"But how do we get to the Greenway?"— a multi-disciplinary, multi-jurisdiction, multi-modal strategy to increase connections to the Charles River Basin

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Introduction

The world-famous Charles River Reservation lines both sides of its majestic river for 8-1/2 miles in greater Boston. Created as a State Reservation between 1910 and 1936, this beautiful urban greenway contains continuous, longitudinal paths that serve as "trunk routes" for non-motorized transportation, hourly serving as many as 10,000 cyclists, pedestrians and runners. However, narrow bridges and urban land uses abutting the Reservation (high-volume arterial roads, railyards and car-oriented streets and businesses) present major barriers to access from the adjacent communities and to the greenway and the river.

This paper presents the draft findings and specific strategies of a "Pedestrian and Bicyclist Connectivity Study." It was commissioned jointly by two state agencies—(a) the Massachusetts Department of Transportation, which has primary jurisdiction over the Charles River roads and bridges in the study area; and (b) the Massachusetts Department of Conservation and Recreation, responsible for care and control of the Charles River Reservation.

The Study was prepared between 2009 and 2013 by a team led by the Boston landscape architecture firm of Halvorson Design Partnership, with Alta Planning + Design, multi-modal planners and HDR Engineering, civil engineers.

The research design involved a rigorous, data-driven methodology that analyzed existing "bike-ped" infrastructure and trip generators. The study also assessed the nature and location of barriers to access in and around the Reservation, and the ten bridges that traverse it.

A "toolbox" of 22 specific measures with potential to improve connectivity for the Charles River Reservation was developed.

The overall goal of this project is to improve the quality of life for tens of thousands of people who live or work within walking, running, skating or bicycling distance by increasing use of the greenway as a transportation and recreational resource. Accordingly, more than 100 specific improvements in the approaches to (and river crossings within) the greenway were identified to enhance pedestrian and bicycle connectivity to the adjacent neighborhoods, many of which currently have limited or missing connections to the river. (See Figure 1.)

Changes in the Charles River Basin area do not occur in isolation: roadway projects, new trails and greenways, and renovated bridges are being implemented throughout the region. Non-motorized mobility initiatives, programs and policies are already encouraging a more diverse

mix of travel patterns and behaviors, helping the region to move towards a "mode shift" away from private automobiles to more sustainable modes.

[This is happening in Cambridge and Boston already, as each city continues to improve the walking environment, promote universal accessibility and develop a network of integrated bicycle facilities. A notable example of this phenomenon is the implementation in Boston of "Hubway," a city-wide bicycle sharing system, sponsored by New Balance and operated by Alta Bike Share. In its first 16 months of operation, Hubway recorded more than 675,000 separate trips. 2012 saw the expansion of the system to neighboring Cambridge and Somerville and plans are underway to add Hubway stations and bikes to Brookline, as well. All four municipalities are working with Massachusetts Department of Transportation, Metropolitan Area Planning Council, Massachusetts Bay Transportation Authority and the Federal Transit Administration to continue to fill and expand the system in the Metro Area.]

Background

The eight-and-a-half mile stretch of the Charles River from Watertown and Newton down to Cambridge and Boston is the convergence of the region's built and natural environments. As the River approaches Boston Harbor, it passes through communities of increasing density.

The path systems that frame each bank and the thirteen bridges across the river comprise a network of popular multi-modal routes—a critical nexus in the metropolitan transportation network.

However, while some of the surrounding urban areas feature well-established bicycle and pedestrian links to the Reservation, many have fragmented or nonexistent connections. (See Figure 3.) This is due to the presence of the adjacent, moderate- to high-speed parkways, the Massachusetts Turnpike, auto-oriented streets and land uses, rail yards, and potentially dangerous intersections. Such barriers that can be particularly discouraging to young families on foot and cyclists with less experience—user groups for whom the greenway would otherwise be very attractive.

