

Green Routes Bicycle Network Plan

Brookline Bicycle Advisory Committee

November 10, 2008

Updated: January 2012, February 2013, January 2014, January 2015, January 2016, January 2017, January 2018

1. Vision for a Bicycle Friendly Community

Bicycling is a sustainable, economical, and convenient mode of transportation for short and medium distance trips and is a popular form of recreation for young and old. Bicycling is good for the environment, for public health, and for reducing traffic congestion and parking demand. It offers older children a measure of independence and is a practical mode of travel to Brookline High School, sports fields, and other local destinations.

Brookline already has many conditions conducive to bicycling – compact development, proximity to major employment centers, relatively flat topography, and a temperate climate. At 4% of commuter trips made by bicycle (US Census, 2010), Brookline’s percentage has increased from 1.5% since 2000. Bicycle counts conducted during rush hour on one weekday each September since 2008 show more than 1,000 bicyclists per hour passing major checkpoints, including more than 100 people riding daily to Brookline High School. As many as 70 bicycles may be parked around Coolidge Corner at mid-day on September Saturdays.

Beacon, Harvard, Washington, and Carlton Streets are major connectors for cyclists traveling from Brookline and Newton to Kenmore Square and downtown Boston, across Brookline, and between Jamaica Plain and Brighton. Boston has made a strong commitment to improving conditions for cyclists and has made major strides in recent years toward this goal.

Brookline’s notable improvements in bicycle facilities and accommodations in recent years include more bike racks in commercial areas, additional bike lanes and shared lane markings on Longwood Avenue, Washington Street and elsewhere, contraflow lanes and cycle tracks on Netherlands and Parkway Roads, and institution of a \$50 fine for vehicles blocking bike lanes.

Brookline installed three bike-sharing stations in 2012 following the successful 2011 launch of the Hubway Bike Sharing Program in Boston. A fourth station was installed in 2013 and more are projected for the future.

However, bicycle use in Brookline remains well below its potential. For most residents, getting outside one’s immediate neighborhood requires negotiating heavily trafficked streets, resulting in a level of stress and danger that many people – especially less experienced cyclists – prefer to avoid. Every community with high bicycle use, whether in the Netherlands, Denmark, Davis (CA), Portland (OR) or Boulder (CO), offers an extensive *network of bike routes with low traffic stress*.

Brookline’s quiet local streets are ideal for bicycling, but they are not connected in a network that facilitates cross-town travel. Even the town’s few dedicated bicycle facilities subject cyclists to high traffic stress. The bicycle lanes on Beacon Street disappear at intervals, leaving cyclists in heavy traffic, particularly at intersections. Bike lanes often occupy the “door zone” of high turnover parking lanes. Thus, even recent improvements to bicycle facilities must be viewed as transitional, with further

improvements needed to make them truly safe and low stress. Double parking is also a problem as it blocks bike lanes and forces cyclists to stop abruptly or swerve into traffic.

“Brookline Complete Streets Policy” was adopted by the Board of Selectmen in 2016 and states:

The Town of Brookline shall plan, construct, and maintain its public ways to enhance safety, access, inclusion, convenience and comfort for all users, thereby creating “complete streets.” The Town will create a comprehensive transportation network that sufficiently accommodates people of all ages and abilities, whether traveling by foot, bicycle, wheelchair, mass transit, or motor vehicle.

...the Town’s transportation projects shall be designed and implemented to provide safe and comfortable access for healthful transportation choices such as walking, bicycling, and mass transit. The needs and safety of the town’s most vulnerable users shall be given special consideration during project planning. Users may be considered vulnerable by virtue of their mode of transportation, such as bicycling or walking, or because of their age or ability....

Brookline’s favorable urban structure offers the potential to create the network of low traffic stress and “green” bicycle routes that its citizens want. Other communities’ experiences suggest that Brookline can have 5 to 10% of its trips being made by bicycle within a few years. Young people will routinely cycle to school and to athletic fields for games and practice. Residents will shop and run errands by bicycle, reducing motor vehicle traffic and parking demand. New greenways will better connect South Brookline to the rest of town, a boon to walkers, joggers, and bicyclists alike. Families will enjoy riding along Brookline’s green routes, with easy access to the Town’s open spaces and to regional paths. More adults will bicycle to work and to do errands, getting the exercise and fresh air they need while saving money, enjoying their commute, and contributing to a sustainable environment. Safe routes to Green Line T stops, three of which have nearby Hubway bike share stations and many of which have bike racks, could help to encourage combining cycling and transit use.

Creating this network of green routes requires deliberate planning, budgeting, and refocused priorities. Some of the network can be created at minimal capital expense using road markings and traffic management changes such as parking restrictions. Other parts of the network will require modest capital improvements such as curb ramps and extensions. Some streets, notably in South Brookline and along the town’s busiest thoroughfares, will require major new infrastructure, likely requiring state or federal funding. With reasonable aid infusions for five large projects, most of the Green Routes Bicycle Network could be accomplished within a few years.

This remainder of this master plan is organized into the following sections:

- 🌀 Section 2: Network plan
- 🌀 Section 3: Roadway treatments
- 🌀 Section 4: Signage and Pavement Markings
- 🌀 Section 5: Bicycle Accommodations: General Comments
- 🌀 Section 6: Priorities
- 🌀 Section 7: Street List of Proposed Projects
- 🌀 Section 8: Projects Approved/Awaiting Funding
- 🌀 Section 9: Projects Funded/Awaiting Construction
- 🌀 Section 10: Completed Projects
- 🌀 References
- 🌀 Appendices

This master plan should be complemented by other Town efforts to improve conditions for cycling, including provisions for bicycle parking, safety education, traffic law enforcement, and ensuring that every street project undertaken or permitted by the Department of Public Works includes reasonable accommodation for bicyclists and pedestrians. The network evolution should be coordinated with regional plans including those for Boston, Newton, and Cambridge to maximize its benefit to the entire region.

2. Network Plan

Bicyclists are permitted to use every street in Brookline, from small residential streets to Route 9. Therefore, every street should be made safe and accessible to bicyclists, and bicycle accommodations should be considered whenever road work is done.

For the Town to plan and implement bicycle-related safety improvements, the Bicycle Advisory Committee has designed a *Green Routes Bicycle Network* of safe, pleasant, and connecting routes. The network connects neighborhoods with important local destinations including the high school, libraries, parks, and commercial districts; it also connects to Green Line T stops and to important bicycling routes at the Town limits, including Beacon Street in Boston and Newton, Commonwealth Avenue, Perkins Street, West Roxbury Parkway, and the Charles River bike paths. The Network avoids circuitous routes that discourage cycling. As much as possible, its routes minimize traffic stress, avoid hills, are esthetically pleasant, and minimize stops. It incorporates routes that cyclists prefer, because there is no benefit to designating routes that bicyclists won't follow.

The network's framework is comprised of routes that traverse the Town—roughly north-south and east-west. A second level of connecting streets provides access to and from these major routes, to the Town's neighborhoods and key destinations such as schools and parks. The major cross-town routes are listed below.

- **Beacon Street** crosses the most densely populated part of Brookline from the edge of Brighton and Newton to Boston's bike lanes leading into Kenmore Square and downtown Boston. This is a high-traffic route for motor vehicles and bicyclists alike.
- **The "D-line" route** is a less traffic-intense east-west route that roughly follows the D-line trolley. It uses the Muddy River path, Netherlands, Aspinwall, Kent, Davis, Greenough, Sumner, Clark, Clinton, Eliot, Cleveland, Reservoir, Middlesex, Hammond, and Heath Streets.
- **South of Route 9** is a cross town route along Dudley and Walnut Streets, Route 9, and the Muddy River path.
- **Harvard Street** crosses town from Brookline Village to Allston/Brighton.
- **Washington Street** crosses town from Brookline Village through Washington Square to Brighton.
- **The South Brookline** route includes Newton Street, West Roxbury Parkway, Hammond Street, Clyde and Lee Streets. The more densely-populated part of South Brookline is separated from North Brookline by the large open space (without any through streets) comprised of the Country Club, Putterham Meadows Golf Course, Dane Park, and Pine Manor College. The network skirts this open space on all sides. This circuit of the open space also offers the opportunity for a greenway for bicyclists and pedestrians that would be both a recreational resource for this part of Brookline and an access route between South Brookline and North Brookline as well as Boston and Newton.

- **Route 9** crosses town from Chestnut Hill in the west to Brookline Village and the Jamaica Way in the east. With the planned protected bike lanes on Washington Street (Route 9) that is part of the Gateway East project, Route 9 becomes an important connector, and extending protected lanes further west would enhance its use as a bicycle route.

3. Roadway Treatments

The network may be divided into four levels:

- *Level One: Off-road paths* such as the Muddy River/Emerald Necklace Path (shown in the photo at right).
- *Level Two: Slow traffic streets.* Much of the bicycle network follows low speed streets where parking turnover is minimal. In 2017, Brookline opted to make 25 mph the statutory speed limit on all public ways in thickly settled and business districts unless otherwise posted. Where traffic volumes are low, bicycles can share space with motor traffic; where traffic volumes are higher, bicyclists should be offered accommodations such as those described below. On the Green Routes Network map, some of these streets are shown as “connecting routes” that link streets with bicycle accommodations or link Brookline streets to town borders.



Traffic calmed streets are a special case of slow traffic streets. These are streets where special measures have been taken to slow traffic for the safety of pedestrians, using such measures as speed humps, speed tables, raised crosswalks, raised intersections, median refuges and bulb-outs. These can be excellent streets for cyclists as well. However, care should be taken in designing such pedestrian safety measures so that they do not increase risks for cyclists or preclude later additions of bicycle accommodations.

- *Level Three: Greenways.* Because it lacks a dense street grid, many bicycle routes in South Brookline must follow arteries carrying high speed motor traffic. Physically separate facilities offer the best and safest alternative for bicycle accommodations in this environment, and can often be achieved by means of “road diets” that reduce pavement, decrease storm water runoff, and permit development of tree-lined greenways that benefit both pedestrians and cyclists. This part of the network requires extensive roadway changes, entailing considerable expense and planning effort. A successful example of this approach is the Leverett Pond bike path, where a street was converted to a bike path, diverting motor traffic to the parallel Pond Avenue and providing separate paths for pedestrians and cyclists.



- *Level Four: Main streets.* Beacon Street, Harvard Street, Washington Street (which joins Route 9) and Route 9 are Brookline’s main streets that carry through traffic and host busy commercial centers with high turnover parking. These functions make it challenging to devote more roadway space to bicycles. But at the same time, they make these streets the most important to improve for safe and low stress bicycling.

Although some bicyclists mix comfortably with moderate speed motor traffic, most of the bicycling (or potential bicycling) population is “traffic-intolerant”: people who can follow the rules of the road, and who don’t mind riding on low-speed, low-traffic local streets, but who elsewhere want to be separated from the stress of sharing space with motor traffic. The

Green Routes Bicycle Network aims to accommodate traffic-intolerant cyclists by offering the separation from traffic that they need, using a variety of designs. In addition to off-road paths such as the Muddy River/Emerald Necklace path and directing cyclists along residential streets with low traffic volumes and speeds, the *Green Routes Bicycle Network* includes the following roadway treatments.

- 🚲 **Bike lanes** designate exclusive space for bicyclists. Lanes are appropriate on moderate speed streets with low turbulence, i.e., without high turnover parking lanes and intersection approaches with heavy right turning traffic. Where there is parallel parking, bike lanes must be wide enough and adequately engineered to discourage bicyclists from riding in the “door zone,” where opening vehicle doors can create a significant hazard to cyclists. Bike lanes that terminate abruptly, for example to make space for a turning lane, make roads unaccommodating for most bicyclists.
- 🚲 **Buffered bike lanes** are bike lanes separated from the adjacent vehicle travel lane and/or parking lane by a buffer lane of some width—usually designated by striped painted lines in the buffer area. Buffers increase cyclists’ safety by designating an area adjacent to a bike lane to highlight a safe door opening area and/or vehicle passing distance.
- 🚲 **Bicycle priority lanes** are shared travel lanes (bike and motor vehicle) indicated by “Bikes may use full lane” signs and/or roadway markings. These lanes are inferior to buffered bike lanes, and are not recommended, but can be used on streets with speeds up to 25 mph. Shared lane arrows (“sharrows”) have been marked on streets in many cities. In Brookline, sharrows are in use on Longwood Avenue and Washington Street, for example. Markings that delineate a bicycle priority zone allow cyclists to travel more confidently on street segments where a full bike lane is impractical.
- 🚲 **Bike boxes.** A bike box is a marked queuing area for bikes in front of the stop line for vehicles at a signalized intersection. Bike boxes improve safety by putting stopped bikes ahead of cars or providing suggested two-stage left turns for bicyclists. Setting the motor vehicle stop line back from the intersection also improves pedestrian comfort and visibility.
- 🚲 **Contraflow lanes** allow two-way bicycle traffic on streets designated as one-way for motor traffic. On a contraflow street, all traffic stays to the right of a yellow “center” line; however, the lane in the contraflow direction is narrow because only bikes are permitted in that direction. “One Way” and “Do Not Enter” signs on such streets require a supplementary plaque on “Do Not Enter” signs: “Except Bicycles.”

In Brookline, one-way restrictions are often applied to keep through traffic off residential streets, making those streets ideal for contraflow bicycling. In many situations, contraflow offers bicyclists safer and more direct routes. Contraflow bike travel has an excellent safety record in Europe and the United States. Several of Brookline’s one-way streets already carry considerable contraflow bicycle traffic. Formally designating such streets two-way for bicycles using signs and markings should improve safety as it raises motorist expectations of finding opposing bicycle traffic. Contraflow lanes were implemented on Netherlands and Parkway Roads and have been used successfully since 2009. Formal designation is necessary before any route with contraflow can be marked with signs or on a map; it is also a powerful way of indicating that bikes are intended users of our streets.

