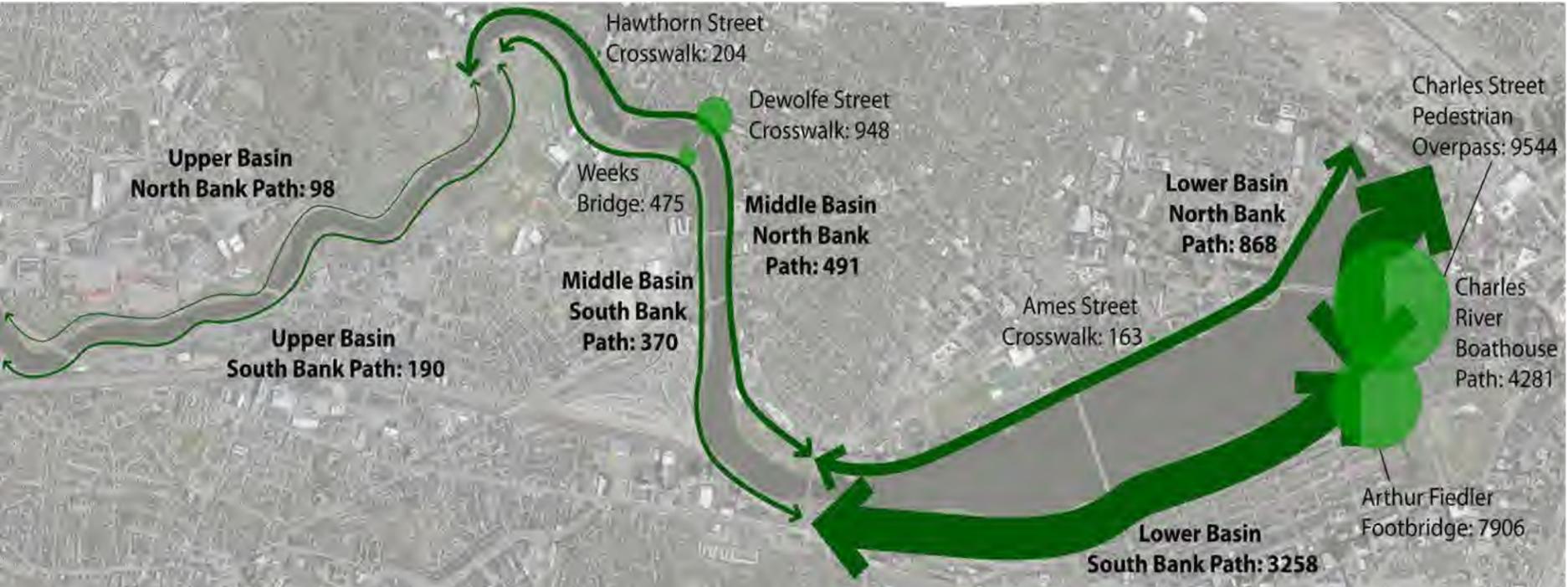


## Part 1 | Background + Analysis



The Charles River Basin is a world-class resource for people and nature that brings with it the challenges of balancing social uses and environmental conservation. The park system that stretches eight-and-a-half miles along the river from Watertown to Boston and Cambridge is the convergence of the region's built and natural environments, and a critical nexus in the metropolitan transportation network. These open spaces also play a role in supporting wildlife and preserving habitat. In 2009, the Department of Conservation and Recreation (DCR) and Massachusetts Department of Transportation (MassDOT) jointly authorized a study as part of Governor Patrick's Accelerated Bridge Program to evaluate existing conditions and future opportunities for the pedestrian and bicycle facilities along the Charles River Basin.

As the Charles River approaches Boston Harbor, it passes through communities of increasing density. The path systems that frame the river banks and the thirteen bridges that span the water form a "trunk route" of non-motorized transportation for Newton, Watertown, Cambridge, Boston, and beyond. People use the paths for both recreation and transportation, and the heavy use of the current path system has resulted in multiple "goat tracks" in the green space along the river, causing an increase in erosion, runoff and maintenance issues. Several of the surrounding communities have provided well-established bicycle and pedestrian links to the Charles River Basin; however, there are still many fragmented or nonexistent connections due to the presence of adjacent parkways, the Massachusetts Turnpike, rail yards, or auto-oriented land uses. These barriers can discourage walking and bicycling to, along, and across the river.



2. Volume of pedestrians and cyclists on reservation paths recorded during the Spring 2012 semi-annual user count, one of multiple semi-annual non-motorized user counts since 2009. For additional information, see the report on the MassDOT website at [http://www.massdot.state.ma.us/Portals/26/docs/bikePedRpt\\_fall11.pdf](http://www.massdot.state.ma.us/Portals/26/docs/bikePedRpt_fall11.pdf).