Extensive empirical data regarding volumes of non-vehicular trips is being collected by the Project Team at 25 locations. Day-long user counts have been conducted twice a year on weekends and weekdays since 2009. (See Figure 4.) These user count surveys have revealed significant and increasing levels of use —during peak hours, eight to ten thousand people are walking, running, jogging or skating in the Basin.

People use the paths for both recreation and transportation. It is important that the connectivity recommendations address the needs of all users, including those who are less experienced with urban bicycling and walking.

Overuse of the current path system—together with the preference of many runners not to run on pavement—has resulted in multiple ribbons of bare dirt in the green spaces along the river. These "goat tracks," in turn, cause additional erosion, runoff and maintenance issues.

Regional context

The path system along the Charles River Basin is the backbone of region-wide greenway network in Eastern Massachusetts. (See Figure 5.)

Greater Boston is also blessed with a network of green spaces, trails and parkways that date back to the regional planning efforts Charles Eliot and Frederick Law Olmsted's 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 railyards. The Charles River Basin greenway needs to be understood in this context to appreciate fully the need to improve pedestrian and bicycle connectivity throughout the corridor.

In aggregate, the connectivity recommendations in this report will help to create safe, attractive, and seamless non-motorized connections across the metropolitan area. By promoting connections to the Emerald Necklace, the Boston Harborwalk, the Minuteman Rail Trail (through Bedford, Lexington and Arlington to Cambridge, Somerville's Community Path and the long-distance 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. In consequence, the improved greenway corridors will become a critical component of the Commonwealth's commitment to lessen greenhouse gas emissions and improve public health.

Related studies undertaken by the Study Team

The Connectivity Study consultant team has been working with MassDOT and DCR on site analysis, planning and conceptual design since 2009. These efforts have generally fallen under the umbrella of the Charles River Basin Pedestrian and Bicycle Study for Pathways and Vehicular Bridges.

Since the Fall of 2009, the team has and published the semi-annual user count data in a memo available on the MassDOT website. This non-motorized user count effort is currently planned to continue through Spring 2014, which will provide MassDOT and DCR with a total of over 5 years of count data.

In June 2010 the team published the Charles River Basin Existing Conditions Report, which provided an overview and analysis of the existing condition of the pathways, bridges, and bridge approaches on both sides of the river.

In April 2011, the team published the Leverett Circle Pedestrian and Bicycle Crossing Study. This study includes an evaluation of the potential at-grade and grade-separated options for better pedestrian and bicycle connectivity in the congested Leverett Circle intersection.

The team has also been involved with the ABP projects, by participating in the Longfellow Bridge Task Force and giving feedback on the River Street, Western Avenue, Anderson and Craigie Bridge designs to each bridge team.

The Connectivity Study effort has been made possible by the support of Massachusetts Department of Transportation (MassDOT) and the Department of Conservation and Recreation

(DCR). The team has also worked consistently with the Solomon Foundation, collaborating on design recommendations for Greenough Boulevard and Charlesgate improvements. This included the team's analysis and recommendations related to a potential new traffic signal on the Harvard Bridge, in conjunction with the Foundation's effort to create a path connection through the underutilized DCR parkland between the bridge and the Bowker Overpass.

Goals

The project has three primary goals:

- promoting walking and bicycling as viable transportation options in the Boston metropolitan region;
- highlighting the recreational, environmental and cultural opportunities within the Reservation;
- making the Reservation accessible for all users.

Methods

The study began in August 2011 with a bike tour of the Basin with representatives from MassDOT, DCR, consultants and local bicycle and pedestrian advocates. Public workshops were held in October 2011 to introduce the study and get preliminary feedback on connectivity issues in the Basin. The team also met with city officials of Boston, Cambridge and Watertown to ensure that the report reflected relevant planning efforts from those municipalities.

The team conducted a detailed inventory and analysis of existing conditions throughout the study area. In addition a comprehensive analysis was prepared of locations and districts that generate trip demand for pedestrians and/or bicyclists in the area. These two analyses were compared and used to generate information about specific locations of gaps and problems for connections to the greenway. Case studies were undertaken of comparable situations nationwide, and an extensive photo inventory of conditions was created.