- 🚲 **One-Way Streets with end-marked bike contraflow:** One-way streets often offer cyclists quiet connections or routes around busy streets and intersections. In northern Europe, cyclists are permitted to bike against the one-way flow of traffic on low volume one-way streets without the formality of a painted lane. Signs are used at the beginning and end of the street: on the “no entry” end, an additional sign is added— “except bicycles.” On the other end, a sign is added to alert drivers to “Expect two-way bicycle traffic.” A pilot of such road use might be tried on three to six streets, where motor traffic is already low volume and low speed, and residents

favor participating. Candidate streets include Abbottsford, Beals, Coolidge, Crowninshield, Egmont, Fuller, Green and Thorndike, among others.

- 🚲 ***No passing bicycles zones*** are appropriate on short sections of streets that are too narrow for a car to pass a bike without crossing the center line, and where crossing the center line is dangerous because of frequent intersections or limited sight distance. One example is Carlton Street southbound from Beacon Street, where motorists frequently squeeze past bicyclists with little clearance, and often drive on the wrong side of the road as they approach the sharp turn onto Colchester Street. Another example is on curved sections of Heath Street. A posted passing restriction encourages bicyclists to ride at a safe distance from the curb, making the restriction self-enforcing, and relieving motorists of the stress of seeking an opportunity to pass when it isn't safe to do so.
- 🚲 ***Road diets (pavement reductions)*** reduce the number of lanes on a road, usually to one in each direction, plus short extra lanes where needed for capacity at intersections. Candidates include Lee and Clyde Streets, Hammond Street, and Newton Street and West Roxbury Parkway bordering the Putterham Golf Course. The reclaimed space can be used to create greenways with tree lawns and shared use paths, benefitting both pedestrians and cyclists.
- 🚲 ***Cycle tracks or protected bike lanes*** are parallel to a road but are physically separated from motor traffic lanes by a curb or buffer. They are the most common bicycle accommodation in the Netherlands and Denmark, countries that have set the standard for high levels of bicycle use and safety. Increasingly, they are seen in the United States as necessary to make the busiest streets safe and low stress for bicycling.

One-way paths lying on either side of the road, as on Vassar Street in Cambridge, work well in many situations. Two-way paths, as on Memorial Drive, may be preferred on roads with few intersections and where safe transitions at path endpoints and intersections can be provided.

Ideally, roadside bike paths are distinct from the sidewalk. However, in a park or greenway, they can be shared space. Sections of a bike path can also be shared with automobiles if limited to a driveway function (access to a few homes) and engineered for driveway speeds.

- 🚲 ***Intersections*** are the most dangerous locations for all road users and the sites of many crashes. For the safety of cyclists, it is important to continue bicycle lanes through intersections and sometimes paint them green to alert motorists (particularly turning motorists) of the presence of bicyclists. Bike boxes can also be useful, particularly at signalized intersections.
- 🚲 ***Detours during construction:*** At construction sites that block normal sidewalks and bicycle paths, safe accommodations for walkers and cyclists should be provided around the blockage.

4. Signage and Pavement Markings

Wayfinding Signage

Wayfinding signage for cyclists provides information on distances/directions to key locations and the optimal cycling routes to those destinations.

- **Brookline example:** Coolidge Corner, 1 mile.
- **Commuting examples:** Best routes to downtown, river, Longwood Medical Area, with signs, arrows, distances

An additional benefit of wayfinding is that it increases awareness for automobile drivers as well. When they see a cycle/wayfinding sign, it indicates that this is a cycling route/corridor/bicycling friendly road. The signs also communicate that this is a bicycling aware/friendly community.



Cambridge, MA

Compared to other cities, Brookline and Boston have very little wayfinding signage. On the Riverway/Olmsted park path, for example, there is not one sign that indicates “this way to destination X” (Fenway, Jamaica Pond, MFA, etc.), or “path continues over there.”

Some efforts are underway, for example, a pilot program in downtown Boston and a similar program in Cambridge, with some signage pointing to Alewife T Station, Harvard Square, and so on. In Brookline, with all the work going on at River St./Washington St., it would be useful to include wayfinding (this way to Fenway, that way to Jamaica Pond, etc.).

We recommend three signage guidelines as part of the *Green Routes Plan*:

- Improved signage and wayfinding to destinations in Brookline (i.e. Coolidge Corner), and commuting corridors (to downtown, medical area, river, etc.)
- Wayfinding should be destination oriented but also best route oriented (i.e., where there are bike lanes and markers)
- Signage should be large enough to be visible to cyclists and to drivers



Besides guiding cyclists, destination signs advertise the Town’s bike routes, tourist sites, and commercial areas, promoting bicycling and bicycle tourism. They also convey to motorists and cyclists alike the message that our society supports bicycling.

Downtown Boston



Portland, Oregon

Other Bicycle Signage

Other bicycle specific signs and pavement markings may include “sharrows” (see explanation below), “bikes may use full lane,” and “except bicycles” (where bicycles are permitted to make maneuvers or enter areas not permitted for motorists). Green paint can be used to highlight bike areas, particularly at intersections. Another way to guide cyclists is to mark the pavement with a double chevron (>>) on intersection approaches, tilting the chevrons to the right where the bike route turns. This kind of marking, used in Brussels, is especially valuable on bike routes that follow side streets.



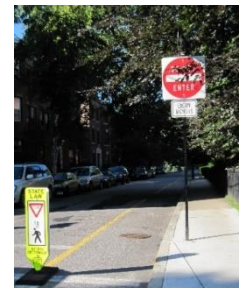
Sharrows

Shared lane markings (“sharrows”) indicate where cyclists should ride in a shared travel lane to be safe from opening doors on parked cars or other hazards. Motorists drive as normal in a shared lane when no cyclists are present; when cyclists are present, motorists should slow down and pass with care, at a safe distance, and only when it can be done without endangering the cyclist or oncoming traffic.



Except Bikes

This sign indicates that bicyclists may turn right (from Harvard Street to Washington Street in Brookline Village), when cars are prohibited from doing so. Other “Except Bikes” signs may indicate that bicycles are permitted to make maneuvers or enter areas not permitted for motorists, such as traveling both ways on a street restricted to one-way motorist traffic, such as the example at Netherlands Road and Parkway at right.





Change lanes to pass

This sign reminds motorists to pass cyclists at a safe distance by changing lanes.

Share the Road

Share the road signs are generally not considered to be useful; this one may be the best one to use—if any.



Bikes May Use Full Lane

Research has shown that this sign communicates more clearly than either Sharrows or Share the Road signs

Walk your bike

“Walk your bike” signs have been installed in Brookline’s commercial areas to remind cyclists to walk their bikes on sidewalks in business districts.



5. Bicycle Accommodations: General Comments

Bicycle Friendly Community Status: Moving from Bronze to Silver

In the spring of 2016 Brookline received a bronze Bicycle Friendly Community designation from the national League of American Bicyclists. The report card that accompanied the designation shows how Brookline matches up to national standards of bike friendliness and indicates key steps toward the next level. See appendices.



E-Bikes (Electric Bikes)

E-Bikes run on electric power as well as pedaling. Generally, a small motor using rechargeable batteries is located on the bike to assist the rider in pedaling; standard e-bikes travel about 16-20 mph. Brookline should consider how to accommodate e-bikes, considering the following:

- E-bikes will increase the total number of bicycles on the road
- They will lead to an increased number of people using bicycles, representing a wider breadth of age groups, physical conditions, bicycle awareness and experience.
- They will use the same infrastructure as bicycles (rather than cars or mopeds) – both on the road, and also for parking/locking, etc.
- They can travel substantially faster than most bicyclists, especially uphill.
- Eventually, there will also be a need for charging stations (possibly solar-powered); these can be either standalone or combined with electric vehicle (EV) charging stations.





Automatic Bicycle Counters have been installed in many cities and prove a useful source both of bicycling data as well as points of interest and encouragement for cycling. The one at the left is in Portland, Oregon; the one at the right is at Staniford and Causeway Streets in Boston.



Replacement/Maintenance of Bicycle Accommodations

Once put in place, bicycle accommodations on Brookline's streets need to be adequately maintained. Whether in the form of painted lines, stencils, bollards, curbs, or other means of providing safety for cyclists sharing roads with vehicular traffic, it is essential that these accommodations be promptly replaced or maintained when damaged or removed by road/construction projects or by regular wear and tear. Monitoring of utility and other construction work should assure that trenches or other pavement cuttings do not leave dangerous ridges in bike lanes. It is also important that bike lanes be kept clear of overhanging vegetation, debris and snow.

Brook-on-Line is a useful method for reporting problems that need to be addressed by various Town Departments; however, new categories directly related to bicycle issues on the site would be useful.

Filling in Gaps in the Green Routes Network

Brookline has added a number of bicycle accommodations in recent years, and streets with those accommodations are seeing a gradual increase in bicycle traffic. For bicycling to become a truly safe and viable form of transportation within and across town, it is important that both large and small gaps in the network be filled in, otherwise it is not a network. Bicycle lanes that disappear at intersections (the most dangerous place for all road users) or that start and stop along a major road as they do on Harvard Street, do not offer safe, continuous routes that most bicyclists will feel comfortable using. Major gaps are delineated in the street list and map of the network, but it should be noted that there are also small gaps that need to be filled to knit together safe, continuous bike routes. A few examples:

- Safe crossing of Netherlands Road between Parkway Road and the Muddy River Path
- Multiple interruptions of the bike lanes along the length of Harvard Street, where bike lanes repeatedly turn into shared bicycle/vehicle lanes
- Beacon Street outbound from Pleasant Street to Marion Street
- Washington Street, where bike lanes turn into shared bicycle/vehicle lanes, e.g., northbound from the Main Library exit drive to School Street or near and across the intersection with Beacon Street

Improvement of Bicycle Accommodations

For bicycling to become a truly safe and viable form of transportation within and across town for persons of all ages and abilities, it is also important to continue improving existing bicycle accommodations, especially on busy streets. For example, some bike lanes need to be widened, buffered or physically protected to reduce the perceived and real risk of crashes such as dooring. Other examples include upgrading sharrows to bike lanes.

Projects to implement Brookline's *Green Routes Bicycle Network* are presented below in various categories: **Priorities** highlight projects that connect various parts of the network and various parts of the town to increase safety and comfort for travel among and to educational, recreational, governmental and commercial destinations. The **street list** provides explanations and rationales for individual projects by street, supplemented by detailed recommendations (see appendices). Streets are listed alphabetically to facilitate incorporation of bike accommodations into ongoing street rehabilitation, repaving or

rebuilding. *Projects approved/awaiting funding* have been reviewed and approved by the Transportation Board. *Projects funded/awaiting construction* are already scheduled for completion, although some may be delayed because of factors such as concurrent utility or road work in the area. Finally, *completed projects* highlight those projects that have been completed since the *Green Routes* plan was developed in 2008; this is both a celebration of accomplishment and a convenient reference to assist in developing new projects or making further upgrades.

The 2008 plan anticipated the Town increasing bicycle project funding from zero to \$110,000 per year, which amounts to about \$2 per resident per year. Major projects identified in this plan will require much larger amounts. In some cases, state and federal aid may be available for more expensive projects. Small sidewalk repair, signage, and marking projects can be implemented within the Town's normal maintenance program.

Designs presented below are conceptual; each project requires engineering study and design by the Department of Public Works, review by the Transportation Board at their public meetings, and identification of funding.

6. Priorities

Projects that contribute to a safe cycling network throughout Brookline are assigned the highest priority. Routes to schools, parks, business districts and other frequently visited destinations that connect existing paths, bike lanes and quiet streets are assigned a high priority. Completing bike routes on major streets that are heavily used by commuting or shopping cyclists—such as Beacon Street, Harvard Street, and Longwood Avenue—are also high priority. When reviewing projects on one street, attention should be given to intersecting streets to ensure connectivity within the network. The priority list highlights comprehensive projects, but also lists in boldface individual streets/intersections that could be handled as stand-alone projects that would eventually contribute to the entire network. The priority list also includes treatments that are relatively new to Brookline and deserve pilot projects that may lead to more extensive use of the treatment.

As noted in the introduction, bicyclists are entitled to use all streets in Brookline. Whenever changes or improvements in roads are planned, consideration should be given to bicycle and pedestrian safety and convenience, in particular:

- All traffic signals should either be on a regular cycle that provides opportunities for all road users to cross in all directions OR sensors should be set in such a way that they can be triggered by a cyclist in the road.
- Cyclists should be permitted to cross streets with advance pedestrian walk signs, as long as doing so does not endanger pedestrians.
- Street lights should be adequate (and appropriately aimed) on all streets to make the right of way visible to pedestrians and cyclists.
- Changes such as bulb outs that force cyclists to temporarily merge with motor traffic should be avoided.

1. Muddy River Route—Reconnect all sections of the Emerald Necklace from the Carlton Street Footbridge to Jamaica Pond, including safe crossings at **Brookline Avenue, River Road, Route 9/Boylston Street, and Parkway Road**. In 2011-12, the Selectmen's Committee on Emerald Necklace Bicycle and Pedestrian Crossings reviewed and designed new crossings at these locations with help from staff and consultants. A member of the Bicycle Advisory Committee served on the committee. The draft plan has been presented to the Board of Selectmen.

2. Coolidge Corner: Incorporate recommendations of the "Bicycle and Pedestrian Infrastructure Assessments, Brookline, MA Harvard Street Corridor: Longwood Avenue to Shailer Street" (see

appendices) This report was prepared through the cooperation of the Massachusetts Department of Transportation, Walk Boston and Mass Bike. Its goal was to study this section of Coolidge Corner and make recommendations to improve pedestrian and bicyclist safety and convenience.

3. Beacon Street—Improvements to safety for bicyclists along Beacon Street and access points such as **Park Street** are very important. This is a heavily used bicycle route and provides access to local commercial districts. Section 7 and appendices detail the sections of Beacon Street that are part of this project. Research on Beacon Street shows that unprotected bicycle lanes are inadequate provisions for people who cycle on Beacon Street because the lanes are frequently blocked by stopped motor vehicles. The goal is to eventually provide protected bike lanes in both directions for the entire length of Beacon Street through Brookline.

4. Harvard Street—Improvements to safety for bicyclists along Harvard Street are very important. This is a heavily used cross-town bicycle route and provides access to local commercial districts and schools. Section 7 and appendices detail sections of Harvard Street that are part of this project. Research on Harvard Street shows that unprotected bicycle lanes are inadequate provisions for people who cycle there because the lanes are frequently blocked by stopped motor vehicles. The goal is to eventually provide protected bike lanes in both directions for the entire length of Harvard Street through Brookline.

