTT STREET	CABOT ST	GALLOUPE AVE	Urban Minor Arterial	2	X				X		42.0	See report for road diet recommendation										
ELLIOTT STREET	GALLOUPE AVE	MECHANIC ST	Urban Minor Arterial	2	X				X		42.0	See report for road diet recommendation										
ELLIOTT STREET	MECHANIC ST	CHASE ST	Urban Minor Arterial	2	X				X		42.0	See report for road diet recommendation										
ELLIOTT STREET	CHASE ST	RANTOUL ST	Urban Minor Arterial	2	X				X		42.0	See report for road diet recommendation										

Street Name	From	To	Road classification	Roadway Existing Conditions								Recommendation	Recommendation - Details								
				Sidewalks	Travel Direction			Parking			Curb-to-Curb		Parking	Buffer or Shoulder	Bike Lane	Buffer	Travel Lane (s)	Travel Lane (s)	Buffer	Bike Lane	Buffer or Shoulder	Parking
				Number	Two-Way	One-Way	Multiple lanes?	None	Both	One Side	Width		WB/SB	WB/SB	WB/SB	WB/SB	WB/SB	EB/NB	EB/NB	EB/NB	EB/NB	EB/NB
ELLIOTT STREET	RANTOUL ST	PARK ST	Principal Arterial	2	X		2 SB			NB	33.0	See report for road diet recommendation										
ELLIOTT STREET	PARK ST	DOCK LN	Principal Arterial	2	X		2 each direction	X			44.0	See report for road diet recommendation										
ELLIOTT STREET	DOCK LN	MCPHERSON DR	Principal Arterial	2	X		2-3 each direction	X			60.0	See report for road diet recommendation										
ELLIOTT STREET	MCPHERSON DR	CUMMINGS CENT	Principal Arterial	2	X		1-2 each direction	X			48.0	See report for road diet recommendation										
ELLIOTT STREET	CUMMINGS CENT	MCKAY ST	Principal Arterial	2	X		1-2 each direction	X			48.0	See report for road diet recommendation										
ELLIOTT STREET	MCKAY ST	ECHO AVE	Principal Arterial	2	X		1-2 each direction	X			42.0	See report for road diet recommendation										
ELLIOTT STREET	ECHO AVE	GREENE ST	Principal Arterial	2	X			X			32.0	Bicycle lanes			5		11	11		5		
ELLIOTT STREET	GREENE ST	GOLDSMITH AVE	Principal Arterial	2	X			X			32.0	Bicycle lanes			5		11	11		5		
ELLIOTT STREET	GOLDSMITH AVE	NORTHERN AVE	Principal Arterial	2	X			X			42.0	Buffered bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	NORTHERN AVE	HILLSIDE AVE	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	HILLSIDE AVE	COUNTY WAY	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	COUNTY WAY	GILES AVE	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	GILES AVE	WINSLOW RD	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	WINSLOW RD	DAVIS RD	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	DAVIS RD	CRESSY ST	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	CRESSY ST	WILLIAMS ST	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	WILLIAMS ST	FRIEND ST	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	FRIEND ST	SUNSET DR	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	SUNSET DR	BEVERLY HILLS AVE	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ELLIOTT STREET	BEVERLY HILLS AVE	TOWN LINE	Principal Arterial	2	X			X			42.0	Bicycle lanes			5	4	12	12	4	5		
ESSEX STREET	CABOT ST	WATCH HILL LN	Urban Minor Arterial	2		NB				SB	42.0	Bicycle lanes	8		5		12	12	5			
ESSEX STREET	WATCH HILL LN	WINTER ST	Urban Minor Arterial	2		NB				SB	42.0	Bicycle lanes	8		5		12	12	5			
ESSEX STREET	WINTER ST	DANE ST	Urban Minor Arterial	2		NB				SB	42.0	Bicycle lanes	8		5		12	12	5			
ESSEX STREET	DANE ST	CHARNOCK ST	Urban Minor Arterial	2	X				X		42.0	Shared lane markings	8				13	13				8
ESSEX STREET	CHARNOCK ST	MUNROE ST	Urban Minor Arterial	2	X				X		42.0	Shared lane markings	8				13	13				8
ESSEX STREET	MUNROE ST	MADISON AVE	Urban Minor Arterial	2	X				X		42.0	Shared lane markings	8				13	13				8
ESSEX STREET	MADISON AVE	BAKER AVE	Urban Minor Arterial	2	X					SB	30.0	Shared lane markings	8				11	11				
ESSEX STREET	BAKER AVE	BURTON AVE	Urban Minor Arterial	2	X					SB	30.0	Shared lane markings	8				11	11				
ESSEX STREET	BURTON AVE	BISSONS ST	Urban Minor Arterial	2	X					SB	30.0	Shared lane markings	8				11	11				
ESSEX STREET	BISSON ST	PRATT AVE	Urban Minor Arterial	2	X					SB	30.0	Shared lane markings	8				11	11				
ESSEX STREET	PRATT AVE	CEDAR ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	CEDAR ST	NEWBURY ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	NEWBURY ST	SHERMAN ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	SHERMAN ST	LOWELL ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	LOWELL ST	MAGNOLIA ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	MAGNOLIA ST	GARDNER ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	GARDNER ST	HAWTHORNE ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	HAWTHORNE ST	SPRING ST	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	SPRING ST	PARRAMATTA RD	Urban Minor Arterial	2	X					SB	42.0	Bicycle lanes	8		5		12	12		5		
ESSEX STREET	PARRAMATTA RD	LAKE SHORE AVE	Urban Minor Arterial	2	X					SB	32.0	Shared lane markings	8				12	12				
ESSEX STREET	LAKE SHORE AVE	BRIMBAL AVE	Urban Minor Arterial	2	X				X		42.0	shared lane markings	8				13	13				8
ESSEX STREET	BRIMBAL AVE	KELLEHER RD	Urban Minor Arterial	2	X			X			26.0	Shared lane markings	7				9.5	9.5				
ESSEX STREET	KELLEHER RD	ICE HOUSE LN	Urban Minor Arterial	1	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	ICE HOUSE LN	COLE ST	Urban Minor Arterial	2	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	COLE ST	YANKEE WAY	Urban Minor Arterial	1	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	YANKEE WAY	MEADOW RD	Urban Minor Arterial	1	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	MEADOW RD	EVELYN RD	Urban Minor Arterial	2	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	EVELYN RD	OLD ESSEX RD	Urban Minor Arterial	2	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	OLD ESSEX RD	RTE 128	Urban Minor Arterial	1	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	RTE 128	OLD ESSEX ST	Urban Minor Arterial	1	X			X			28.0	Bicycle lanes			4		10	10		4		
ESSEX STREET	OLD ESSEX ST	THOREAU CIR	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	THOREAU CIR	GROCE ST	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	GROCE ST	BOXWOOD LN	Urban Minor Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	BOXWOOD LN	STANDLEY ST	Urban Minor Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	STANDLEY ST	GROVER ST	Urban Minor Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	GROVER ST	HULL ST	Urban Minor Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	HULL ST	WALKER RD	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	WALKER RD	HARWOOD ST	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	HARWOOD ST	GREENLEAF DR	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	GREENLEAF DR	HOLLY LN	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	HOLLY LN	BURLEY ST	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	BURLEY ST	COGSWELL AVE	Urban Minor Arterial	2	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	COGSWELL AVE	FOREST ST	Urban Minor Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	FOREST ST	OLD RUBBLY RD	Urban Minor Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10		3		
ESSEX STREET	OLD RUBBLY RD	TOWN LINE	Urban Minor Arterial	1	X			X			26.0	Maximize shoulder width		3			10	10		3		
FEDERAL STREET	CABOT ST	CHAPMAN ST	Urban Minor Arterial	2		EB				EB	30.0	Bicycle lanes			5			12	5	8		
FEDERAL STREET	CHAPMAN ST	MULBERRY ST	Urban Minor Arterial	2		EB				EB	30.0	Bicycle lanes			5			12	5	8		
FEDERAL STREET	MULBERRY ST	ASHLAND ST	Urban Minor Arterial	2		EB				EB	30.0	Bicycle lanes			5			12	5	8		
FEDERAL STREET	ASHLAND ST	CHASE ST	Urban Minor Arterial	2		EB				EB	30.0	Bicycle lanes			5			12	5	8		
FEDERAL STREET	CHASE ST	RANTOUL ST	Urban Minor Arterial	2		EB				EB	30.0	Bicycle lanes			5			12	5	8		
FEDERAL STREET	RANTOUL ST	PARK ST	Urban Minor Arterial	2		EB				EB	31.5	Bicycle lanes			5.5			12	6	8		
FEDERAL STREET	PARK ST	RIVER ST	Urban Minor Arterial	2	X			X			31.5	Bicycle lanes			5.5			12	6	8		
HALE STREET	EAST LOTHROP ST	ORCHARD ST	Urban Minor Arterial	2	X					NB	34.0	Shared lane markings					13	13				8
HALE STREET	ORCHARD ST	OBER ST	Urban Minor Arterial	2	X					NB	34.0	Shared lane markings					13	13				8
HALE STREET	OBER ST	BISSON ST	Urban Minor Arterial	2	X					NB	34.0	Shared lane markings					13	13				8
HALE STREET	BISSON ST	PENNY LN	Urban Minor Arterial	2	X					NB	34.0	Bicycle lanes			5		12	12		5		
HALE STREET	PENNY LN	HALE PARK AVE	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	HALE PARK AVE	CORNING ST	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	CORNING ST	CROSS ST	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	CROSS ST	TYLER RD	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	TYLER RD	EISENHOWER AVE	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		

