BROOKLINE, MASSACHUSETTS

Complete Streets Prioritization Plan

Prepared for
Town of Brookline, Massachusetts

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Introduction

Encouraging walking and biking is a priority for the Town of Brookline. When residents can replace short driving trips with active transportation, it helps lower traffic congestion and improves public health and the livability of the Town. This Prioritization Plan enables the Town to access resources from the Commonwealth's Complete Streets Funding program that can help build sidewalks, bike facilities, safer crossings, and many other opportunities to improve daily lives.

Complete Streets include providing multimodal options for travel for all road users. This photo was taken in Brookline Village. Photo: HSH

A Complete Street is one that provides safe and accessible travel alternatives for all modes—walking, biking, transit, and motorized vehicles. Complete Streets designs contribute towards safety, health, and economic vitality that can be enjoyed by people of all ages and ability. Having multi-modal options to travel between home, work, schools, recreation, and retail destinations are essential in promoting more livable communities.

Complete Streets improvements may be large-scale – such as a corridor-wide improvement – or focused on the needs of a single mode – such as a bus shelter for a highly used bus stop. Each improvement must meet current Americans with Disabilities Act (ADA) and the Massachusetts Architectural Access Board (AAB) guidelines.

The Massachusetts Department of Transportation (MassDOT) recognizes the importance of projects that provide thorough, context-sensitive, multi-modal transportation options. To promote these priorities, MassDOT issued the Healthy Transportation Policy Directive in 2013. This directive, while focused on state and federally funded roadways, can be applied to local roads at the municipal level. It was through the creation of the Complete Streets Funding Program that this goal was realized.

MassDOT Complete Streets Funding Program

The MassDOT Complete Streets Funding Program was initially conceived through legislative authorization as part of the 2014 Transportation Bond Bill. The Program was released in February 2016. The intent of this program was to reward municipalities that demonstrated a commitment to Complete Streets both in policy and in practice. This was also a great opportunity to continue to build on the relationship between the Baker-Polito administration and municipalities, which had started earlier through the Community Compact Cabinet. The reward to municipalities that choose to participate includes funding for technical assistance in the development of a Prioritization Plan and funding for construction of Complete Streets projects selected from the Prioritization Plan. The eligibility requirements are designed to demonstrate a municipality's commitment to embedding Complete Streets in policy (Complete Streets Policy) and plan (Complete Streets Prioritization Plan).

The Complete Streets Funding Program is structured with three Tiers:

- Tier 1 – Complete Streets Training and Policy Development
- Tier 2 – Complete Streets Prioritization Plan
- Tier 3 – Project Construction Funding

The Town of Brookline attended the required Complete Streets training offered by MassDOT and submitted their Complete Streets Policy for approval. Their policy was approved on July 26, 2017. This document serves as the Town's Tier 2 – Complete Streets Prioritization Plan.

The Town of Brookline

A view of Brookline Town Hall from Pierce Street. Photo: HSH

With a growing population of 58,732[1] people and located within Norfolk County, Brookline is located among the Boston neighborhoods of Allston/Brighton, Fenway, Kenmore, Longwood Medical Area, Mission Hill, Jamaica Plain, and West Roxbury. The Town of Brookline's rich history shapes its existing conditions today. The Town's origin as a farming settlement and the preservation of open space have contributed to this community becoming one of Metropolitan Boston's most picturesque suburbs. Additionally, the arrival of the Boston and Worcester Railroad in Brookline Village and the extension of Beacon Street through Brookline in the 19th century prompted the extension of Boston's railroad and streetcar system into the Town, drawing Brookline conveniently closer to Boston.[2]

Today, Brookline's commercial and mixed-use areas serve as focal points of community life. The Town's various commercial centers include Brookline Village, Coolidge Corner, Washington Square, and Chestnut Hill. These commercial centers are located throughout the Town, with Brookline Village, Coolidge Corner, and Washington Square in North Brookline and Chestnut Hill in South Brookline. Through various pedestrian- and bike-friendly corridors and a comprehensive transit network, these neighborhoods are within walking, biking, and transit distance to each other.

BROOKLINE VILLAGE

Brookline Village is in the northeastern portion of Brookline, bounded by intersection of Harvard Street and Vernon Street, Route 9, Mission Hill, and Jamaica Plain. Brookline Village is defined by the two- and three-story commercial and retail buildings that line the neighborhood's main street,

[1] U.S. Census (2010)
[2] Brookline's 2005-2015 Comprehensive Plan

Harvard Street. These commercial and retail buildings include a diverse mix of services, such as Bonnie's Boutique, Henry's Bear Park, Village Hair Design, Cutty's, Beacon Hill Athletic Clubs, Orinoco, Pomodoro, and Matt Murphy's Pub. Additionally, the Town's civic center is also in Brookline Village, with Town Hall located right off Harvard Street and Washington Street. At the periphery of Harvard Street and the Town's civic center are one- to two-story residential houses and three-story condominium buildings that are adjacent to many neighborhood parks.

A view of Brookline Village from Station Street. Photo: HSH

In addition to walking and biking options through the Town's network of sidewalk and bicycle facilities, getting to Brookline Village is easy. The area is well-served by the Massachusetts Bay Transportation Authority (MBTA) train and bus network. The Green Line D Branch stops at the Brookline Village stop on Station Street and MBTA Bus Routes 65 and 66 have several stops within the neighborhood, specifically along Washington Street and Harvard Street. With the abundance of open space, trees, outdoor seating, transit access, shops, and services within a short walking distance of each other, Brookline Village is one of the Town's most visited communities and can benefit from Complete Streets improvements that will further improve its transit network, walkability, and bike-friendliness.

COOLIDGE CORNER

Coolidge Corner is the Town's main central business district (CBD)[3] with many amenities and multiple transportation choices. Like Brookline Village, Coolidge Corner is a commercial activity hub characterized by two- and three-story buildings with commercial and retail services on the ground floor. Services within this neighborhood vary by employer; some of the larger, national employers in this area include Walgreens, CVS, Trader Joe's, and Bank of America. Along with these retailers are independent, locally-owned businesses, such as Brookline Booksmith, Coolidge Corner Theatre, and

[3] A CBD is the commercial and business center of a city or town.

Simons Shoes. Out of the 1,355 total businesses in Brookline's commercial districts, 42% are in Coolidge Corner.[4]

This commercial center is well-served by a multitude of transportation options. Harvard Street and Beacon Street are North Brookline's two main corridors that have the highest density of access points. For instance, residents from the Town of Newton and Boston's Fenway and Kenmore neighborhoods can access Coolidge Corner via Beacon Street. Residents from Boston's Dudley Square neighborhood, Allston/Brighton neighborhoods, and the City of Cambridge can reach this neighborhood using Harvard Street. Additionally, MBTA's Green Line C Branch stops at the intersection of Harvard Street and Beacon Street, the heart of Coolidge Corner. MBTA's Bus Route 66 also runs along Harvard Street, making stops near Trader Joe's and Brookline Bank.

A view of Coolidge Corner neighborhood. Photo: HSH

Surrounding Coolidge Corner's commercial hub are historic one- to two-story single-family homes, apartment buildings, and condominium buildings that range in style. Most of the apartment buildings and townhouses are built mostly of brownstone with planted flowers, gardens, bushes, trees surrounding them. Just like Brookline Village, there is no shortage of open space in Coolidge Corner. Within walking distance, residents and visitors can access many playgrounds such as Amory Playground, Halls Pond, Griggs Park, St. Marks Park, and other neighborhood playgrounds.

WASHINGTON SQUARE

Washington Square is another commercial hot spot with streets that offer a diverse mix of restaurants and shops. Unlike Coolidge Corner, there are fewer national retailers and more locally-owned businesses and restaurants. Some of the most visited places within Washington Square are Athan's Bakery, Connelly Hardware Company, The Publick House, Golden Temple, Barcelona

[4] 2016 Infogroup Business Level Data (2016); MAPC: Perspectives and Opportunities for Brookline's Commercial Areas

Restaurant, Sunshine Academy, The Abbey, Marathon Sports, and Porto Maltese. MBTA's Green Line C Branch has two stops within the neighborhood: Washington Square and Tappan Street. MBTA's Bus Route 65 also serves this neighborhood. Homes within and adjacent to this neighborhood follow the same style and type that are found near Coolidge Corner.

CHESTNUT HILL

The Chestnut Hill neighborhood is in South Brookline. Unlike Washington Square and Coolidge Corner, Chestnut Hill is characterized as a small, quiet neighborhood in the more suburban area of Brookline. A single strip mall – called The Shops at Chestnut Hill – contains many retail shops and restaurants that serve the single-family homes that make up most of this neighborhood. The Shops at Chestnut Hill is located off Boylston Street (Route 9) and is connected by pedestrian walkways and sidewalk cafes that give the strip mall a more welcoming experience to visitors. Chestnut Hill is adjacent to the Chestnut Hill stop for MBTA's Green Line D Branch and the Boylston Street and Hammond Street stop for MBTA's Bus Route 60.

Facing Boylston Street (Route 9) and The Shops at Chestnut Hill entrance from Hammond Street. Photo by: HSH

In addition to the Town's distinct commercial districts, residential neighborhoods also vary in size and style depending where they are located within Brookline. Most residential homes near Brookline Village, Coolidge Corner, and Washington Square follow compact development design in which the homes are low-rise with small backyards. There are also a handful of two- to three-story condominium buildings integrated within the single-family houses. South Brookline offers larger estates and a quieter setting, and unlike North Brookline, trips to restaurants and the grocery store require residents to drive a couple of miles as opposed to having the convenience of walking or biking.

POPULATION CHARACTERISTCS

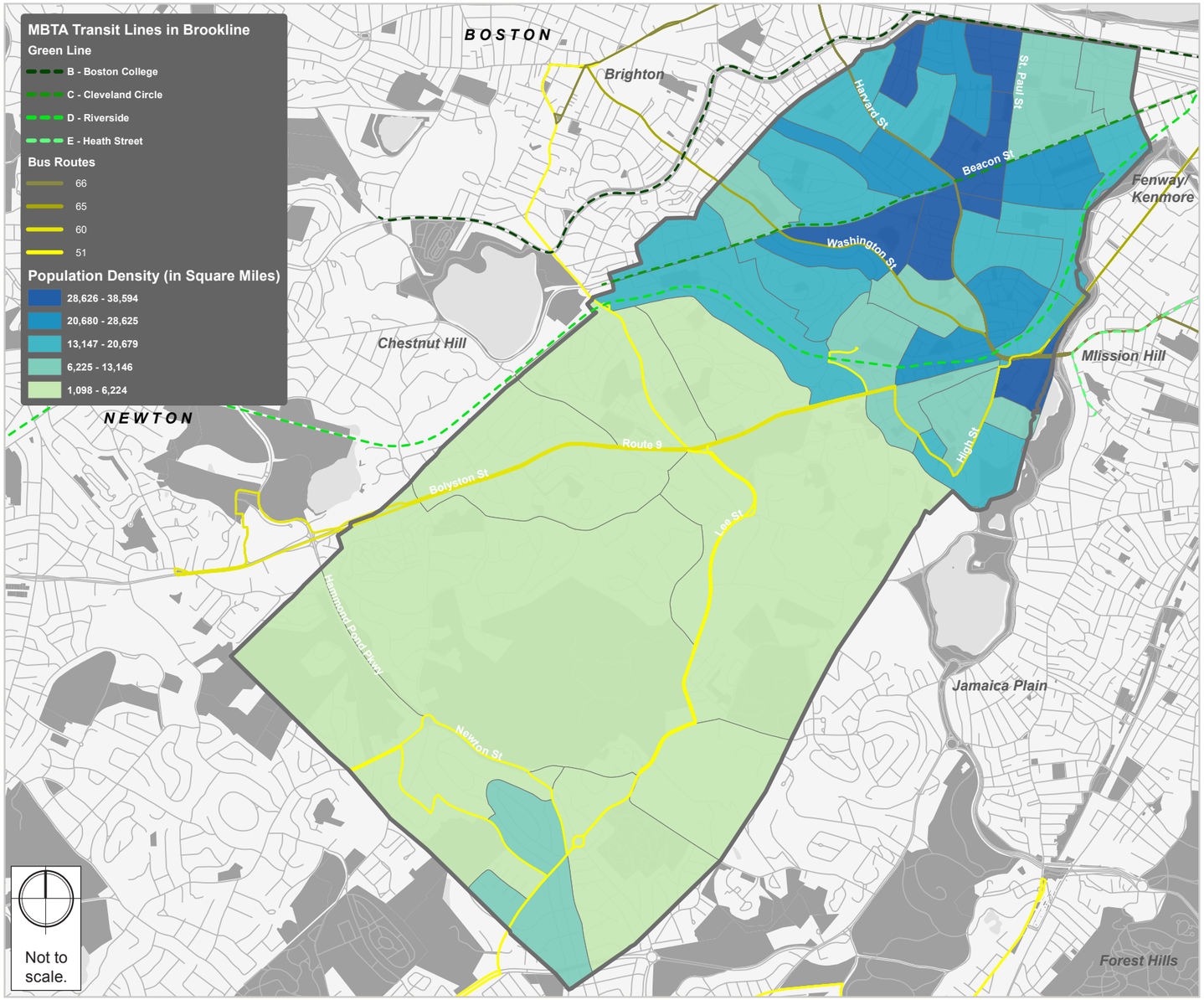
A typical residential neighborhood in North Brookline. Photo: HSH

Supported by the patterns of density in the varying areas of the Town, population density is significantly higher in North Brookline than in South Brookline **(Figure 1)**. The location of census blocks that have the highest density of population are adjacent to Brookline Village, Washington Square, Coolidge Corner, and the portion of St. Paul Street (north of Beacon Street). These areas have residential homes that range between single-family homes, condominiums, and apartment buildings. The census blocks adjacent to Coolidge Corner and Brookline Village include buildings that house affordable units for low-income families, the elderly, and disabled. Census blocks that are southwest of Clinton Road and Cypress Street have lower density and are larger (e.g., mansions and estates) that are more spread out. Brookline's larger parks and open space, such as Larz Anderson Park, the Brookline Country Club, and Brookline Reservoir Park, are also located in South Brookline.