5. Washington Street—This is an important route through Brookline and connects Brookline Village and Washington Square. Bicycle safety improvements along the length of the street have been initiated in the form of bicycle lanes and shared lanes, but further improvement is needed and is detailed below.

6. Greenways in South Brookline include **Lee/Clyde Streets, Newton Street, West Roxbury Parkway** and **Hammond Street**. These projects would substantially improve access between South Brookline and North Brookline as well as improving recreational options for cyclists and pedestrians throughout South Brookline. The greenway proposal is a major undertaking, but segments could be built as individual projects, along with improvements to streets and intersections such as **Dudley Street, Walnut Street, Heath Street, and Chestnut Hill Avenue**. Each change would improve the bicycling environment.

7. Bicycle Parking is essential to making it convenient to use bicycles for transportation. Single and multiple use racks have been installed in many locations around Brookline, but additional bike parking is needed. “Hitching posts” installed on parking meters (and parking meters themselves) are useful for bicycle parking. Town residents have noted a need for additional bike parking at such locations as Town Hall, the Public Safety Building on Washington Street, the small commercial area at Washington and School/Cypress Streets, at schools and parks, and in some residential areas where there are no parking meters and few sign posts available to secure bicycles. Seasonal bike corrals are successfully installed each year in Cambridge and Somerville and one was installed in Coolidge Corner in 2016.



**Seasonal Bike Corral on Harvard Street in Coolidge Corner
Saturday, October 8, 2016, 1 PM**

Street List of Proposed Projects

Projects are listed below alphabetically by street name. Asterisks highlight projects and intersections that are particularly important and/or dangerous as currently configured. These should have high priority for reconfiguration, repair, or other appropriate attention. As noted in the introduction, bicyclists are entitled to use all streets in Brookline. Whenever changes or improvements in roads are planned, consideration should be given to bicycle and pedestrian safety in accordance with the “Brookline Complete Streets Policy.” Specific concerns are noted in section 6 above and in the street list below. See appendices for general estimates of project size and cost.

Alton Place between Harvard Street and St. Paul Street: Add a contra-flow bike lane.

Aspinwall Avenue between St Paul and Kent: Add bicycle lanes, or add sharrows and assure that traffic is slow enough for bicycles to mix safely with cars.

Aspinwall Avenue between Kent and Brookline Ave: Add bicycle lanes in both directions.

***Babcock Street:** Since the plans for the I-90 Allston/West Station project call for a bike and pedestrian path to cross the Mass Pike heading north from Babcock Street, and since protected bike lanes are currently under construction on Commonwealth Ave, Babcock Street’s importance as a connector for bicycles will only grow in the future because it will provide a direct route between Brookline and Commonwealth Avenue, the projected West Station, and newly created parkland and bicycle paths along the Charles River. When Babcock Street is repaved, it should be made bicycle and pedestrian friendly for its entire length. The best option for cyclist safety is a two-way raised cycle track extending ideally from Harvard Street to Commonwealth Avenue (or, if absolutely necessary, from John Street, with a safe crossover for cyclists from a south side bike lane between Harvard and John Streets to the two-way cycle track). Raised crosswalks across side streets will help slow traffic and minimize up and down movements by cyclists at intersections.

Beacon Street outbound from Boston City line to Harvard Street: Upgrade bicycle facilities to protect cyclists better from moving motor vehicles and the door zone of parked cars. See appendices for specific suggestions.

Beacon Street at Charles Street: Traffic signal for left/U-turn from Beacon Street inbound to Beacon Street outbound or from Charles Street to turn left on Beacon is not triggered by a bicycle.

***Beacon Street outbound from Pleasant to Marion Street:** Design safe passage for bicycles from the end of the Beacon Street bike lane to start of bike lane at Marion Street.

Beacon Street outbound from Westbourne Terrace to Washington Square: Improve transition from the end of the bike lane near Westbourne Terrace to Washington Street intersection.

***Beacon Street Morning Rush Hour Bicycle Lane (inbound)** via parking restrictions on sections of Beacon Street inbound where parking is allowed and there is no bike lane. During the Beacon Street reconstruction project, there were parking restrictions on Beacon Street inbound. Restoring those restrictions during the morning rush hour period would effectively create a 7' wide bicycle lane to the right of the two lanes of motor vehicle traffic, thereby increasing safety and throughput for both cyclists and motorists.

Bicycle Racks Additional bicycle racks are requested for Town Hall, particularly under the parking lot side of the overhang outside the entrance to provide some protection from weather; at some public schools; lower Beacon Street between Carlton and St. Mary’s Streets on the inbound side of Beacon Street; Cypress/School/Washington business area; at parks throughout town that have few if any bicycle

parking racks. Specific requests have been made for 200 Washington Street in Brookline Village, Gibbs Street between Beals Street and Naples Road.

Brookline Avenue—Bike lanes between Town line and Washington Street (Route 9) would continue lanes and sharrows already installed by Boston through the Longwood Medical Area and provide an important connection to the Emerald Necklace paths and Brookline Village.

Brookline Avenue Path repairs: The path running parallel to Brookline Avenue on the southeast side needs repair; tree roots, erosion, and other natural degradation has made this path dangerous for bicycles. A wider path would reduce cyclist/pedestrian conflicts. (Department of Conservation and Recreation)

***Brookline Avenue crossing for Emerald Necklace/Muddy River Path** at Parkway Road requiring new signals, signal synchronization, curb extension, curb ramps: The Muddy River Path is an attractive greenway for cyclists traveling between the Landmark Center and Jamaica Pond. Brookline Avenue bisects the path, and it is difficult to cross this four-lane road due to heavy traffic, physical barriers, and the lack of a dedicated crossing. This project requires a traffic signal installed at the intersection of Brookline Avenue and Parkway Road with a sequence tied to the signal at the corner of Aspinwall Ave and Brookline Ave. This would allow for to safely cross between Parkway Road (with its contraflow lane) and the Emerald Necklace. Additionally, a curb extension and ramps are necessary to allow bicycles to safely queue on the southeast side of Brookline Ave and to ascend onto the greenway. (In 2011, Brookline received a grant to proceed with planning of this and other connections for the Emerald Necklace.)

Carlton St. Footbridge: We support the repair and reopening of the Carlton St. Footbridge to provide a direct connection for cyclists and pedestrians between the Muddy River Path and Carlton St., including a safe crossing of Carlton St. at the footbridge site. We request the installation of bike channels on each side of the stairs at each end of the bridge to make it easier for bicyclists who would prefer to use the stairs instead of the accessibility ramps. This would allow them to shorten their crossing by 315 feet. The channel installation should be designed and supervised by an expert in bicycle facility design, to avoid the inadvertent installation of channels that don't work effectively. The bike channel itself should have a bike symbol in the channel trough at the beginning of the bike channel, making the purpose of the channel obvious.

Chestnut Hill Avenue between Route 9 and Beacon Street at Cleveland Circle: Install bike lanes on both sides of the street. There is already a shoulder on both sides of the road. These should be widened sufficiently to be bicycle lanes. This could become a major route from South Brookline (extending the bike lanes on Lee/Clyde Streets) to Dean Road, Clinton Street and Beacon Street at Cleveland Circle.

Chestnut Hill Avenue at Clinton is a difficult crossing for cyclists and pedestrians, with poor sight lines. A median refuge is recommended to allow crossing half of Chestnut Hill Avenue at a time.

Chestnut Hill commercial district bike lanes and paths: This project helps to make the Chestnut Hill shopping area safer and more accessible for bicyclists. It takes advantage of the relative safety of both Middlesex Road on the north side of Route 9 and Heath Street on the south. The project involves creating bike lanes on Hammond Street from Middlesex Road to the shopping center and then extending a bike path through the shopping center connecting to the traffic light at Tully Street, thence to Heath Street and to and from Hammond Pond Parkway. Some of the bike path would be built as a sidewalk extension. Coordination with the City of Newton is essential. An additional accommodation could be to re-stripe the Hammond Street/Route 9 intersection to make it safer for bicyclists to go from Middlesex, across Route 9 to a right turn on Heath Street.

Cypress Street (near Washington Street, CVS): Improve southbound approach to Washington Street. See appendices.

Davis Avenue at Cypress Street: Traffic signal is not triggered by cyclists waiting to cross Cypress Street.

Davis Avenue: Install bike lane from Cypress Street to Greenough Street to increase safety for cyclists going to and beyond the High School.

Dean Road from Clinton Street to Beacon Street would benefit from bike lanes or sharrows since this stretch provides an important connection between Beacon Street and routes to the Runkle School and the High School.

Freeman Street: Add sharrows and improve design of intersection with Babcock Street to slow vehicular turns. One possibility is to reconfigure and enlarge the small park to make one T-intersection of Freeman with Babcock rather than the two current intersections on either side of the park. Implement traffic calming to discourage cars from speeding to beat the traffic lights at Pleasant and St Paul Streets or change the signals at Pleasant and at St Paul Streets to be 4-way stop controlled. Besides reducing speeding, this would reduce pedestrian waits at the intersections.

Gateway East is the area surrounding the intersection of Washington Street and Route 9 This is a Massachusetts Department of Transportation Project approaching full design in 2017 and includes cycle tracks in both directions from the Washington-High Street intersection to the Boston border. Walnut Street will be realigned to Pearl Street, with a traffic signal to provide bicycle and pedestrians crossing of Route 9.

Goddard Avenue provides a direct connection between South Brookline and Boston at Jamaica Pond. In its present configuration, it is narrow and winding, but should reconstruction be possible in the future, it should be considered for bicycle accommodations, such as an off-road side path for bicyclists and pedestrians. In the meantime, sharrows and “no passing of bicycles” signs could improve safety for those cyclists who do use it.

Green Street: Add a commercial loading and unloading zone at the intersection with Harvard Street to reduce the incidence of motor vehicles standing in the bicycle lane on Harvard Street between Beacon Street and Green Street.

Green Street: Stripe and sign Green Street for a contraflow lane for bicycles from Dwight Street to Harvard Street. This contraflow lane would replace the existing with-flow unmarked bike lane, which is not necessary because of the low traffic speed and volume. Because Green Street connects to the quiet streets north of it (Dwight St., Pleasant St., etc.), this contraflow lane is all that is needed to create a safe two-way route connecting the Boston University bridge area (access to Commonwealth Avenue, university areas, Cambridge and the Esplanade), as well as the dense Coolidge Corner Northeast residential area, to the bike lanes on Harvard Street (leading toward the center of Coolidge Corner, the Pierce School, town center and the high school). (Turned down by Transportation Board, 2012.)

Greenough Street at the High School: Create a separate shared path between the benches along Greenough Street in front of the High School and Cypress Field that would allow cyclists to travel from Sumner Road onto Greenough Street at Davis. This would require ramps at each end of the path and signage to make path use clear to all. This allows cyclists access to bike racks at the high school as well as a direct route past the high school to Washington Street (and Washington Square) and Park Street (to Coolidge Corner).

Grove Street: Bike lanes in both directions between Newton Street and Putterham Circle.

Grove Street and Allandale Road: Traffic signal should include a protected/dedicated left turn from Grove to Allandale. Vehicles coming inbound from Putterham Circle come very fast over a rise, making the left turn dangerous for both cyclists and vehicles.

***Hammond Street Greenway:** Create a green street to enhance commuter and recreational cycling through South Brookline, connecting West Roxbury Parkway with Boylston and Beacon Streets. Use a road diet for Hammond between the rotary and Route 9 for one lane in each direction (except at Route 9 junction). Install median refuge and traffic signal at Woodland Road to allow safe crossing and access to Woodland Road for pedestrians and cyclists; install additional crosswalks for safer pedestrian crossing at other points, e.g., near Dane Park and the Fire Station. See full description in the appendices.

Hammond Pond Parkway multi-use path would provide Newton-West Roxbury connection and recreational access to Brookline parks and conservation areas. Install multi-use path along the entire length of the Parkway, with connection to Skyline Park. (MA Department of Conservation and Recreation project)

***Harvard Street:** Incorporate recommendations of the “Bicycle and Pedestrian Infrastructure Assessments, Brookline, MA Harvard Street Corridor: Longwood Avenue to Shailer Street” (see appendices.) This report was prepared through the cooperation of the Massachusetts Department of Transportation, Walk Boston and Mass Bike. Its goal was to study this section of Coolidge Corner and make recommendations to improve pedestrian and bicyclist safety and convenience.

***Harvard Street:** Upgrade bicycle facilities and make them continuous for the length of Harvard Street through Brookline to protect cyclists better from moving motor vehicles and the door zone of parked cars. See appendices for Detailed Recommendations on possible bicycle accommodation improvements on Harvard Street.

Harvard Street at Babcock Street: The left turn signal from Harvard Street southbound to Babcock Street is not triggered by a bicycle.

***Heath Street passing restrictions:** Heath Street runs east/west roughly parallel to Route 9 from the Brookline Reservoir to the Newton border. As such, it's a very attractive route for cyclists commuting, seeking recreation, or shopping. Heath Street's width makes passing impossible without crossing substantially into oncoming traffic or without coming dangerously close to cyclists. This project calls for signage to prohibit motorists from passing bicycles between Warren and Hammond, along with sharrows and traffic calming to slow vehicular speed.

Independence Drive: Bike lanes in both directions between Putterham Circle and Town line to improve safe access to Baker School.

***Lee/Clyde segment of South Brookline Greenway:** A major project could create a “greenway” by moving motorized traffic to the west side (one lane in each direction) and constructing a mixed-use path and service road on the east side.

Longwood Avenue at Chapel Street: Continue the bike lane toward the Medical Area through the Chapel Street intersection to the bridge across the Muddy River. Maintain sharrows from Chapel Street westbound (toward Coolidge Corner).