Mid-way through the project, a broadly publicized series of Public Information Hearings were conducted by MassDOT, Highway Division, DCR and the project team. Held on successive Tuesdays, the well attended hearings were held at Shriners Hospital, in Boston, Morse School, in Cambridge, and the community rowing facility, in Brighton. The discussion covered the background and goals of the study, results of the existing conditions analysis and three years of user counts, coordination with the Commonwealth's Accelerated Bridge Program, the pedestrian and bicyclist "toolboxes" of available improvement measures and the Study's preliminary recommendations.

These hearings were important. Comments from the meeting attendees and stakeholders provided critical feedback, which has been factored into the Study's final recommendations.

Results

This comprehensive study generated three categories of results:

- 1. Findings
- 2. "Tools" appropriate for the Charles River greenway situation
- 3. Recommendations

Each of these aspects of the study results is discussed separately below.

Results – Part 1. Findings

Existing infrastructure

The existing bicycle and pedestrian infrastructure within and connecting to the Charles River Basin currently includes sidewalks, crosswalks at both signalized and non-signalized intersections, pedestrian overpasses and underpasses, multi-use paths and limited on-road bicycle facilities. (Figure 6.).

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 deterrent are the parkways that line the river, typically four-lane roadways with limited 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 because of the 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 path while others contain inadequate sidewalks that lead to potentially dangerous intersections.

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

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. The Study documented myriad origins and generators of pedestrian and bicycle activity within study area. These include:

Academic

- Three major university campuses along the river: Harvard University, Boston University and the Massachusetts Institute of Technology (MIT), with a combined student population of nearly 70,000;
- Dozens of smaller colleges, primary and secondary schools;

Commercial

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

Transportation

- MBTA stations, especially Red Line heavy rail that 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 of the Charles River shoreline throughout the Reservation; including such specific destinations as the Hatch Shell, Magazine Beach, The Esplanade; the new Esplanade Playspace for older children and "Christian Herter Park;"
- "Riverbend Park," which is not a park per se, but an innovative management program that shuts out vehicular use every Sunday from April to October on two stretches of the Memorial Drive parkway in Cambridge'
- Events year round, including concerts, especially the Boston Pops Fourth of July Celebration, movie nights and fund-raising "walks" year-round;
- Historic and cultural landmarks including Fenway Park, the Boston Public Library, the State House, and the Museum of Science; and
- Other major parks and open spaces in the area, such as Boston Common and the Public Garden, Back Bay Fens, and Mount Auburn Cemetery are major destination parks in the area.

Figure 6. illustrates the activity generators listed above, indicating graphically where existing and future demand for pedestrian and bicycle infrastructure.

Gaps + problem areas

By overlaying maps of the Existing Pedestrian/Bike Infrastructure and the Generators of Pedestrian/Bike Activity, a series of problem areas are apparent. These problem areas (Figure 7.) 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 linear path system;
- 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.
-

Results – Part 2. Appropriate tools for enhancing Charles River greenway "connectivity"

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.

There are a wide range of tools that can be deployed in the Charles River Basin and adjacent neighborhoods to improve pedestrian accessibility and experience. (Figure 8.)

- Improved sidewalk connections
- Universal access curb cuts
- Interpretive and wayfinding signs
- Shared use paths, with adequate width
- Amenities, such as seating and shade
- Pedestrian count-down crossing signals
- Raised crosswalks and median "refuge" islands
- Paved paths with a separate, parallel stonedust path
- Tighter curb radii at corners
- Streetscape/landscape improvements
- Traffic calming

Bicycle facility toolbox

There are also a wide range of bicycle facilities that can dramatically enhance bicycle safety, accessibility and experience crossing the parkways into the Reservation or in the neighborhoods adjacent to the Charles River Basin.
The elements shown here are consistent with the AASHTO Guide to Bicycle Facilities, the AASHTO Manual of Uniform Traffic Control Devices, and the NACTO Urban Bikeway Design Guide. (Figure 9.)