1. Existing Conditions Report, June 2010

In order to understand the current demands on the parkland and path system throughout the Reservation, a program of non-motorized user counts was conducted. These counts occurred twice annually over a five year period (ten total), and tracked walkers, joggers, bicyclists and skaters at 23 to 25 locations including path locations, bridges, pedestrian overpasses and key crosswalk locations. Results showed up to 20,000 trips can be made in the Basin within a two hour period of time during mid-week late afternoons and mid-day periods on weekends. A separate report by the consulting team includes a detailed set of conclusions and analysis. Overall, the count data helped to solidify trail recommendations made in this report, and inform where improvements could be made to promote additional safety and connectivity elsewhere. Figure 1 above shows results of one of the counts.

The proposed improvements are intended to create a more coherent and well-connected network of paths, sidewalks, intersections and bike facilities, and to connect with the adjacent communities and nearby transit and Hubway stations. These improvements are intended to better manage the wide range of uses along the river, reduce negative impacts caused by overuse of the current infrastructure, and create a greenway network that supports sustainability in the Basin. The Study takes into account the improved pedestrian and bike facilities that have been implemented or planned through MassDOT's Accelerated Bridge Program (ABP). For example:

- Bicycle lanes have been striped on the BU Bridge
- An accessible pedestrian bridge has recently been replaced at Magazine Street
- Wider sidewalks and bicycle lanes will be constructed on the Longfellow Bridge
- An accessible pedestrian bridge will be replaced at Charles Circle
- One-way cycle tracks, as well as signaling and intersection improvements will be constructed on the River Street and Western Avenue Bridges
- Bicycle lanes and intersection improvements will be constructed on the Craigie Dam Bridge and Drawbridge and the Anderson Memorial Bridge
- Recent improvements have made Weeks Bridge bicycle and ADA accessible.

In addition to the currently recommended pedestrian and bicycle facilities, the MassDOT ABP teams studied the potential for bicycle and pedestrian underpasses at the approach intersections on the River Street Bridge, Western Avenue Bridge, and Anderson Memorial Bridge. In August, 2014, MassDOT publicly expressed support for an underpass at the southern end of the Anderson Bridge, and committed to build it in close cooperation with DCR, if it receives all required permits and has no adverse impacts to wetland resources and parkland. At-grade enhancements will also be implemented, providing significantly improved safety and crossing conditions (by shortening crossing distances

## Scenes from the Study Area



3. User-created "goat tracks" occur when users feel that the path surface provided is too narrow, too hard or both. Here, three informal paths have been created.



4. Low traffic volumes on Greenough Boulevard provide an opportunity for lane reduction and parkland expansion



5. This wide path on the South Bank in Boston adjacent to Soldiers Field Road is shared by all users.



6. Although difficult to see, a connection can be made under this Bowker Overpass ramp to the gatehouse (roof seen at right) and Charles River beyond



7. Members of the August 2011 bike tour identify a non-standard curb ramp and difficult crossing at the Arsenal Bridge.



8. In some of the upstream portions of the Study Area, the character is more rural.

and lengthening crossing times). The work being done to rehabilitate the bridges will not preclude the construction of underpasses in the future.

The changes in the Basin are not occurring in isolation: roadway projects, new trails and greenways, and bridge rehabilitations are being implemented throughout the region. Non-motorized mobility initiatives, programs and policies encourage a diverse mix of travel patterns and behaviors, helping the region promote "mode shift," moving away from private automobiles and towards sustainable modes. This is already underway in Boston and Cambridge, as each city continues to improve the walking environment, promote universal accessibility and develop a network of integrated bicycle facilities.

As the recommendations are implemented, the roadway, trail and bridge improvements will enhance pedestrian and bicycle connectivity within the Basin and to the adjacent neighborhoods, many of which currently have limited or missing connections to the Basin. The connectivity recommendations should address the needs of all users, including those who are less experienced with urban bicycling and walking. Meeting these goals will not be possible by simply accommodating those who currently walk or bike. Providing the connections will increase use of the Basin as a transportation and recreational resource and improve the quality of life for tens of thousands of people who live or work within walking, running, bicycling or skating distance. In particular, the improvements will enable improved connections to the many adjacent Hubway bike share stations, some sitting on DCR land itself. Improved Hubway access will promote additional transportation and recreational bicycling throughout the Basin.

The Study is intended for DCR, MassDOT, stakeholders, and the municipalities that line the Charles River to move forward and meet the commitment by recent MassDOT Secretary Davey to triple walking, bicycling, and transit mode share in the Commonwealth by 2030. In addition, the Study will support implementation of the MassDOT Healthy Transportation Policy Directive, which requires all state transportation projects to increase bicycling, transit, and walking options. The recommendations in this report are conceptual in nature and will require further analysis before moving forward to implementation. The variety of projects presented in this study will help Greater Boston become a multi-modal region and create a model for integrating green infrastructure that connects people and nature. As the primary corridor for pedestrian and bicycle transportation and recreation, the Charles River Basin will play an instrumental role in ensuring a sustainable future for the region.