Street Name	From	To	Road classification	Roadway Existing Conditions								Recommendation	Recommendation - Details								
				Sidewalks	Travel Direction			Parking			Curb-to-Curb		Parking	Buffer or Shoulder	Bike Lane	Buffer	Travel Lane (s)	Travel Lane (s)	Buffer	Bike Lane	Buffer or Shoulder	Parking
				Number	Two-Way	One-Way	Multiple lanes?	None	Both	One Side	Width		WB/SB	WB/SB	WB/SB	WB/SB	WB/SB	EB/NB	EB/NB	EB/NB	EB/NB	EB/NB
HALE STREET	EISENHOWER AVE	PICKMAN RD	Urban Minor Arterial	1	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	PICKMAN RD	MORRISON AVE	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	MORRISON AVE	BRACKENBURY LN	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	BRACKENBURY LN	BOYLES ST	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	BOYLES ST	HALE STREET	Urban Minor Arterial	2	X			X			34.0	Bicycle lanes			5		12	12		5		
HALE STREET	WEST STREET	TOWN LINE	Urban Collector	2	X			X			34.0	Bicycle lanes			5		12	12		5		
LOTHROP STREET	WATER ST	BARTLETT ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	BARTLETT ST	STONE ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	STONE ST	QUINCY PK	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	QUINCY PK	WILSON AVE	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	WILSON AVE	CENTRAL ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	CENTRAL ST	WASHINGTON ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	WASHINGTON ST	THORNDIKE ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	THORNDIKE ST	ABBOTT ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	ABBOTT ST	ATLANTIC AVE	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	ATLANTIC AVE	OCEAN ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	OCEAN ST	IVES ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	IVES ST	DANE ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	DANE ST	BAY ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOTHROP STREET	BAY ST	HALE ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
LOVETT STREET	HALE STREET	WASHINGTON ST	Local	2	X				X		34.0	Signed route	8				9	9				8
MCKAY STREET	COUNTY WAY	PRINCETON AVE	Urban Minor Arterial	2	X			X			31.0	Shared lane markings					13	13				
MCKAY STREET	PRINCETON AVE	AMHERST RD	Urban Minor Arterial	2	X			X			31.0	Bicycle lanes			5		10.5	10.5		5		
MCKAY STREET	AMHERST RD	COLGATE RD	Urban Minor Arterial	2	X			X			31.0	Bicycle lanes			5		10.5	10.5		5		
MCKAY STREET	COLGATE RD	JENNESS ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
MCKAY STREET	JENNESS ST	BALCH ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
MCKAY STREET	BALCH ST	GOODYEAR ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
MCKAY STREET	GOODYEAR ST	MATTHIES ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
MCKAY STREET	MATTHIES ST	STURTEVANT ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
MCKAY STREET	STURTEVANT ST	BLAKE ST	Urban Minor Arterial	1	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
MCKAY STREET	BLAKE ST	GLIDDEN ST	Urban Minor Arterial	1	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
MCKAY STREET	GLIDDEN ST	ELLIOTT ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
OAKMONT ROAD	PUTNAM ST	WALDEN ST	Local	1	X			X			N/A	Signed route to bypass Dodge Street										
OBER STREET	HALE STREET	LANTHORN LN	Local	0	X			X			22.0	Advisory lane		4			14				4	
PARK STREET	FEDERAL ST	RIVERSIDE ST	Urban Collector	2	X			X			26.0	Shared lane markings					13	13				
PARK STREET	RIVERSIDE ST	WEST DANE ST	Urban Collector	2	X			X			26.0	Shared lane markings					13	13				
PARK STREET	WEST DANE ST	CREEK ST	Urban Collector	2	X			X			26.0	Shared lane markings					13	13				
PARK STREET	CREEK ST	ROUNDY ST	Urban Collector	2	X			X			26.0	Shared lane markings					13	13				
PARK STREET	ROUNDY ST	ELLIOTT ST	Urban Collector	2	X			X			26.0	Shared lane markings					13	13				
PARK STREET	BOW ST	FEDERAL ST	Urban Collector	1	X			X			27.0	Shared lane markings					13.5	13.5				
PARK STREET	PLEASANT ST	RAILROAD AVE	Urban Collector	2	X			X			27.0	Shared lane markings					13.5	13.5				
PARK STREET	RAILROAD AVE	BROADWAY	Urban Collector	1	X			X			27.0	Shared lane markings					13.5	13.5				
PARK STREET	BROADWAY	WALLIS ST	Urban Collector	1	X			X			27.0	Shared lane markings					13.5	13.5				
PARK STREET	WALLIS ST	BOW ST	Urban Collector	1	X			X			30.0	Shared lane markings					15	15				
PUTNAM STREET	DODGE ST	OAKMONT ROAD	Local	2	X			X			N/A	Signed route to bypass Dodge Street										8
RAILROAD AVENUE	CABOT ST	ELM ST	Urban Collector	2	X					EB	32.0	Shared lane markings					12	12				8
RAILROAD AVENUE	ELM ST	HIGHLAND AVE	Urban Collector	2	X					EB	33.0	Shared lane markings					12.5	12.5				8
RAILROAD AVENUE	HIGHLAND AVE	MOULTON CT	Urban Collector	2	X					EB	32.0	Shared lane markings					12	12				8
RAILROAD AVENUE	MOULTON CT	HARDY ST	Urban Collector	2	X					EB	30.0	Shared lane markings					11	11				8
RAILROAD AVENUE	HARDY ST	RANTOUL ST	Urban Collector	2	X					EB	34.0	Shared lane markings										
RAILROAD AVENUE	RANTOUL ST	PARK ST	Urban Collector	2	X					EB	68.0	Bicycle lanes set away from head on parking										
RANTOUL STREET	BROADWAY	WALLIS ST	Principal Arterial	2	X				X		45.0	Undergoing reconstruction										
RANTOUL STREET	WALLIS ST	BOW ST	Principal Arterial	2	X				X		45.0	Undergoing reconstruction										
RANTOUL STREET	BOW ST	HOME ST	Principal Arterial	2	X				X		46.0	Undergoing reconstruction										
RANTOUL STREET	HOME ST	FEDERAL ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	FEDERAL ST	RIVERSIDE ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	RIVERSIDE ST	POND ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	POND ST	WEST DANE ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	WEST DANE ST	CREEK ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	CREEK ST	ROUNDY ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	ROUNDY ST	ELLIOTT ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	ELLIOTT ST	CHESTNUT ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	CHESTNUT ST	SUMMER ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	SUMMER ST	MYRTLE ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	MYRTLE ST	LENOX ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	LENOX ST	CABOT ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	CABOT ST	SCHOOL ST	Principal Arterial	2	X				X		42.0	Undergoing reconstruction										
RANTOUL STREET	SCHOOL ST	EDWARDS ST	Principal Arterial	2	X				X		43.0	Undergoing reconstruction										
RANTOUL STREET	EDWARDS ST	FAYETTE ST	Principal Arterial	2	X				X		43.0	Undergoing reconstruction										
RANTOUL STREET	FAYETTE ST	PLEASANT ST	Principal Arterial	2	X				X		45.0	Undergoing reconstruction										
RANTOUL STREET	PLEASANT ST	RAILROAD AVE	Principal Arterial	2	X				X		46.0	Undergoing reconstruction										
RANTOUL STREET	RAILROAD AVE	BROADWAY	Principal Arterial	2	X				X		45.0	Undergoing reconstruction										
RIVER STREET	SCHOOL ST	WEBBER AVE	Urban Collector	2	X			X			31.5	Shared lane markings					15.75	15.75				
RIVER STREET	WEBBER AVE	PLEASANT ST	Urban Collector	2	X					SB	32.0	Shared lane markings	8				12	12				
RIVER STREET	PLEASANT ST	BRIDGE ST	Urban Collector	2	X					SB	32.0	Shared lane markings	8				12	12				8
RIVER STREET	BRIDGE ST	FEDERAL ST	Urban Minor Arterial	2	X			X			32.0	Bicycle lanes			5		11	11		5		
SCHOOL STREET	CABOT ST	RANTOUL ST	Urban Collector	2		WB			X		29.0	Bicycle lanes	8		5		11			5		
SCHOOL STREET	RANTOUL ST	COX CT	Urban Collector	2		WB			X		35.0	Buffered bicycle lanes	8		5	2.5	12		2.5	5		
SCHOOL STREET	COX CT	OVERPASS	Urban Collector	2		WB			X		33.0	Bicycle lanes	8		5	1.5	12		1.5	5		
SOHIER ROAD	COLON ST	CHARLES ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
SOHIER ROAD	CHARLES ST	SWAN ST	Urban Minor Arterial	1	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		

Street Name	From	To	Road classification	Roadway Existing Conditions								Recommendation	Recommendation - Details									
				Sidewalks	Travel Direction			Parking			Curb-to-Curb		Parking	Buffer or Shoulder	Bike Lane	Buffer	Travel Lane (s)	Travel Lane (s)	Buffer	Bike Lane	Buffer or Shoulder	Parking
				Number	Two-Way	One-Way	Multiple lanes?	None	Both	One Side	Width		WB/SB	WB/SB	WB/SB	WB/SB	WB/SB	EB/NB	EB/NB	EB/NB	EB/NB	EB/NB
SOHIER ROAD	SWAN ST	MASON ST	Urban Minor Arterial	2	X			X			28.0	Bicycle lanes			4		10	10		4		
SOHIER ROAD	MASON ST	BEAVER ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
SOHIER ROAD	BEAVER ST	LYMAN ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
SOHIER ROAD	LYMAN ST	STORY AVE	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
SOHIER ROAD	STORY AVE	HERRICK ST	Urban Minor Arterial	2	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
SOHIER ROAD	HERRICK ST	TOZER RD	Urban Minor Arterial	2	X			X			33.0	Bicycle lanes			5		11.5	11.5		5		
STONE STREET	CABOT ST	LOTHROP ST	Local	2	X					EB	26.0	Signed route					9.5	9.5				7
THORNDIKE STREET	CABOT ST	LOVETT ST	Local	2	X				X		34.0	Shared lane markings	7				10	10				7
TOZER ROAD	DODGE ST	HELLARD RD	Urban Minor Arterial	0	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
TOZER ROAD	HELLARD RD	COMMONS DR	Urban Minor Arterial	0	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
TOZER ROAD	COMMONS DR	ROUTE 128	Urban Minor Arterial	0	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
TOZER ROAD	ROUTE 128	SOHIER RD	Urban Minor Arterial	0	X			X			30.0	Bicycle lanes			4.5		10.5	10.5		4.5		
WALDEN STREET	OAKMONT ROAD	TOZER RD	Local	2	X			X			N/A	Signed route to bypass Dodge Street; will require short connection to Tozer Road										
WASHINGTON STREET	LOVETT ST	LOTHROP ST	Local	2	X				X		34.0	Signed route	8				9	9				8
WATER STREET	CABOT ST	FRONT ST	Urban Minor Arterial	2	X			X			26.0	Shared lane markings					13	13				
WATER STREET	FRONT ST	WATER ST	Local	2	X			X			26.0	Shared lane markings					13	13				
WATER STREET	WATER ST	LOTHROP ST	Local	2	X			X			26.0	Shared lane markings					13	13				
WATER STREET	LOTHROP ST	SILVER CT	Local	2	X					WB	33.0	Shared lane markings	8				12.5	12.5				
WATER STREET	SILVER CT	DEAD END	Local	2	X			X			28.0	Shared lane markings					14	14				
WATER STREET	DEAD END	WATER ST	Local	1	X			X			28.0	Shared lane markings					14	14				
WEST STREET	HALE STREET	HALE STREET	Urban Minor Arterial	2	X				X		38.0	Shared lane markings	8				11	11				8

