# *Green Routes Bicycle Network Plan*

Brookline Bicycle Advisory Committee

November 10, 2008
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## 1. Vision for a Bikable 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. With 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. A survey indicated 70 bicycles parked in Coolidge Corner at mid-day on one September Saturday.

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 is scheduled for 2013.

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 and on Harvard Street disappear at intervals, leaving cyclists in heavy traffic; furthermore, the bike lanes barely clear the "door zone" of high turnover parking

lanes. Double parking is also a problem as it blocks bike lanes and forces cyclists to stop abruptly or swerve into traffic. The Emerald Necklace path (Muddy River to Leverett and Jamaica Ponds) is interrupted by the dangerous crossing of Route 9. The Charles River bicycle path is just a few hundred feet from Essex Street in Brookline, but the dangerous crossings approaching Commonwealth Avenue renders it practically inaccessible to many.

> The need for safe and "green" bicycle routes is a recurring theme in recent Town planning documents. The *Parks, Open Space and Recreation Strategic Master Plan* (2006) reported that *"more trails and bike paths"* was the third most popular funding priority among Brookline residents. The Conservation Committee's *Open Space Plan 2010* states:
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> > During the Open Space 2010 Plan public forums, comments from Brookline residents stressed the need for improved bicycle and pedestrian routes, access to open space, and greening of roads and bike trails
> >
> > … There is a need to identify and protect important existing greenways in town, and to identify key transportation corridors that can be developed into greenways through improvements to pedestrian and bicycle amenities, and increased vegetation.
>
> Similarly, *Brookline Comprehensive Plan 2005-2015*, recommended that the Town
>
> > … prepare a bicycle/pedestrian master plan that outlines a system of connections between neighborhoods, activity centers, and public open spaces.
> >
> > … provide safe and attractive pedestrian and bicycle access Town-wide to all major open space destinations.

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.

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, 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 10 years at a cost of about $2 per year per resident.

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

- Section 2: Network plan
- Section 3: Roadway treatments
- Section 4: Signage
- Section 5: Project list

- 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

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 of bicycles 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 roadwork is done.

However, for the Town to plan and implement bicycle-related safety improvements, the BAC 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 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 might be acceptable for motor traffic. 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 like 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 Road, Aspinwall, Kent, Davis, Greenough, Sumner, Clark Road, Clinton, Eliot, Cleveland, Reservoir, Middlesex, Hammond, and Heath Streets.

- **South of Route 9** is a cross town route along Heath, 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 to 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, Dana 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.

Roadway treatments are described in the next section. Priorities for completing the network are listed in Section 6, and detailed recommendations for individual streets are listed alphabetically by street name in Section 7.

# 3. Roadway Treatments

The network may be divided into four levels:

- *Level One: Off-road paths* such as the Muddy River Path.

- *Level Two: Slow traffic streets.* Much of the bicycle network follows low speed streets where parking turnover is minimal. 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 streets" that link streets with bicycle accommodations or link Brookline streets to town borders.

- *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 accommodation 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, and Washington Street are Brookline's main streets that carry through traffic and host commercial centers with high turnover parking. These important functions limit the degree to which roadway space can be devoted to bicycles. However, because of their importance as both through routes and destinations, these streets should be improved to accommodate bicyclists more safely.

Although some bicyclists mix comfortably with moderate speed motor traffic, the majority of the 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 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 to allow bicyclists to avoid the "door zone," the area 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.

- ***Bicycle priority lanes*** are shared travel lanes (bike and motor vehicle) with "bicycle zone" indicated by roadway markings. These lanes are appropriate for streets with speeds up to 30 mph. Shared lane arrows ("sharrows") have been marked on streets in many cities, including Cambridge and Montreal. 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 streets where a full bike lane is impractical.

- ***Bike boxes.*** A bike box is a marked queuing area for bikes between the stop line and the crosswalk at a signalized intersection. Bike boxes improve safety by putting stopped bikes ahead of cars that may turn right when the light changes, and by giving left-turning bicyclists a protected path during the red phase of the cycle. 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 "center" line; however, the lane in the contraflow direction is narrow because only bikes are permitted in that direction. An analogy is contraflow bus lanes, used on Washington Street in Boston. "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 has an excellent safety record in Europe and America. Cambridge has four contraflow sections; Provincetown has two-way bicycling and one-way motor traffic all along Commercial Street, its principal thoroughfare. 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 have been successfully implemented on Netherlands and Parkway Roads. 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.

- ***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.

- ***Roadside bicycle paths***, also called *cycle tracks*, parallel 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.