- Bike lanes
- Buffered bike lanes
- Contra-flow bike lanes
- Two-stage turn-queue boxes
- Colored pavement paint
- Shared lane markings
- Cycle tracks
- Bicycle- and pedestrian-only bridges
- Bicycle boulevards
- Signs for wayfinding and orientation
- Roadway-to-bridge transitions

Results – Part 3. Draft Recommendations

The planning-level recommendations developed through this Study include more than 100 site-specific proposals. (See Figure 10. for example.) It is anticipated that they will occur

incrementally—designed, funded and implemented over time, in the context of MassDOT's Accelerated Bridge Program projects, the City of Boston's Bike Master Plan, the Esplanade 2020 Plan and DCR's on-going maintenance, management and upgrades of pathways and parkland within the Charles River Reservation.

General recommendations that apply throughout the Basin include:

- DCR should strive to develop a 10'-wide paved path with a parallel soft-surface trail or shoulder for runners where possible. All path widening projects must take into consideration the value of the Reservation as a natural resource. Exceptions to the path-width standards should be made in the presence of historic landscape, riparian habitat or large and mature trees. In "pinch point" conditions, a min. 8' paved path with 3' shoulder on one side should be incorporated.;
- Traffic signals should be examined to determine if concurrent or exclusive pedestrian phases are appropriate. Exclusive signals are recommended where feasible;
- A wayfinding study should be conducted to identify type and location of wayfinding signage to enhance pedestrian and bicycle connectivity and to support environmental stewardship, education and interpretation;
- Branding the pathways along the Basin as the "Charles River Greenway" to support the concept of green infrastructure as an integrated element of the Basin's conservation strategy;
- Regular maintenance of the paths throughout the Reservation is essential to their continued success as a transportation, conservation and recreation corridor.

Other draft key recommendations include:

- Numerous streetscape enhancements are recommended in Watertown and Newton along roadways that should connect directly to the Reservation, but currently do not;
- A new ADA-compliant footbridge over the Charles River that connects Newton and Watertown, providing additional opportunities for walking and bicycling loops between the Galen and North Beacon Street bridges;
- New crosswalks, roadway geometry and bike lanes on or adjacent to the North Beacon Street Bridge;
- The lane reduction of a mile-long stretch of Greenough Boulevard that provides the opportunity for new parkland and paths that form an integrated loop with Herter Park on the south bank of the river;
- A road narrowing along Memorial Drive between Mt. Auburn Hospital and John F Kennedy Park in Cambridge that improves connections to Brattle Street and provides space for separated paved and soft-surface paths;
- Long-term recommendation for providing the link from the Boston University Bridge to the Esplanade, incorporating the rail trestle that may be redeveloped as a part of the Grand Junction trail project;

- A plan to re-connect the Esplanade with the Emerald Necklace, utilizing a new path through DCR-owned land adjacent to the Bowker Overpass, paralleling the Muddy River and along a widened sidewalk of the viaduct over the Mass Pike;
- Previously planned improvements as part of the Memorial Drive Phase II project that will widen the existing path adjacent to the seawall, introduce a parallel soft-surface path in places and planting of additional trees;
- A mix of enhancements to improve connections from the Albany and Sidney Street corridors in Cambridgeport to the river using shared lanes, signage, an improved at-grade railroad crossing and new paths through Fort Washington Park;
- In conjunction with the planned improvements to the Longfellow Bridge through MassDOT's ABP, new traffic signals and crosswalks to link the Broad Canal path to Cambridge Parkway;
- Bicycle connections through Charles Circle that will include green bike lanes, enhanced signage and frequent shared-lane markings on the Boston end of the Longfellow Bridge and a new non-motorized pedestrian/bicyclist bridge/ramp providing direct access between the Bridge and the Esplanade;
- A critical link from the north to the south bank of the Charles utilizing a pair of new foot bridges along the upstream side of the Museum of Science on the old dam (one located at the point where Lechmere Canal and the River join, and the second spanning the channel connecting the Upper and Lower Basins) , ideas being explored in a preliminary study initiated by DCR;
- Building on a separate study completed by the Connectivity Study team in 2011, at-grade pedestrian and bike enhancements at Leverett Circle (with provisions for a pedestrian overpass in the future).