Notes:
--Red text in the travel lanes indicates shared lane markings or signage.
--*A breakdown of Existing Conditions striping within the curb-to-curb space is provided when possible. If blank, this indicates that either the roadway does not have existing striping.

The Rantoul Street reconstruction project

The City will soon begin reconstruction of Rantoul Street, an important street that forms the spine of the downtown area. The project, more than a mile long, will include a reconstructed roadway with new 11-foot sidewalks, trees, lighting, ADA-accessible ramps at all crossing points, and five-foot bicycle lanes running through the corridor (see Figure 11). This project has the potential to act as a catalyst that will greatly increase the number and visibility of cyclists in the downtown.

Figure 11: Rantoul Street Future Conditions Rendering (Source: City of Beverly)

Brimbal Avenue Interchange Redesign

The City is in the design phase of an interchange improvement project at Brimbal Avenue. Phase 1 of this project will include roadway and intersection improvements for vehicles, pedestrians, and bicyclists to Brimbal Avenue, Sohier Road, and the Connector Road.[5] Preliminary design elements of Phase 1 include roundabouts to reduce delays and crashes, an off-street shared use path on Brimbal Avenue and bicycle lanes, and new landscaping. In July 2014 the City, in conjunction with MassDOT and other stakeholders, performed a Road Safety Audit for this area. The results of this audit propose additional recommendations for near-term, mid-term, and long-term improvements including recommendations for restriping, signage recommendations, etc.

[5]The future Phase 2 of this project proposes a fully reconstructed and expanded interchange including a new bridge over Route 128, new on and off ramps, a removal of the existing ramps, and other improvements.

Reimagining Broadway for connecting the Bass River to downtown and the beach

In February 2014 the City worked with MAPC to create a vision for the Bass River district near the Beverly Depot commuter rail station. This work built upon early initiatives, including the 2002 Master Plan and a 2013 study by a team of students from the Harvard Advanced Management Development Program in Real Estate. The vision for this area is to create an active, mixed-use neighborhood that will be visually and experientially connected to the Bass River, as well as to the other parts of Downtown along Rantoul and Cabot Streets.

During this process, Broadway was identified as a potential key gateway and connection between Cabot Street and Rantoul Street, as well as a link to the Beverly Depot Commuter Rail station.[6] Between Rantoul and Cabot Streets the roadway is approximately 37' in width and is comprised of parking on both sides and one vehicular lane in each direction. The roadway is unstriped for the majority of this segment. The sidewalks are 10' wide, which provides adequate room for pedestrians, street trees, lighting, etc. Many sections of the sidewalk are in poor condition with cracked and uneven surfaces.

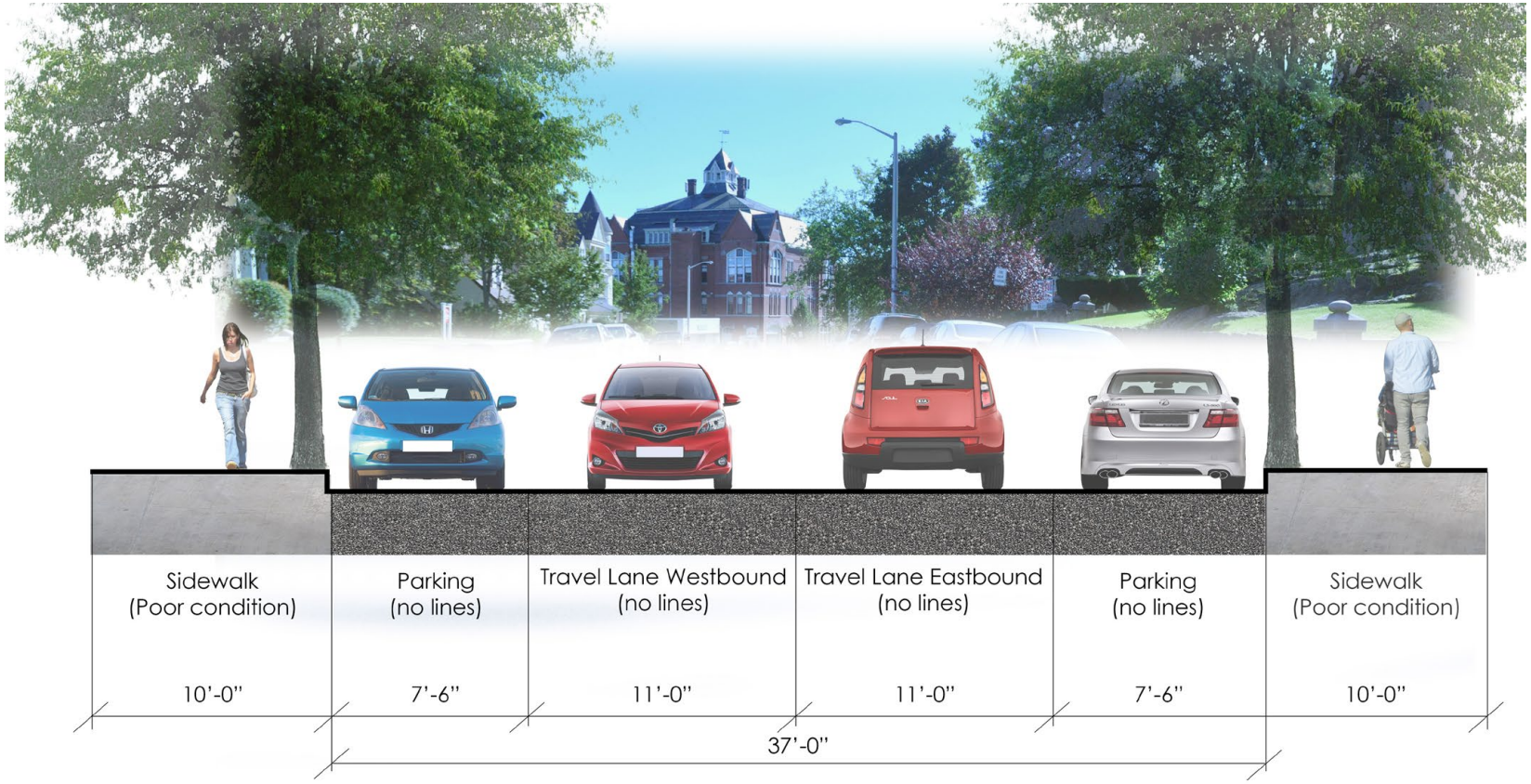


Figure 12: Broadway - Existing (Note - The majority of the roadway segment is unstriped; therefore, lane widths have been estimated

[6] Beverly Bass River District Vision and Action Plan. February 2014. MAPC.

MAPC explored several alternatives to improve Broadway for pedestrians and bicyclists, each of which would maintain existing on-street parking. In each case MAPC recommended reconstructing the sidewalk to address the deficiencies outlined above.

In one scenario, MAPC, the City, and residents discussed the possibility of converting Broadway from a two-way street to a one-way street eastbound, utilizing Railroad Avenue as a westbound one-way connection, thus forming a "couplet" whereby vehicles have access in both directions using these two streets. If Broadway becomes a one-way street, the existing curb-to-curb space would allow either a buffered bicycle lane eastbound (i.e., in the direction of vehicular traffic) or, preferably, a bicycle lane eastbound and "contra-flow" bicycle lane westbound.

Contra-flow lanes are useful to reduce distances bicyclists must travel to access a safe facility and can make bicycling safer by creating facilities to help other roadways users understand where to expect bicyclists. Contra-flow bicycle lanes have been implemented successfully in Cambridge, MA and are included as part of the City of Boston's Complete Streets Guidelines.

Although converting Broadway into a one-way street could be considered in the future, it would require extensive analysis and public input to fully understand the feasibility and implications of changing the roadway configuration in this manner. After consideration the City has decided that in the foreseeable future Broadway should function in its current, two-way configuration.

Due to the limitations of the curb-to-curb width, there is inadequate room for striping traditional bicycle lanes under the current two-way configuration with parking on both sides of the street. Because of the importance of this connection, as well as the City's desire to make a "high impact" statement recognizing the importance of pedestrian and bicyclist infrastructure, there is an opportunity to install an innovative treatment known as an **advisory lane**. Introduced in the Overview of Bicycle Facilities section, advisory lanes consist of one motor vehicle traffic lane in the middle of the street and two bicycle (or shared use with pedestrian) lanes, one on each side of street.

These treatments are currently allowed as experimental designs in the Manual on Uniform Traffic Control Devices (MUTCD) and have active official experiments in:

- Minneapolis, MN
- Edina, MN
- Richfield, MN
- Columbia, MO
- Alexandria, VA
- Hanover, NH

The streets currently with advisory lanes vary in terms of width and on-street parking availability.