Helping to guide the Study's recommendations were a series of stakeholder engagement events and community meetings. During the first year of the effort, MassDOT, DCR and the consultant team rode the entire Basin Loop with members of MassBike, LivableStreets Alliance and WalkBoston to discuss the issues relevant to walking and bicycling. In December of 2012, the team held a pair of public outreach meetings at each end of the Basin. Near the completion of the Study, a final meeting to present draft recommendations was made to over 50 people at the Brighton Boat House in the winter of 2014. In between, meetings with individual municipalities were held, so that the recommendations would be made consistent with each adjacent city's planning efforts.

**Purpose and Goals**

The purpose of the Charles River Basin Pedestrian + Bicycle Study for Pathways + Vehicular Bridges grew out of the need to identify connectivity gaps and opportunities for enhancements that exist where physical or other constraints impede bicycle and pedestrian travel throughout the network of paths, intersections and bridges along the Charles River Basin. The Study will describe through narrative, diagrams and other graphics, the various gaps that preclude a seamless connection to the bridges and parkland within the Charles River Basin.

During the preparation of the Study, the goals emerged for the recommended enhancements to the roadways, bridges, paths and intersections within, and adjacent to, the Charles River Basin. Four related goals were identified:

- Promoting walking and bicycling as transportation
- Improving safety, access and mobility for pedestrians and cyclists
- Supporting public health by providing opportunities for physical activity
- Highlighting the recreational, environmental and cultural opportunities within the Basin

The Study also promotes MassDOT’s GreenDOT initiative, launched in June 2010 by Governor Patrick. GreenDOT is driven by three primary goals:

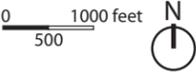
- Reduce greenhouse gas emissions
- Promote the healthy transportation options of walking, bicycling, and public transit
- Support smart growth development

The GreenDOT vision states that “Through the full range of our activities, from strategic planning to construction and system operations, MassDOT will promote sustainable economic development, protect the natural environment, and enhance the quality of life for all the Commonwealth’s residents and visitors.” In addition to conducting this study in conjunction with DCR, the Accelerated Bridge Program has enabled MassDOT to embrace the GreenDOT vision through providing enhanced pedestrian and bicycle accommodations on the Craigie Dam Bridge and Drawbridge, Longfellow Bridge, Charles Circle Pedestrian Bridge, Boston University Bridge, Magazine Street Pedestrian Bridge, River Street Bridge, Western Avenue Bridge, and Anderson Memorial Bridge.

For more information on GreenDOT visit: [www.massdot.state.ma.us/greendot.aspx](http://www.massdot.state.ma.us/greendot.aspx)



9. The study area includes: (a) the Charles River Reservation between Newton Lower Falls and the Craigie Dam Bridge and Drawbridge, (b) the bridges within this stretch; and (c) areas in close proximity to the reservation boundary.



## Study Area

The study area spans from the Galen Street Bridge in Watertown downstream to the Craigie Dam Bridge and Drawbridge in Boston and Cambridge, and includes areas within one or two blocks from the Basin reservation See Figure 9.

## Study Process

Beginning in the fall of 2009, biannual pedestrian and bicycle counts at 23 to 25 locations along the Basin have been conducted and published on the MassDOT website. The non-motorized user counts continued through the spring of 2014, providing DCR and MassDOT with a total of over 5 years of count data. Non-motorized user counts confirm the significant use of the trails and bridges along and across the Charles River. To date, the counts have shown that as many as 10,000 bicyclist, pedestrians and runners use the paths in the peak hours. Results and analysis of the program of user counts have been described in a related but separate report, commissioned by MassDOT.

In June 2010 the Charles River Basin Existing Conditions Report was completed. The report provides an overview and analysis of the existing conditions of the pathways, bridges, and bridge approaches along the river. The counts and report can be found at: [http://www.massdot.state.ma.us/Portals/26/docs/bikePedRpt\\_fall11.pdf](http://www.massdot.state.ma.us/Portals/26/docs/bikePedRpt_fall11.pdf).

## Public Participation

The Study began in August 2011 with a bike tour of the Basin with representatives from DCR, MassDOT, the project team, and local bicycle and pedestrian advocates. The bike tour allowed DCR and MassDOT a firsthand look at the areas missing connections, areas needing improvements, and areas lacking accommodations.

In October 2011, a broadly publicized series of three public information meetings were conducted by DCR and MassDOT. Held on successive Tuesdays, the well-attended hearings were held at Shriners Hospital in Boston, Morse School in Cambridge, and Community Rowing in Brighton. The discussions covered the background and goals of the study, the results of the existing conditions analysis and three years of user counts, coordination with ABP, the pedestrian and bicyclist “toolboxes” of available improvement measures, and the Study’s preliminary recommendations.

Upon completion of the Draft Study, DCR and MassDOT solicited public comments on the recommendations. The Draft Study was posted on the MassDOT website for review and a public meeting was held at the Brighton Community Boating Center on December 3, 2013. All comments received during this review period were incorporated in the final copy of the Study to the maximum extent possible.