Conclusion

This study addressed the challenge of balancing human use and environmental conservation by enhancing the Basin's green infrastructure for non-motorized mobility in concert with improved safety, access and mobility for all walkers, runners and bicyclists. These efforts can help the region reduce air pollution, encourage physical activity, and support stewardship of the river's, natural, scenic and historic values.

The proposed changes to the Basin are intended to connect the adjacent communities, transit and Hubway stations, and create a more coherent and well-connected network of paths, sidewalks, intersections and bike facilities. These improvements are intended to manage better 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. They take into account the improved pedestrian and bike facilities that have been planned and, in some cases implemented, through MassDOT's Accelerated Bridge Program (ABP).

Taken together, the recommendations of this study offer a blueprint for the Commonwealth and the municipalities of the Charles River Basin to improve the ways for everyone to "get to the Greenway"—helping to achieve the goal, set by Governor Deval Patrick and MassDOT Secretary Richard Davey, to triple walking and bicycling in the Commonwealth.

References

American Association of State Highway and Transportation Officials, Manual of Uniform Traffic Control Devices, 3rd ed. (Washington DC: American Association of State Highway and Transportation Officials, 2003).

"Charles River Basin," The Charles River Conservancy, last modified 2013. http://www.charlesriverconservancy.org/crb/crb.html

Goody, Clancy Associates;, et al, "Master Plan for the Charles River Basin: The Second Century." (Metropolitan District Commission [now the Massachusetts Department of Conservation and Recreation], 2002

Institute of Transportation Engineers, Guide for the Development of Bicycle Facilities, 4th ed. (Washington DC: American Association of State Highway and Transportation Officials, 2012).

"Making Bridges, Doing Business Differently," MassDOT Accelerated Bridge Program, last modified 2010. http://www.eot.state.ma.us/acceleratedbridges/

"NACTO Urban Bikeway Design Guide," National Association of City Transportation Officials, last modified 2013. http://nacto.org/cities-for-cycling/design-guide/

Halvorson Design Partnership, Alta Planning + Design and HDR, Inc., "Charles River Basin: Leverett Circle Pedestrian and Bicycle Crossing Study", (Massachusetts Department of Transportation and the Massachusetts Department of Conservation and Recreation, April 2011)

Halvorson Design Partnership, Alta Planning + Design and HDR, Inc., "Existing Conditions Analysis - Charles River Basin Pedestrian and Bicycle Study for Pathways and Vehicular Bridges" (Massachusetts Department of Transportation and the Massachusetts Department of Conservation and Recreation, June 2010)

Halvorson Design Partnership, Alta Planning + Design and HDR, Inc., "Technical Memorandum: September 2011 Non-Motorized User Counts Along the Charles River Basin." Charles River Basin Pedestrian and Bicycle Study for Pathways and Bridges (Massachusetts Department of Transportation and the Massachusetts Department of Conservation and Recreation, November 2011)

"What We Do," The Esplanade Association, last modified 2013. http://www.esplanadeassociation.org/what-we-do/projects/

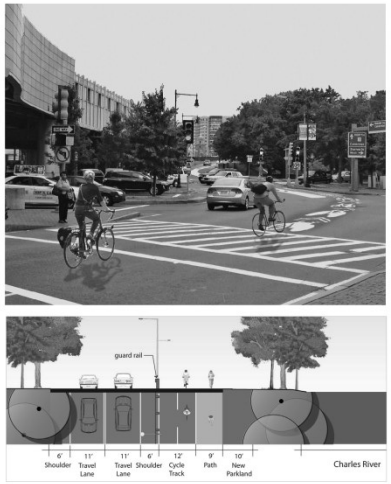
Figures

The figures on the following pages are excerpted from the draft report of the 2013 Charles River Basin Pedestrian and Bicycle Connectivity Study.