Example of an advisory lane in Minneapolis, MN.

Example of an advisory lane in Hanover, NH

The Federal Highway Administration (FHWA) provides suggested roadway characteristics where advisory lanes (which it terms dashed bicycle lanes) can achieve public acceptance and be generally advantageous:

- Traffic volume is less than 6,000 ADT
- Width of 16 feet or greater between dashed bicycle lanes
- The street is not a designated truck or bus route
- The dashed bicycle lanes are not installed on a street interspersed in an overall one-way street

Broadway meets most of these suggested requirements, except for slightly falling short of the sixteen foot distance between dashed bicycle lanes. However, this is a suggestion and not a requirement. The most recent advisory lane installation, in New Hampshire, has a travel lane width of approximately 12 feet. The following diagram illustrates how Broadway between Rantoul Street and Cabot Street could be laid out to include an advisory lane. This treatment could be tested using temporary materials as a first step towards understanding the success or challenges prior to re-striping the roadway. More information is available at http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/mutcd/dashed_bike_lanes.cfm.

Accompanying the dashed lines should be bicycle lane signs as directed by the MUTCD. In addition, a green-colored pavement may be used to enhance the visibility of the bicycle lanes. Experiments for dashed bicycle lanes will only be approved for specific locations or corridors rather than on an agency-wide basis. If desired, agencies can expand the experiment to additional locations at a later time.

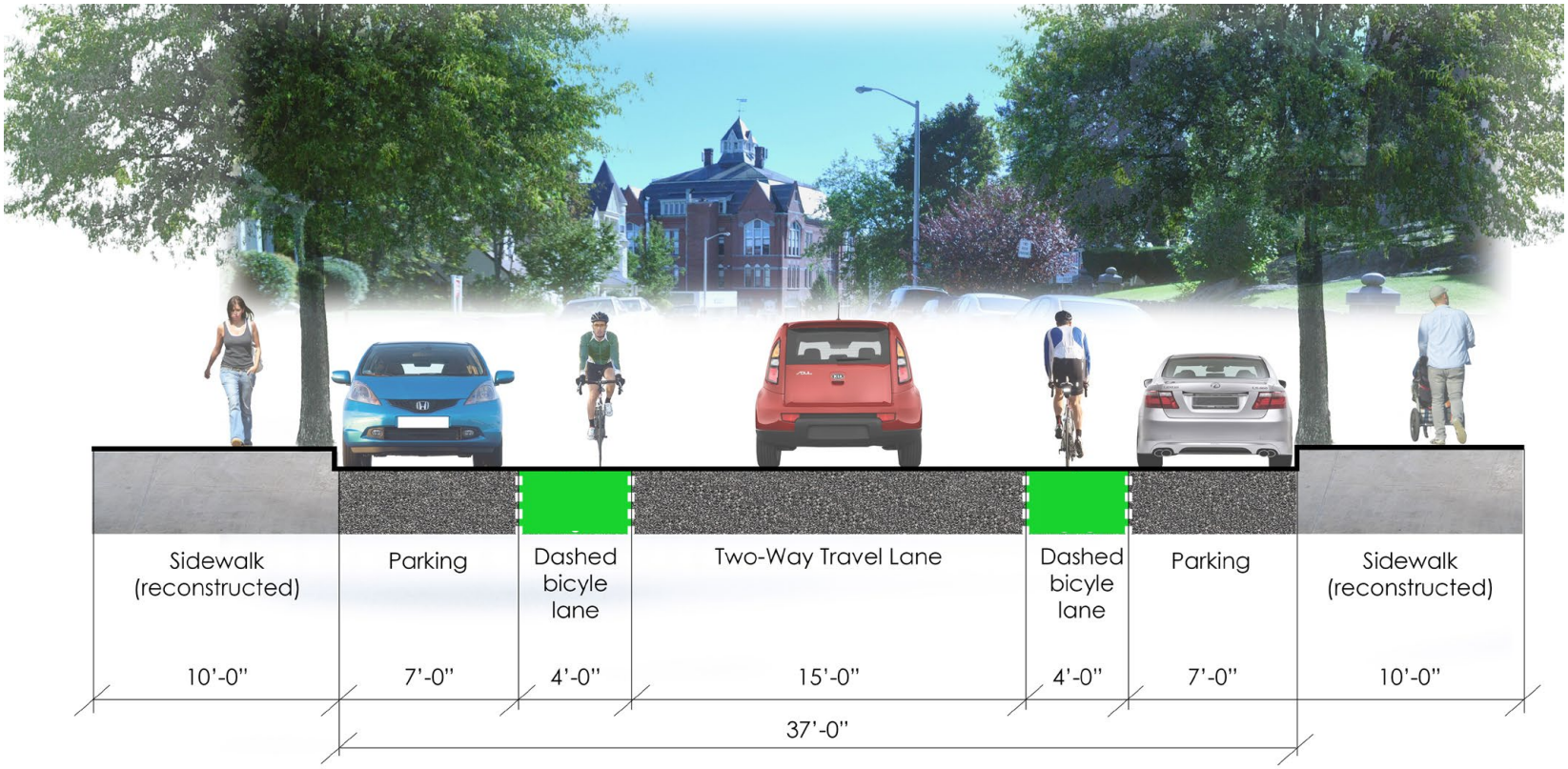


Figure 13: Broadway - Proposed with advisory lanes

As an additional option, the City may stripe sharrows to emphasize that the roadway is accessible to both vehicles and bicyclists. Wayfinding signs between the Cabot Street area, the Commuter Rail station, and the Bass River could be installed to emphasize the connection between the two areas.

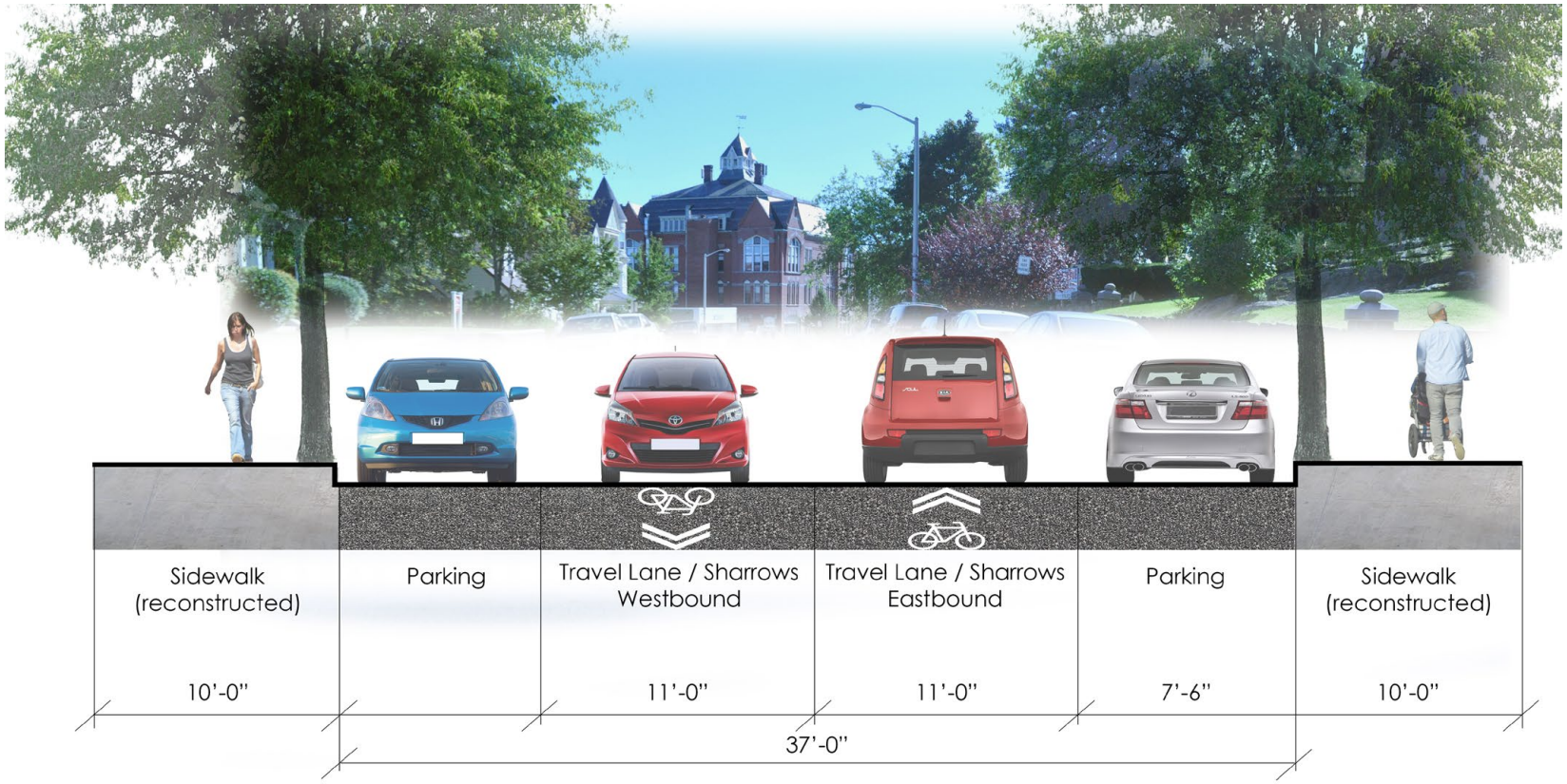


Figure 14: Broadway - Proposed with shared lane markings

In addition to creating the connection between Rantoul Street and Cabot Street, Broadway and nearby streets can provide a connection between the Beverly Depot commuter rail station all the way to the coast, but will require several different roadway treatments. From west to east, the City should:

- Establish new curb lines in front of the commuter rail station along Park Street, reducing excess pavement.
- Provide contra-flow bike lane on one-way section between Park Street and Rantoul Street.
- Provide advisory lanes between Rantoul Street and Cabot Street.
- Stripe shared lane markings on Thorndike Street between Cabot Street and Lovett Street.
- Provide signed route to turn south on Lovett Street and east on Washington Street, which provides direct access to the beach.