These meetings were an important part of the process. Almost 150 specific comments were received from municipal agencies, stakeholder organizations and interested individuals following the public presentation and issuance of the draft report. Each of these suggestions are itemized in Appendix 1, together with an explanation of how the study responded.

The presentation made at the 2013 Public meeting is on-line at: <http://www.mass.gov/eea/docs/dcr/news/public-meetings/materials/crbpresentaion2.pdf>

## Report Organization

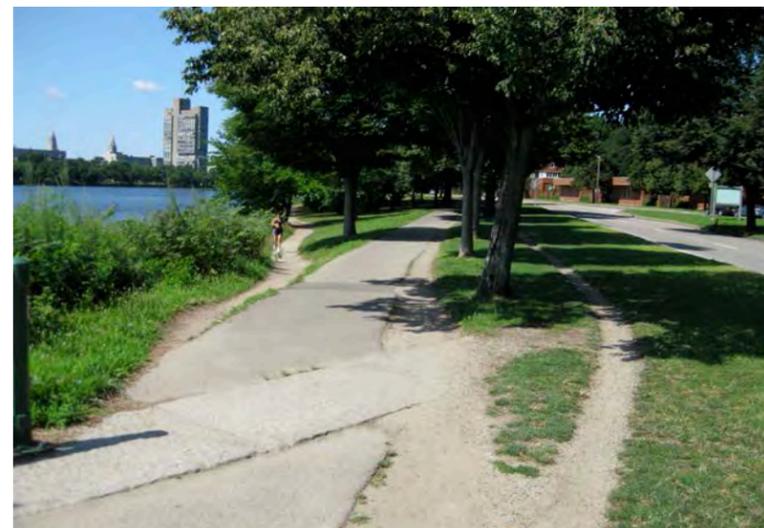
The Study contains dozens of planning-level pedestrian, bicycle and accessibility-related recommendations. Part I, Background + Analysis, describes and illustrates the existing pedestrian and bicycle infrastructure in and around the Basin. It also presents a summary of the pedestrian and bicycle facility “toolboxes” reflected in the recommendations. Part II, Recommendations, walks through the recommended enhancements in detail starting in Watertown and moving downstream to Boston and Cambridge, with supporting detail plans, sections, and photo simulations. All of the recommendations are listed at the end of the study in the Implementation Tables (page 36). The recommendations included in this study are preliminary and conceptual in nature. Proposed improvements will need to be evaluated for design and construction feasibility, cost effectiveness, regulatory compliance, and long-term maintenance requirements.

# Existing Pedestrian and Bicycle Connectivity

## Existing Infrastructure

The existing bicycle and pedestrian infrastructure within and connecting to the Charles River Basin includes sidewalks, crosswalks at both signalized and non-signalized intersections, pedestrian overpasses and underpasses, multi-use paths and limited on-road bicycle facilities (Figure 12). While this infrastructure provides pedestrian and bicycle connectivity to the open-space and path system within the Basin, there are also barriers that deter easy passage. The most significant deterrents are the parkways that line the river, typically four-lane roadways with few intersections and traffic speeds in the range of 30 to 60 mph. Additionally, the Massachusetts Turnpike and the rail yards in Allston provide no easy way across or around them. City streets that may have once provided a link to the river are disconnected by roadway infrastructure developed in the decades after World War II. Other barriers are the bridges themselves. Some do not provide connections to the adjacent riverfront paths while others contain narrow, heavily trafficked sidewalks that lead to intersections that may be challenging to navigate.

Because of these barriers, the number of non-motorized users along the Charles River Basin varies significantly. While fluctuations in the use of the system can be expected along an eight-mile river corridor, the working assumption of this study is that connectivity improvements will result in additional use of the Basin's paths and bridges by walkers and cyclists.



10. The existing paths have "goat tracks" along them from extremely high use by people running, walking and bicycling.

## Trip Generators in and around the Basin

In addition to looking at the existing physical infrastructure in and around the Basin, connectivity can also be evaluated by understanding the latent demand. A myriad of origins and generators of pedestrian and bicycle activity exist in study area. These include:

### Academic

- Three major university campuses along the river: Harvard University, Boston University and Massachusetts Institute of Technology (MIT), with a combined student population of more than 60,000;
- Dozens of smaller colleges, primary and secondary schools;

### Commercial

- Major retail districts, including Boylston and Newbury Streets in Boston and Cambridge's Central Square and Harvard Square;
- Hundreds of workplaces;

### Transportation

- MBTA stations, especially Red Line, which attracts over 170,000 daily riders, Hubway stations and North Station Commuter Rail;

### Residential uses

- Nearby neighborhoods of Beacon Hill, West End, East Cambridge, Cambridgeport, Back Bay, Allston, Brighton and Watertown that include residents who utilize the Basin regularly for both transportation and recreation;

### Recreation

- Nine boathouses along the river, which provide access for rowing, sailing and other water recreation enthusiasts;
- The parkland throughout the Reservation;
- Historic and cultural landmarks including Fenway Park, the Boston Public Library, the State House, and the Museum of Science;
- Other major parks and open spaces in the area, such as Boston Common and the Public Garden, Back Bay Fens, and Mount Auburn Cemetery .