Longwood—left turn onto Chapel Street: The left turn from Longwood Avenue southbound onto Chapel Street (toward the Longwood T-stop, the ramp to the Muddy River path and Longwood Towers) is both heavily used and difficult for both cyclists and motorists because traffic moves steadily on Longwood from the Longwood Medical Area. Although there is a light at this intersection, left turning traffic has no opportunity for a protected turn. Cyclists waiting to turn have moving traffic on both sides of them. It would be beneficial to have an option to allow bicycles and vehicles queued at the light to turn left without oncoming traffic at the beginning of the light cycle. Install don't block the box street markings in the intersection.

Middlesex Road bike lanes: Middlesex Road is an important link for travel to and from the Chestnut Hill commercial district. This plan has three essential parts. First, it calls for a contraflow lane from Circuit Road to Reservoir Road. Second, it calls for bicycle priority lanes between Hammond Street and Circuit Road. Third, it calls for a curb ramp to access the Reservoir Road Bridge from the reservoir side over the D line. Because the Hammond Street end is in Newton, we need to coordinate with that city.

Netherlands Road: Provide safe passage from Parkway contraflow lane to Muddy River Path.

***Newton Street, Goddard Circle to Town line:** Install bike lanes in both directions on this wide street with fast moving traffic to connect to the Newton Street entrance to Larz Anderson Park and to Boston (Jamaica Pond area)

***Newton Street Greenway** will improve conditions for commuter and recreational riders traversing South Brookline around the Country Club and Putterham Golf Course between Brookline, Newton and West Roxbury. Install roadside bike paths on both sides of Newton Street from Clyde/Newton intersection to West Roxbury Parkway. Provide safe crossing of Newton Street at South Street with either a median refuge for cyclists and pedestrians and/or traffic signal to allow safe access to Putterham Circle, Independence Drive and VFW Parkway. Install bike lanes (preferably protected bike lanes) in both directions between Clyde Street and Putterham Circle.

***Park Street:** Bike priority lanes north and south on Park Street between Marion and Washington. Park Street connects North Brookline to Brookline High School, the Kirrane Aquatic Center and the rest of the Brookline Hills area and is a quieter alternative to cycling on Harvard Street.

Pleasant Street is shown as a “connector route” for the network. For the present, this seems sufficient EXCEPT for the last block from John Street to Beacon Street where bicycle markings would help clarify road use for both bicyclists and motorists as they approach this difficult Coolidge Corner intersection.

Route 9 Crossing at Chestnut Hill Avenue: Improve bicycle use and safety in this intersection by adding lanes connecting Chestnut Hill Avenue, Heath Street, and Lee Street.

Route 9 north side from Town Line to Brookline Avenue: See Gateway East above.

***Route 9 cycle tracks from Washington Street to Pond Ave:** See Gateway East above.

Route 9, Washington/High Street intersection to Cypress and beyond: Continue the cycle tracks planned for Gateway East (as described above) to facilitate safe bicycle travel along the developing corridor and beyond toward Chestnut Hill.

Route 9 grade-separated crossing for Muddy River Path: Even with an at-grade crossing of Route 9 for the Muddy River path, a grade-separated crossing using the existing highway bridge is a useful option to consider. See appendices.

Station Street: Replace cobblestone crosswalks, which are a hazard to cyclists, with alternate crosswalk treatment

Stedman Street: Provide a safe contraflow from Harvard Street towards Gibbs Street, taking into account the entire right of way width. This might be accomplished by a protected contraflow bicycle track, by a multi-use path for both cyclists and pedestrians or some other means. This is important for the safety of students using bicycles to travel to and from school because without a safe way of moving from the school into the neighborhood to the north and east, they would be required to bike to Harvard Street and interact with the busy traffic there.

Stedman Street at Harvard Street: Traffic signal is not triggered by a bicycle.

Sumner at Route 9: Traffic signal is not triggered by a bicycle.

Tappan Street at Cypress Street: Traffic signal for turns from Tappan Street onto Cypress Street is not triggered by a bicycle.

Tappan Street: Install bike lane from Greenough Street to Cypress Street to improve safety for cyclists around the High School.

Walnut Street safety improvements: Install additional but gentler speed humps or raised crosswalks along Walnut Street to slow vehicular traffic. Install bike priority lane markings

Walnut/Juniper Streets as reconfigured at Route 9 should include bicycle lanes in both directions.

***Washington Street** is a major artery in Brookline. It connects the Driscoll School, the Pierce School, the Main Branch Library, the Town Hall, the Public Safety building, two commercial districts, and is immediately connected to Brookline High School via the recently improved Greenough St. It intersects both the C Line and the D Line, and is served by the Route 65 bus. As a result, it has considerable use by motorists, public transit users, bicyclists, and pedestrians. This project would implement a Complete Streets treatment of the entire length of Washington Street between the north town line and Route 9. See full description in the appendices.

***West Roxbury Parkway Greenway (along Putterham Golf Course):** A major project would create a “greenway” by moving motorized traffic to the west side (one lane in each direction) and constructing a mixed-use path and service road on east side in multi-lane sections of West Roxbury Parkway and Newton St. Bike lanes should be established on the rest of West Roxbury Parkway. Intersections will need to be redesigned.

Williams and Centre Street: Change signalized intersection to stop-controlled intersection

Willow Pond Road: Bicycle accommodations (lanes or sharrows, signage) to make a safe connection through Olmsted Park, connecting bike paths on the two sides of the park. (Would require cooperation with Massachusetts Department of Conservation and Recreation and with Boston because the road crosses the town border.)

Winchester Street: Bicycle safety improvements will enhance the connection between Coolidge Corner and Brighton. Install additional but gentler speed humps along Winchester Street to slow vehicular traffic. Install bike lane southbound toward Beacon Street and bike priority lane northbound

8. Projects Approved/Awaiting Funding

Freeman Street at Browne Street: Eliminate parking for 30’ westbound before crosswalk. Restripe the center line from the triangular park at Babcock to Pleasant Street for a westbound 17-foot travel/parking lane, and a 10-foot eastbound travel lane with a striped 3-foot shoulder. *Approved by Transportation Board, October 2017*

Ivy Street: Extend contraflow lane to the block between Carlton Street and St. Mary’s Street. This extends a connection on quiet neighborhood streets to and from Audubon Circle, Beacon Street and the Fenway area. *Estimated cost: \$4,528*

Naples Road: Bike lane on north side but *without* a double yellow center line; absence of a center line has been shown to slow traffic. *Approved, by Transportation Board, March 2016*

Pearl Street: Install raised cycle track from Brookline Avenue to raised crossing at the Brookline Village T-stop; install buffered bike lane from the raised crossing to Brookline Avenue. Sharrows in both directions between the T-stop and Washington Street. *Approved by Transportation Board, July 2017*

St. Mary's Street (Beacon Street-Mountfort Street): Sharrows in both directions. *Estimated cost: \$9,203*

9. Projects Funded/Awaiting Construction

Centre Street bike and priority lanes: Centre Street runs parallel to Harvard Street, one block west. It provides a low traffic connection for cyclists to the farmers' market as well as the Coolidge Corner and JFK crossing commercial and residential districts. On the southern section of Centre Street this project would provide a bicycle lane southbound, and a bicycle priority lane northbound. Where road space allows, a dedicated bike lane would be painted in both directions. *Approved by Transportation Board, March 2017; funded for FY 2018*

Centre Street at Beacon: Traffic signal to be triggered by cyclists. *Approved by Transportation Board, March 2017; funded for FY 2018*

Essex Street crossing Dummer Street leads to the new and heavily used contraflow lane on Essex going through the Cottage Farm area. Despite signage, motorists are not aware that cyclists can go straight across Dummer, whereas motor traffic must turn right. Painting a green lane across the Dummer intersection and/or installing a raised intersection should help alert motorists to crossing bike traffic. *Approved for FY 2019*

St. Mary's Street: Stripe and sign for a contraflow lane for bicycles from Mountfort Street to Commonwealth Ave. upon completion of St. Mary's Street bridge project. MassDOT has included with flow and contraflow bike lane striping on the St. Mary's Street bridge. *Pending construction by Mass DOT*

10. Completed Projects

The following projects have been completed. As conditions change and engineering practice advances, additional improvements will be warranted for many Brookline streets. For example, consideration can be given to replacing bicycle lanes with cycle tracks or protected lanes.

Aspinwall Avenue from Washington to St. Paul: Bike lanes and sharrows. *Completed, Summer 2014.*

Beacon Street outbound from Marion St. to Westbourne Terrace: Buffered bike lane *installed 11/14/16 for a one-year trial.*

Beacon Street extension of bike lane inbound from the traffic signal at Winchester Street to Webster Street: A bike box at Webster facilitates cyclists' left turns from Beacon onto Centre Street. *Completed Fall 2015*

Beacon Street priority lanes: Bicycle lanes are *not* continuous along the entire length of Beacon Street within Brookline, and this creates a serious hazard for cyclists and uncertainty among cyclists and motorists on sharing the road. Bicycle priority lanes provide a minimal connection of the bike lane segments. *(Approved by Transportation Board, January 3, 2013; funding approved for 2014 construction; completed summer 2015)*

Chapel/Colchester/Carlton/Ivy/Essex Street bike lanes: This major commuting and recreational route for Brookline residents and others cycling between Cambridge and the Muddy River and Longwood Medical Area in Boston includes bike lanes and priority lanes from Longwood and Chapel to Essex and Dummer via Carlton Street, Ivy and Essex. *Completed, Summer 2013*

Chapel Street at Longwood: A bike box for cyclists' left turns from Chapel Street to Longwood Avenue; a camera changes the traffic signal for cyclists. *Completed, 2014.*

Clark Road bicycle priority lanes: Marked for bicycle priority lanes in both directions.

Clyde Street at Lee Street: Intersection narrowed to improve pedestrian safety and vehicle turns onto Lee and Clyde including a dedicated, protected slip lane for cyclists turning right where Clyde turns south. *Completed Spring 2017*

Cypress Street bike lanes: **South Cypress** from Paul Pender Circle along Chestnut, High and Cypress to Boylston Street *Completed, Summer 2013* **North Cypress Street** from Boylston Street to Washington Street *Completed Summer 2014.*

Dudley Street: Contraflow lane along the south side of the Brookline Reservoir (from Lee Street to Warren Street). *Completed, Summer 2013*

Essex to Commonwealth connector - Curb Ramps, Paint, and Signage allows northbound bicycles to get to the southeast corner of Mountfort St and Commonwealth Avenue, which then allows them to turn right onto the bicycle lane at Commonwealth Ave or proceed north to the bicycle lanes on the BU Bridge. *Completed, Summer 2013*

Goddard Avenue from Newton Street to Avon Street: Bike lanes on south side of Goddard Avenue from Newton Street along Larz Anderson Park, and bike lanes/sharrows on north side of Goddard Avenue to Clyde. *Approved by Transportation Board, December 2014; completed fall 2015*

Greenough Street: "Except bicycles" sign added to the "do not enter 9 AM to 4 PM school days only September 1 to July 1" restriction on Greenough Street in front of Brookline high School.

Greenough Street between Washington Street and Lowell Street: Sharrows in both directions; new extended curb on NW corner to slow turning traffic. *Approved by Transportation Board, June 2015; completed Spring 2017*

Harvard Street bike lanes/sharrows (School to Beacon) complete the bike lane from Beacon to the town line with Allston. *Completed, Summer 2013*

Harvard Street at Washington (Brookline Village): "Except bicycles" sign added to the "no right turn" restriction at the intersection of Harvard Street at Washington Street.

Longwood Avenue dedicated bicycle lane eastbound, bicycle priority lane westbound, Harvard Street to Town Line at Muddy River. *Completed 2010 and 2013*

Netherlands Road contraflow lane from Parkway to Aspinwall *Completed 2009*

Newton Street from Clyde to Goddard Avenue: Bike lanes on both sides of Newton Street between Clyde and Goddard, including bollards along the south side and a bike box at Goddard Circle to provide safe waiting space for crossing to Goddard Avenue. Bike left turn lane from Clyde to Goddard to the right of turning vehicles. *Approved by Transportation Board, December 2014; completed Fall 2015*

Newton Street between Horace James Circle and Town line: Bike lane on both sides of street to provide safer access between the Circle and Skyline Drive leading to Skyline Park and the transfer station. *Approved by Transportation Board, June 2015; completed Spring 2017*

Park Street contraflow from Marion Street to Beacon Street *Completed, Summer 2013*

Parkway Road contraflow lane from Brookline Avenue to Netherlands Road *Completed 2009*

River Road/Muddy River Path: Muddy River path paved along River *Completed, fall 2016*

Route 9 Crossing for Muddy River Path (at grade): Curbs reconfigured, median widened, traffic signal installed. *Completed Fall 2016*

School Street repaved from the public parking lot to Washington St. to remove dangerous hump in the street parallel to the curb. *Completed 2012*

School Street bike/priority lanes from Washington Street to Harvard Street. *Completed Summer 2014*

St. Paul Street from Aspinwall Avenue to Beacon Street: Bike lane on northbound side; sharrows on southbound side. *Completed 2014.*

St. Paul Street from Beacon Street to Commonwealth Avenue: Bike lane on northbound side; sharrows on southbound side. *Approved by the Transportation Board, December 2014; completed Fall 2015*

Sumner Street from Buckminster to Route 9: Bike lane and shared vehicular right turn with through bike lane at Route 9, *completed 2014.*

Washington Street bike lanes and sharrows from Davis to School and Cypress Streets. *Completed 2010*

Washington Street: Bicycle lanes and sharrows from School and Cypress Streets to the town line near Corey Road. *Completed Summer 2013*

References

“Brookline Complete Streets Policy” adopted by the Board of Selectmen (May 17, 2016).

Federal Highway Administration, *Manual on Uniform Traffic Control Devices (MUTCD)*.

League of American Bicyclists, Bronze Level Report Card for Brookline (Spring 2016; see Appendix B).

National Association of City Transportation Officials, *NACTO Urban Bikeway Design Guide* (<http://nacto.org/cities-for-cycling/design-guide/>)

National Association of City Transportation Officials, *Designing for All Ages and Abilities* (December 2017). https://nacto.org/wp-content/uploads/2017/12/NACTO_Designing-for-All-Ages-Abilities.pdf

John Pucher and Ralph Buehler, editors, *City Cycling* (Cambridge, MA: MIT Press, 2012).