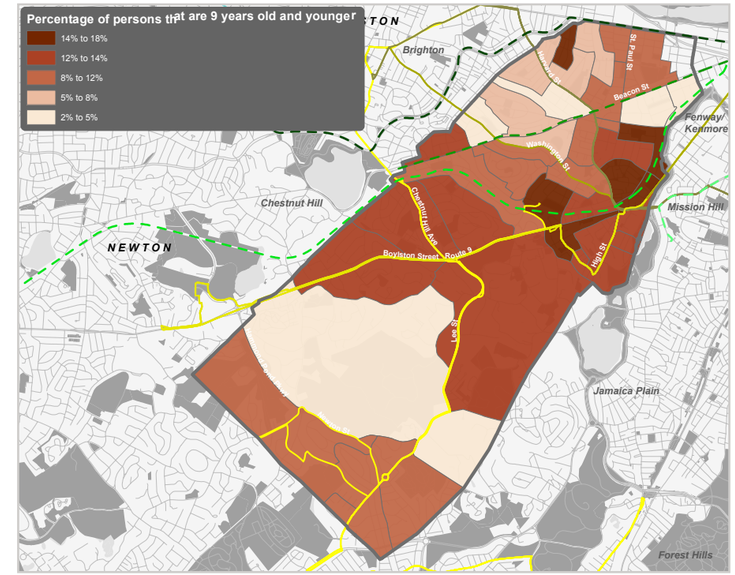
Figure 1 shows that children from the ages of nine years old or younger are mostly located in North Brookline, specifically adjacent to Brookline Village, Emerson Gardens, and High Street Hill. Brookline High School is located within one of the census blocks that has the highest density of children nine years old or younger. A census block in the North Brookline neighborhood also has a high density of children. Overall, neighborhoods that are north of Route 9 have relatively high densities of young children compared to census blocks in South Brookline. The high density of families with school-aged children in the northern portion of Brookline is supported by the fact that most of Brookline's public school are in North Brookline. There are 12 public schools in Brookline, 10 of which are located north of or adjacent to Route 9 and two that are in South Brookline (Baker School and one of several Brookline Early Education Program (BEEP) locations).

Figure 1. Brookline Population

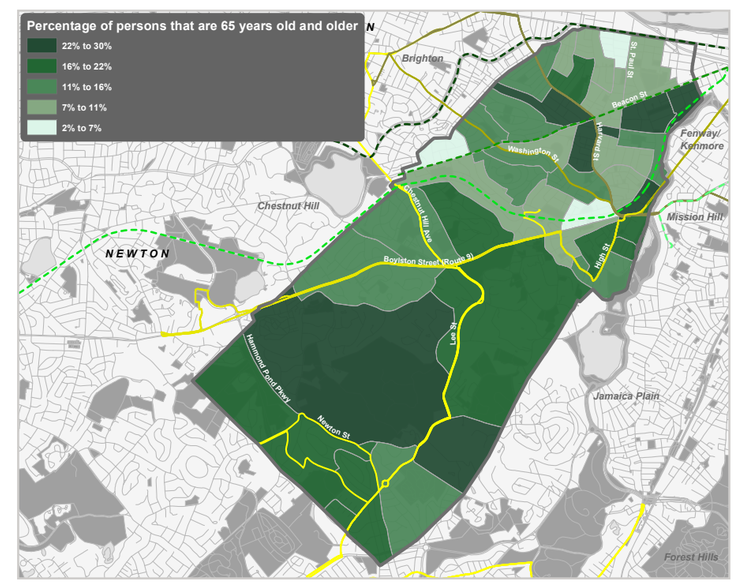
Population Density (Per Square Mile)



Percentage of Population That Are 9 Years Old and Younger



Percentage of Population That Are 65 Years Old and Older



Data Source: ACS 5-Year Estimates

In contrast, the percentage of people that are 65 years or older are evenly distributed between North and South Brookline. In the northern portion of Brookline, senior citizens are located near Coolidge Corner, Brookline Village, and a neighborhood near St. Mary's Street. Within the southern portion of Brookline, the census block with the highest percentage of senior citizens is adjacent to the Woodland Heath neighborhood.

OPEN SPACE AND RECREATION

Larz Anderson Park in South Brookline. Photo: HSH

Brookline's priority of providing open space and parks that are within a reasonable walking distance for residents is evident through its comprehensive network of playgrounds and walking trails distributed throughout the Town. Brookline residents value and enjoy the high-quality and comprehensive system of parks, recreation programs, trails, and natural open space that are available to them. Most of Brookline's park sites are set in an urban context, within neighborhoods connected by streets. An expanding network of trails and bikeways supplement the sidewalks and streets that connect these assets. Most of the parks in Brookline are neighborhood playgrounds, primarily designed to support the everyday activities of residents, particularly children. There is a handful of parks and open spaces that draw visitors from across the Greater Boston area and neighboring communities; these parks, such as Brookline Reservoir, Larz Anderson Park, and the Emerald Necklace, include high-quality facilities and walking and biking trails.

The characteristics that make Brookline a highly livable community today are the same characteristics that make their transportation network improvements challenging and complex. As developable land becomes scarce and the Town's roadway network ages, the challenge of accommodating a growing population moving through and within the Town has become more significant.

EXISTING ROADWAY NETWORK

Brookline's roadway network provides access to and from Brookline and is relied upon by many as a means of getting around the metropolitan Boston area. While driving is still the main mode of traveling in Brookline – due to its unprecedented convenience and popularity – the Town is also well-served by other, more sustainable transportation options such as walking, biking, and taking transit (which will be discussed in later sections).

Heavily traveled roadways within Brookline, such as Route 9, Beacon Street, Harvard Street, Clyde/Lee Street, Hammond Pond Parkway, Hammond Street, Newton Street, and West Roxbury Parkway, provide the highest mobility for commuters traveling within and outside the area. These heavily traveled corridors are functionally classified as either Urban Principal Arterials or Urban Minor Arterials. Urban Principal Arterial is a classification for roadways that serve major centers of metropolitan areas and provide a high degree of movement. These roadways tend to have relatively high traffic volumes and the longest trip demands. Urban Minor Arterial is a classification for roadways that accommodate trips of moderate lengths and offer connections to urban principal arterial roadways. These roadways usually distribute traffic to small geographic areas and serve trips at a lower capacity.[5]

The Town has approximately 176 miles of public roadway, of which 26.5 miles are under the jurisdiction of MassDOT and the Massachusetts's Department of Conservation and Recreation (DCR)[6]. There are four primary roadways that provide access from Brookline to adjacent Boston and Newton neighborhoods. The four roads are:

- Harvard Street: Allston neighborhood
- Beacon Street: Fenway-Kenmore neighborhood, Town of Newton
- Washington Street: Brighton neighborhood
- Route 9: Mission Hill neighborhood, Town of Newton

Harvard Street is an Urban Principal Arterial roadway that is under the jurisdiction of the Town. The corridor runs in a northwest to southeast direction, connecting to Boston's Allston neighborhood from Washington Street in Brookline Village. Overall, Harvard Street provides at least one lane in each direction, widening out to two lanes in each direction as it intersects major roadways, such as Beacon Street. Bicycle facilities and sidewalks are provided on both sides of the corridor. Parking is also available for most of the segment.

[5] "Highway Functional Classification Concepts, Criteria, and Procedures" (FHWA)
[6] Brookline's 2005-2015 Comprehensive Plan

Beacon Street is another Urban Principal Arterial and is under the jurisdiction of the Town. Beacon Street runs in an east-west direction and connects to Newton and Boston's Fenway-Kenmore neighborhood. Beacon Street is a bidirectional roadway with MBTA's Green Line C Branch in a dedicated median separating at least two lanes per direction with additional travel lanes at specific intersections. Wide sidewalks on both sides of the corridor are available for pedestrians. Bicycle facilities, such as bicycle lanes and shared lane markings (also known as "sharrows"), can be found in certain segments. Parking is available in certain blocks of the corridor.

Like Harvard Street and Beacon Street, Washington Street is an Urban Principal Arterial roadway that is under the jurisdiction of the Town. Like Harvard Street, the corridor runs in a northwest to southeast direction, connecting to Boston's Brighton neighborhood from Harvard Street in Brookline Village. Washington Street provides at least one lane in each direction, with designated turning lanes at specific intersections. Sidewalks, bicycle lanes, and sharrows are provided throughout the corridor. Parking is available on both sides of the streets.

Boylston Street (Route 9) is an Urban Principal Arterial roadway that is under the jurisdiction of MassDOT and ineligible for funding through the State's Complete Streets Program. Located at the center and seen as the dividing line separating North and South Brookline, the Route 9 corridor runs in an east-west direction from the Riverway out to Interstate 95 (I-95) in Newton. The number of lanes and width vary throughout the corridor – it is mostly two through lanes per direction with additional turning lanes at specific intersections. Sidewalks and parking are located on both sides of the roadway. Route 9 is the most heavily trafficked roadway in Brookline due to its high degree of mobility and adjacency to highly visited destinations within the Town, such as Brookline Village, the Emerald Necklace, Brookline High School, Old Lincoln School, and Boylston Street Playground.

Emerald Necklace crossing across Route 9. Photo: HSH

Heavily traveled roadways within South Brookline include Hammond Street, Newton Street, Clyde/Lee Street, Hammond Pond Parkway, and West Roxbury Parkway. Hammond Street, Newton Street, and Clyde/Lee Streets are Urban Minor Arterial roadways owned by the Town that provide

access to different neighborhoods within and outside of Brookline. Hammond Street provides access to Newton, The Shops at Chestnut Hill, and MBTA's Green Line D Branch. The corridor has two lanes per direction from the Town Line to when it transitions to Newton Street. Newton Street starts from where Hammond Street ends and continues until it becomes Pond Street. The corridor is adjacent to single-family homes, Larz Anderson Park, and Putterham Meadows Golf Club. Clyde/Lee Street connect to Newton Street and is the main roadway that connects to Route 9 and North Brookline. Hammond Pond Parkway and West Roxbury Parkway are owned and managed by DCR. They are Urban Principal Arterial roadways that provide the greatest mobility for residents in Brookline and Newton.

The remainder of the roadways in Brookline are local residential roadways that see cut-through traffic and high vehicular speeds. Through the public feedback process, an overwhelming number of comments cited concern that drivers use Brookline's local streets to get to another major roadway. This has caused an increase in traffic volumes and vehicular speeds along roadways that are designed to accommodate lower vehicle capacity and slower speeds. In October 2017, Brookline's Transportation Board voted in favor of establishing a new statutory speed limit of 25 miles per hour (mph) (down from 30 mph), unless otherwise posted. This speed limit applies to all roadways within Brookline and lays the foundation for Complete Streets improvements.

Entrance to Brookline on Chestnut Street (near Ward Pond) with a town-wide 25 mph posted speed limit. Photo: HSH

EXISTING TRANSIT NETWORK

Three branches of MBTA's Green Line – Lines C and D – serve the community and provide access to destinations in Boston and Newton. MBTA bus lines also provide good transit access to most areas of the Town, as well as to the commuter rail station in West Roxbury. The Town also has supplementary transit services that are available to seniors and persons with disabilities.

The MBTA Green Line C Branch runs down the middle of Beacon Street. The Green Line C Branch, also known as the Cleveland Circle Line, makes 12 stops along Brookline's portion of Beacon Street and provides direct access to the Coolidge Corner and Washington Square neighborhoods. The MTBA Green Line D Branch is another transit line that runs through Brookline, specifically along the southeastern portion of Brookline, eventually reaching Newton. The Green Line D Branch, also known as the Riverside Line, makes five stops within Brookline and provides access to Brookline Village and Chestnut Hill neighborhoods. There are seven stops in Newton after the Reservoir stop before the transit line reaches Riverside.

MBTA Green Line D Branch "Brookline Village" stop. Photo: HSH

MBTA Route 66 bus along Harvard Street. Photo: HSH

There are four MBTA bus routes – Routes 66, 65, 60, and 51 – that run through Brookline, connecting to Boston and Cambridge. Bus Route 66 begins at Dudley Square in Roxbury and follows Route 39 and the Green Line "E" Branch on a short segment from Brigham Circle to the Boston city limits. It then travels through Brookline and Allston along Harvard Street before it gets to Harvard Square in Cambridge. Bus Route 65 begins at Kenmore Station in Boston, connecting to Boston, specifically the Brighton Center neighborhood. From Brighton Center, Bus Route 65 runs along Washington Street passing through Washington Square and Brookline Village. The route eventually gets on Brookline Avenue, turns onto Commonwealth Avenue and makes the final stop into the Kenmore Station busway. Bus Route 60 begins at Chestnut Hill Mall and ends at the Kenmore Station. Within Brookline, Bus Route 60 runs along Route 9 and transitions on to Brookline Avenue and runs along the Brookline Avenue corridor until it reaches the Kenmore Station stop. Lastly, Bus Route 51 starts at the Chestnut Hill Reservoir, runs along Chestnut Hill Avenue, down to Clyde/Lee Street, turns to Independence Drive – ending up at Brook Farm neighborhood – and continues onto Weld Street until it gets to Washington Street in Boston.

The route continues onto the Washington Street corridor until it reaches the final stop at the Forest Hills Station. In addition to the commuter rail and bus services, The Ride also provides door-to-door service to eligible people who cannot use public transportation because of disabilities (e.g. physical, cognitive, or mental disability).

BICYCLE AND PEDESTRIAN NETWORK

Brookline has a robust system of sidewalks and pathways with approximately 150 miles of sidewalks and 11 public footpaths.[7] This comprehensive network of sidewalks allows Brookline residents to choose walking for getting around Town. For Brookline's Complete Streets Plan, the goal is to close the gaps in the existing sidewalk network to provide connectivity rather than capacity. Despite Brookline's existing comprehensive sidewalk network, there are still opportunities. Route 9 is a barrier to walking, and too many busy streets do not have sidewalks and/or safe crossings. Crosswalks need upgrades, and there are areas around schools, parks, and commercial centers that need improvements. Better lighting, separation from traffic, wayfinding, and facilities to help those who rely on curb ramps and other aids are also areas where improvements are needed in Brookline. Finally, safe and simple walking connections to reliable public transit are needed.