Figure 13 illustrates the activity generators listed above. The objective of the diagram is to graphically indicate where existing and future demand for pedestrian and bicycle infrastructure lies and where improvements should be considered to meet this demand.

## Gaps + Issue Areas

By overlaying maps of the Existing Pedestrian/Bike Infrastructure (Figure 12) and the Generators of Pedestrian/Bike Activity (Figure 13), a series of problem areas are apparent. These problem areas (Figure 14) should be enhanced to meet safety needs as well as existing and future demand. Examples of these improvements include:

- Bridges that do not provide safe and convenient access to the path system that parallels the river;
- Long stretches of parkways without traffic signals or well-designed crosswalks;
- Locations where highways, on/off ramps and other roadway infrastructure create barriers to the river from adjacent inland areas.



11. The lack of connection between the Esplanade and the BU Bridge on the Boston side is a significant gap in the Basin's path network.

Figure 12

## Existing Pedestrian + Bicycle Infrastructure

Legend

	Signalized crosswalk		Charles River Basin primary path
	Non-signalized crosswalk		Charles River Basin secondary path
	Pedestrian overpass		Sidewalks connect path across bridge
	Pedestrian underpass		Sidewalks and on-road bicycle facility connect path across bridge
	Existing bicycle facilities		Highway or Railroad Barrier
	Proposed bicycle facilities		Street lacking connection to the river
	Key bridge connection without bicycle facility		Parks

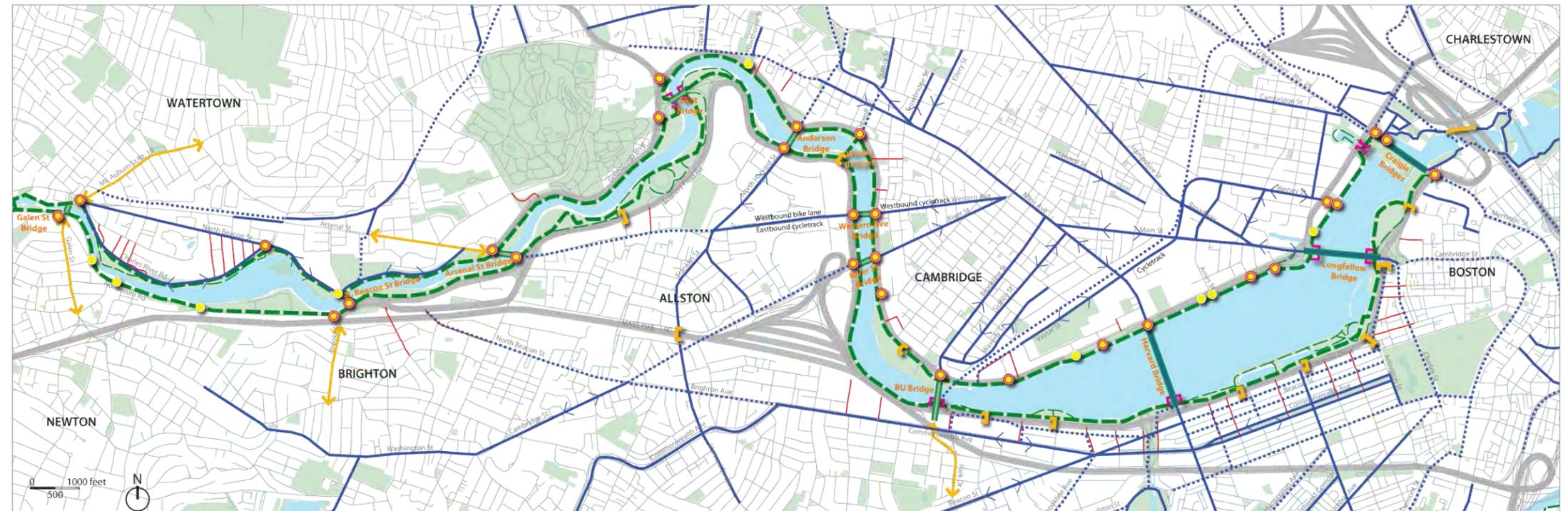


Figure 13

## Generators of Pedestrian + Bicycle Activity

Legend

	Landmarks/Destinations		Charles River Basin primary path
	Primary School		Charles River Basin secondary path
	Secondary School		Boat house
	College/University		MBTA rapid transit stop
	Large campus		Hubway Station
	Key Retail District		Town Boundary
	Parks		