Massachusetts Department of Transportation, *Bicycle and Pedestrian Infrastructure Assessments, Brookline, MA, Harvard Street Corridor: Longwood Avenue to Shailer Street* (16 August 2016). See Appendix C.

Massachusetts Department of Transportation, *Separated Bike Lane Planning Design Guide* (2015)
(<https://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/SeparatedBikeLanePlanningDesignGuide.aspx>)

Appendices

Appendix A: Green Routes Network Map, showing bicycle accommodations completed by type and proposed future work.

Appendix B: Brookline's Bicycle Friendly Community Report Card from the League of American Bicyclists

Appendix C: General Size and Cost Estimates for Green Routes Bicycle Projects

Appendix D: Detailed Recommendations for Bicycle Accommodations (by Street)

Appendix E: Harvard Street Safety Recommendations from Mass DOT Report, 2016

Appendix F: Hammond Street Corridor Public Meeting—Summary and Recommendations

Appendix A: Green Routes Map

(See separate PDF)



BROOKLINE, MA

TOTAL POPULATION

58,732

TOTAL AREA (sq. miles)

6.8

POPULATION DENSITY

8637

OF LOCAL BICYCLE FRIENDLY BUSINESSES

0

OF LOCAL BICYCLE FRIENDLY

0

10 BUILDING BLOCKS OF A BICYCLE FRIENDLY COMMUNITY

Average Silver Brookline

Arterial and Major Collector Streets with Bike Lanes	45%	29%
Total Bicycle Network Mileage to Total Road Network Mileage	30%	11%
Public Education Outreach	GOOD	SOME
Share of Transportation Budget Spent on Bicycling	7%	5.8%
Bike Month and Bike to Work Events	GOOD	SOME
Active Bicycle Advocacy Group	ACTIVE	YES
Active Bicycle Advisory Committee	ACTIVE	MONTHLY
Bicycle-Friendly Laws & Ordinances	SOME	SOME
Bike Plan is Current and is Being Implemented	YES	YES
Bike Program Staff to Population	1 PER 70K	1 PER 293,660

CATEGORY SCORES

ENGINEERING

Bicycle network and connectivity

2110

EDUCATION

1110

Motorist awareness and bicycling skills

ENCOURAGEMENT

Mainstreaming bicycling culture

1110

ENFORCEMENT

Promoting safety and protecting bicyclists' rights

4110

EVALUATION & PLANNING

Setting targets and having a plan

2110

KEY OUTCOMES

Average Silver Brookline

RIDERSHIP

Percentage of Commuters who bike

3.5%

4.1%

SAFETY MEASURES CRASHES

Crashes per wk bicycle commuters

180

444

SAFETY MEASURES

Fatalities per wk bicycle commuters



KEYSTEPSTOSILVER



» Hire a Bicycle Program Manager to ensure that developments and projects incorporate bicycle facilities, assess impacts of bicycle facilities and programming, and implement your bike plan.

» Leverage your proximity to Boston to bring more education and encouragement activities currently taking place in Boston to the Brookline area. Adult bicycle education in particular could be improved.

» Complete and expand upon the network of Green Routes to provide safe and accessible bicycle routes for riders of all ages and abilities. To provide a connected network, use a variety of tools from the NACTO Guide to address issues of limited right of way and a lack of street grid connectivity.

» Continue work to develop and implement a Traffic Demand Management Plan that will expand end-of-trip facilities and ensure that developments benefit people who bike and walk.

» Develop a Complete Streets policy. This means that every transportation project will make the street network better and safer for drivers, transit users, pedestrians, and bicyclists - making your community a more desirable place to live and do business.

» Install a bicycle wayfinding system with distance and destination information at strategic locations around the community, integrating preferred on street routes and off-street facilities.

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Appendix C

GENERAL SIZE AND COST ESTIMATES FOR GREEN ROUTES BICYCLE PROJECTS

	Category/Project	Size s-25-50K m-50-250K l-250K-2M xl-2M+
1	Muddy River Route—Reconnect all sections of the Emerald Necklace in Brookline	
1a	Brookline Avenue crossing for Muddy River Path at Parkway Road requiring new signals, signal synchronization, curb extension, curb ramps	Medium
1b	Route 9 grade-separated crossing for Muddy River Path	Large
1c	Brookline Avenue Path repairs on section running parallel to Brookline Avenue (DCR)	Medium
2	Coolidge Corner and Harvard Street—Safety Improvements	
2a	Short-term Bicycle improvements between Shailer and Longwood as recommended in MassDOT study, plus improvements along entire length of Harvard as identified in Green Routes Plan: continuous 5-ft lanes, left turn queue boxes, advance stop areas, turning and intersection treatments	Medium
2b	Long-term improvement recommended in MassDOT study: continuous separated bike lanes between Shailer and Longwood	X-Large
2c	Bike lanes on Winchester, Centre and Park Streets for bicyclists wanting to bypass Coolidge Corner	Medium
3	Beacon Street—Safety Improvements	
3a	Rush Hour Bicycle Lane inbound from Charles Street to St. Mary's Street, and elsewhere along Beacon, via parking restrictions, signage	Small
3b	Safe passage outbound through Coolidge Corner from Pleasant Street to Marion Street	Large
3c	Bike-activation of in-bound U-turn signal at Charles Street	Small
3d	Improve outbound transition from the end of the bike lane near Westbourne Terrace to Washington Street intersection	Small
4	Washington Street	
4a	Continuous bike lanes from Beacon Street to Harvard Street in both directions, with protected cycle track in at least one direction and safety improvements at all T-intersections	X-Large
4b	Station Street to Route 9: Install bike lanes or protected bike lanes on east side to connect with bicycle accommodations at Gateway East	Medium
4c	Southbound protected left turn to Station Street	Small
5	Greenways in South Brookline	
5a	Provide a bike-safe greenway along Lee and Clyde Streets between Route 9 and Newton Street	X-Large

	Category/Project	Size s-25-50K m-50-250K l-250K-2M xl-2M+
5b	Bike lanes in both directions on Newton Street between Goddard Circle and Brookline/Boston border	Medium
5c	Provide a bike-safe greenway along Newton Street between Clyde/Newton intersection and West Roxbury Parkway, as well as West Roxbury Parkway and Hammond Pond Parkway	X-Large
5d	Bike lanes in both directions along Hammond Street between Beacon Street and Route 9.	Medium
5e	Provide a bike-safe greenway along Hammond Street between Route 9 and Horace James Circle	X-Large
5f	Provide a bike-safe greenway between Horace James Circle and Newton Street/West Roxbury Parkway merge	X-Large
6	Bicycle Parking	
6a	Add bicycle parking throughout town as specifically identified in Green Routes Plan	Small
7	Route 9	
7a	From east Town Line to Brookline Avenue provide safe pedestrian and off road cycle track to connect Muddy River path to Brookline Avenue	Large
7b	Provide cycle tracks (protected bike lanes) at sidewalk level, one on each side of Route 9, between Pond Ave and Washington Street	Large
7c	Provide cycle tracks (protected bike lanes) at sidewalk level, one on each side of Route 9, between Washington Street and Cypress Street	Large
7d	Provide cycle tracks (protected bike lanes), one on each side of Route 9, between Cypress Street and west town line in Chestnut Hill	X-Large
7e	Route 9 crossing at Chestnut Hill Avenue: add lanes connecting Chestnut Hill Avenue, Heath Street, and Lee Street.	Small

Appendix D

DETAILED RECOMMENDATIONS FOR BICYCLE ACCOMMODATIONS (BY STREET)

Beacon Street

Beacon Street outbound from Boston City line to Harvard Street: Upgrade bicycle facilities to protect cyclists better from moving motor vehicles and the door zone of parked cars. Install a curb-side bicycle lane protected from moving motor vehicles by the parking lane and separated from the parking lane by a three-foot buffer. This would require the following adjustments: (1) Narrow the motor travel lanes to 10 or perhaps 10.5 feet; (2) remove the three foot rumble strip and shift the two motor vehicle lanes to the left; (3) remove parking on the intersection approaches where left-turn lanes exist, and on the stretch between Pleasant and Harvard. Additionally, convert 4-6 parking spaces between St. Mary's and Carlton to very short-term loading and unloading zones, since illegal double standing occurs frequently on that stretch.

Cypress and Washington, near CVS

- Extend southbound bike lane toward Washington, to the CVS entrance. It's wide enough there to begin with a buffered bike lane.
- "Bend" the double yellow line before Searle so it better aligns with the double yellow after Searle.

Harvard Street

- 220 Washington: Change curb in no parking zone from gentle triangle to sharp S curve to discourage illegal parking that obstructs the bike lane with rear left portion of car.
- Washington and Harvard: Install a dashed bike lane through the intersection northbound. The geometry and desire line pulls autos into the bike lane.
- Washington and Andem: Narrow northbound rumble from right side so that northbound autos don't drift rightward into the bike lane to avoid strip, both before and after Andem Pl.
- 39 Harvard St: Paint a solid white bike lane line, not dashed. These may former bus stop locations in need of design update.
- 77 Harvard St: The northbound bike lane disappears with the addition of a left turn only lane. It's possible that combining the south bound bike and bus lane could create enough space for a northbound bike lane when combined with removal of several parking spaces on the southbound side.
- 100 Harvard St: Existing south bound bike lane paint worn down. Bicycle rider and arrow stencil remain. Need repaint, preferably solid to dashed.
- South bound just after Harvard Ave: Bike lane disappears; eliminate 2-4 parking spots to continue bike lane.
- Harvard St at Stop & Shop: Paint dashed line across north bound intersection (it is a signal controlled intersection).
- Harvard St at United Parish Church: South bound bike lane should have solid white line before crosswalk. This may be a former bus stop location.

- 251 Harvard St: Paint solid white line on both sides of bike lane all the way to crosswalk. Dashed insufficient.
- Harvard St at Beacon St: Consider installing paint to help organize bicycles. Perhaps a bike box. Perhaps arrows and language that indicate the left lane for turning left onto Longwood, right lane for straight movement. Again, this is for bicyclists turning left onto Longwood.
- 281 Harvard St: Install 9-month delineator posts to protect bike lane.
- Harvard and Green Street: Install a loading zone on Green St to provide a safe and legal loading zone to replace unsafe, illegal use of Harvard St.
- 284 Harvard St: Install 12-month parking. Perhaps bulb the curb and crosswalk here. Consider new Hubway station locations before determining permanent bike parking installation.
- 313A Harvard St: North bound bike lane lost to right turn lane due to painted yellow wedge in middle of road. Eliminating or reducing the north bound bulb out would allow for bike lanes in both directions, as would some “wobble” of the double yellow lines at the Beacon St intersection. Alternatively, eliminating the north bound right hand turn lane would provide adequate space.
- Harvard St Arcade Building: Southbound bike lane should have solid white lane through intersection. Because it is a T intersection and autos can never travel through bike lane to turn, drive, or park, the lane should be solid all the way through.
- 315 Harvard St: North bound should have painted a solid white line, not dashed. South bound should have a painted solid white line, not dashed.
- 322 Harvard St: Southbound bikes should have a left turn bike box to turn left onto Babcock St. Could extend left turn queue backward with slight repaint of double yellow. Add left turn sharrows in left turn queue lane.
- Harvard St Devotion School: Northbound bike lane disappears. Perhaps move red brick curb and hydrant inward, remove Stedman Street bulb out. Move handicap parking spot elsewhere. Could achieve bike lane continuity by just moving the handicap spot and shave down the Stedman Street bulb out. Would have to realign crosswalk.
- 369 Harvard St: Painted yellow wedge far too wide. The north bound bike lane could be preserved on this side of Stedman Street, perhaps requiring bulb out removal/shave and elimination of one parking space.
- Harvard St Kehillath Israel: Paint solid white line, not dashed. This may be a former bus stop location.
- Harvard St at Beals: Bike lane north bound near intersection should be solid, not dashed. South bound should be continuous solid.
- 405 Harvard St: No north bound bike lane between Naples and Fuller. Would have to eliminate a parking lane or north bound left turn lane.

- Harvard St and Fuller St: Consider removing left turn lane from Harvard north bound to Fuller. If it can be eliminated, there becomes room for bike lanes on both sides of intersection. Could use a leading green in one direction (with green arrow) to clear left turning vehicles.
- Harvard St between Fuller St and Coolidge St: If left hand turn lanes at Fuller can't be removed, consider eliminating the north bound bike lane and installing a south bound bike lane. The south bound direction is much more continuous than the north bound; performing this change would preserve a nearly-continuous southbound lane.
- Harvard St and Verndale: Paint a solid white line north bound before Verndale stop bar, not dashed. This may be a former bus stop location. Install dashed white lines through Verndale signalized intersection in both directions. Shave south bound bulb outs both before and after Verndale St to allow for full bike lane width across intersection.
- Harvard St, Boston: All long white lines have been lost. Repaint.

Route 9 grade-separated crossing for Muddy River Path

Even with an at-grade crossing of Route 9 for the Muddy River path, a grade-separated crossing using the existing highway bridge is a useful option to consider. Project elements include: (a) Re-deck the existing highway bridge carrying the Riverway/Jamaicaway over Route 9, shifting travel lanes in order to create a barrier-separated two-way shared-use path along the western edge of the bridge. (b) South of the bridge, regrade the southwest island and build a path that winds down from the bridge to the existing crosswalk that crosses the on-off ramp and leads to the existing paths around Leverett Pond. (c) Reconfigure the junction of River Rd with Riverway, closing the off-ramp (creating more green space) and having the on-ramp meet Riverway at 90 degrees. (d) North of the bridge, this path will have no direct access to Route 9. Continue it from the bridge as a barrier-separated path within space now occupied by the highway, curving it away from the highway onto the existing bridge over the Muddy River, and then curving it back again to cross the on-ramp from River Road to Riverway. A Northeastern University senior design project details the design and shows it to be feasible and cost-effective. There is a \$600,000 federal earmark for this path crossing. Various parts of this route are controlled by different governmental entities, and cooperation would be necessary to plan and construct this project. This link is also very important to Boston's bicycle program.