A system of on-street bicycle lanes and off-street trails currently form the basis of Brookline's bicycle network. Bicycle counts conducted during rush hour on one weekday each September since 2008 showed more than 1,000 cyclists per hour passing major checkpoints, including more than 100 people riding daily to Brookline High School. As many as 70 cyclists have parked in Coolidge Corner at midday on Saturdays in September.[8] Brookline has made tremendous amount of improvements to improve cycling conditions within the Town. Those improvements include installing more bicycle racks in commercial areas; adding bicycle lanes and shared lane markings on Longwood Avenue, Washington Street, Chapel Street; contraflow bicycle lanes and cycle tracks along Netherlands and Parkway Roads; and instituting a $50 fine for vehicles blocking bicycle lanes.[9] Like walking, bicycling is a healthy and efficient way to make many trips in Brookline.

There are Town projects underway that aim to improve safety for cyclists and pedestrians. For instance, Babcock Street will be reconstructed in 2018 to include traffic calming installations such as bicycle lanes and shared lane markings, as well as curb extensions at specific locations in the corridor. Pearl Street, in conjunction with the One Brookline Place project, will also see similar installations in the upcoming year. Today, a significant portion of Brookline residents would like to make more trips by bicycle. One reason this is not the case now is because the current network of on-

[7] Brookline's 2005-2015 Comprehensive Plan
[8] Brookline's Green Routes Bicycle Network Plan
[9] Brookline's Green Routes Bicycle Network Plan

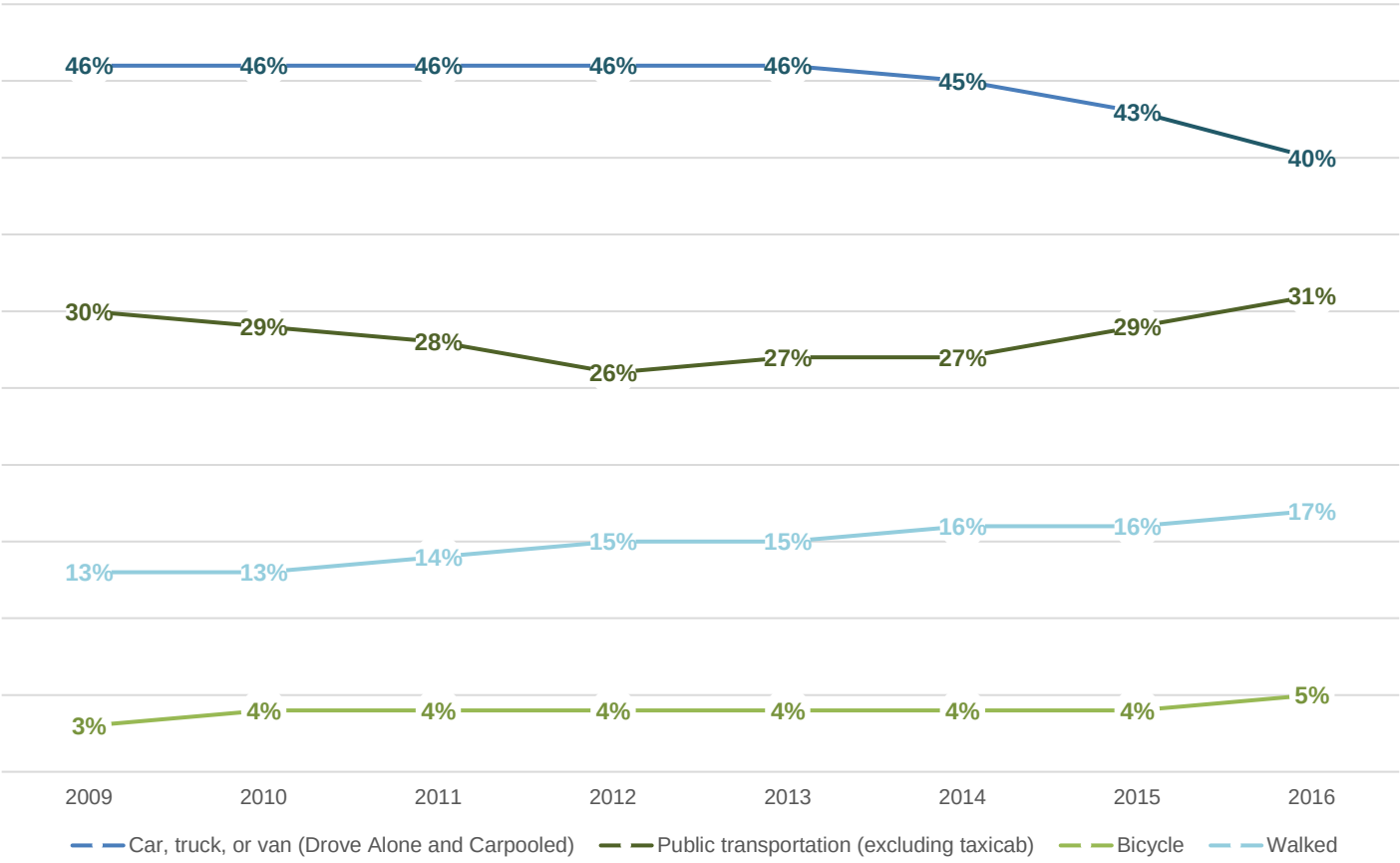
street bicycle lanes does not meet the safety and comfort needs of cyclists that are in the "interested but concerned" category of bicycle riders.

High-quality, separated on-street facilities should be a part of Brookline's bicycling network. This concept is particularly important along high volume/high speed arterials where bicyclists are threatened by automobile traffic and from door openings of parked vehicles. Since Brookline already has a comprehensive existing network of sidewalks, an important supplement to this is to improve the safety of people using traffic calming installations, such as curb extensions to shorten crossing distances and improve visibility between pedestrians and motorists and Rectangular Rapid Flashing Beacons (RRFBs) that alert motorists when pedestrians are crossing roadways.

COMMUTE TO WORK

Using the American Community Survey's (ACS) 5-Year Estimate, employees in Brookline have a longer than average commute time (27.2 minutes) than the normal U.S. worker (25 minutes)[10]. In 2016, the most common method of travel for workers in Brookline was "Drove Alone", followed by those who used public transit and walked. However, taking the share of residents who walked or bike, the percentage of residents who mainly walked or cycled to work increased from 2009 to 2015 (approximately 14% to 21%).[11] When looking at the share of residents who just drove (drove alone and carpooled combined), the percentage of residents who drove to work dropped in 2015 from 2009 by approximately 6% (46% drove in 2009 as opposed to 40% in 2015). In addition to commuting to work, the number of Brookline households that own motor vehicles has dropped from 2009 to 2015 (approximate estimate of 1.19 to 1.09). Although data shows that most residents drive to work, there is a trend in which more people are driving less and using alternative modes such as transit, walking, and biking since 2009.

[10] Data USA (https://datausa.io/profile/geo/brookline-ma/#category_transportation)
[11] Transportation Trends in Brookline (2017)



Means of Transportation to Work in Brookline for Workers that are 16 years and older. Source: U.S. Census Bureau, ACS 5-Year Estimates

A balanced, multimodal transportation system – including public transit, ridesharing, automobiles, and bicycle and pedestrian facilities – is necessary not only for a high quality of life, but also to maintain the economic well-being of the Town. Without this balance, congestion, pollution, and development patterns oriented to the automobile instead of the people that live in Brookline would take a toll on the viability and renowned character of Brookline's commercial and residential districts. With the Complete Streets Funding Program, the Town is taking an imperative step in addressing this imbalance and making sure that the Town retains its unique character today and in the future.

Methodology

At Howard Stein Hudson (HSH), we believe that the Complete Streets Prioritization process is an opportunity for a comprehensive and holistic look at the unique needs of each community. We utilize several innovate tools to better understand existing conditions and the effect proposed projects will have. Together, these tools allow us to answer three key planning questions: Where are existing conditions deficient? What are the community's priorities? And finally, where is the demand?

With a focus on pedestrians and bicyclists, our data collection and analysis develop a complex understanding of where conditions are unsafe, uncomfortable, or inaccessible, as well as where safe and comfortable routes can be best utilized to expand the pedestrian and bicycle networks. Community and municipal input contribute local expertise to the project identification and selection processes and informs an understanding of the community's values. Equity assessments hone in on the neighborhoods most in need of transportation network and facility improvements. Finally, measures of network latent demand provide an understanding of project opportunities and are another important factor for consideration within the prioritization process.

Each set of analysis used to select and prioritize the project list is data driven, transparent, and easily communicated through visual tools. These tools are designed to be living documents that can assist in the Complete Streets Prioritization process today and other planning initiatives moving forward. In this section, we describe each tool and the existing conditions found in Brookline.

Tools to Determine Deficient Conditions

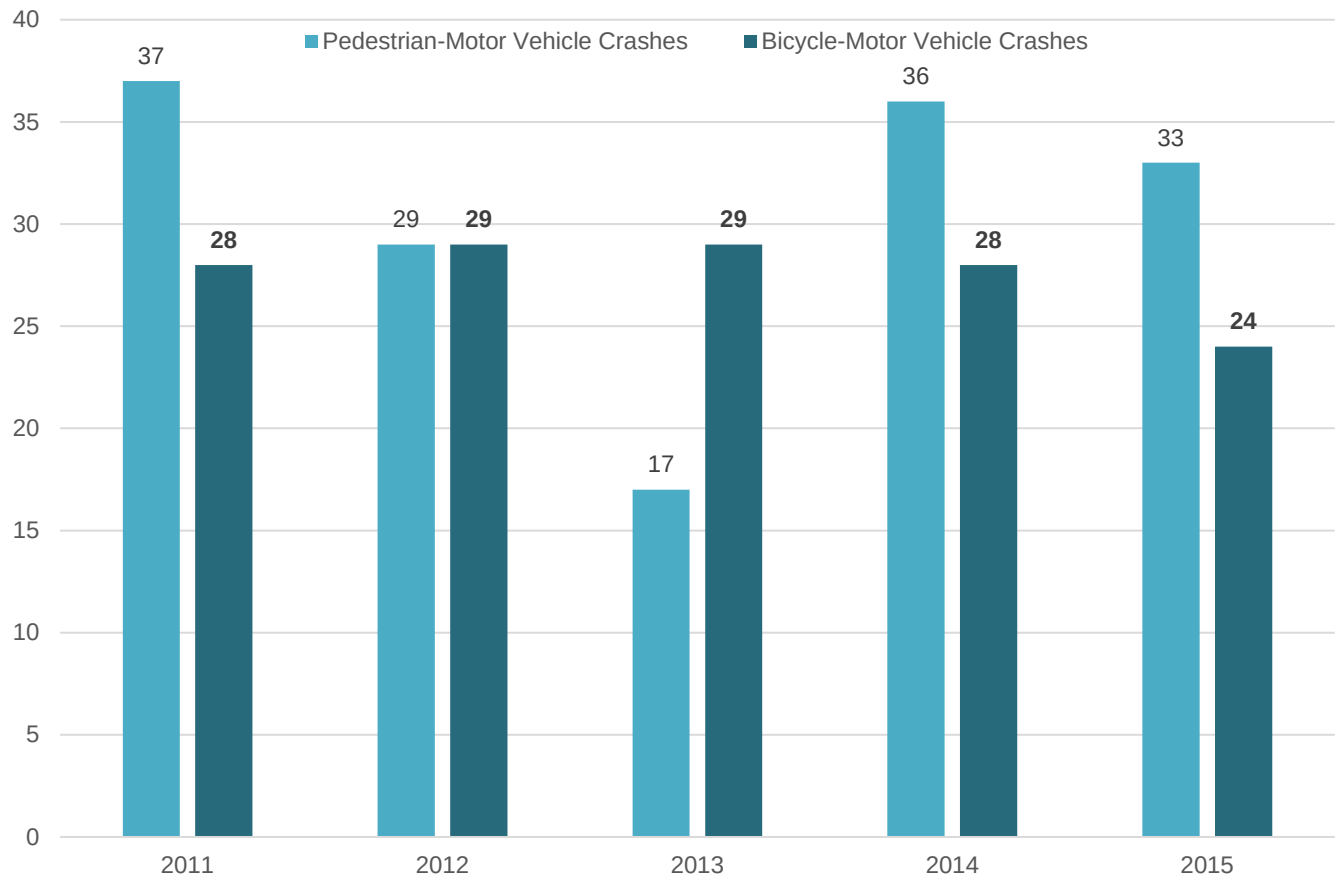
To determine the locations where Complete Streets improvements are desirable and necessary, HSH uses a series of data. The following tools show where there may be gaps in connectivity that deter people from walking and bicycling.

SAFETY

The safety of all road users is a top concern for the Complete Street Prioritization process. Bicycle and pedestrian crashes are taken from MassDOT crash reports from the five most recent complete years of data; at the time of this report, the most recent data available is from 2011 – 2015. Five years of data are used to get a larger set of data points and a better sense of patterns in crashes. Location of crashes indicate where intersection or corridor projects could best improve safety condition. Identified projects that address crash locations hold a high level of priority within our project rankings. Providing dedicated bicycle facilities, such as consistent shoulders or dedicated bicycle lanes, as well as clearly marked wayfinding signage to direct cyclists to safer, residential streets, can help reduce crashes involving bicyclists.

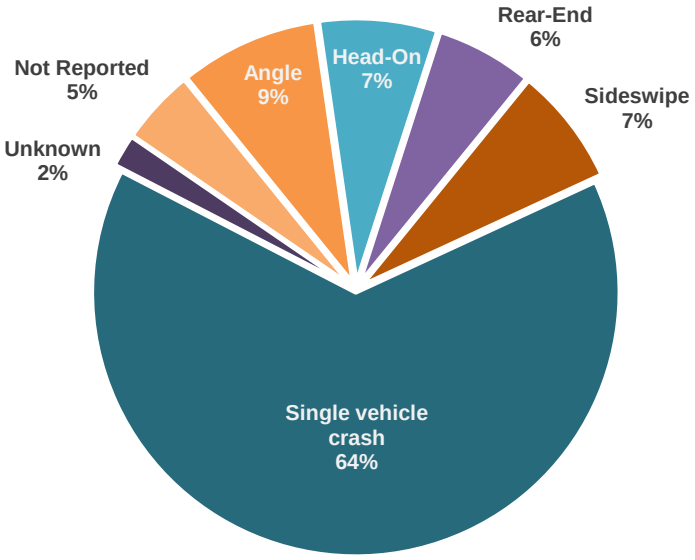
BICYCLE AND PEDESTRIAN CRASHES

The annual number of reported bicycle-motor vehicle crashes held relatively steady from 2011 to 2015, ranging between 24 to 29 **(Figure 2)**. There were 28 crashes in 2011 and 24 crashes in 2015. While the number of reported crashes has remained relatively steady, or even decreased slightly, this has occurred during a period when bicycle use increased significantly. The annual number of reported pedestrian-motor vehicle crashes varied more by year. Year 2013 saw the lowest number of crashes (17), whereas 2011 saw the highest (37). The most current year saw a decrease of three crashes from 2014 to 2015.