  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.

  Normally, 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.

# 4. Signage

As *Green Routes* are established, they should be marked using *way finding* or *destination signage*. In this scheme, routes are not named or numbered, but are indicated by signs stating where the route goes, as shown in Figure 1a (from the Netherlands) and 1b (based on a style developed in Chicago). They use a single sign to convey the same information carried by three signs in the old U.S. standard format (Figure 1c, from Brookline's Harvard Street). To the extent possible, Brookline's signing scheme should be coordinated with signing plans in other Boston area communities.

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

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.

**Figure 1: Destination Signs**

**(a) In the Netherlands** **(b) The Proposed U.S. Standard**


**(c) Old Style Three-Piece Sign (Harvard Street, Brookline, MA)**

Source for (a) and (b): "Proposed D1 & D11 Series Bicycle Guide Signs." Technical Committee Recommendation, NCUTCD Bicycle Technical Committee, 6/23/05, revised 1/20/06.

# 5. Project List

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 educational, recreational, and commercial destinations. The ***street list*** provides detailed explanations and rationales for individual projects by street. 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 have been delayed because of factors such as concurrent 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.

The 2008 plan anticipated the Town increasing bicycle project funding from zero to $110,000 per year, which amounts to $2 per resident per year. 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, 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, commercial areas 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 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.

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. **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 details the sections of Beacon Street that are part of this project.

3. **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 are essential.

4. **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. Street List of Projects

***Asterisks in the list below 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.***

***Beacon Street Rush Hour Bicycle Lane (inbound)** via parking restrictions on sections of lower Beacon Street inbound. During the Beacon Street reconstruction project, there were parking restrictions on Beacon Street inbound. This project seeks to restore those restrictions during the morning rush hour period, effectively creating 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. The no parking restriction would begin at Charles Street and continue to Carlton Street. The area includes both residential and medical commercial buildings.

***Beacon Street hill outbound between Summit and Washington** is a particularly dangerous section for cyclists. There is parking on the right, the travel lanes are narrow, and the street is steep and heavily shaded, which reduces visibility. Vehicles tend to move fast through this section after having been constrained by the congestion of Coolidge Corner. This section should be comprehensively studied to design safety improvements that might include redesign of the entire width of sidewalk and street.

**Bicycle Racks** Additional bicycle racks are requested for Brookline Reservoir (Dudley Street entrance); Cypress/School/Washington business area; Gibbs Street between Beals Street and Naples Road.

**Brookline Avenue Path** repairs: The path running parallel to Brookline Ave on the southeast side is in need of repair; tree roots, erosion, and other natural degradation has made this path dangerous for bicycles. This project could be incorporated into a larger effort to improve the Route 9 crossing and nearby paths; a slightly wider path would reduce cyclist/pedestrian conflicts.

***Brookline Avenue crossing for 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 Sears (Landmark Center) Rotary 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 cyclists on the southeast side of Brookline Ave to safely cross to the contraflow lane at Parkway Road. 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 running parallel to Brookline Avenue on the southeast side. (In 2011, Brookline received a grant to proceed with planning of this and other connections for the Emerald Necklace.) One possible approach to this project developed by Northeastern University civil engineering students can be viewed at: http://wiki.coe.neu.edu/groups/advtraffic2011/wiki/44be2/Slave_Signal_at_Aspinwall_St_at_Brookline_Ave_.html

**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.

**Chestnut Hill Avenue at Clinton** is a difficult crossing for cyclists and pedestrians. A median refuge is recommended to allow crossing of 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. Mitigation funding from the planned Chestnut Square development might be possible. 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 bike lanes**: Cypress Street is a major route across Brookline between Brookline Village and Jamaica Pond/Jamaica Plain; Cypress Street also connects the main Brookline Library, Pierce School, Lincoln School and the High School. South Cypress from Paul Pender Circle along Chestnut, High and Cypress Streets to Boylston Street is scheduled for 2011-12. **North Cypress** from Boylston Street to Washington Street needs to be completed.

**Dean Road bike lanes:** Dean Road between Clark Road and Crafts Road is an important street for safe access to and from Brookline High School. This project calls for marked bicycle lanes *only in uphill directions*: traveling east from Crafts Road to Chestnut Hill Avenue and traveling west from Clark Road to Chestnut Hill Avenue.

**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:** Sign Greenough Street in front of the high school between Tappan and Davis as a contraflow lane for bicycles. The only requirement would be a yellow lane marking and an "except bicycles" sign on the "do not enter" sign as is currently in place for the Netherlands Street contraflow lane at Parkway. 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). Alternatively, a separate shared path between the benches and trees along the street and Cypress Field could be considered.