Washington Street

The section of Washington Street northwest of Beacon Street appears to be in the best condition for bicyclists and pedestrians, although the preservation of parking and a turn lane results in no westbound lane for the ~200 feet west of Beacon, and no eastbound bicycle lane at all, merely sharrows. A Complete Streets approach to Washington Street would include continuous bike lanes in both directions, at a minimum, on this portion. It would also maintain safe crossings at Beacon, near Driscoll School, and elsewhere as needed, with curb bulb-out adjustments to eliminate the hazard to bicyclists. A review of bus station accommodations is also appropriate.

The section between Beacon Street and Cypress Street is in poor condition. The pavement is poor, the bicycle conditions sporadic, some crosswalks have poor sight lines, and there are no bus station accommodations. The crosswalk along Washington Street crossing the one-way Weybridge Rd is too long, on the order of 100 feet, and should be shortened considerably. The bicycle lane heading northwest-bound (uphill) is frequently obstructed by parked cars when it is curbside, and the southeast-bound

bicycle lane (downhill) is nonexistent in portions where preserving parking in front of homes was given priority. A recent project to improve Greenough Street resulted in a better unsignalized pedestrian crossing at Greenough and Beacon. A Complete Streets treatment of this section would include continuous bicycle lanes (or protected bicycle lanes, or cycle tracks) in both directions, from Beacon Street all the way to Cypress Street. It would calm traffic between Park Street and Beacon Street, improve crosswalks, and provide bus stop accommodations.

A consistent treatment along the entire section between the northern town border and Cypress Street is very desirable, and should be possible. Washington Street has a few different widths: 40' near Brookline Village, 43.5' nearer Washington Square, 41.5' north of Beacon. One possible approach would entail the following:

1. Northwest of Cypress on the 40' stretch:
 - a. Remove parking in the southeast-bound direction
 - b. 5' bike lane northwest-bound
 - c. 3' buffer
 - d. 7' parking lane
 - e. 10' northwest-bound motor vehicle lane
 - f. 10' southeast-bound motor vehicle lane
 - g. 5' unprotected bike lane southeast-bound
2. On the 41.5' stretch, add a 1.5' buffer between the southeast-bound bike lane and the travel lane
3. On the 43.5' stretch, increase the 1.5' southeast-bound bike buffer to 2' and add a 1.5' buffer between parking lane and northwest-bound travel lane.
4. Eliminate or convert bulb-outs on northwest-bound side to floating islands so bike lane can go straight through, and remove bulb-outs on southeast-bound side. The pedestrian crossing distance would remain about the same with this approach.
5. At Beacon Street intersection, the southeast-bound bike lane and the right turn lane might need to coincide.
6. Review the Washington Street and Gardner Road intersection configuration. As designed, it is difficult for pedestrians crossing from the southeast-bound side of the street to the northwest-bound side to see traffic traveling in the southeasterly direction. Similarly, it is difficult for cyclists and motorists turning from Gardner Road to Washington Street to see southeast-bound traffic. This reconfiguration may require a slight relocation of the Route 65 bus stop in the northwest-bound direction.
7. Reconfigure the curbs at the corner or corners of Washington Street and Weybridge Road so that the outlet onto Washington is farther from the Park Street intersection and safer for pedestrians walking along Washington Street.

The portion of Washington Street between Cypress/School and Route 9 has well marked crosswalks, although crossing both at Harvard Street and at Station Street present challenges for pedestrians. This portion contains a bicycle lane on the northwest-bound direction, and on the southeast-bound portion between Harvard Street and Route 9. Although there are not frequently observed obstructions on the portion between School and Harvard Streets, there are obstructions due to poorly or illegally parked cars on the bike lanes between Harvard Street and Route 9. Due to the interest in preserving parking on both sides of the street, sharrows exist for a portion of the southeast-bound direction. This portion of Washington Street contains both Route 65 and, in some places, Route 66 bus lines, but also lacks accommodations for passengers waiting for bus arrival. Implementing a Complete Streets treatment will be a challenge in this section of Washington Street, as the right of way simply doesn't allow for two motor vehicle travel lanes, two bicycle lanes, two parking lanes, and two sidewalks. However, in order to achieve a continuous network of bicycle friendly streets, a serious Complete Streets effort is needed. For starters, a few minor adjustments that would improve this section for bicyclists include the following:

1. At 220 Washington, change curb in no parking zone from gentle triangle to sharp S curve to discourage illegal parking that obstructs the bike lane with rear left portion of car.
2. At Washington and Harvard, Install a dashed bike lane through the intersection northbound. The geometry and desire line pulls autos into the bike lane.
3. At Washington and Andem Place, narrow the northbound rumble strip from right side so that northbound autos don't drift rightward into the bike lane to avoid strip, both before and after Andem Place.
4. Establish a 20mph Safety Zone along this section.
5. On Washington Street southbound, provide a protected left turn onto Station Street: This left turn is both heavily used and difficult for both cyclists and motorists because traffic on Washington Street northbound crests a hill while coming around a bend. Although there is a light at this intersection, left turning traffic cannot see when the northbound traffic has a red and when it is therefore safe to turn. A protected left turn would increase safety at this busy intersection that provides access to the Brookline Village T Station (with its Hubway station), to Kent Street, Aspinwall and beyond.

Appendix E

MassDOT Bicycle and Pedestrian Safety Awareness and Enforcement Program
published 16 August 2016

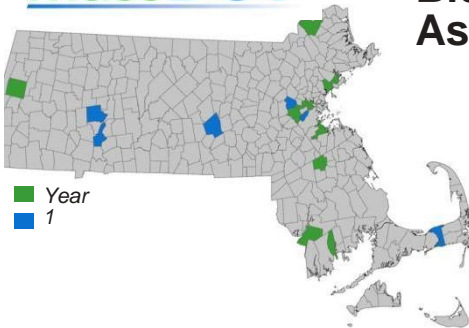
in partnership



walkBoston®



Bicycle and Pedestrian Infrastructure Assessments Brookline, MA



Harvard Street Corridor: Longwood Avenue to Shailer Street

Brookline is one of 18 communities participating in the MassDOT multi-disciplinary program to improve bicycle and pedestrian safety in Massachusetts. One of the components of the MassDOT program is to conduct walk and bike assessments that identify infrastructure challenges to walking and biking and recommend short- and long-term improvements. These assessments are also a means of building local knowledge of the importance of well-designed pedestrian and bicycle facilities. WalkBoston and MassBike conducted an assessment of Harvard Street in Brookline, MA.

Corridor-wide Recommendations

Short-term Recommendations:

1. Conduct a traffic analysis of the corridor and surrounding street network for potential mitigation of traffic flow along the corridor.
2. Reduce pedestrian tripping hazards by replacing sidewalk panels and further implementing the Town's pervious tree grate program.
3. Develop strategies to improve the quality and health of street trees, such as installation of permeable pavement.
4. Identify citizen or business sponsors to install, program, and maintain parklets in high pedestrian area.
5. Add bicycle left-turn queue boxes, where feasible.
6. Modify the "WALK YOUR BIKE" signs or rotate the signs to clarify the circumstances in which bicyclists should walk their bikes.
7. Install additional bike parking or on-street bike corrals in convenient and visible locations throughout the study area.
8. Install pedestrian countdown indications at signalized intersections.
9. Review or reevaluate far-side bus stops to replace existing near side bus stops.

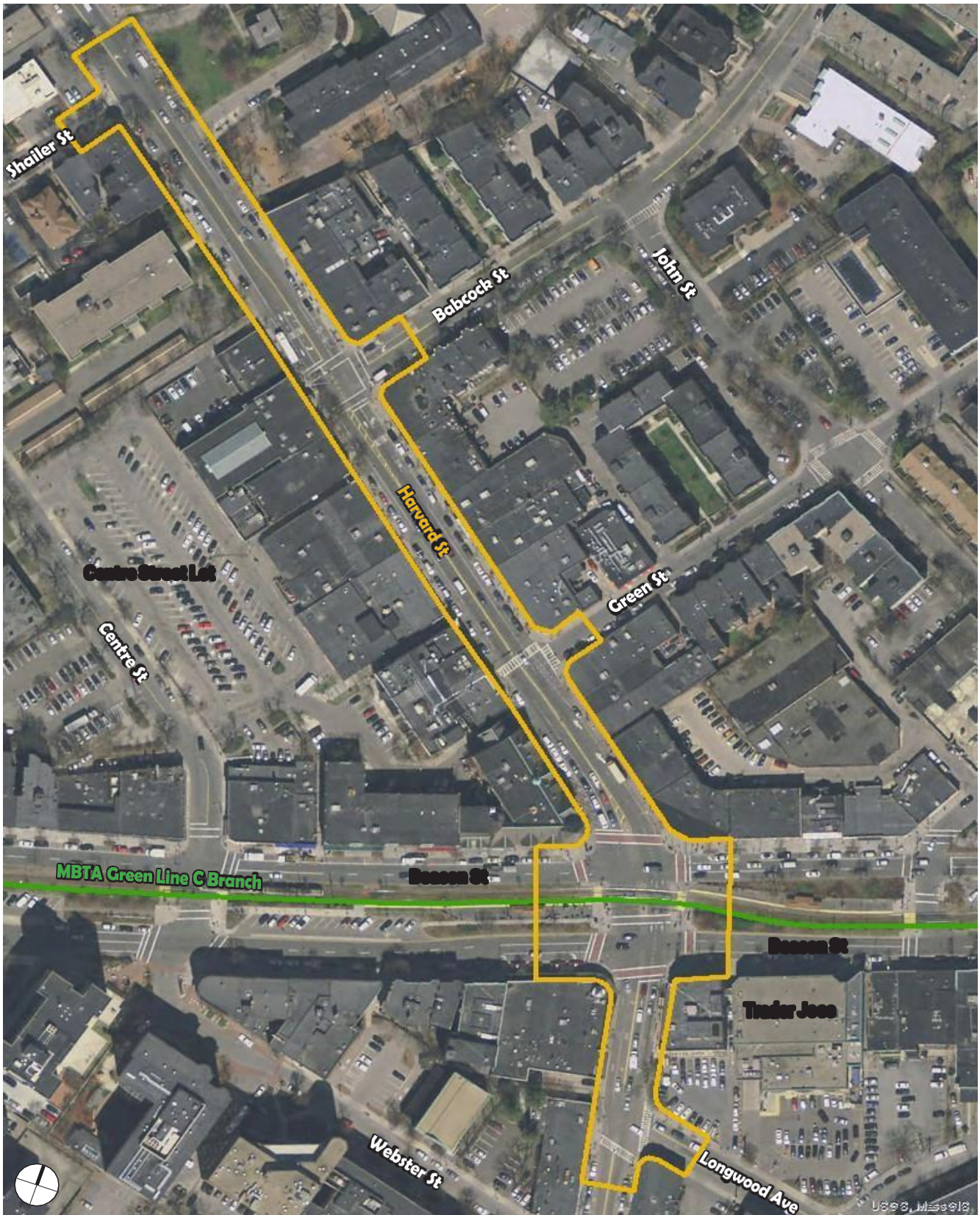
Long-term Recommendations:

1. Provide continuous separated bike lanes or bike lanes throughout the study area by conducting further analysis on the potential to narrow travel lanes, remove travel lanes, or remove parking

2. Further study feasibility of relocating on-street parking north of Beacon Street to Centre Street parking lot to provide wider sidewalks and high quality bicycle facilities.
3. Provide bicycle facilities on nearby Centre Street, Winchester Street, and Park Street which may provide an alternate route for bicyclists routing around Coolidge Corner.
4. Reconstruct curb ramps to meet accessibility standards.
5. Shorten crosswalks with curb extensions or pedestrian crossing islands where such treatments would not interfere with current or future bicycle facilities.



Assessment Area



Intersection Recommendations



Harvard St at Longwood Ave

Short-term:

1. Further study the potential to signalize the intersection and coordinate with the intersection of Beacon Street.
2. Add 'Don't Block the Box' markings and signs that conform to the latest version of the MUTCD.
3. Restrict left turns from Longwood Avenue onto Harvard Street southbound.
4. Further evaluate the intersection of Harvard Street/Sewall Avenue for an increase in left turning vehicles.
5. Install in-street warning signs on the Harvard Street and Longwood Avenue crosswalks.
6. Widen bicycle lane by reducing width of travel lanes and install flexposts.
7. Remove warning signs and replace with a bike lane sign.

Long-term:

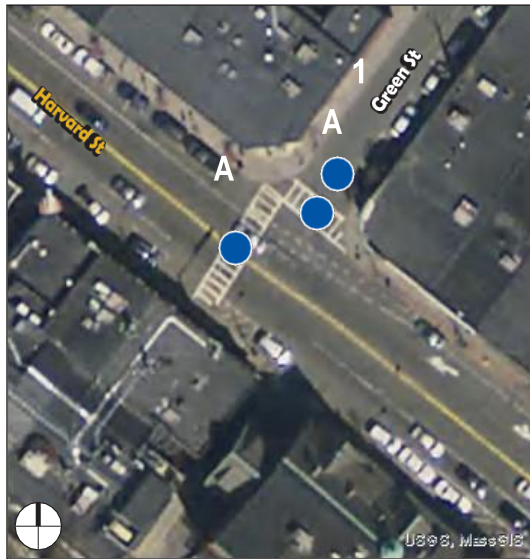
- A. Shorten crosswalks with curb extensions or pedestrian crossing islands where such treatments would not interfere with current or future bicycle facilities.



Harvard St at Beacon St

Short-term:

1. Reduce width of travel lanes to provide continuous bike lanes.
2. Reallocate the space for bicycle facilities for the Beacon Street westbound approach.
3. Remove the two existing small medians and reallocate space to other users.
4. Replace the existing crosswalks with high visibility ladder style crosswalks.
5. Further study the feasibility of providing one stage crossings across Beacon Street.
6. Extend leading pedestrian intervals.
7. Maximize pedestrian crossing times for all approaches.
8. Install bicycle box for the Harvard Street southbound approach to Beacon Street.
9. Install wayfinding signage on southbound Harvard Street north of Beacon Street to inform drivers of the need to position for a left turn onto Longwood Avenue prior to Beacon Street.