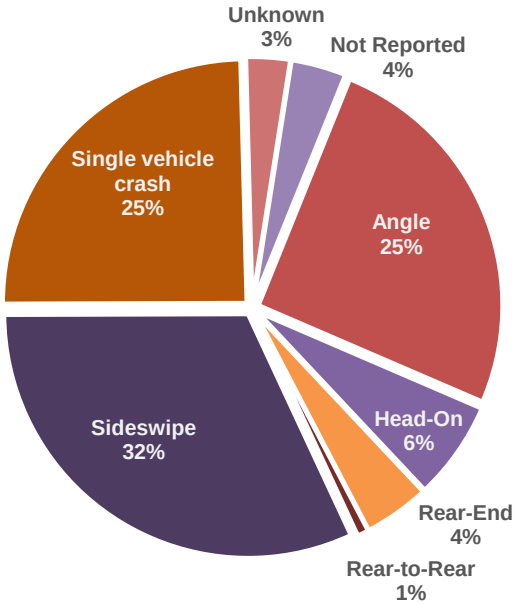
Bicycle and pedestrian crashes by year for 2011-2015. Source: MassDOT Crash Portal

The causes of the bicycle and pedestrian crashes varied. Both bicycle and pedestrian saw the highest percentage of single-vehicle crashes, 25% and 64%, respectively. Pedestrian crash types in other categories were not as significant as the single vehicle crash (the percentage of feedback in other categories was less than 10%). The bicycle-motor vehicle crash types varied. In addition to single-vehicle crash, sideswipes and angled crashes also showed higher percentages. A sideswipe collision refers to the side of one vehicle colliding with the side of a cyclist. An angle collision involves a cyclist moving straight while a single vehicle collides with the cyclist from a perpendicular direction. The remainder of the types of crashes that occurred between cyclists and motorists were less than 10%.



Pedestrian-motor vehicle crash type. Source: MassDOT Crash Portal

As shown in **Figure 2** and **Figure 3**, the Washington Square and Coolidge Corner neighborhoods had the greatest bicycle- and pedestrian-motor vehicle crashes. These two neighborhoods are Brookline's top two commercial districts, to which many residents and visitors go often. The two areas are well-served by public transportation, as well as bicycle and pedestrian accommodations. Explanations for why these bicycle and pedestrian crashes occurred at these specific locations are because they lack safe pedestrian treatments, roadway configurations that deter visibility between pedestrians and vehicles, and



Bicycle-motor vehicle crash type. Source: MassDOT Crash Portal

lack of signage and on-street bicycle treatments that would alert drivers to be more cautious of cyclists using the roadway.

Bicycle and pedestrian crashes were also seen adjacent to Brookline public schools. Bicycle and pedestrian safety for school-aged children is particularly important in the Town. Considering the density of schools, perceived safety risks can impact the number of bicycle and walking trips made.

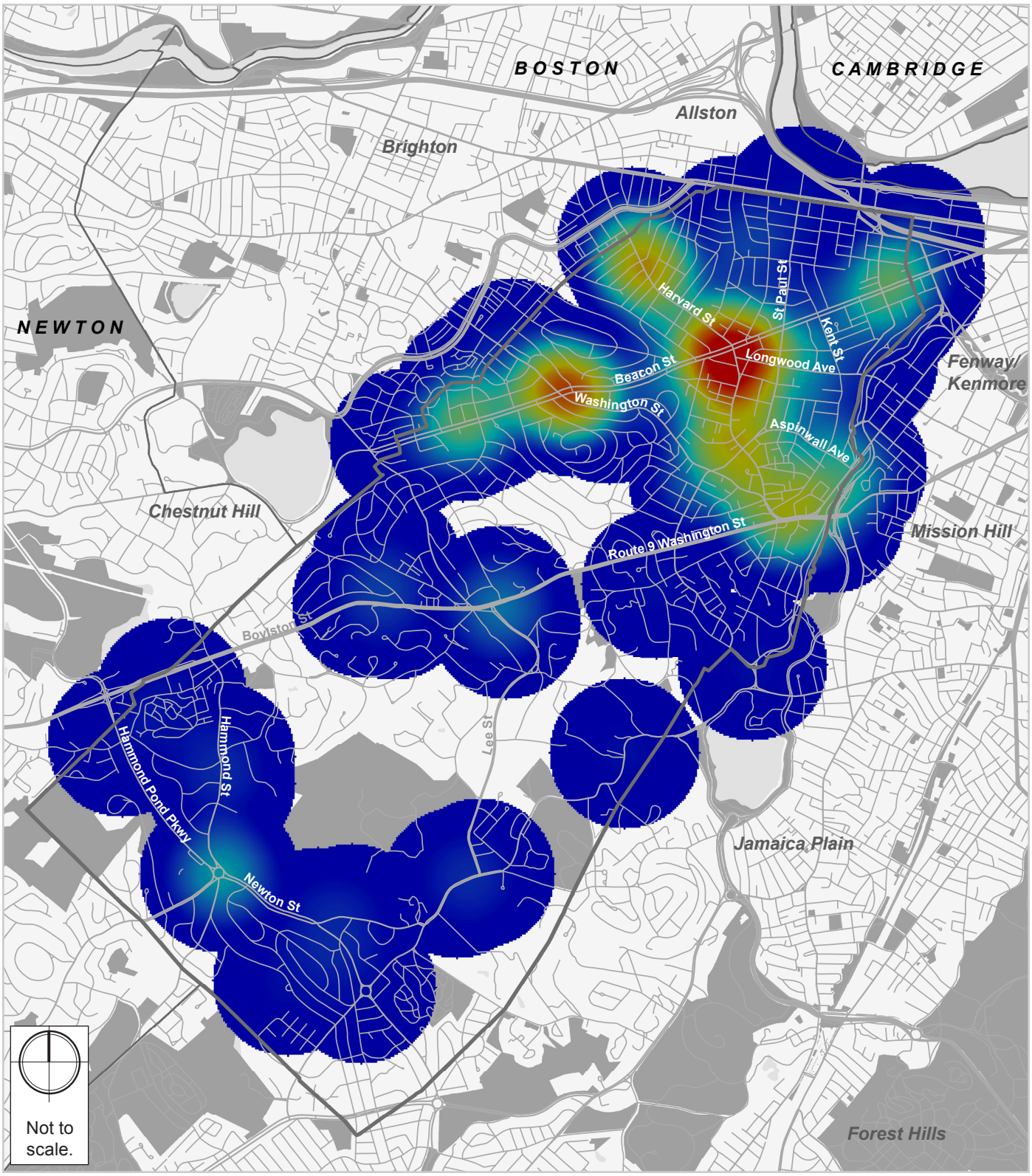
A view of Brookline High School from Greenough Street. Photo: Bing Maps

Parents consider traffic-related danger to be a barrier to allowing children to bike or walk to school[12] so providing better access to safe bicycle and pedestrian facilities for school-aged children could play a significant role in changing Brookline parents' perception of traffic safety for their children. There are nine schools in Brookline (excluding locations of Brookline Early Education Program), that include John D. Runkle School, Pierce School, William H. Lincoln School, Amos A. Lawrence School, Heath School, Michael Driscoll School, Coolidge Corner School (formerly known as the Edward Devotion School), Edith C. Baker School, and Brookline High School. Two of out of the nine schools, specifically Brookline High School and Driscoll School, saw no bicycle-motor vehicle crashes adjacent to the schools. Seven schools, including Coolidge Corner School, Heath School, and Baker School, saw

[12] A Safe Routes to School (SRTS) survey[12] in 2004 found that 30% of parents consider traffic-related danger to be a barrier to allowing their children to bike and/or walk to school. www.cdc.gov, "Barriers to Children Walking to or from School." Direct Link: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5438a2.htm

at least one bicycle crash adjacent to the campus. Coolidge Corner School saw the greatest number pedestrian-motor vehicle crashes (five) – two at the intersection of Babcock Street and Harvard Street, two at the intersection of Williams Street and Harvard Street, and one at the intersection of Stedman Street and Harvard Street.

Figure 2. Bicycle Crashes, 2011-2015



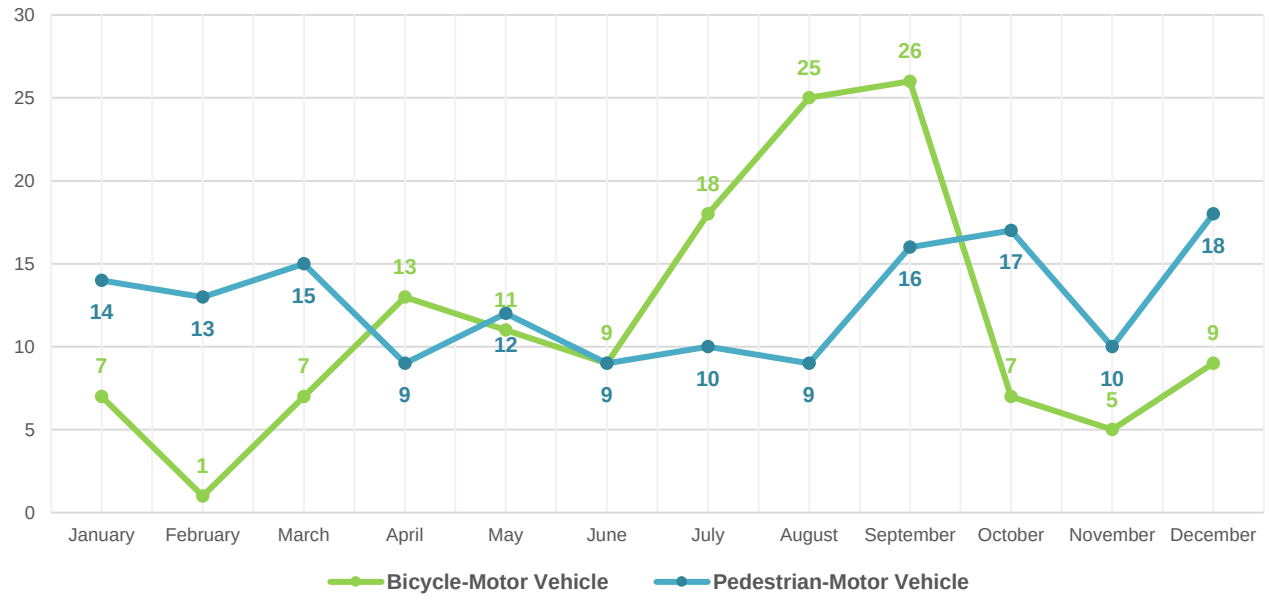
Data Source: MassDOT Crash Portal

Figure 3. Pedestrian Crashes, 2011-2015

Data Source: MassDOT Crash Portal

Seasonal Change

From 2011 to 2015, bicycle and pedestrian crashes show a difference in crash rate trends based on the season. Bicycle crashes show high variability in cycling activity based on months. The graph below shows that bicycle crashes peaked in the summer season and remained relatively high into early fall, with very few crashes in the winter. The months of July, August, and September showed to have the highest number of crashes at 18, 25, and 26 bicycle-motor vehicle crashes, respectively. The number of crashes dropped in October and stayed at less than 10 crashes per month from October to March. This trend can be explained by the lack of interest in cycling in cold weather or icy roadway conditions.



The total of bicycle and pedestrian crashes by month from 2011 to 2015. Source: MassDOT Crash Portal

Unlike the trends seen in bicycle-motor-vehicle crashes, pedestrian-motor-vehicle crash rates tend to remain relatively consistent throughout the year since pedestrians can walk year-round. Pedestrian-motor vehicle crashes were at the highest in September to December and January to March. Winter weather conditions can create dangerous conditions for pedestrians. Slippery conditions, narrow sidewalks, untreated sidewalks, and reduced visibility for both pedestrians and drivers are all factors that can contribute to pedestrian-motor vehicle crashes.

PEDESTRIAN INTERSECTION DELAY – WORST-CASE CONDITIONS

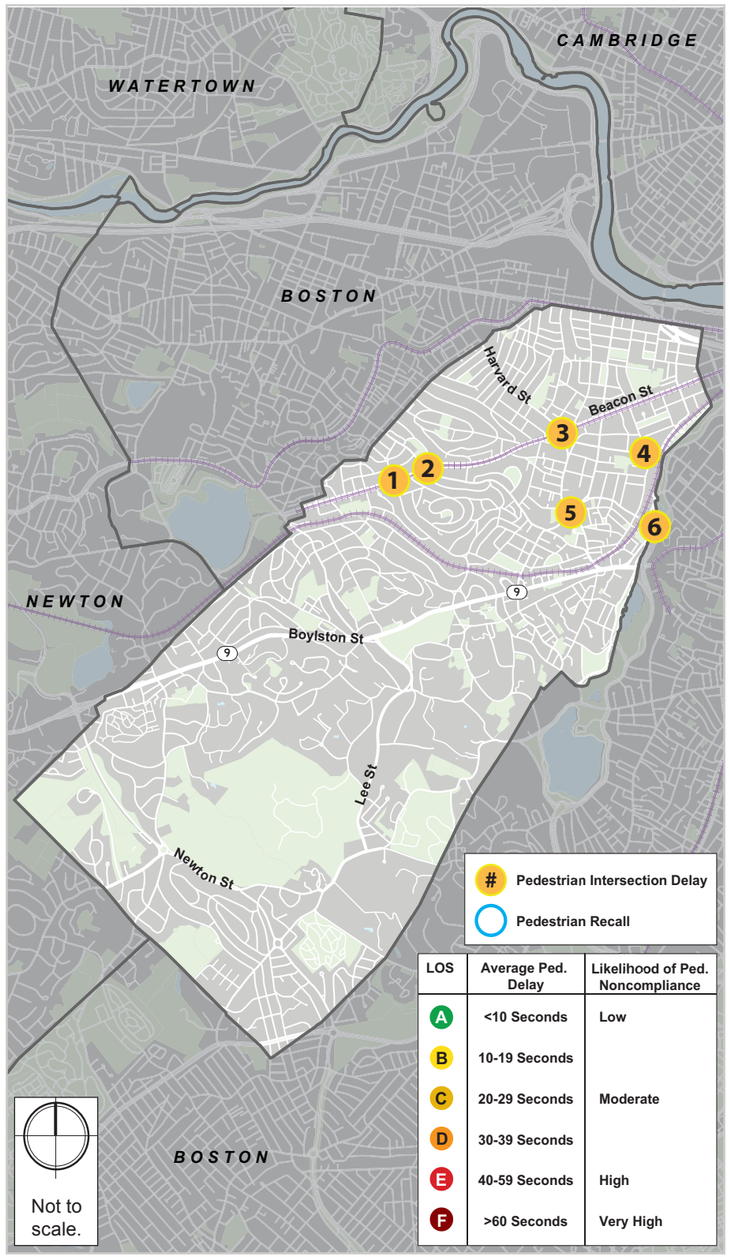
In addition to pedestrian crashes, pedestrian delay at six intersections within the Town was also evaluated to look at pedestrian mobility and service level. HSH looked at the worst-case scenario, or the highest amount of pedestrian delay, at six intersections. At the worst condition, all six intersections have at least 20 seconds of delay between when the "WALK" sign is registered and when it comes on for pedestrians.