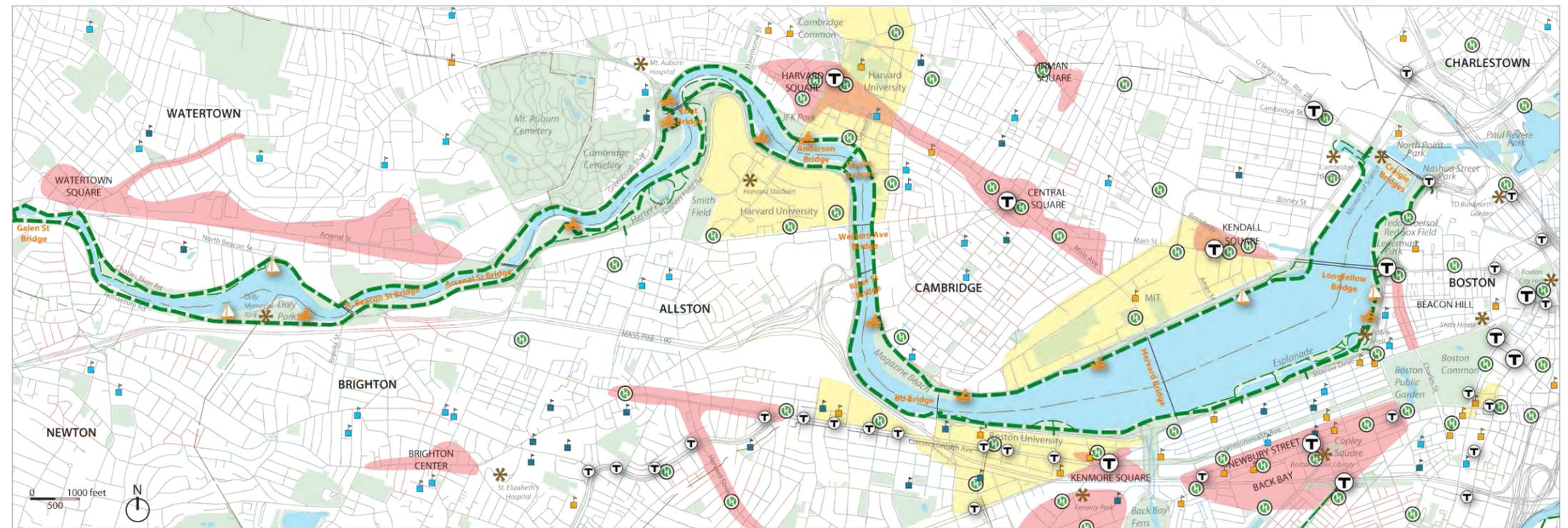
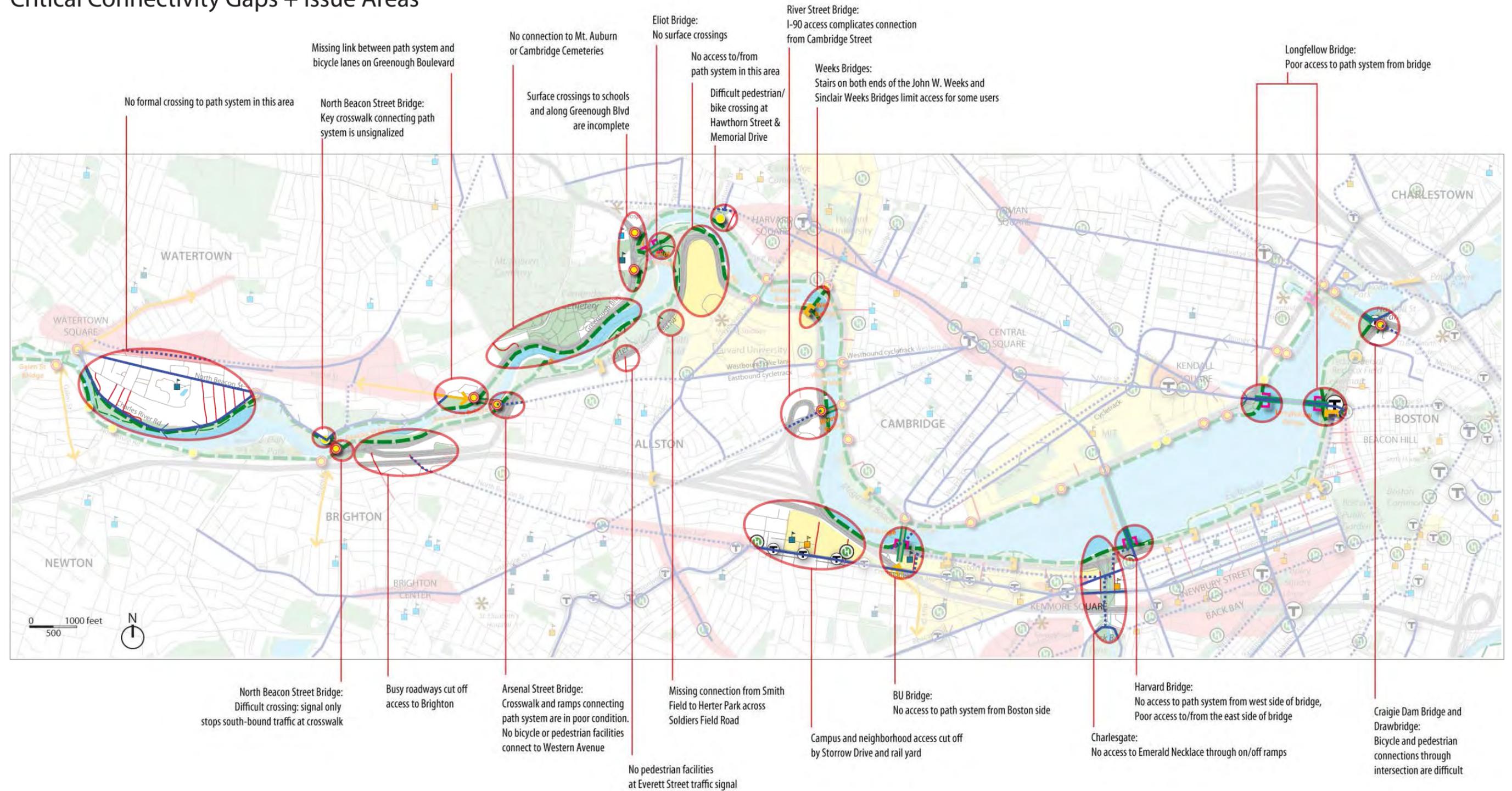