DRAFT

Charles River Basin
Pedestrian and Bicycle Study for Pathways and Bridges

Pedestrian and Bicycle Connectivity Study



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dcr Massachusetts

HALVORSON DESIGN PARTNERSHIP

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HDR

Figure 1. Cover of draft report

Figure 2. Overview of study-wide draft recommendations

Typical conditions in the Connectivity Study area

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

Access for pedestrians and bicyclists on the important desire line between Arsenal Mall and the River is uncontrolled and unmarked.

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.

The Bowker Overpass roadway may be wide enough, relative to its anticipated vehicular use, for a dedicated zone for bicycles.

Accommodation for pedestrians and bicycles is needed on many of the the bridges over the river, as well as safe and well-marked ways to negotiate the intersections at either end. This is Charles Circle at the South Bank end of Longfellow Bridge.

A "user counter" on the Esplanade records three different types of user sharing the path right-of-way: a jogger, a cyclist and a stroller.

Figure 3. Sample of existing conditions.

1. Volume of pedestrians and bicyclists on Reservation paths recorded during the Spring 2012 biannual user count.

Figure 4. Sample user count findings

Regional context

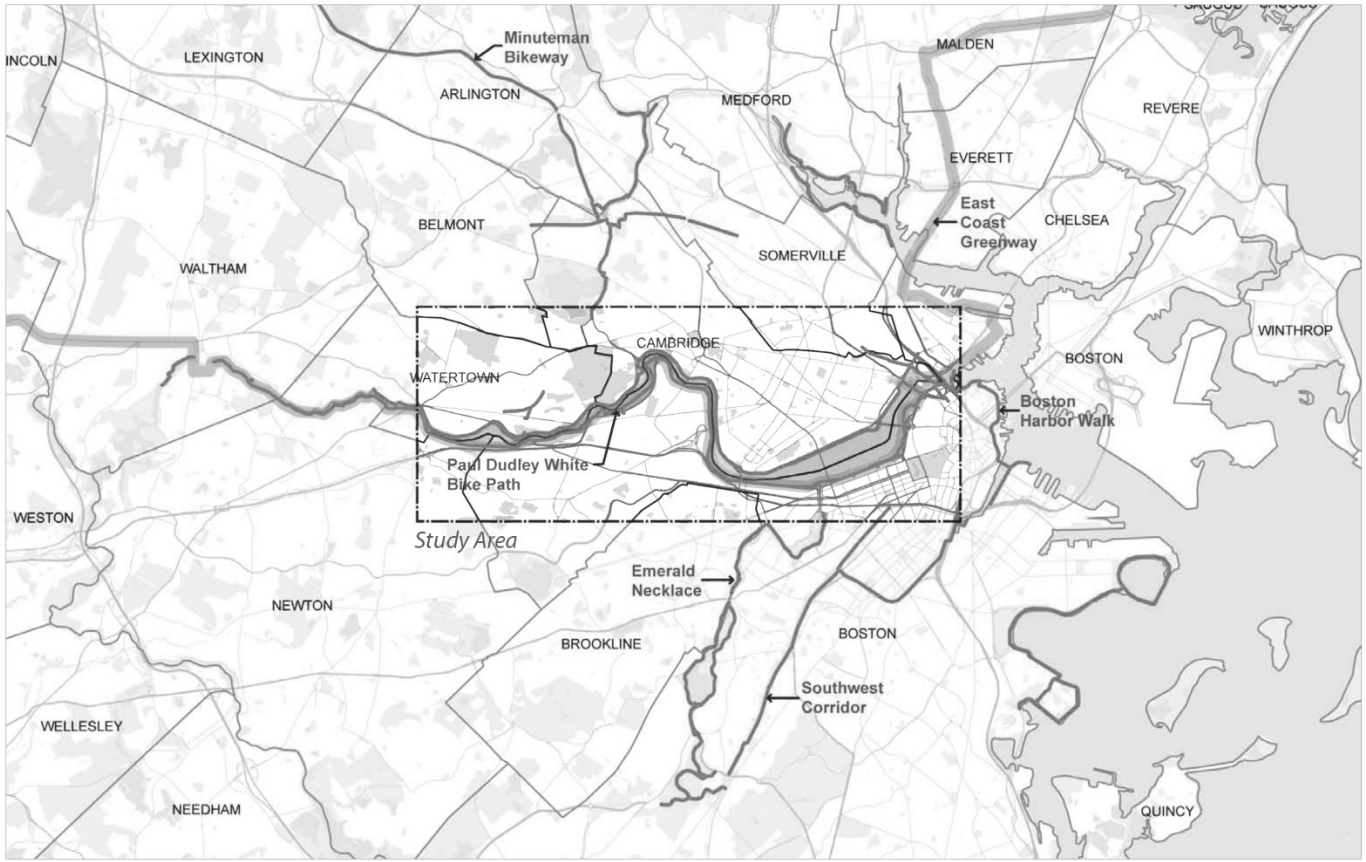


Figure 36

Figure 5. Regional greenway context

Figure 11

Existing pedestrian + bicycle infrastructure

Legend

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

Figure 12

Generators of pedestrian + bicycle activity

Legend

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

Figure 6. Findings regarding existing infrastructure + existing trip generators

Figure 7. Composite analysis of study-wide connectivity gaps and problem 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.

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

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

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

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

17. **Shared use paths** *along the riverfront provide tremendous amenities for cities.*

18. **Seating and shade trees** *are particularly good for the elderly or people with limited mobility.*

19. **Pedestrian countdown signals** *create predictability for pedestrians and discourage jay walking.*

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

21. **Paved paths with a separate stonedust track** *provide a soft-surface option for walkers and runners.*

22. **Tighter-radius-curb corners** *require motorists to slow down when taking turns and provide shorter pedestrian crossing distances.*

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

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

Figure 8. "Toolbox" of pedestrian-oriented measures appropriate for the Charles River Basin

Bicycle facility toolbox

There are also a wide range of bicycle facilities that can dramatically enhance bicycle safety, accessibility and experience crossing the parkways into the Reservation or 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***.

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

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

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

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

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

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

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

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

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

34. **Signage** *can greatly improve wayfinding for bicyclists.*

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

Figure 9. "Toolbox" of bicyclist-oriented measures appropriate for the Charles River Basin