As shown in **Figure 4**, four out of the six intersections had 20-39 seconds of average delay, or Levels of Service (LOS) C and D, meaning the likely chance for a pedestrian crossing the street during a red light is moderate; this event is also known as pedestrian noncompliance. Two out of the six intersections have 40-50 seconds of average delay, or LOS E, meaning there is a high chance of pedestrian noncompliance at these intersections.

A pedestrian running diagonally at the intersection of School Street, Aspinwall Avenue, and Harvard Street during a WALK phase. Photo: HSH

The signal system for the intersection of School Street, Aspinwall Avenue, and Harvard Street is an exclusive pedestrian phase, where vehicle movements in all directions are stopped to allow pedestrians to cross in any direction at the intersection, including diagonally. Given the worst condition, the average pedestrian delay for this intersection is approximately 40 seconds, which indicates a higher risk of a pedestrian illegally crossing. An exclusive pedestrian phase system requires a longer pedestrian clearance interval to allow pedestrians sufficient time to clear the longest crossing.

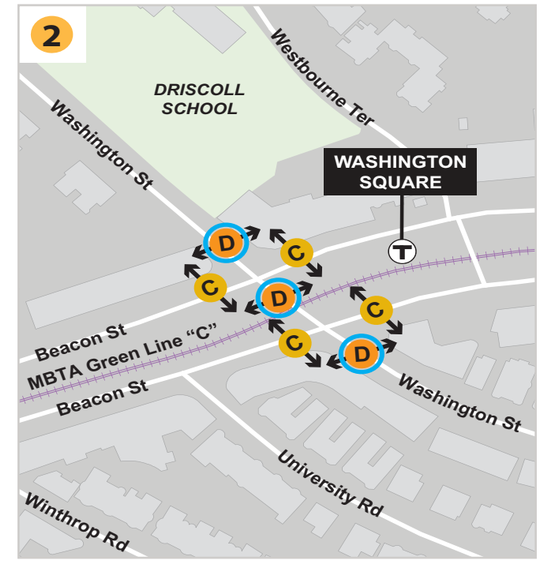
Figure 4. Pedestrian Intersection Delay – Worst Case Conditions



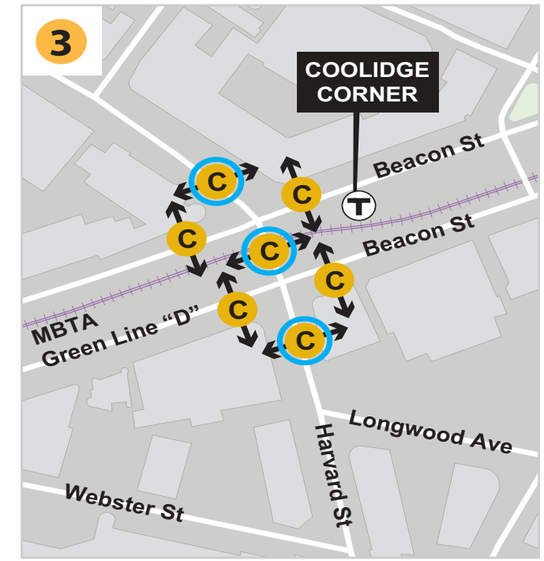
LOS	Average Ped. Delay	Likelihood of Ped. Noncompliance
A	<10 Seconds	Low
B	10-19 Seconds	
C	20-29 Seconds	Moderate
D	30-39 Seconds	
E	40-59 Seconds	High
F	>60 Seconds	Very High

Beacon St/Corey Rd: Concurrent Pedestrian Phase

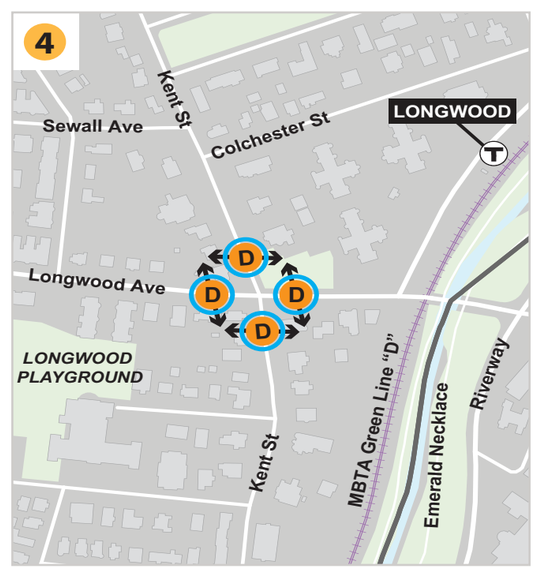
Beacon St/WAshington St: Concurrent Pedestrian Phase



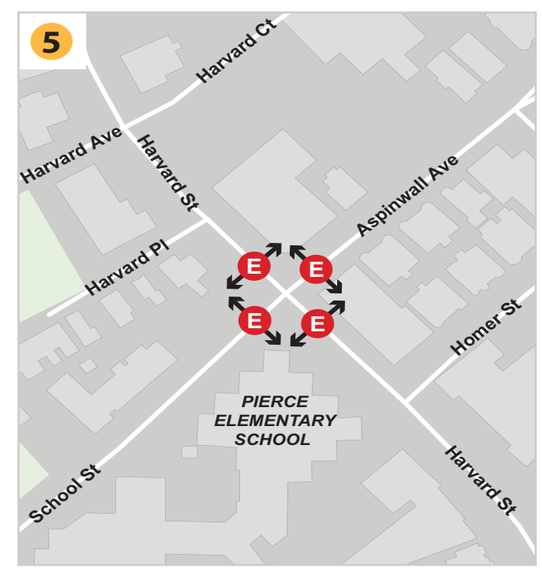
Beacon St/Harvard St: Concurrent Pedestrian Phase



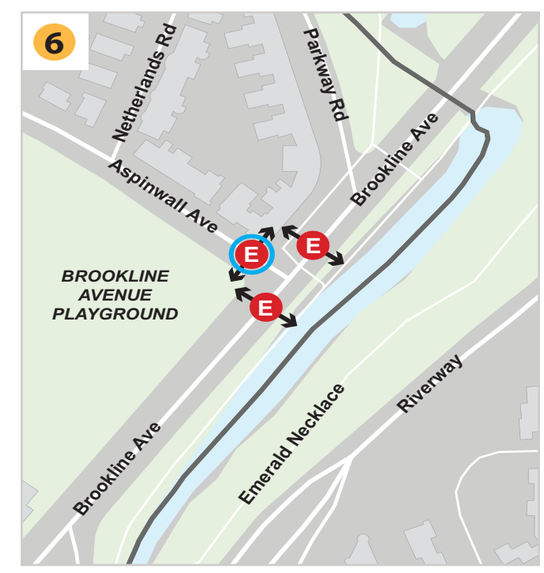
Longwood Ave/Kent St: Concurrent Pedestrian Phase



Aspinwall Ave/Harvard St: Exclusive Pedestrian Phase



Aspinwall Ave/Brookline Ave: Concurrent Pedestrian Phase



Data Source: HSH

LEVEL OF COMFORT

To improve and create excellent active transportation environments, we assess both bicycle and pedestrian level of comfort. Level of comfort addresses not only whether a sidewalk or bicycle accommodation is provided, but also other factors, such as the speed of traffic, proximity to green space, separation from the roadway, and the presence of an on-street parking lane. These factors contribute not only to the physical safety of vulnerable road users, but also to the overall comfort of the roadway, which is a major factor of whether pedestrians and bicyclists will use it. Areas with low comfort are targeted for project selection. During the prioritization process, projects with low bicycle or pedestrian comfort receive greater priority as well as projects that would increase the level of comfort most. Fixing a short, low-comfort segment can often bridge two neighborhoods high-comfort streets, substantially expanding the bicycling network in both neighborhoods.

For both bicycle and pedestrian analyses, we use the road edge as the basis for geographic information systems (GIS) analysis rather than the centerline. This allows us to have directionality for each segment and add subtleties such as one-sided on-street parking, one-way routes, or intersection crossings for each direction. MassGIS roadway data is used to assign road speed, average daily traffic (ADT), number of adjacent lanes, the presence and width of a median, and roadway surface width values to each segment, as well as the roadway characteristics for intersection crossings. Manual data entry for each segment recorded the type and width of sidewalks or bicycle facilities, the presence of a centerline, right-turn lane characteristics at signalized intersections, and the presence of on-street parking, including whether the parking is long-term (generally residential) or short-term (commercial zones), to determine the frequency of bike lane blockage. In certain cases, adjustments were made to reflect local knowledge of conditions not captured by the analysis, such as the impact of sharp curves on level of comfort.

BICYCLE LEVEL OF COMFORT

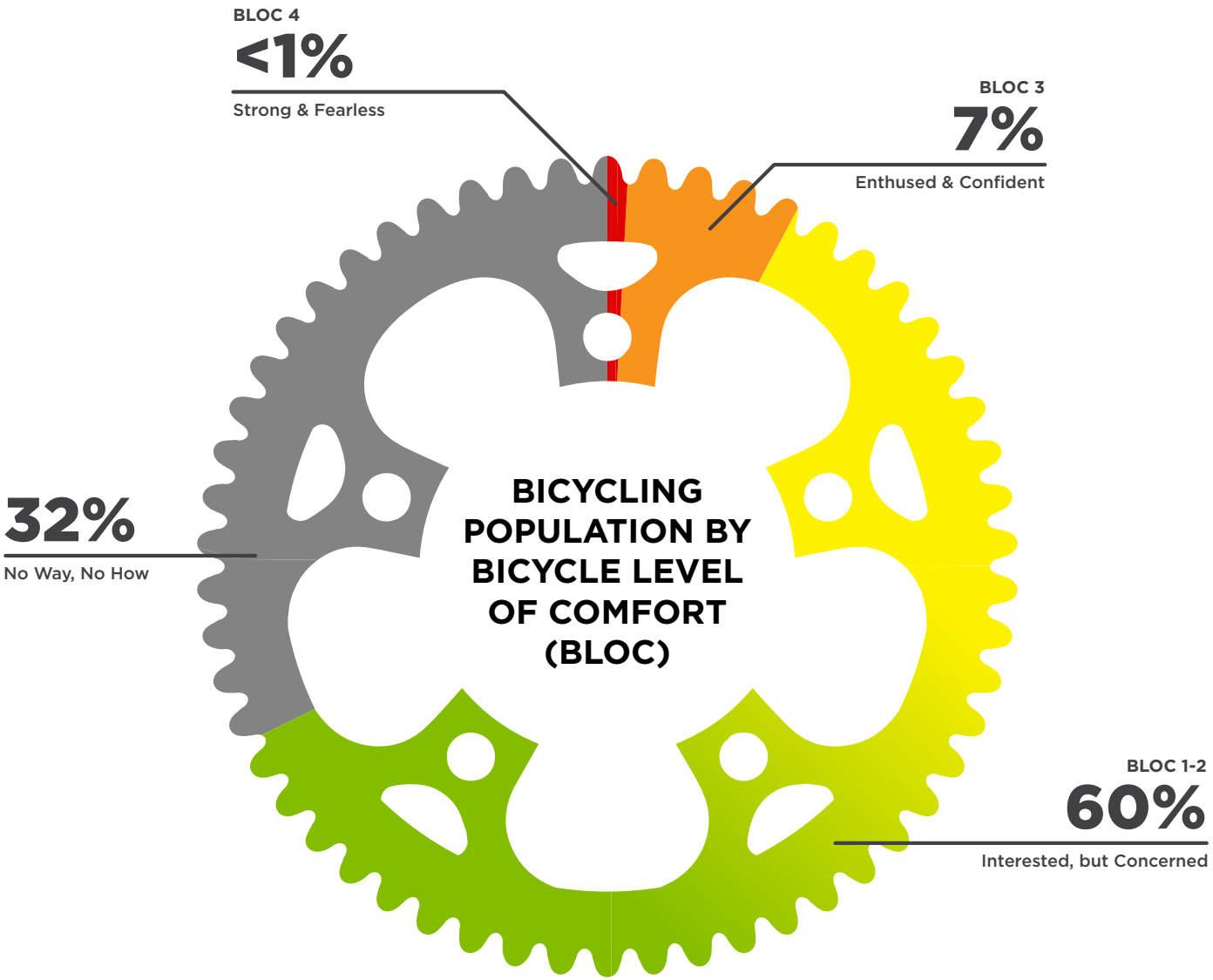
The Bicycle Level of Comfort (BLOC) methodology is based on analysis originally carried out by Professor Peter Furth of Northeastern University. His team developed a set of criteria to determine the level of traffic stress for road segments, which correspond to the type or ability of bicyclist who would be willing to ride on that segment. The types of riders relate to categorizations first presented by Roger Geller, Bicycle Coordinator at the Portland Bureau of Transportation in Oregon, which classified cyclists into four categories: “No Way No How,” encompassing 33% of the population of Portland, Oregon who are not interested in bicycling at all; the “Interested but Concerned” group, which makes up 60% of the population; “Enthused and Confident” riders who make up about 7% of

the population; and "Strong and Fearless" riders who make up less than 1% of the population (**Figure 5**).[13]

We have based our analysis for the Town of Brookline on the same methodology with minor adjustments to produce a town-wide map of Bicycle Level of Comfort, ranging from high to low. In general, those in the 60% population range who are interested but concerned would likely be willing to ride on the most comfortable routes, thus falling into the "High" and "Medium-High Comfort" categories in our analysis. These routes typically include low-speed residential roads that are often without centerlines, physically separated bicycle facilities, and off-street trails. Confident and enthused riders would likely be willing to ride on road segments that fall into the "Medium-Low" Comfort category, and strong and fearless bicyclists would fall into the "Low" Comfort category. A low-stress cycling network is one where most of the population would feel comfortable riding; as such, we consider high and medium-high comfort routes to dictate the usable cycling network.