Contra-flow bicycle lane, Cambridge MA (source: www.bikexprt.com)

Additional Advisory Lane Opportunities (Ober Street and Others)

In addition or in lieu of advisory lanes on Broadway, the City could consider piloting an advisory lane on Ober Street, which connects Route 127 to the Lynch Park and the ocean. As a low-volume road with an important destination this road could provide an alternative test case for an advisory lane. The approximate width of the roadway is 22', allowing for 4' dashed shoulders and a 14' center travel lane. As with Broadway, the advisory lanes can be striped in temporary paint in the spring to understand the effects of the treatment.

If the advisory lane treatments are successful other potential streets that could be candidates for future advisory lanes include:

- Cole Street
- Boyles Street
- Common Lane
- Grover Street

In cases where the street lacks sidewalks and right-of-way limitations prevent their installation, the dashed advisory lanes also increase the comfort and safety of pedestrians.

Intersection Improvements North of the Essex Bridge

The Essex Bridge (Route 1A), connecting Beverly to Salem, is a popular route for both vehicular traffic as well as bicycling. The bridge itself has wide shoulders that could be formalized for biking. To the north of the bridge, however, is a busy intersection that is potentially dangerous for cyclists. At this intersection Cabot Street, Route 1A (Rantoul Street), and Route 127 (Water street) meet with multiple lanes in each direction. Working with the City and Bike Committee, MAPC has developed alternative striping allocations to provide bicycle accommodations while maintaining traffic flow. The timing of the striping may coincide with the completion of the Rantoul Street complete streets project. The following provides alternatives to today's existing allocation of space.

Intersection north of Essex Bridge

North side of intersection: The intersection (Cabot Street, Route 1A, and Route 127) may be restriped to provide bicycle lanes from the Essex Bridge to Cabot Street and Rantoul Street while maintaining the existing left-hand turn lane.

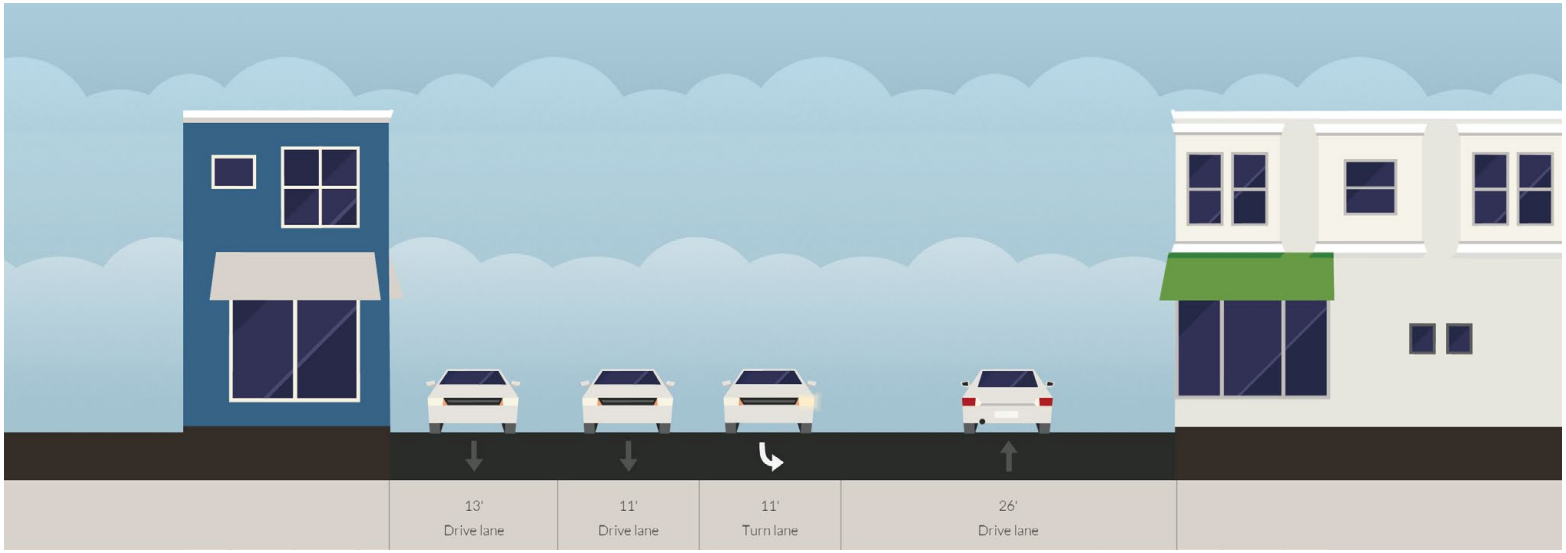


Figure 15: Cabot Street-Rantoul Street Split: Existing Configuration

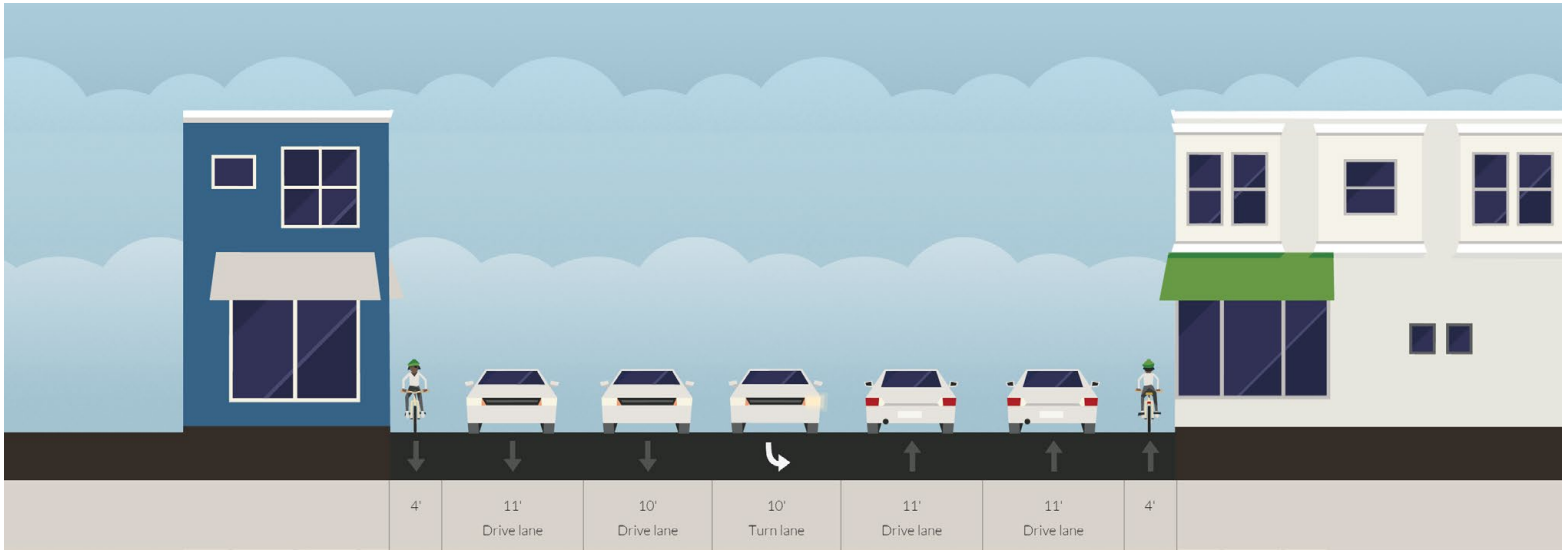


Figure 16: Cabot Street-Rantoul Street Split: Proposed Configuration

Heading northbound on the departure side of Route 127, travel lanes can be restriped to allow for 4 foot bicycle lanes and a mix of 10 and 11 foot travel lanes. To access Rantoul St northbound, cyclists will be directed north on Cabot Street to left on School Street.

South side of intersection: The Essex Bridge was recently reconstructed and included 8 foot shoulders in both directions. The northbound shoulder continues to Route 127. However, the southbound shoulder does not start until Cox Court south of the Route 127 intersection. The City should remove and realign the pavement markings to narrow the northbound shoulder 2-3 feet to provide space to install a 5 foot bicycle lane in the southbound direction.

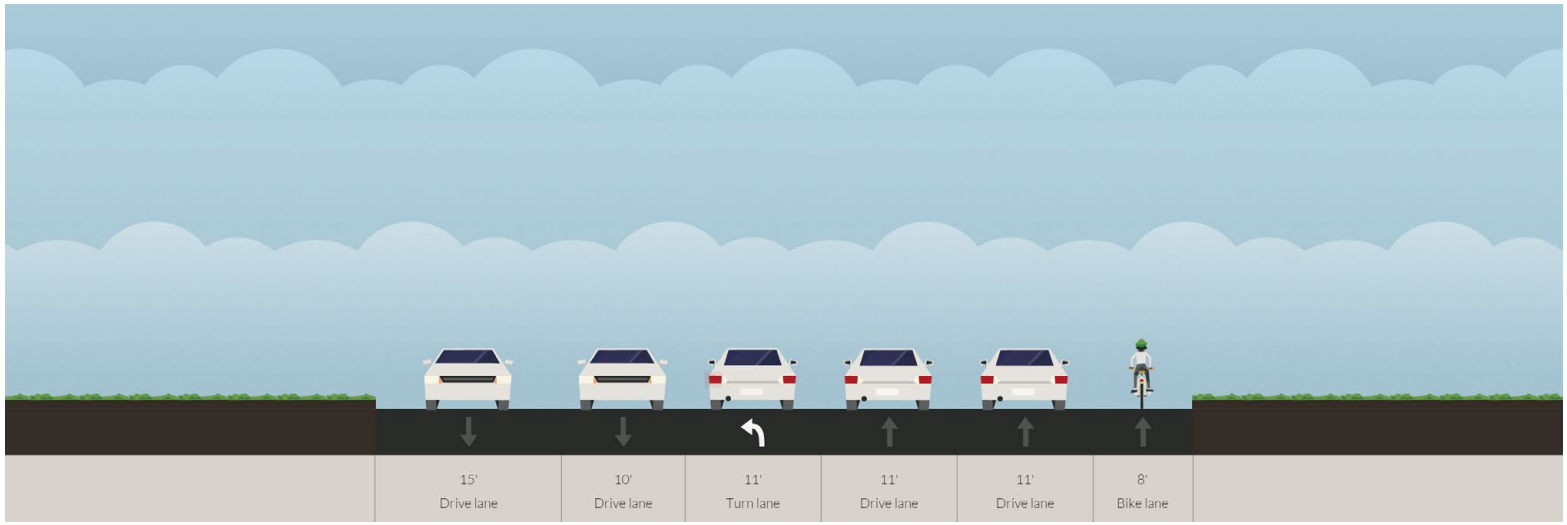


Figure 17: Cabot Street-Rantoul Street Essex Bridge Approach: Existing Configuration