***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 at Woodland Road to allow safe crossing and access to Woodland Road for pedestrians and cyclists

**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.

***Heath Street** passing restrictions: Heath Street runs east/west roughly parallel to Route 9 from the Brookline Reservoir to the Newton Town Line. 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.

***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. One possible approach to this project developed by Northeastern University civil engineering students can be viewed at: https://myfiles.neu.edu/xythoswfs/webui/_xy-6198661_1-t_iOVT5EAL

**Longwood Avenue toward Longwood Medical Area--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.

**Middlesex Road bike lanes:** Middlesex Road is an important link for travel to and from the Chestnut Hill commercial district. This project 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 (being completed by Boston, 2012). Because the Hammond Street end is in Newton, we need to coordinate with that city.

***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.

***Park Street** 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.

***River Road/Muddy River Path:** Along River Road, the Muddy River path is nothing but a narrow informal dirt track worn into the grass. This section of path on the Brookline side of the river should be restored. This project involves narrowing River Road and widening the park area between the road and the flood wall to construct a path in that narrowed section (asphalt paving). River Road should be made one-way northbound. Access from Brookline Avenue to the businesses along River Road may require an easement on a private drive connecting them just north of the Gulf Station.

**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 cycle tracks from Walnut Street to Pond Ave:** The Gateway East project will bring Walnut Street one block closer to the Muddy River, and provide a safe crossing at Walnut/Pearl. This project will link Walnut Street to the Muddy River paths, completing the connection from the Brookline Reservoir to the Muddy River. The preferred layout is a pair of one-way cycle tracks (bike paths) at sidewalk level, one on each side of Route 9, from Pond Street to Walnut Street. (In 2011, Brookline received a grant to proceed with planning of this and other connections for the Emerald Necklace.)

***Route 9 Crossing for Muddy River Path (at grade):** A safe crossing for cyclists and pedestrians is absolutely essential to connect two parts of the Emerald Necklace—the Muddy River Path and the paths around Leverett Pond leading to Jamaica Pond. Reconfigure the curbs on Route 9, reducing it to two through lanes in each direction (plus an outbound bus lane); widen the median to create a safe unsignalized crossing using the median as a refuge. (In 2011, Brookline received a grant to proceed with planning of this and other connections for the Emerald Necklace.)

***Route 9 grade-separated crossing for Muddy River Path:** Even if an at-grade crossing of Route 9 is provided 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. One possible approach to this project developed by Northeastern University civil engineering students can be viewed at: http://www.coe.neu.edu/transportation/boston/muddy.html

**St. Paul Street from Aspinwall to Commonwealth Avenue**: This route between Brookline Village and the BU Bridge has the advantage of avoiding Coolidge Corner and connecting with bike lanes on Commonwealth Avenue, Beacon Street, and Longwood Avenue. It is wide enough for bike lanes in some sections and should be studied for bike lanes and bike priority lanes as space permits in compliance with contemporary design guidelines.

**School Street bike/priority lanes** from Washington Street to Harvard Street would extend the Cypress Street bike lanes to connect with Harvard Street bike lanes to Coolidge Corner and Brookline Village.

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

**Washington Street southbound, protected left turn to Station Street:** The left turn from Washington Street southbound onto Station Street 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.

***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. One possible approach to this section was developed by Northeastern University civil engineering students during 2010-11.

**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 lanes and bike priority lanes as space permits in compliance with contemporary design guidelines.

# 8. Projects Approved/Awaiting Funding

**Beacon Street extension of bike lane** inbound from the traffic signal at Winchester Street to Webster Street: Beacon Street is still fairly wide at this point and could accommodate an extension of the bike lane, which would have the advantage of clarifying travel lanes for both motorists and cyclists turning onto Park or Webster or proceeding through those intersections to Harvard Street. It would also facilitate connecting the proposed contraflow lane for bicycles on Park Street to Beacon Street. A bike box at Webster would facilitate cyclists' crossing when traffic is stopped to allow a left turn onto Center Street. (Approved by Transportation Board, January 3, 2013.)