Figure 14

## Critical Connectivity Gaps + Issue Areas



# Pedestrian Facility Toolbox

Improving the quality of pedestrian facilities means increasing connectivity, designing for all users, and providing amenities to increase attractiveness. In addition, improvements should emphasize safety, particularly at crossings and intersections.

Shown here are a wide range of tools that can be deployed in the Charles River Basin and adjacent neighborhoods to improve pedestrian accessibility and experience.



15. Well-connected sidewalks, lined by street trees, create a comfortable buffer from moving or parked cars.



16. Curb cuts allow pedestrian routes to be accessible for people of all mobility levels.



17. Interpretive or wayfinding signage and mile markers help people understand the landscape around them.



18. Shared-use paths along the riverfront provide tremendous amenities for cities.



19. Seating and shade trees are particularly important for the elderly and people with limited mobility.



20. Pedestrian countdown signals create predictability for pedestrians and discourage jay walking. With Leading Pedestrian Interval (LPI), the walk signal begins before cars have a green light.



21. Raised crosswalks and median refuge islands improve safety at pedestrian crossings.



22. Paved paths with a separate stone dust track provide a soft-surface option for walkers and runners.



23. Corners with short-radius curbs require motorists to slow down when taking turns and provide shorter pedestrian crossing distances.



24. Streetscape elements and landscaping help to create a strong sense of place.



25. Traffic calming measures, such as chicanes, slow traffic and improve the pedestrian environment.

A wide range of bicycle facilities can dramatically enhance the safety and experience of crossing the parkways into the reservation and in the neighborhoods adjacent to the Charles River Basin.

The elements shown here are consistent with the AASHTO *Guide to Bicycle Facilities*, the *Manual of Uniform Traffic Control Devices*, and the NACTO *Urban Bikeway Design Guide*.



26. **Bike lanes** create a designated area for cyclists alongside a motor vehicle lane and are typically used on roadways with over 3000 ADT.



27. **Buffered bike lanes** create additional separation from opening car doors



28. **Counter-flow bike lanes** allow bicyclists to ride against traffic on a one-way street



29. **Two-stage, turn-queue boxes** help bicyclists safely make left turns on high volume streets.



30. **Colored paint** or other markings may be used to increase the visibility of a bike lane as it goes through an intersection.



31. **Shared lane markings** provide guidance on roadways that are not wide enough for bike lanes.



32. **Cycle tracks** are protected from adjacent travel lanes through curb separation, a buffer or parked cars.



33. **Bicycle- and pedestrian-only bridges** help to remove gaps in an urban bikeway network.



34. **Bicycle boulevards** are streets with signage, markings and other devices to reduce speeds and volumes of motor vehicles.