[13] Four Types of Transportation Cyclists, www.portlandoregon.gov

Figure 5. Four Types of Cyclists in Portland by Proportion of Population



Data Source: Portland Bureau of Transportation

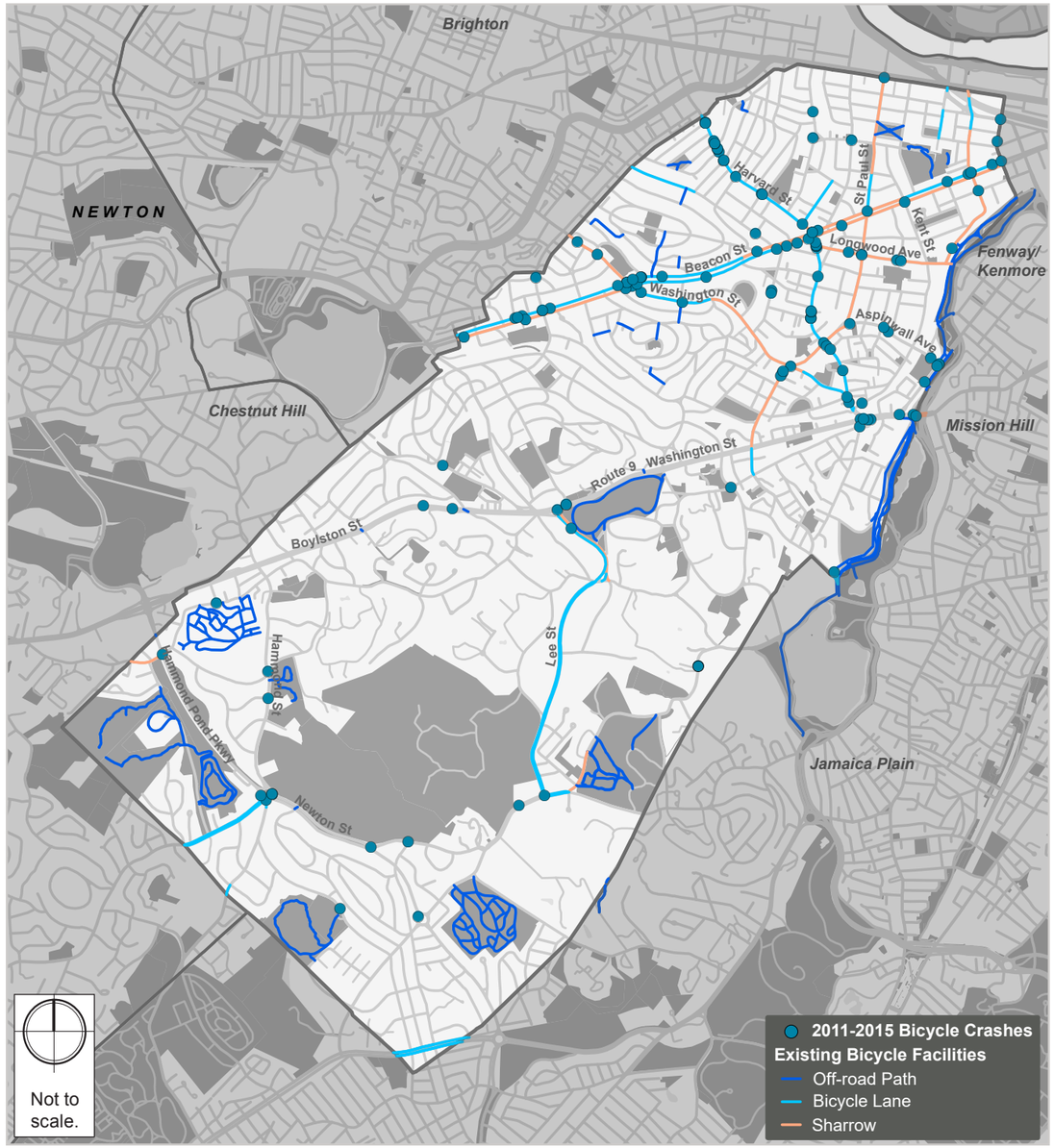
Existing Conditions – Bicycle Level of Comfort

The Bicycle Level of Comfort map (**Figure 6**) shows locations where people would and would not feel safe riding, helping to identify projects that would most benefit modal shift towards cycling. In general, roadways that see high vehicular volumes and speeds have the lowest levels of comfort such as Hammond Street, Hammond Pond Parkway, Newton Street, Clyde/Lee Street, VFW Parkway, and Boylston Street (Route 9). Since these streets provide the highest mobility to adjacent municipalities, roadway conditions will often be less accommodating to pedestrians and cyclists due to higher vehicular speeds and volumes. Although projects proposed along Hammond Pond Parkway, VFW Parkway, and Boylston Street (Route 9) cannot be funded through this program since they are under State jurisdiction, there is potential to include interventions in the future or through another program.

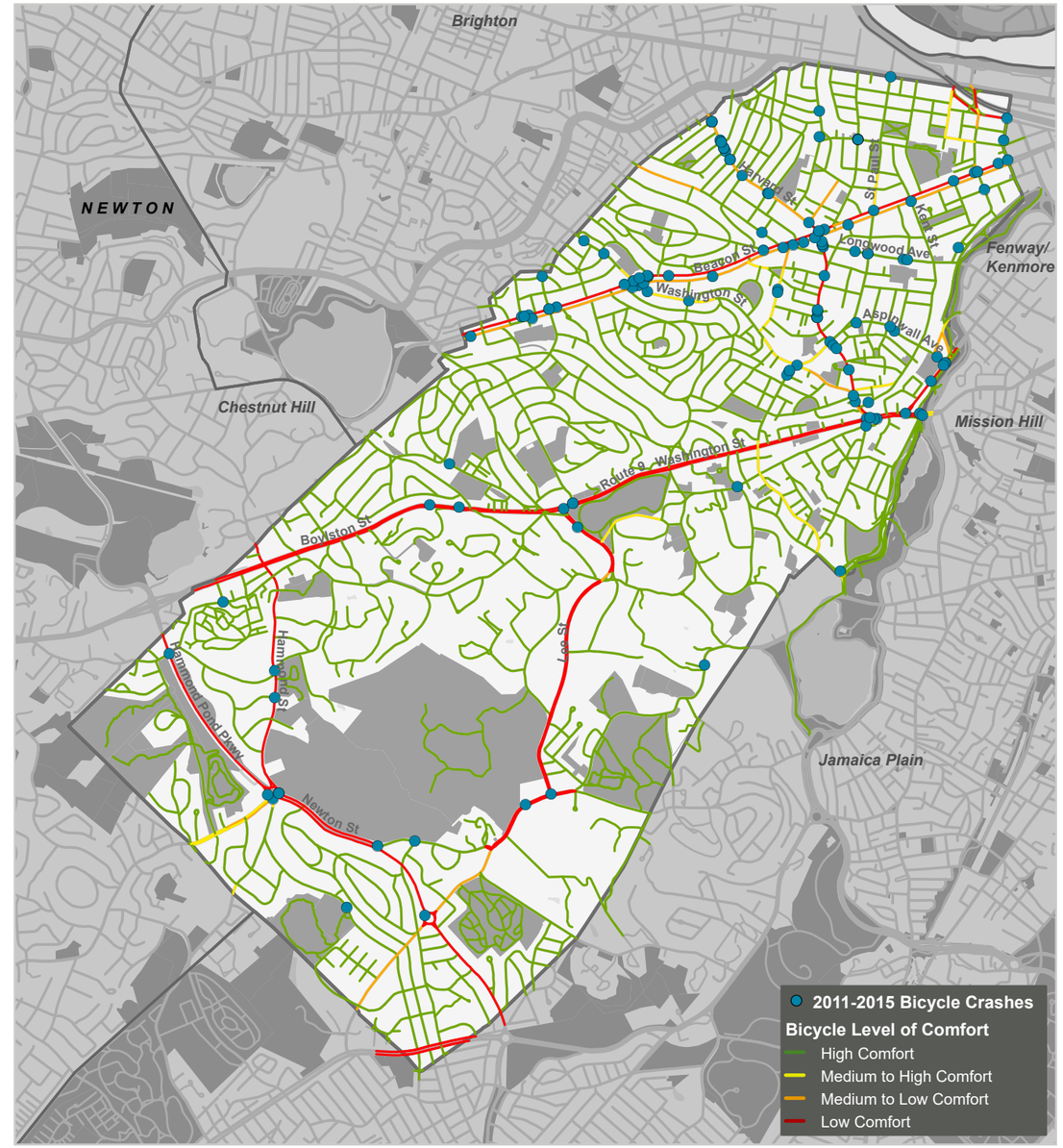
Examples of interventions that can be done to improve bicycle and pedestrian safety along these corridors are the creation of shared use paths or separated bicycle lanes. Beacon Street and Harvard Street, corridors that cross through three of Brookline's most visited commercial neighborhoods, also have low comfort conditions for cyclists. Although these two roads have a combination of bicycle lanes and sharrows, the speed and volume of vehicles traveling adjacent to cyclists limits the effectiveness of the facilities. Beacon Street is an Urban Principal Arterial that is divided by a wide median where MBTA's Green Line C Branch runs through. There are two lanes per direction on either side of the median with designated turning lanes at specific intersections. Beacon Street also has on-street parking and high volumes of vehicles that drive significantly faster than the posted speed limit of 25 mph. Harvard Street is also an Urban Principal Arterial roadway that generally provides one lane in each direction, widening out to two lanes per direction as it intersects with Beacon Street. Harvard Street has on-street parking on both sides with commercial uses throughout the entire corridor, which leads to high parking turnover and potential conflict with cyclists traveling adjacent to the parking lane. The remainder of the segments in the BLOC analysis, mostly located within residential developments and along local roads, scored high or medium-to-high values.

Figure 6. Cycling Conditions in Brookline

Existing Bicycle Facilities



Bicycle Level of Comfort



Data Source: HSH; MassDOT; Peter Furth

PEDESTRIAN LEVEL OF COMFORT

HSH developed a similar measure of Pedestrian Level of Comfort (PLOC) to complement the Bicycle Level of Comfort analysis. Variables included are intended to reflect the pedestrian experience in terms of safety and amenity. Typically, our analysis is divided into Facilities Level of Comfort and Surroundings Level of Comfort. The Facilities Level of Comfort analysis includes measures such as the width of each sidewalk, as well as the narrowest point, including blockage by utility poles or other obstacles that may inhibit the passage of persons with disabilities. The criteria used to evaluate the Level of Comfort resulting from the surroundings include adjacent roadway conditions such as speed or average daily traffic, whether the sidewalk is near a high-volume corridor, the primary land use, and the diversity of commercial or downtown areas. The Facilities and Surroundings level of comfort analyses were applied to five specific neighborhoods in Brookline: Brookline Village; Chestnut Hill; Coolidge Corner, Washington Square, and Beacon Street; North Brookline; and Route 9 East. These neighborhoods were chosen for the analyses because they are the main areas that help to define the Town through its history, high activity, as well as having the most potential to become more walkable within itself and adjacent areas.

Existing Conditions - Pedestrian Level of Comfort - Facilities Analysis in Five Focus Areas

The PLOC – Facilities Analysis reflects the pedestrian experience, in relation to infrastructure conditions. The results of the PLOC – Facilities Analysis (**Figure 7**) varied. Factors that would have made an impact on the Level of Comfort scores for the Facilities Analysis include: narrow widths, inadequate sidewalk condition, discontinuous (thus creating sidewalk gaps in the network), and lack of buffers that would provide some protection for pedestrians from incoming vehicles, driveways, and lack of grade separation and roadway shoulders.