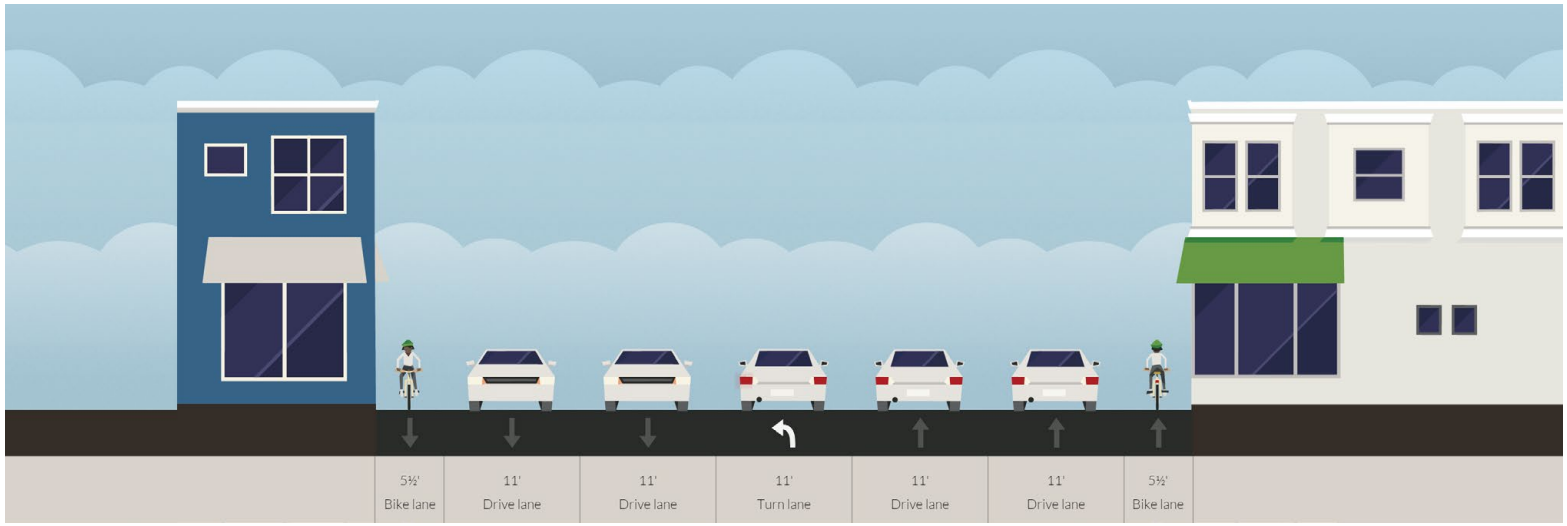


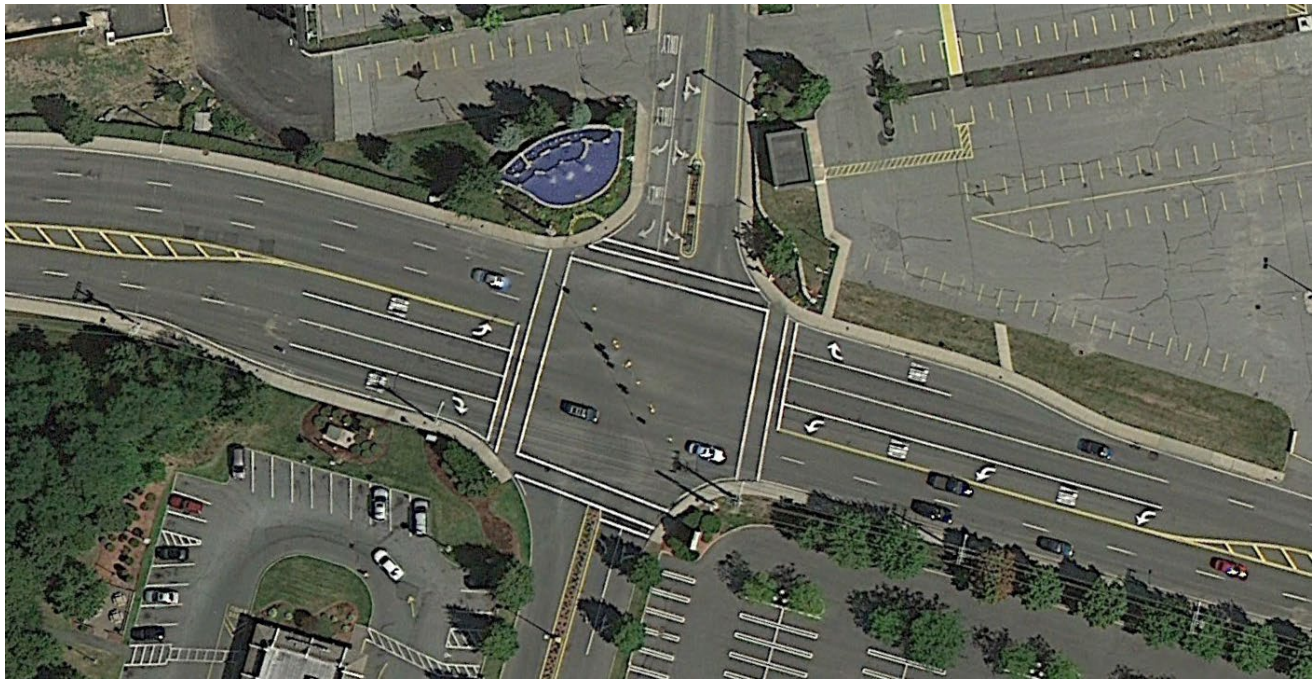
Figure 18: Cabot Street-Rantoul Street Essex Bridge Approach: Proposed Configuration

Connecting to Cummings Center

The Cummings Center is a major employer in the City. It has both barriers and opportunities for cyclists and pedestrians.

Elliot Street "Road Diet"

Elliot Street (Route 62) from the Danvers line east to approximately Echo Avenue consists of one vehicular lane in each direction with ample shoulders. This roadway segment provides a corridor for residents living off of this street to access both the downtown of Beverly, as well as Danvers. As noted in the detailed recommendations table, this street has the potential to convert the shoulders into formalized bicycle lanes. From Echo Avenue to the east, however, the roadway expands to consist of two to four travel lanes in each direction (adjacent to the Cummings Property office development). Roadways with excessive vehicular lanes can act as a barrier for cyclists to safely and comfortably bike. According to a recent study,[7] streets carrying up to 25,000 vehicles per day function effectively with three lanes, depending upon the traffic volumes of nearby adjacent streets. MassDOT's most recent data from its Transportation Data Management System provided a count of 23,500 vehicles (2002). The City should work with MassDOT to explore whether a "road diet," whereby a travel lane is eliminated through a reconfiguration of the painted lanes, is appropriate. If appropriate, utilizing a center turning lane would reduce the number of vehicular lanes and create additional space to stripe bicycle lanes into the downtown.



Elliot Street at Cummings Center existing conditions.

[7]Nikiforos Stamatiadis and Adam Kirk, "Guidelines for Road Diet Conversions," (University of Kentucky, 2012).

Bass River Trail Connection

Elliot Street provides an east-west connection to this area. There is also a potential north-south connection from the Beverly Depot Station along a shared use path, parallel to River Street and the west side of McPherson Drive. The path cuts through the boat yard (which currently provides public access). From there, a proposed trail could provide access at Elliot Street up to the north of Cummings Center to an existing path running along the east side Shoe Pond to Balch Street. The Bass River Action Plan (MAPC 2014) provides recommendations for improving these paths to make more inviting and comfortable for users.

Existing shared use path along Bass River

Bicycle Parking

Providing amble parking for bicycles is an important component of creating an environment that makes bicycling convenient. Providing bicycle parking encourages people to use their bicycles, as they are more likely to do so if they are confident that they will find convenient and secrete parking at their destination.

Bicycle parking should be located in areas that are convenient for cyclists. Within retail areas, particularly Rantoul Street, Cabot Street, and sections of Bridge Street and Hale Street, bicycle racks should be located frequently (e.g., one per two businesses). Short-term bicycle parking should be located in a publicly accessible space within 50 feet of pedestrian entrances. Short-term bicycle parking is intended primarily to serve visitors, such as retail patrons making trips of up to a few hours; however, it may serve other bicycle users as needed.

Other important areas include schools, commuter rail stations, places of recreation (e.g., parks and beaches), as well as within private retail and commercial developments. In places of potential high demand (e.g. supermarkets, drug stores, big box retail) larger capacity racks (holding 4+ bicycles) should be installed.

The siting of a bicycle rack is an extremely important factor in its usefulness. The rack should be located in a safe and accessible place with adequate space to maneuver a bicycle in and out. Where businesses are set back from the street with parking in front, such as along Dodge Street, racks should be located near the building entrances.