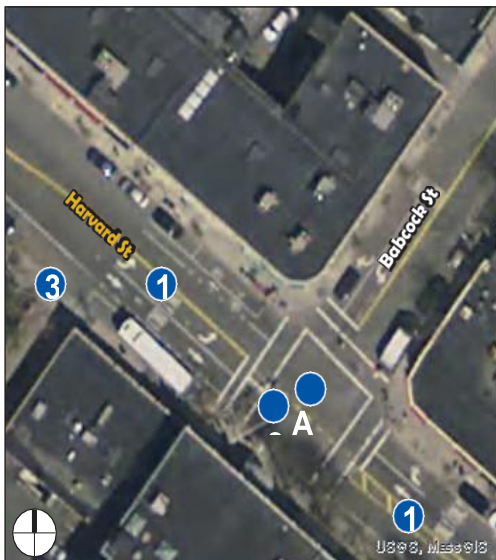
Harvard St at Green St

Short-term:

1. Evaluate adding contraflow bicycle lane on Green Street and potential intersection improvements at Harvard Street and Green Street.

Long-term:

- A. Shorten crosswalks with curb extensions or pedestrian crossing islands where such treatments would not interfere with current or future bicycle facilities.



Harvard St at Babcock St

Short-term:

1. Adjust pavement markings to provide a minimum of a 5-foot bike lane by narrowing the travel or parking lane.

2. Modify signal to lagging left-turn instead of leading left turns to allow people waiting to cross first.
3. Close exit driveway from Centre Street parking lot or restrict parking by removing adjacent parking meters, adding no parking pavement markings, and adding no parking signs.

Long-term:

- A. Coordinate intersection improvements with the selected Babcock Street alternative.

HAMMOND STREET CORRIDOR– PUBLIC MEETING

SUMMARY & RECOMMENDATIONS

CREATED FOR:

The Brookline Bike Advisory
Committee Town of Brookline, MA

CREATED BY:

The Emerald Network Initiative
LivableStreets Alliance

The logo features a stylized green and blue geometric shape above the text "EMERALD NETWORK".

**EMERALD
NETWORK**
Connecting Our Urban Greenways

September 2017

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- b) Location specific recommendations

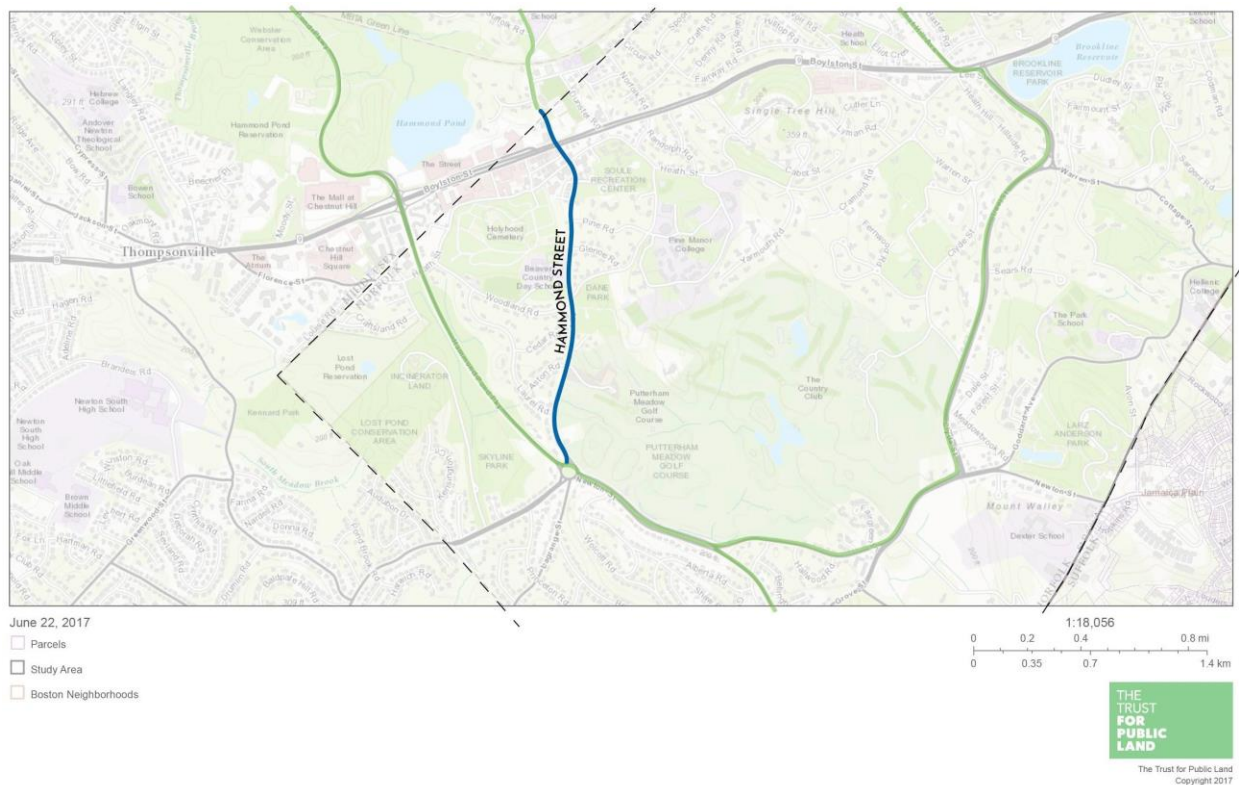
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- c) Street Audit Results
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I. PROJECT INTRODUCTION

Hammond Street Greenway Project:

Featuring dedicated bike lanes in the short term and separated walking and bicycle tracks in the long term, the proposed Hammond Street Greenway will enhance connectivity and mobility choices along a street dotted with parks, schools and single family homes.



a) Greenway Partners Program:

To support the completion of the 200-mile Emerald Network, the Greenway Partners Program selected 6 community partners to receive capacity-building aid in advancing proposed greenway projects.

Through the program, LivableStreets provides technical assistance to each of the six partners. The support is customized to fit the unique opportunities and challenges posed by each community, and includes a mix of encouraging community engagement, developing

design concepts, commissioning feasibility studies, hosting community workshops, and building public and political support. Read on below to learn more about each of our current partners.

b) Project process

The Brookline Bicycle Advisory Committee is responsible for advising the Brookline Transportation Board on making improvements to bicycling in the Town. In 2008, the Committee developed a Green Routes Bicycle Network Plan to serve as a guide to creating a safe bicycling network throughout the Town; the plan is revised annually to reflect progress made and to incorporate new ideas and advances in bicycle infrastructure design.

A greenway on Hammond Street has been part of the plan from the outset. With technical assistance and support from LivableStreets Alliance, the BAC undertook two outreach efforts to seek community input on this project: (1) An information table with maps and post-it notes at the annual Climate Week event allowed everyone who wished to make comments and suggestions on this and other possible improvements to cycling in Brookline to do so. (2) As described in this report, a community workshop was held to specifically engage the local community to identify problems and suggest ideas for improving Hammond Street for cyclists and pedestrians.

Possible bicycling accommodations will be discussed by the Bicycle Advisory Committee in its public meetings, and recommendations will be made for improvements to Hammond Street. Specific designs will be prepared by staff of the Transportation Department and reviewed by the Transportation Board at its public meetings. Once a plan is approved, funding will be sought through the Town's Capital Improvement Projects budgeting process.

II. PUBLIC WORKSHOP

Venue:

Beaver Country Day School

Attendance:

Approximately 30 people participated.

a) Workshop Highlights:

- A walk along Hammond Street followed by a Street Audit (Appendix A). The results of the walking audit can be found in Appendix B.
- A personal testimony by Nia Negron for improvements to the corridor that would improve connectivity and safety for people on foot. A copy of Nia's testimony is included in Appendix C.

b) Format:

- [Optional] Hammond Street Walk
- Introductions
- Project overview presentation
- Breakout group work
- Report back and closing remarks

III. COMMUNITY INPUT

The input gathered from the community members in attendance is summarized below in two sections:

- a) **Workshop Themes:** A list of overarching themes expressed throughout the workshop by the attendees.
- b) **Location Specific Comments:** These comments are geographically tied along Hammond Street.

a) Workshop Themes:

Issues along Hammond Street:

- **Speeding** is an issue for the entirety of the corridor. Some tactics proposed to reduce speeds are:
 - Narrow lanes
 - Fewer lanes
 - Flexposts to mark bike lanes and tighten turning radius at key intersections.
 - Speed humps and tables at intersections
 - More trees
 - Bike paths
- **Sidewalks** are in a state of disrepair in several sections along the corridor and nonexistent on others.
- There is a lack of safe crossings at **intersections**.
 - Crosswalks are long in several locations because of wide turning radiuses. For example at Hammond Street & Aston Road.
 - There are very few crosswalks to get from one side of Hammond Street to the other along the corridor.

Solutions:

- Reduced speeds
- Fewer lanes for cars
- Intersections can be improved for all modes by creating:

- Raised crossings and speed tables to discourage speeding
- Pedestrians islands/refuges for crossing
- Crosswalks both along and across Hammond Street
- Continuous, improved, and well-maintained sidewalks on both sides to create safe pedestrian accommodations.
- More trees to narrow the perceived width of the street

b) Location Specific Comments

Hammond Street and Woodland Rd:

- Problems with sightlines for people coming off Woodland Rd. It is unclear whether the proposed redesign will solve that.
- Speeding is an issue at the intersection.

Hammond Street and Pine:

- There are no accommodations for crossing in front of the day care. This is an extremely unsafe place for people on foot.
- The Sidewalk is in poor condition between Pine Rd and Soule Recreation center.

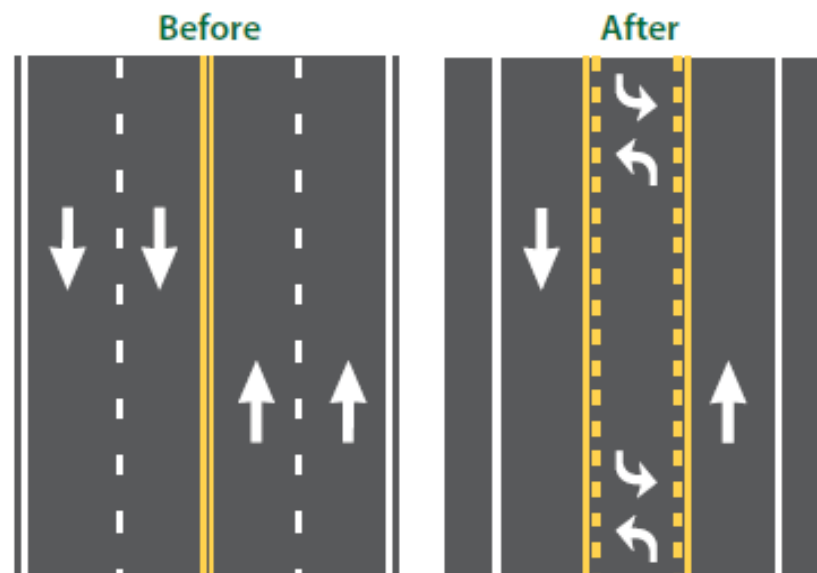
Hammond Street and Hammond Pond Parkway:

- The rotary is a major divider in the community.
- There are no crosswalks at any of the feeder roads, making it impossible to cross safely and lawfully.
- There is an existing traffic signal at the Brookline fire station but no crosswalk for pedestrians, even though people from the community could walk to it on voting days.
- Traffic queues up in the evening to Laurel Road. The intersection needs to be thought through for better flow.

IV. RECOMMENDATIONS:

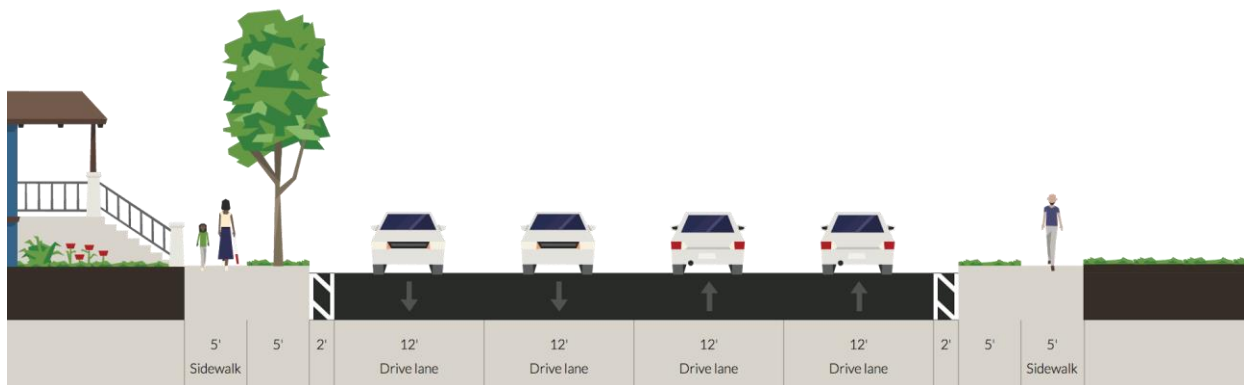
a) Corridor recommendations:

- **Commitment to Vision Zero:** Speeding along the corridor was cited as a major issue by multiple workshop attendees. As cities in the region prioritize safety for all people on their streets, it is important for Brookline to respond with infrastructure improvements that fulfill Vision Zero. Hammond Street should be designed for a speed limit of 25 miles an hour that is self-enforcing. The attendees discussed several ways of achieving that, discussed in details below.
- **Road Diet:** A recent study conducted on one of the busiest intersections along the corridor, Hammond Street and Woodland Road revealed too much capacity on the roadway that could be narrowed to enhance safety for all users. In that vein, the desire for a road-diet was strongly expressed. Federal Highway Administration's standard toolkit can be applied to the entire stretch of Hammond Street in Brookline to reduce the number of lanes from 4 to 3, with a two way turn lane in the middle (see diagram below). Additionally, FHWA, AASHTO and NACTO guidelines recommend lane widths of 10 - 11' for safe driving speeds in urban areas. Narrowing the lanes creates a perception of constricted roadway among automobile drivers inducing slower speeds and safe driving habits.