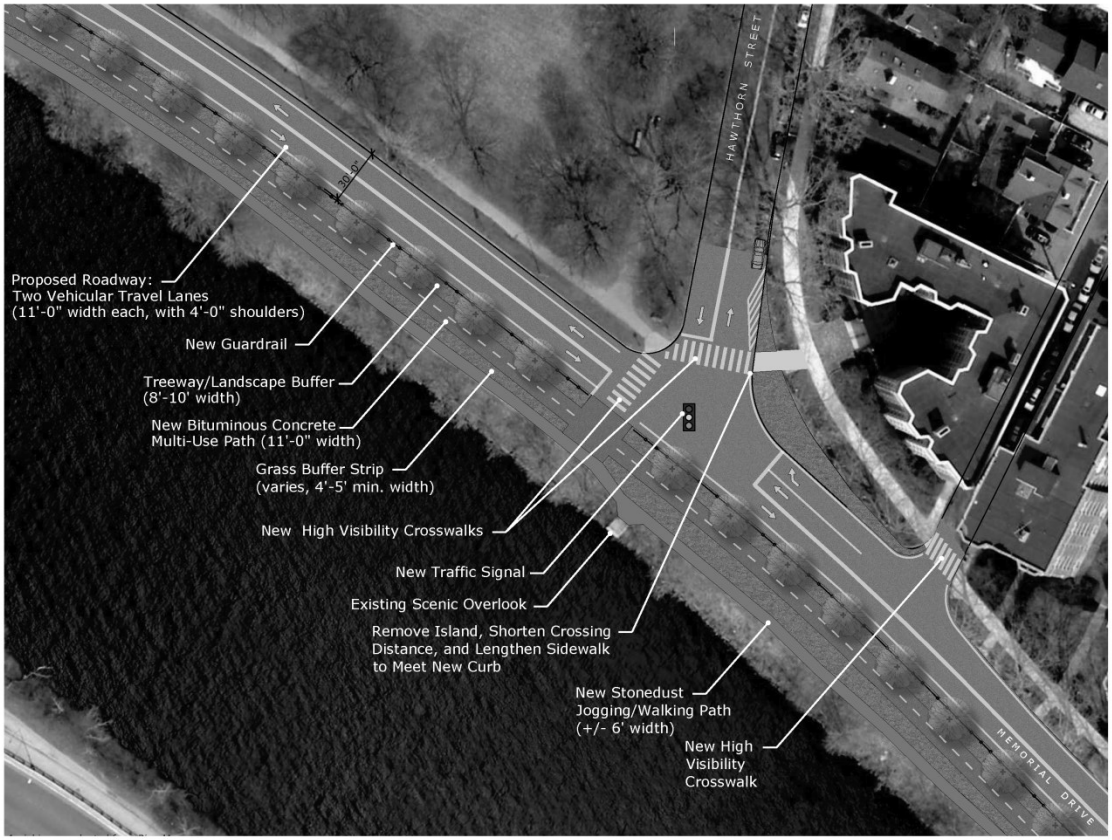
Figure 39

Recommendations

Section A | west
Galen Street Bridge to North Beacon Street Bridge

Figure 10. Sample detailed plan showing specific draft recommendations.

Section D **Eliot Bridge - Western Avenue Bridge** continued



53. Plan view showing the Memorial Drive lane reduction, expansion of the adjacent parkland and new traffic signal the Memorial Drive/Hawthorn Street intersection

between Mount Auburn Street and Memorial Drive. At the intersection, a traffic signal or a refuge island is recommended to improve the existing crosswalk (Figure 50).

Further downriver, the planned reconstruction of the Anderson Memorial Bridge includes bike lanes in each direction. These bike lanes should be carried through to the two-way section of JFK Street between Memorial Drive and Eliot Street.

The signalized crossing at Dewolfe Street is an important connector between Mount Auburn Street and the reservation, and should be improved with bicycle facilities, which in the longer term could include striped bike lanes, but in the short term shared-lane markings and signage.

There is very high residential density adjacent to Memorial Drive between Dewolfe Street and Western Avenue but there are no pedestrian crossings between the two intersections. People frequently dash across Memorial Drive here to access the path system along the river. The sidewalk on the Cambridge side of Memorial Drive should be widened and improved to encourage joggers and pedestrians to use it to get to the signalized pedestrian crossings.

The intersection of Western Avenue and Memorial Drive is being redesigned as part of the Western Avenue Bridge reconstruction project by MassDOT. One proposed configuration for the intersection includes only one outbound lane on Memorial Drive. If this becomes the final configuration for the intersection, then road narrowing should be considered for a section of Memorial Drive upriver of Western Avenue. This provides the opportunity to expand the parkland on the river side of Memorial Drive, or to expand the sidewalk on the Cambridge side. Due to the need for queuing at the JFK Street intersection, the lane reduction may function best between Western Avenue and Dewolfe Street.

South Bank. On the south side of the Charles River, the path runs along the edge of Soldiers Field Road from the Eliot Bridge to the Anderson Bridge. Raised and/or high visibility crosswalks should be considered at the driveways of the boathouse.

As part of the Anderson Memorial Bridge reconstruction, removal of the right-turn slip lanes and curb realignments are planned that will reduce the crossing distance for path users on the south end of the bridge.

The Weeks Bridges are currently only accessible by stairs on the north and south ends. In the long term, bicycle accessibility and ADA-compliance should be a goal for the two Weeks Bridges.

Figure 11. Sample recommendations page with text and an enlarged illustration showing specific draft recommendations.