There are a variety of designs for bicycle racks; however, not all racks are created equal. There are a number of features that should be considered when purchasing bicycle racks. In general, MAPC recommends the inverted "U" rack. These have two-point support and can fit a variety of bicycle types. Custom designs and "artistic" racks can be used, provided they meet basic criteria. Features of strong bicycle racks include:

- Installed on a permanent foundation (e.g., concrete pad) to ensure stability.
- Securely anchored into or on the foundation with tamper-proof nuts if surface mounted.
- Support for an upright bicycle by its frame horizontally in two or more places.
- Keeps both bike wheels on the ground.
- Designed to prevent the bicycle from tipping over.
- Ability to support a variety of bicycle sizes and frame shapes.
- Space to secure the frame and one or both wheels to the rack with a cable, chain, or u-lock.
- Diameter of locking pole is no more than 1.5 inches.

For additional guidance on bicycle parking, including potential zoning requirements, design guidance, and location advice, refer to the City of Cambridge Bicycle Parking Guide.[8]

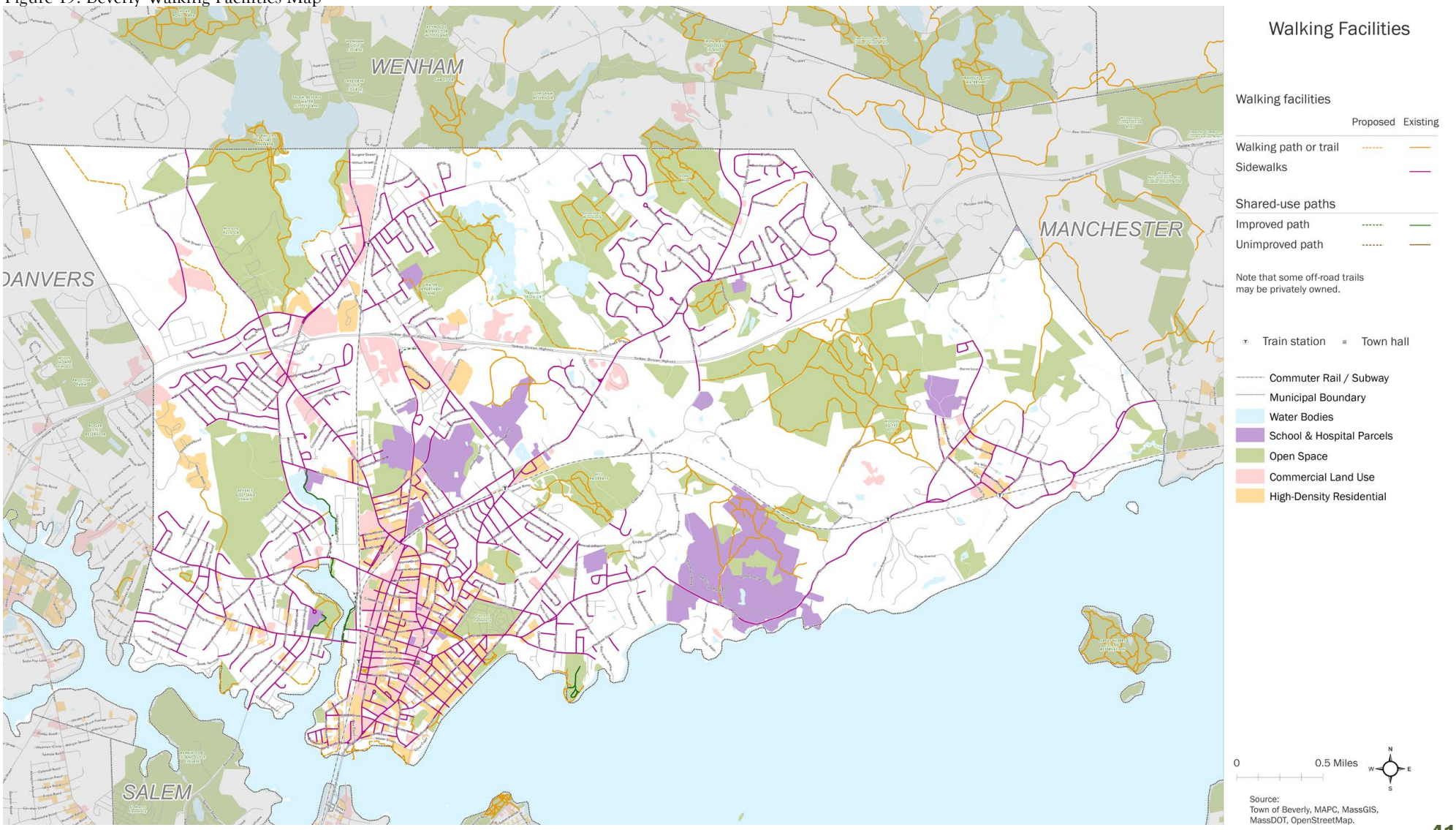
Example of inverted "U" bicycle rack

[8]Some information in this section was adapted from the City of Cambridge's Bicycle Parking Guide (Fall 2013). http://www2.cambridgema.gov/cityofcambridge_content/documents/bikeparkguide2013.pdf

Pedestrian Recommendations

As noted in the Introduction, Beverly has an extensive network of on-road pedestrian facilities (i.e., sidewalks), as well as walking paths and shared use paths throughout the City. Sidewalk availability and accessibility is an important part of transportation infrastructure in every city and town. Figure 19 depicts all of the existing sidewalks and paths throughout the City, as well as additional proposed trails to create further connections. The downtown area, in particular, contains a dense network of sidewalks, making it highly walkable. In addition, other important sites such as school generally have sidewalk coverage. The City should ensure these sidewalks are well-maintained and remain in good condition.

Figure 19: Beverly Walking Facilities Map



Sidewalk Gaps

While the pedestrian network in Beverly is strong, gaps in coverage do exist. MAPC reviewed all of the sidewalk gaps for all roads in Beverly. MAPC recommends providing pedestrian facilities (sidewalks, shared use paths, etc.) on at least one side of all roadways where feasible.

As illustrated in the Sidewalk Gap map (Figure 20), the vast majority of Beverly's downtown, as well as many arterials and collectors throughout the City, have sidewalks. In addition, there are sidewalks leading to most of the schools. Sidewalk coverage in other parts of the City varies, with many local roads lacking sidewalks. In some cases the lack of sidewalk coverage is due to limited right of way. When streets are scheduled for repaving or reconstruction, the City should evaluate and, where feasible, accommodate pedestrians. Depending upon the context and right-of-way, a pedestrian facility could be a sidewalk, a meandering side-path, or a strip of asphalt separated by a buffer.

Table 4 lists the streets lacking sidewalks that should be considered as a high priority. In particular, Tozier Road is a high priority street to fill in the missing sidewalk infrastructure, as it is the longest section of road in the City in commercial or retail areas lacking sidewalks.

In cases where insufficient right-of-way precludes installation of sidewalks, measures can be utilized to calm traffic and, therefore, improve pedestrian safety.

One mechanism to consider are chicanes. Chicanes create a horizontal diversion of traffic and can be gentler or more restrictive depending on the design. They help reduce vehicle speeds and offer the opportunity to add more greenspace (landscaping) to a street.

Shifting a travel lane has an effect on speeds as long as the taper is not so gradual that motorists can maintain speeds. For traffic calming, the taper lengths may be as much as half of what is suggested in traditional highway engineering. The taper lengths should reflect the desired speed which should be posted prior to the chicanes. A chicane design may warrant additional signing and striping to ensure that drivers are aware of a slight bend in the roadway. Chicanes can be piloted using temporary measures to test their effect prior to committing to the investments for more permanent installations.

An additional intervention, appropriate only for low volume roadways, is to remove the centerline. Removing the roadway centerline striping can "soften" the appearance of a roadway, altering motorist perception, and create a more residential and local visual character for the roadway. With the elimination of centerline delineation, motorists tend to drive closer to the center of the roadway, creating roadside area for pedestrians and cyclists. In general, centerlines should only be considered in roadways with minimal horizontal and vertical curves, as sight lines are important when attempting to provide space in the roadway for bicycles and pedestrians. Centerlines can remain where necessary to guide motorists around horizontal or vertical curves.