Wide sidewalks, trees, and benches along Beacon Street, approaching Harvard Street. Photo: HSH

Out of the five neighborhoods, Coolidge Corner, Washington Square, and Beacon Street have the highest level of comfort scores under the Facilities Analysis. This is attributable to Beacon Street's and Harvard Street's "excellent" or "good" sidewalk condition, generous widths, and vertical and lateral buffers that provide protection from moving vehicles. Most sidewalks in

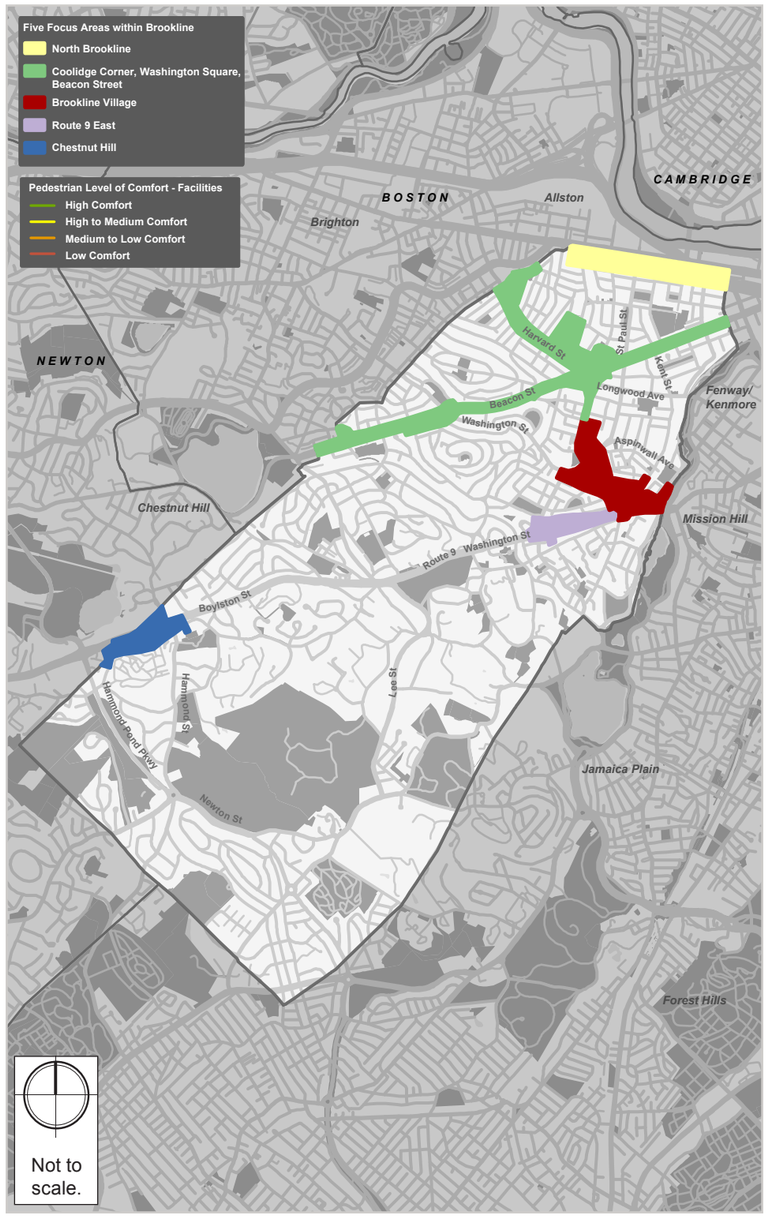
this area are wide and have amenities like benches, trash cans, street trees, and bike racks that result in a comfortable place to walk. Many of the side streets had lower comfort scores. The pedestrian networks within the focus areas of Chestnut Hill, Brookline Village, and Route 9 East, while generally in good condition and grade separated, are narrower and are not buffered from major roads like Route 9, thus providing less comfortable connections to adjacent neighborhoods. Sidewalks in North Brookline varied in comfort level from low to high – higher comfort segments were in residential neighborhoods that are characterized by abundant vegetation and low-conflict streets. Lower scoring segments were located on narrow sidewalks adjacent to and crossing over I-90.

A residential neighborhood in North Brookline in which sidewalks are separated by an abundant amount of vegetation. Photo: HSH

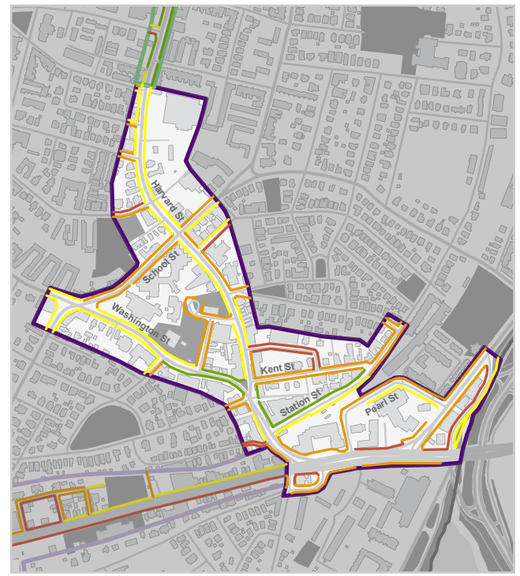
Pedestrian improvements that would benefit the condition of sidewalks that scored low to fair include providing adequate barriers – such as a grass buffer – between sidewalks, moving traffic, parking, and/or other traveled-way elements. Possible interventions that would improve the condition of sidewalks that scored low in the five neighborhoods include sidewalk reconstruction to ensure adequate sidewalk widths. While most sidewalks in all five neighborhoods met or exceeded standard widths, objects like utility poles, street signs, or trees often created narrower pinch-points, falling short of ADA requirements.

Figure 7. Pedestrian Level of Comfort - Facilities Analysis in Five Focus Areas

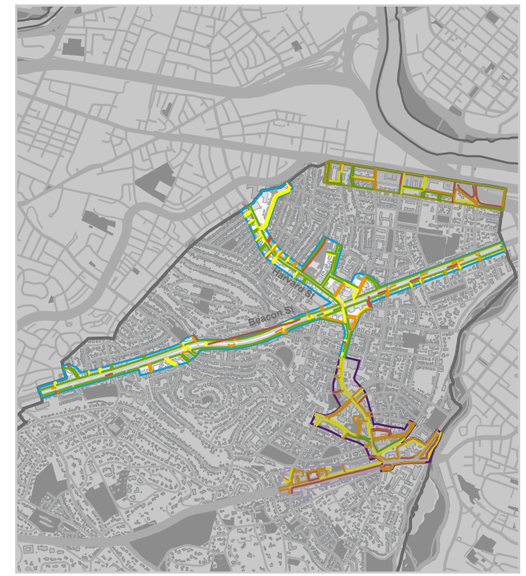
Townwide Map



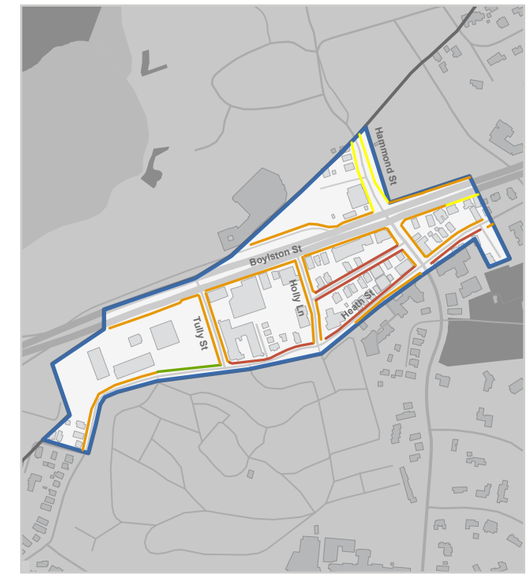
Brookline Village



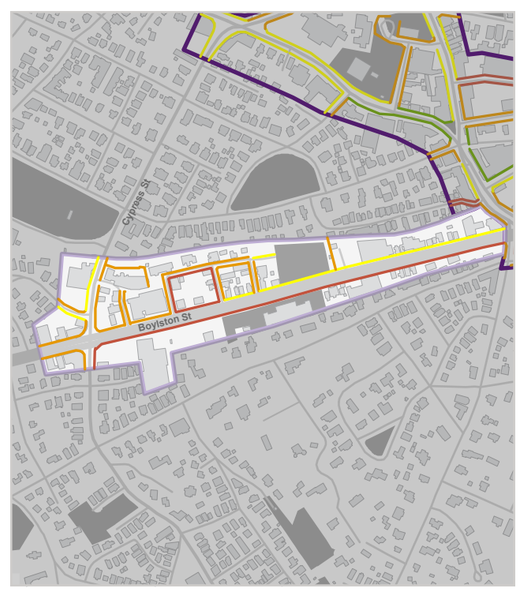
Coolidge Corner



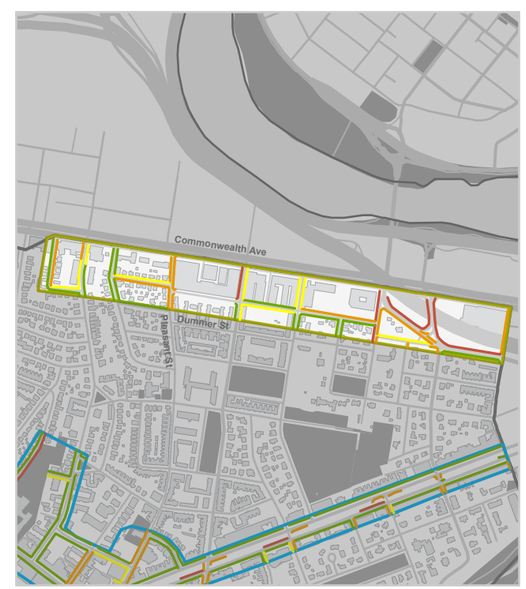
Chestnut Hill



Route 9 East



North Brookline



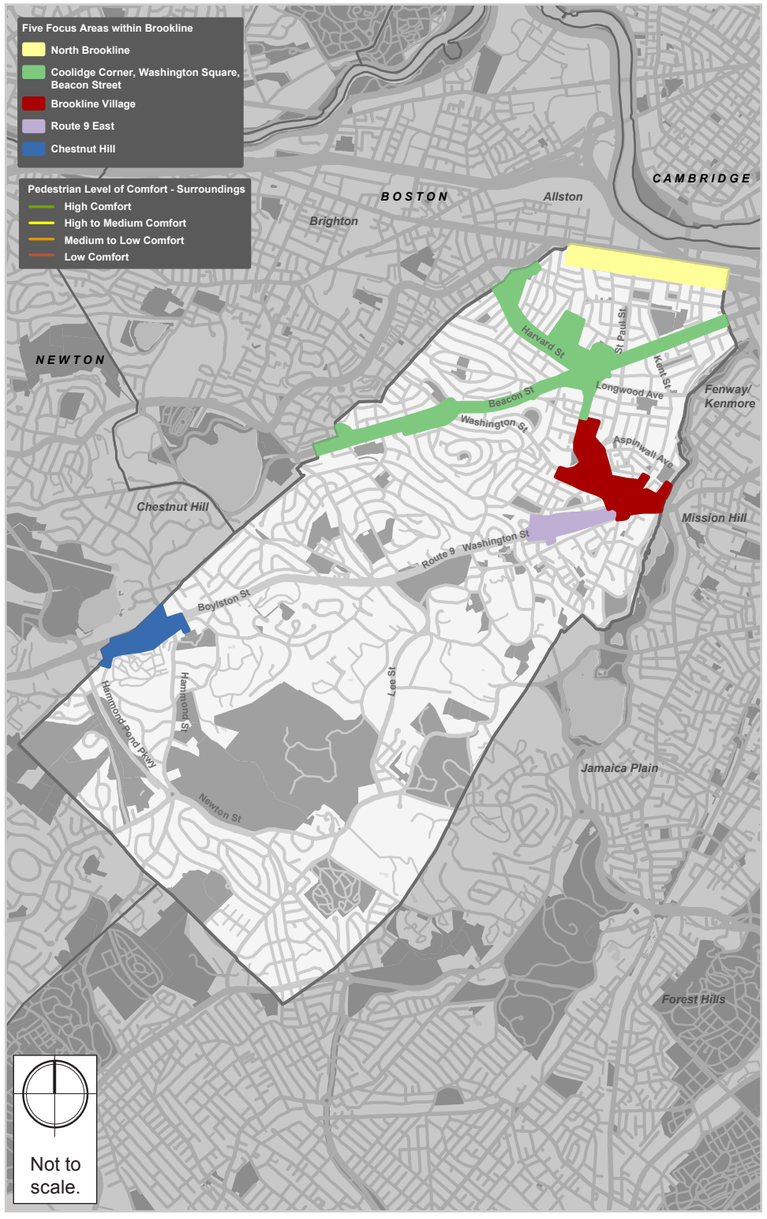
Data Source: HSH; MassDOT; Peter Furth

Existing Conditions - Pedestrian Level of Comfort - Surroundings Analysis in Five Focus Areas

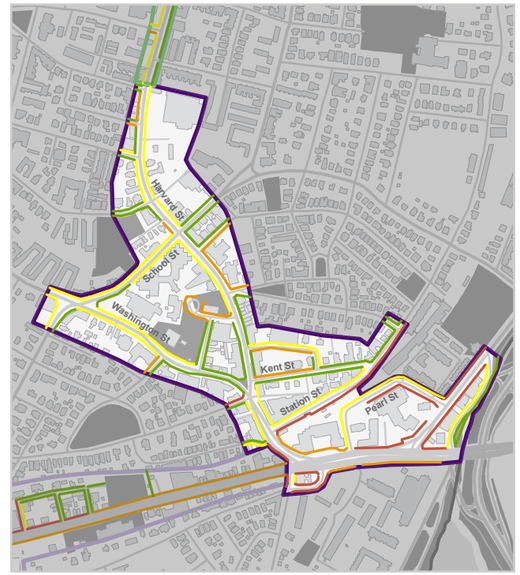
The result of the PLOC – Surroundings Analysis shows that most sidewalks in all five neighborhoods are low-to-medium and medium-to-high comfort, with a good proportion of high comfort sidewalks as well. **Figure 8** reflects the pedestrian experience along existing sidewalks, in relation to the adjacent surroundings. Factors that influence the level of comfort scores for the Surroundings Analysis include: roadway conditions (e.g., number of lanes, Average Daily Traffic (ADT), and road speed), whether the segment is in 1/10th of a mile from a highway, and the level of diversity within the land uses that are adjacent to the sidewalk segments. Segments that are adjacent to roadways with high numbers of lanes, ADT value, and high posted speed limits score lower. Most of the focus area neighborhoods included high-diversity commercial corridors adjacent to high-volume roadways, including portions of Beacon Street, Boylston Street/Route 9, Commonwealth Avenue, and I-90. Streets that scored higher under the Surroundings Analysis include Harvard Street and residential side streets, which are attributable to the lower traffic volumes and speeds characterizing many local roads and residential neighborhoods in Brookline. Through the Surroundings Analysis, we can identify areas where people may be inclined to walk, independent of sidewalk quality.