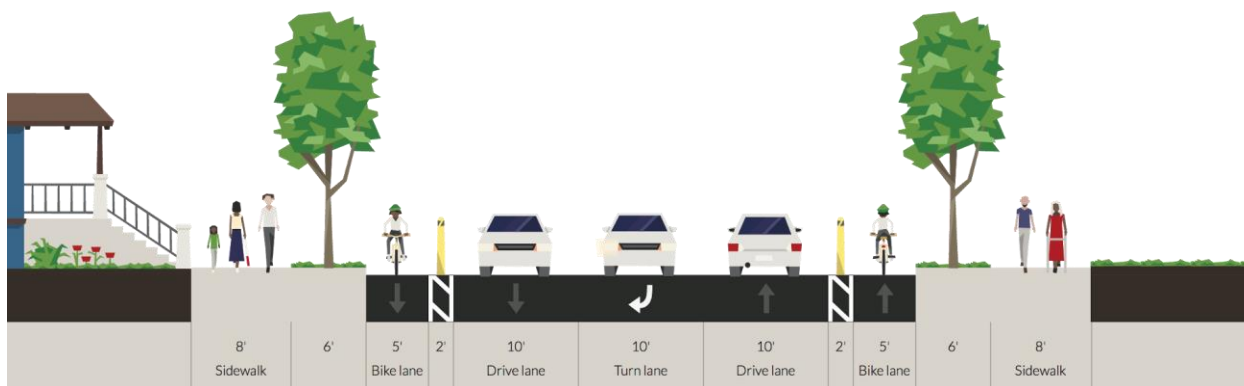


4 lane to 3 lane road diet (Source: Federal Highway Administration)

- **Remove Shoulders** and reallocate space for bicycle lanes and landscaping: AASHTO guidelines recommend no shoulders for streets designed for or below 35 miles/hour. Given the central location of the roadway in the community and a proposed design speed of 25 miles/hr, the shoulders of both sides of the streets should be reallocated to bicycle lanes and landscaping to support tree growth.
- **Typical Section** to accommodate street trees, enhanced sidewalks and bicycle infrastructure. The space attained/saved by removing a traffic lane and shoulders should be reallocated to better infrastructure for people on foot and bicycles wanting to travel to the various destinations along Hammond Street and beyond in a safe manner. See typical existing road section and proposed section below. One travel lane each direction with a center turn lane is recommended throughout the corridor except at the two ends of the street, the third lane would become a travel lane in the direction approaching the James rotary on one end and Route 9 on the other end.

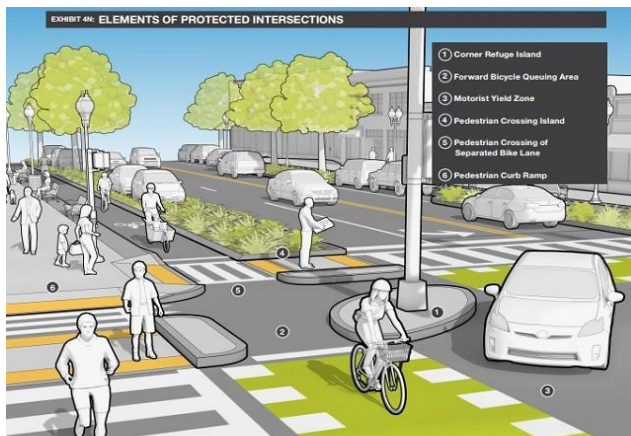


Hammond Street Existing Cross-section (Approximate)



Hammond Street Proposed Cross-section

- **Connectivity** throughout the town should be at the forefront of each conversation, irrespective of the scope of one particular project. Workshop attendees often made references to destinations beyond Hammond Street demonstrating the need for connectivity and continuity in infrastructure for people walking and bicycling. People rarely use streets unless they are trying to get to some place, and it is important to the success of Hammond Street that the proposed improvements to the corridor don't end at the project extremities.
- **Safe Intersections:** All intersections along Hammond Street are important for a variety of reasons. For example, the Soule Recreation center is a family destination, Woodland Street intersection is home to a Beaver Country Day School, and Pine Road, Glenoe Road, Laurel Road and other side streets are dotted with homes. Aligned with the road diet throughout the corridor, these intersections should be much safer for people walking and bicycling, and that can be achieved by doing the following:
 - Crosswalks: Standard crosswalks, curb cuts and yield signs to be added wherever missing.
 - Tighter Turning Radius: To improve sightlines and reduce speeds, all turning radii should be made tighter. Additionally, tighter turning radii bring people waiting at the corners visually closer to the driver making it easier to be spotted.



Left: Elements of protected intersections (Source: MassDOT), Right: A tactical approach to narrowed intersections (Source: Austin, Texas)

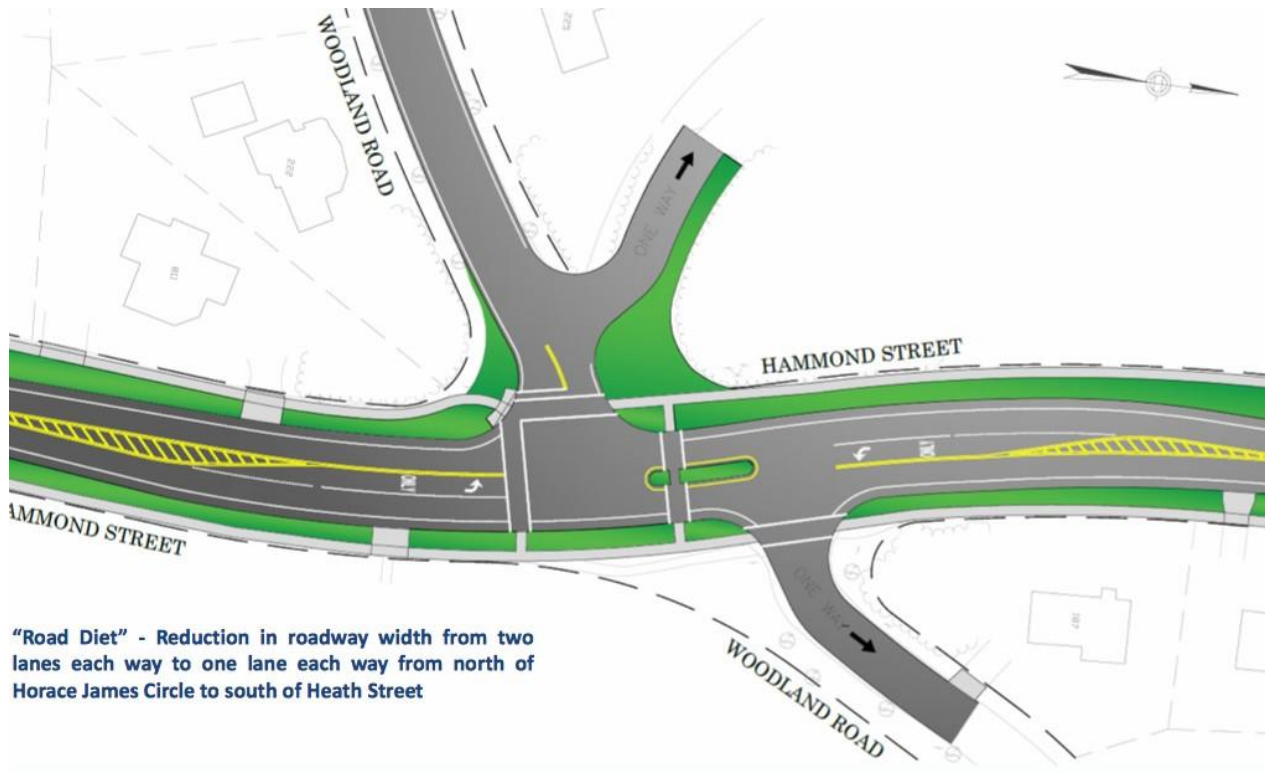
b) Location Specific Recommendations:

- **Soule Recreation @ Hammond Street:** A family friendly destination with playground, splash pad and athletic field, has three crossing treatments on Hammond Street. The multitude of etchings make it confusing for pedestrians and drivers alike, while doing little for the overall safety. A raised crossing is recommended for this location to make it legible for people crossing, a speed deterrent for those driving.



Left: Existing Condition at Soule Recreation looking across Hammond Street (Source: Google Street View), Right: Example proposed raised intersection (Source: Federal Highway Administration)

- **Hammond Street and Woodland Road:** The intersection improvement study completed by the Transportation Division of the Town of Brookline covers three alternatives including - unsignalized with road diet, signalized with road diet and a roundabout. We strongly recommend going forward with the unsignalized option for two reasons (see diagram on next page):
 - Participants shared concerns about the width of the road for people on foot, and we feel that the unsignalized option narrows the roadway enough to make it safer to walk.
 - Participants at the meeting shared one of their major concerns coming off Woodland Road as obstructed sightlines. Tightening of the intersection significantly by a bump out will bring pedestrians waiting at the corner into the vision cone of drivers.
 - A signalized intersection may be proposed as a last resort to assuage community concerns, however, the traffic experts associated with LivableStreets Advocacy Committee recommend otherwise.



Unsignallized Intersection with Road-diet (Source: Town of Brookline)

- Gateways and wayfinding:** Faster speeds along the corridor and introverted design of various green spaces has led to many people in the town not making them a part of their daily journey on foot and bicycles. Wayfinding oriented more towards slower moving modes on the future greenway will have a significant effect on people's level of comfort and thus increased foot traffic on the greenway. Additionally, Town of Brookline should consider gateway treatments for both extremities of the project within the town boundary as a part of wayfinding design to promote a sense of place and awareness of the surroundings.

V. APPENDICES

a) Workshop Sign-in Sheet

Hammond Street Workshop Attendees				
First Name	Last Name	email	ZIP	Street
Jenice	Kahn	jski514@aol.com	02467	
Doris	Hanna	dhanna@rcn.com	02467	
Peter	Vicars	vicars@gansummer.com	02467	
Rubin	Pfeffer	rubinpfeffer@gmail.com	02467	
K	George	kay-george@rcn.com	02467	Hammond
Regina	Frawley	reginafrawley@yahoo.com	02467	
Jaak	Vilms	ljvilms@comcast.net	02467	
Hugh	Joseph	hjoseph@tufts.edu	02467	676 Hammond
Marian and Jerry	Lazar	lazar32@verizon.net	02467	32 Craftsland
Blair	Hines	bh@verdantla.com	02467	745 Heath
Carla	Beuka	rcvben@earthlink.net	02467	26 Circuit
David	Kobes	david2.kobes@gmail.com	02467	629 Hammond
Jose	Negron	jose.negron2004@gmail.com	02467	856 Hammond
Jane	Flanagan	flanagig@bc.edu	02467	854 Hammond

b) Street Audit

Street Audit

Date:

Time of day:

1. Information about you:

Name (optional): Age:

Location(s) of observation:

2. How did you traverse the area?

☐ You walked

☐ You biked

Outstanding

Poor

3. Overall experience

Walking (if applicable):

Biking (if applicable):

4. Level of perceived safety

Along the corridor:

At Intersection:

(name the intersection)



5. The corridor serves the following modes adequately (Select all that apply)

☐ People walking

☐ People on bicycles

☐ People in cars

☐ Other (specify)

6. Briefly describe your primary concerns for:

A. People WALKING:

B. People in WHEELCHAIRS:

C. People pushing a STROLLER:

D. People on BICYCLES:

E. People driving an AUTOMOBILE:

If you could change ONE thing about this section of the street, what would that be?

.....

.....

.....



c) Street Audit Results

Street Audit Hammond Street, Brookline Thursday, June 22, 2017, 6:00-6:30 PM

4 walkers, 1 cyclist (2 of the walkers who are also cyclists, evaluated from both perspectives)

	No. of responses	Rating	
Overall experience:			
Walking:	2	4 (poor end of scale)	
	2	3 (average)	
Biking:	1	3	
	4	4-5	
Perceived safety:			
Corridor:	3	4-5	
Intersection:	4	4-5	Hammond at Woodland
	1	3	
Comments:	<i>Hammond and Woodland; Hammond and Pine: YIKES!</i>		
Adequate served:			
Walking:	2		
Biking:	1		
Driving:	3		
Comments:	<i>Egress for abutters less than adequate</i>		
Concerns:			
Walking:	<i>Noise! Crossing streets! Sections without curbs seem extra dangerous ADA not fully adhered to at intersection; no blind pads Intersection safety; traffic noise</i>		
Wheelchairs:	<i>Same (Intersection safety; traffic noise) Intersection appears accessible for wheelchairs (Woodland) Sidewalk OK for most part; tree roots pushing up in places Cars don't wait for 90-year-old in wheelchair. Also met dog at risk in crosswalk</i>		
Strollers:	<i>Sidewalk seems OK Same (Intersection safety; traffic noise)</i>		
Bicycles:	<i>Traffic speed makes it dangerous Speed is counter-intuitive to bike comfort No shoulder; fast cars' poor surface condition Sharing road with speeding cars; rough road</i>		
Automobiles:	<i>Speed and passing cars; turning from Hammond onto Woodland; entering Hammond from Woodland Geometric of Woodland not conducive to lower speed</i>		
One thing to change:	<ul style="list-style-type: none"> ○ <i>Do something to make it safe for walkers to cross Hammond St.</i> ○ <i>Reduce 85% vehicle speed; review potential of lane reduction</i> ○ <i>In a word, it's treacherous and unbikeable!</i> ○ <i>Slow cars down</i> ○ <i>More trees</i> 		

d) Personal testimony: Nia Negran

Nia

Hi, my name is Nia Negran. I go to Baker School in Brookline and I'm in 5th grade. I love Baker and Brookline, but there is one problem. On Hammond St. Where the fire station is, there isn't a crosswalk. My dad, my brother, and I would love to walk to school more often, but it is too dangerous, that we have to drive to school. Every day, joggers, runners, people who walk their dogs etc. have to go through the streets without a crosswalk. I imagine I am jogging to Dane Park from school. I have to pass the roundabout to get there and for anybody no matter what age, it's so dangerous especially for kids. If we had a crosswalk in the front of the fire station it would be so much easier for so many people. People also have to go to the fire station to vote. Think of how difficult that would be! All I'm saying is that if we had a crosswalk in front of the fire station on Hammond St. It would make people's lives better, easier, and safer. Thank you