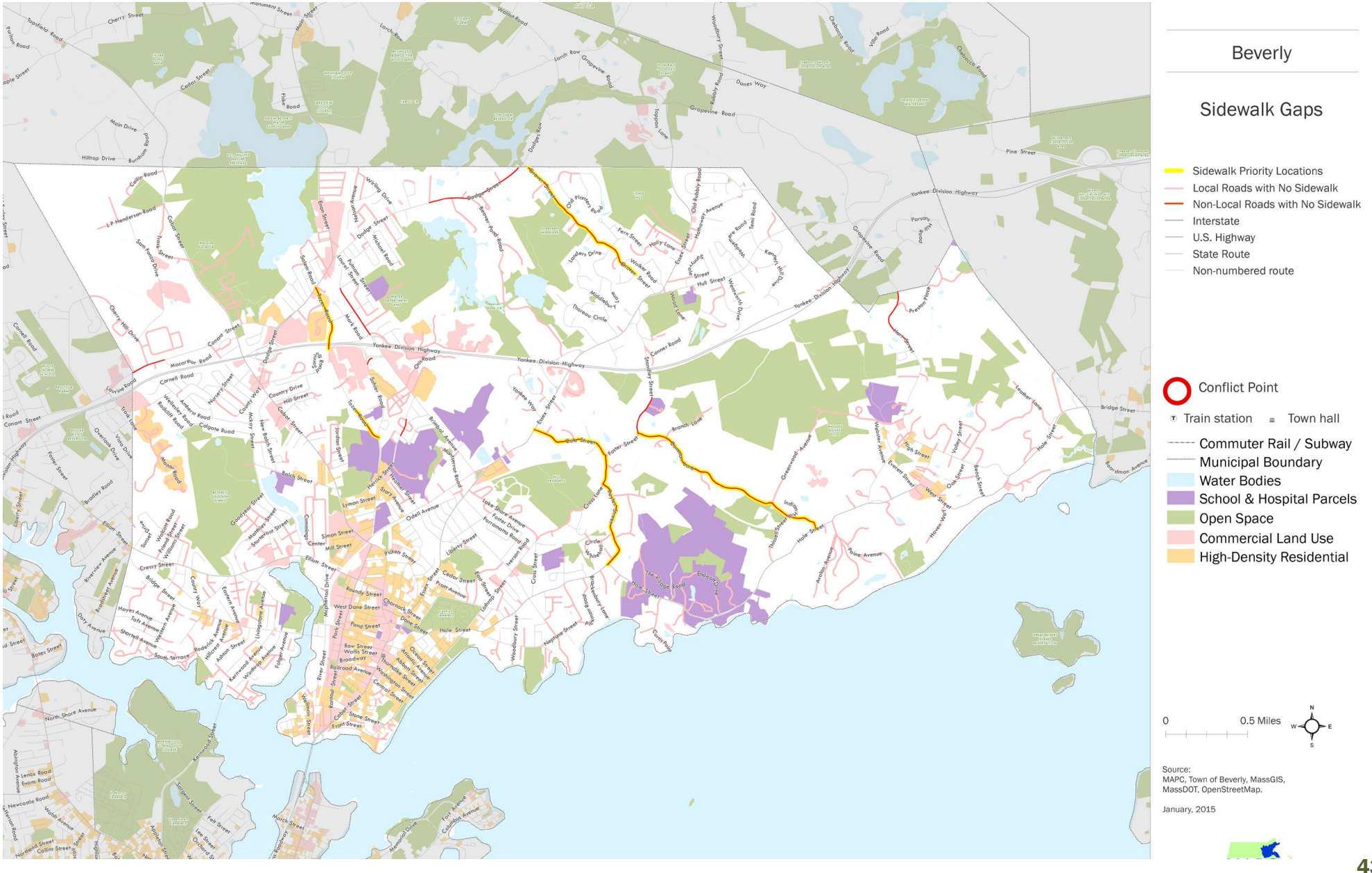
Example of chicanes using plantings

Example of a road with no centerline or other striping

Table 4: City of Beverly Pedestrian Infrastructure Priority Locations

Street	Limits	Comments
Tozier Street	Portions between Dodge Street Sohier Road	One of the few non-local roads lacking sidewalks
Common Lane	Hale Street to Foster Street	Limited right-of-way may preclude sidewalk installation
Boyle Street	Hale Street to Cross Lane	Limited right-of-way may preclude sidewalk installation

Figure 20: Beverly Sidewalk Gaps (Local and Non-Local Roads) and Sidewalk Priority Locations



4

NEXT STEPS

Next Steps

This report provides a number of opportunities for constructing bicycle and pedestrian facilities. Implementation of the plan requires a multi-prong approach, as discussed using the 5 E's framework. Below is a summary of next steps to further the City of Beverly's efforts to increase walking and bicycling and to improve the quality of life and health of the community. Action steps include:

- Incorporate bicycle facilities as a matter of routine – most bicycle facilities, such as bicycle lanes and shared lane markings are relatively low cost solutions. Incorporating these facilities when a road is repaved/restriped will lead to incremental change in a cost-effective manner.
- Invest the time and effort for one or more "bold" moves – in order to position Beverly as a true bike-friendly community the City should explore the feasibility of implementing one or more "bold" initiatives described in this report in addition to the routine striping options.
- Prioritize sidewalk investments proactively – the City should review its approach to prioritizing sidewalk construction and repairs. One consideration for prioritizing sidewalk construction an¬d improvements could be the Neighborhood Walks Map.
- Seek out additional funding sources –The City should continue to proactively seek out funding sources and grants. An example of potential funding is the pending Complete Streets Certification program, which will allocate up to $10,000,000 per year for five years to be distributed among certified communities to plan and implement complete streets.
- Adopt a complete streets policy – The City is in the process of adopting a complete streets policy, which aims to make incorporate pedestrian and bicycle facilities and amenities a part of both routine projects, as well as larger ones. Adopting a policy is a requirement of obtaining certification through the State's Complete Street program, described above.
- Work with adjacent communities – As Beverly prioritizes and begins to install pedestrian and bicycle facilities, Planning, DPW, and Engineering should communicate with their counterparts in the adjacent communities to ensure continuous facilities beyond municipal borders, especially when there are important destinations for Beverly residents.
- Work with community partners – the City should continue to engage with the Beverly Bike Group and other relevant community partners involved in increasing physical activity to explore ways to improve the pedestrian and bicycle experience.

APPENDICES

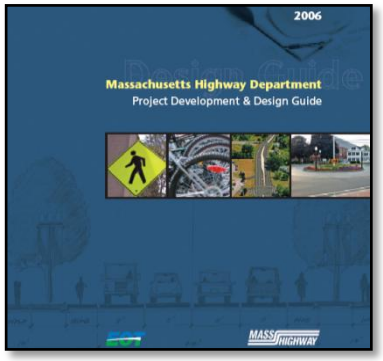
The following appendices are provided to supplement the work described in this report.

Appendix A: Pedestrian and Bicycle Facility Design Guidelines and References

Appendix B: City of Beverly MassDOT Road Network Functional Classifications

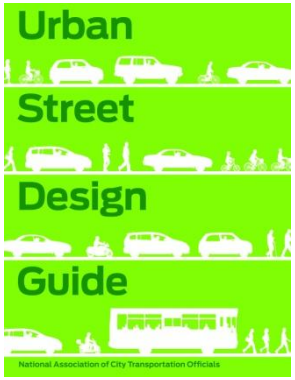
Appendix A – Pedestrian and Bicycle Facility Design Guidelines and References

MassDOT's Development and Design Guidebook[1]



The primary resource that should be adhered to is the MassDOT Project Development and Design Guidebook.

Multimodal accommodation that encourages and supports safe travel for pedestrians, bicyclists and other modes of travel is a key feature of the MassDOT Guidebook. The MassDOT Guidebook directs the designer to begin at the edge with the pedestrian and work their way in, to ensure that the needs of non-motorized users remain integral to project planning and design. This approach facilitates the use of context-sensitive design, environmental protection and the careful consideration of the safety and accessibility needs of pedestrians, bicyclists and non-motorized facility users.

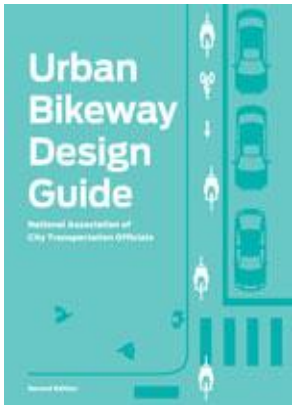


NACTO's *Urban Street Design Guide*

The NACTO Urban Street Design Guide shows how streets of every size can be reimagined and reoriented to prioritize safe driving and transit, biking, walking, and public activity. Unlike older, more conservative engineering manuals, this design guide emphasizes the core principle that urban streets are public places and have a larger role to play in communities than solely being conduits for traffic. In April 2014 MassDOT officially endorsed the Urban Street Design Guide.

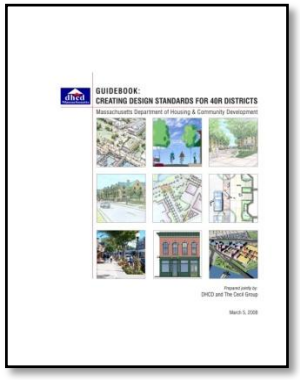
[1] www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx

NACTO's *Urban Bikeway Design Guide*



The NACTO *Urban Bikeway Design Guide, Second Edition*, is based on the experience of the best cycling cities in the world. Completely re-designed with an accessible, four-color layout, this second edition continues to build upon the fast-changing state of the practice at the local level.

First and foremost, the *Urban Bikeway Design Guide* will help practitioners make good decisions about urban bikeway design. The treatments outlined in this updated Guide are based on real-life experience in the world's most bicycle friendly cities and have been selected because of their utility in helping cities meet their goals related to bicycle transportation.



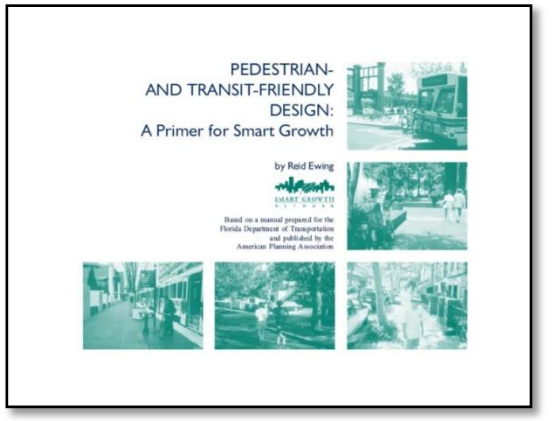
Creating Design Standards for 40R Districts[2]

Prepared jointly by the Massachusetts Department of Housing and Community Development and the Cecil Group in 2008, this Guidebook serves as a resource for communities and citizens in Massachusetts working to establish special design standards in conjunction with Smart Growth Zoning Districts enabled by M.G.L. Chapter 40R.

It provides practical information and references for crafting workable standards that will apply to the land uses and development within Smart Growth Zoning Districts. Accommodations for pedestrians such as walkway and sidewalk width, provision of benches, lighting fixtures and other street furniture elements are addressed in this Guidebook.

[2] http://www.growsmartri.org/training/Creating%20Design%20Standards%20for%20Transit-Oriented%20Districts.pdf

Pedestrian and Transit-Friendly Design: A Primer for Smart Growth[3]



Published by the Smart Growth Network, this guide is based on a manual prepared for the Florida Department of Transportation. The publication is a general guide to and discussion of design concepts that support pedestrian activity and transit use.

The concepts are not presented in the format of design standards but they do provide some of the underlying rationale and strategies around which a community might develop measurable standards. The guide's various elements are broken into three categories: "Essential Features", "Highly Desirable Features", and "Nice Additional Features."

[3] http://www.epa.gov/smartgrowth/pdf/ptfd_primer.pdf#search='Primer%20on%20Street%20Design%20Guidelines

Appendix B – MassDOT Road Network Functional Classifications