**Beacon Street priority lanes**: Beacon Street bicycle lanes are heavily used by those traveling east-west through Brookline as well as to many major points within town. However, the 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. In the outbound direction the lanes only exist between Saint Mary's Street and Pleasant Street, and again between Washington Street and the Town Line. In the inbound direction, the lane exists only between Washington Street and Winchester Street. Bicycle priority lanes provide an opportunity to connect the bike lane segments and to link to bicycle facilities on Winchester Street, Harvard Street, and Carlton Street. Priority lanes (indicated by sharrows) should be installed in every section of Beacon Street that does not have dedicated bike lanes. (Approved by Transportation Board, January 3, 2013)

# 9. Projects Funded/Awaiting Construction

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

**Cypress Street bike lanes**: Cypress is a major route across Brookline between Brookline Village and Jamaica Pond/Jamaica Plain, also connecting the Main Library, Pierce School, Lincoln School and the High School. Bike lanes/priority lanes and symbol pavement markings will be applied with thermoplastic paint. **South Cypress** route from Paul Pender Circle along Chestnut, High and Cypress to Boylston Street (2011-12) Schedule: *Construction in Summer 2013*

**Dudley Street:** Stripe and sign Dudley Street (along the south side of the Brookline Reservoir) as a contraflow lane for bicycles (from Dudley Way to Warren Street). This would allow cyclists a safe, quiet and expeditious route from Lee Street to the Warren/Sumner crossing of Route 9 (and hence to the high school or to Tappan Street and Washington Square) and to Walnut Street (and hence to the New Lincoln School and connections to Brookline Village). The alternative is riding on the narrow, heavily trafficked Warren Street or through the difficult intersection of Route 9 at Chestnut Hill or even down Route 9. Schedule: *Construction in Summer 2013*

**Essex-Commonwealth connector** - Cycletrack/Lanes Requiring Curb Ramps, Paint, and Signage: Essex Street is the northernmost portion of the Carlton Street Connector, which connects Longwood Avenue to Commonwealth Avenue and the BU Bridge via Chapel, Carlton, Ivy (contraflow), and Essex (portions contraflow). However, vehicles traveling northbound on Essex are channeled right onto Mountfort St. This project consisting of curb ramps, paint, and signage will allow 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. Schedule: *Construction in Summer 2013*

**Harvard Street bike lanes** to bring Harvard Street (School to Beacon) into compliance with contemporary designs and to complete the bike lane from Beacon to the town line with Allston. Schedule: *Construction in Summer 2013*

**Longwood Avenue priority lanes** - dedicated bicycle lane eastbound, bicycle priority lane westbound: Longwood Avenue is one of the most heavily biked roads in Brookline. It connects North Brookline with the Longwood Medical area. The bicycle lane and priority lanes were installed west of St. Paul Street in 2009-2010 when that section of Longwood was resurfaced. *Extension of sharrows from Sewall to Harvard is scheduled for summer 2013.*

**Park Street contraflow (Marion Street to Beacon Street):** Stripe and sign Park Street as a contraflow lane for bicycles from Marion to Beacon. This would allow safer access for bicyclists into Coolidge Corner. At present, some cyclists go the wrong way on Park without the safety of striping or signage, or if traveling along Park, must go right on Vernon Street, make a difficult left onto Harvard, and then travel in a heavily trafficked area of Harvard Street to reach Coolidge Corner. Schedule: *Construction in Summer 2013*

**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. *Postponed pending construction by Mass DOT*

**Washington Street:** Bicycle lanes or shared lanes should be delineated from School and Cypress Streets to the town line near Corey Road. This is a major cross-town route that currently has lanes/sharrows from Cypress to Brookline Village. These lanes should be continued for the rest of the length of Washington Street, facilitating cross-town biking, and connecting with existing or proposed lanes on Harvard, Park (High School route to and from Coolidge Corner), and Beacon Streets. Schedule: *Construction in Summer 2013*

# 10. Completed Projects

**Clark Road bicycle priority lanes:** Clark Road between Sumner Road and Dean Road is an important route for safe access to and from Brookline High School. Since it is a narrow street with parking on its northern curb it should be marked for bicycle priority lanes in both directions.

**Greenough Street:** Alter 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 by adding "except bicycles."

**Harvard Street at Washington (Brookline Village):** Alter the "no right turn" restriction at the intersection of Harvard Street at Washington Street by adding "except bicycles."

**Longwood Avenue** dedicated bicycle lane eastbound, bicycle priority lane westbound, St. Paul to Town Line at Muddy River—completed 2010

**Netherlands Road** contraflow lane from Parkway to Aspinwall—completed 2009

**Parkway Road** contraflow lane from Brookline Avenue to Netherlands Road—completed 2009

**School Street** Repaving on from the public parking lot to Washington to remove a very dangerous hump in the street parallel to the curb—completed 2012

**Washington Street** bike lanes and sharrows from Davis to School and Cypress Streets—completed 2010

**References**

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

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

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