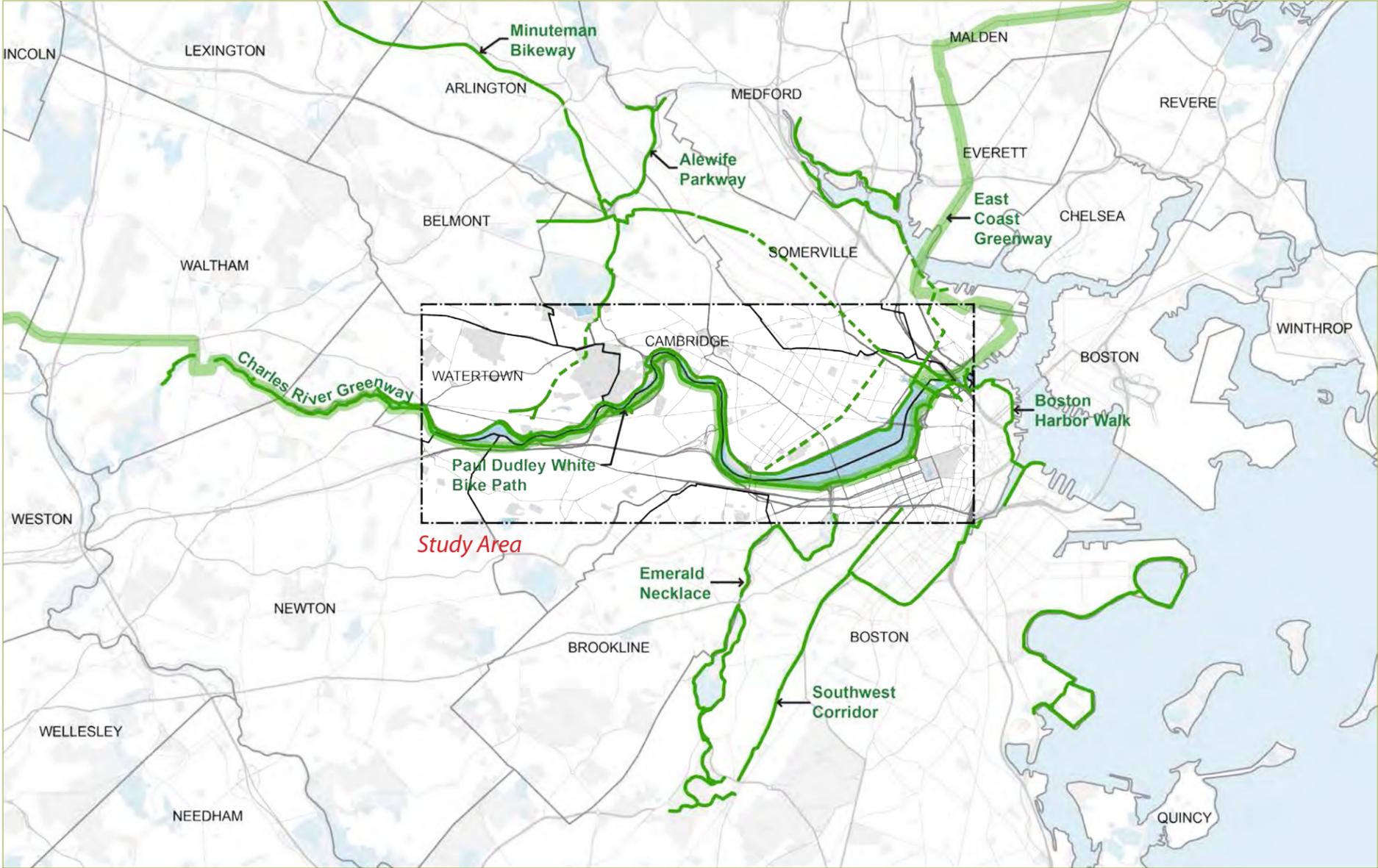


35. **Bike Boxes** provide additional queuing space for cyclists and a visual warning for turning motorists.



36. **Roadway-to-bridge transitions** should be clearly defined.

# Regional Context



37. Context map showing relationship of the Study Area to the existing regional path systems.



## The Hub of a Regional Non-Motorized Network

The path system along the Charles River Basin is the backbone of the Greater Boston greenway network. The 8-mile stretch of the Basin that forms the Connectivity Study Area is not just a riverside park, but the nexus of a multi-modal system that carries tens of thousands of walkers, runners and cyclists on a daily basis.

Greater Boston is also blessed with a network of green spaces, trails and parkways that date back to Charles Eliot and Frederick Law Olmsted’s regional planning efforts more than 100 years ago. Called Boston’s “Green Routes” by local advocates, many of these regional feeder corridors are currently barred from access to the Charles River Basin by busy parkways, highway overpasses and rail yards. The Basin needs to be understood in this context to appreciate fully the need to improve pedestrian and bicycle connectivity throughout the entire corridor.

The recommendations in this report will help to create safe, attractive, and seamless non-motorized connections across the metropolitan area. By promoting links to the Emerald Necklace, the Boston Harborwalk, the Minuteman Bikeway, Somerville’s Community Path and the East Coast Greenway, the Basin will become an even more critical piece of the green “web.” This will almost certainly increase the numbers of people walking, running, bicycling and skating for recreation, commuting and utility trips and reduce the region’s dependence on motor vehicles for transportation. The improved greenway corridors will become a critical component of the Commonwealth’s commitment to lessen greenhouse gas emissions and improve public health.