Figure 8. Pedestrian Level of Comfort – Surroundings Analysis in Five Focus Areas

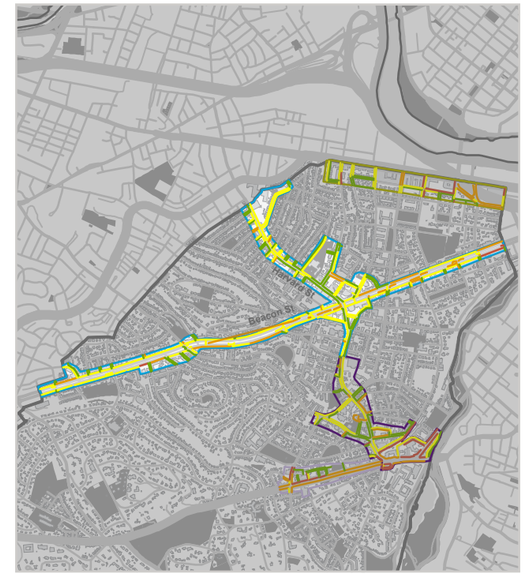
Townwide Map



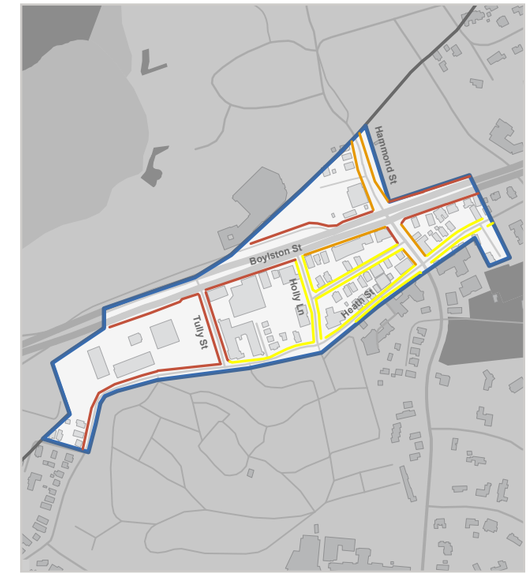
Brookline Village



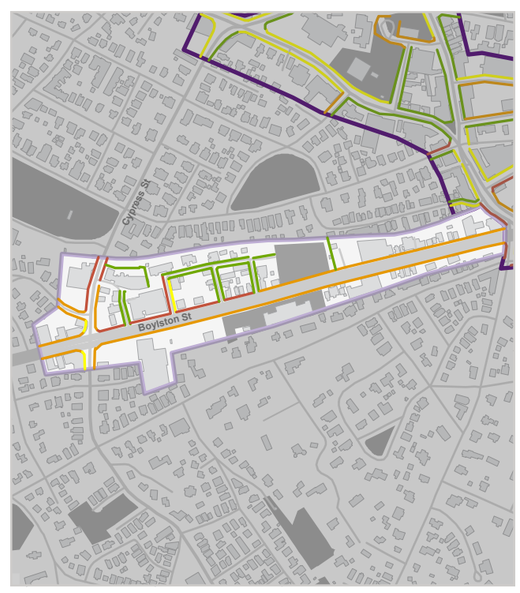
Coolidge Corner



Chestnut Hill



Route 9 East



North Brookline

Data Source: HSH; MassDOT; Peter Furth

Tools to Assess Demand

LOCAL ACCESS SCORE

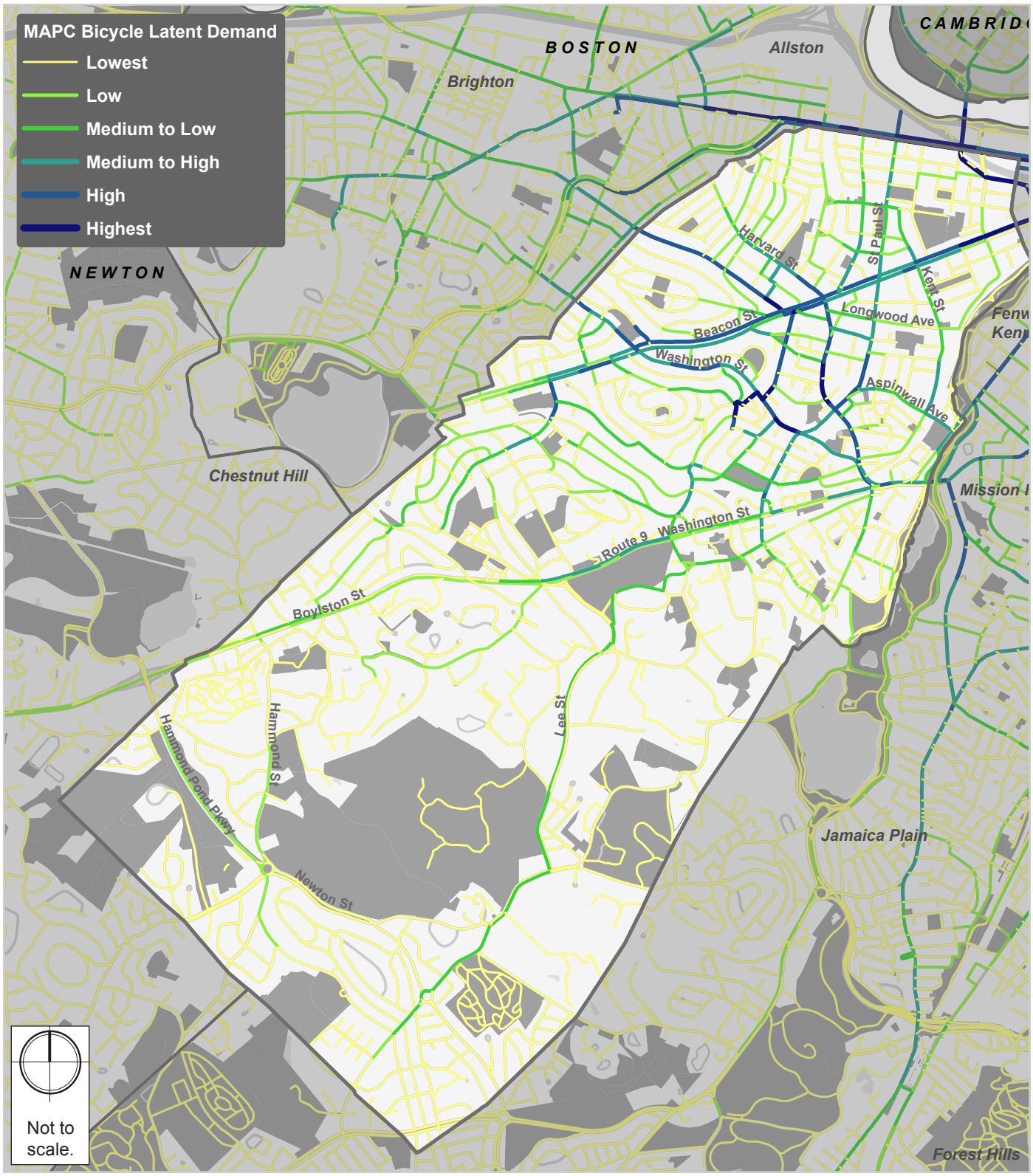
HSH considers the potential travel demand to a variety of destinations such as schools, shops and restaurants, transit stations, and parks. Beacon Street, Harvard Street, and Washington Street are the three corridors that show the highest potential local walking and biking trips to reach local destinations. The use of Metropolitan Area Planning Council's (MAPC) local access score is to help municipalities prioritize sidewalk and bicycle route improvements on the most useful connection between residents and important local destinations.

Local access scores are calculated using a travel demand model that uses Massachusetts specific travel survey data and information on homes and businesses to estimate how many trips residents might make on a roadway when traveling from their homes to local destinations. MAPC's dataset contains three scores – walking score, biking score, and an overall composite score. HSH used the walking and biking scores to evaluate the bicycle and pedestrian local access demand.

EXISTING CONDITIONS- BICYCLE AND PEDESTRIAN LOCAL ACCESS SCORES

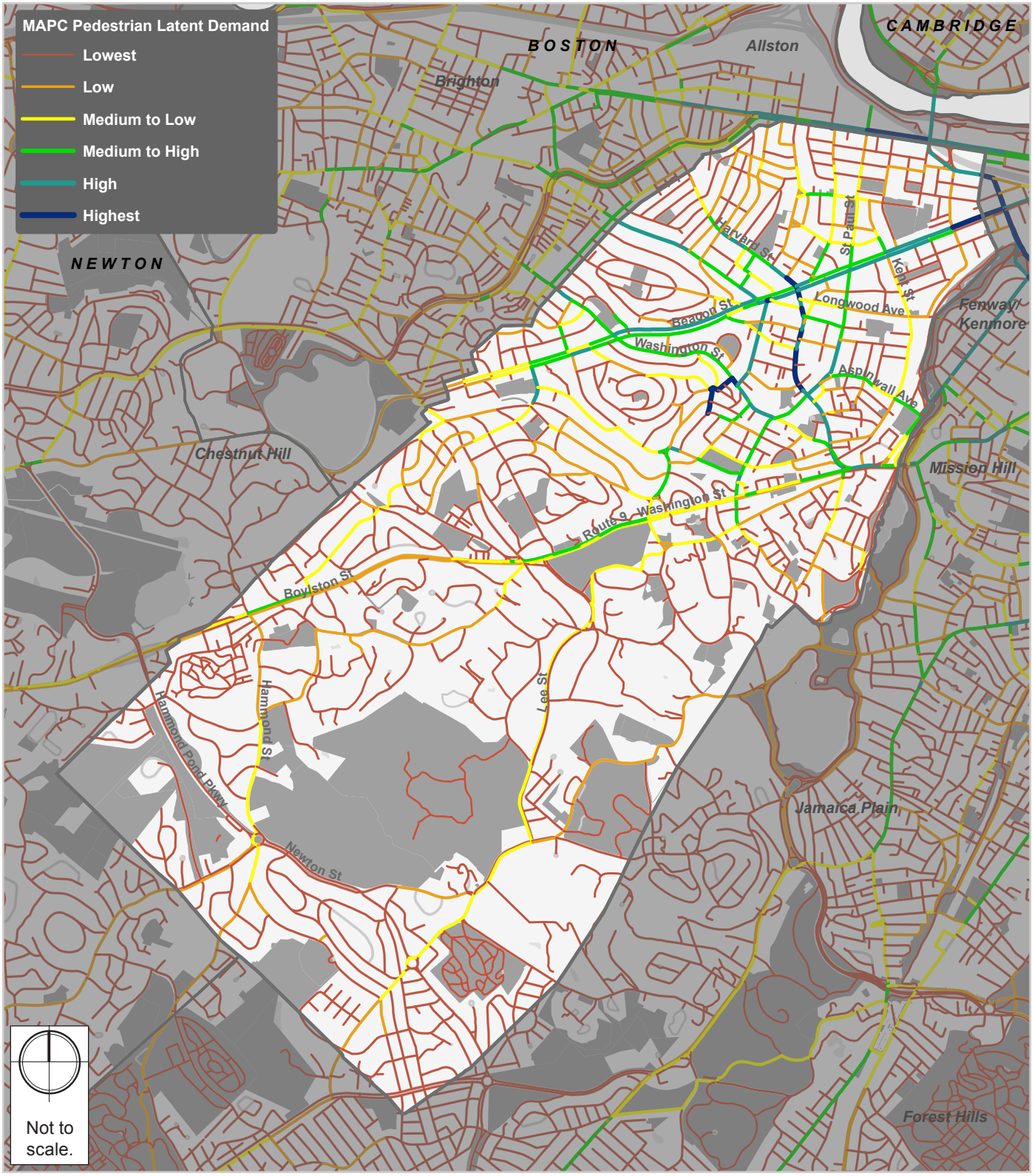
Figure 9 and **Figure 10** show the cycling and walking scores in Brookline. The darker lines represent road segments with higher local access scores, and the lighter colors represent roads with lower scores. Both the bicycle and pedestrian scores show similar results. Road segments closer to the Coolidge Corner, Washington Square, and Brookline Village neighborhoods tend to have higher local access scores than those further away because of the MBTA Green Line stations and high concentration of restaurants, grocery stores, and shops in these three commercial neighborhoods. The side roads that are adjacent to Beacon Street, Harvard Street and Washington Street have lower scores because those side roads would provide direct connections only to people who live on those blocks, while the three main corridors would be useful for all adjacent residential neighborhoods.

Figure 9. Bicycle Local Access Score



Data Source: MAPC

Figure 10. Pedestrian Local Access Score



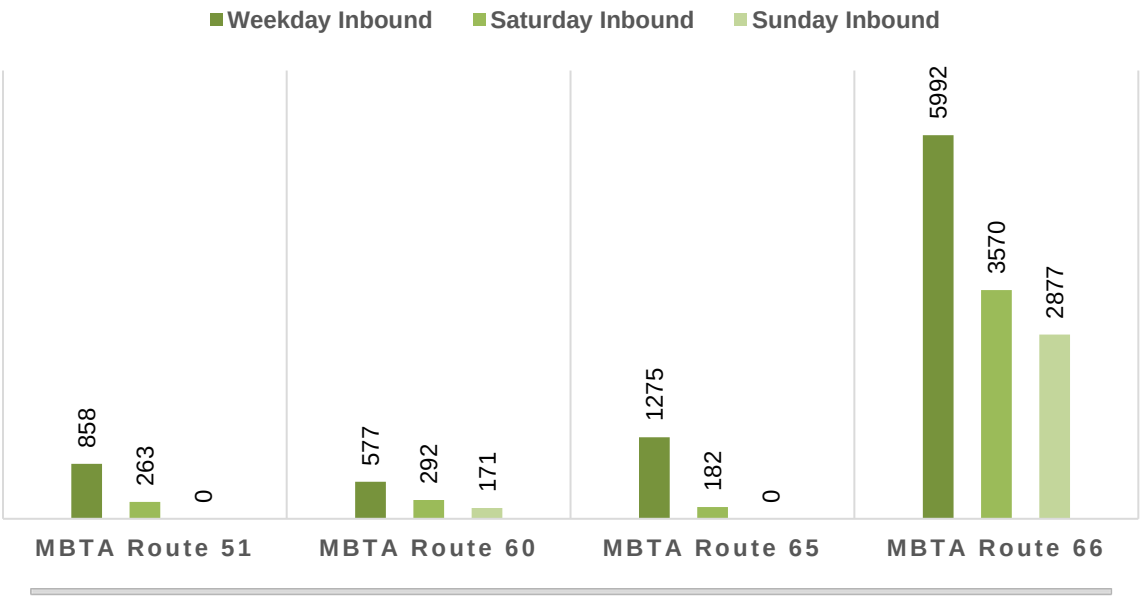
Data Source: MAPC

BUS RIDERSHIP

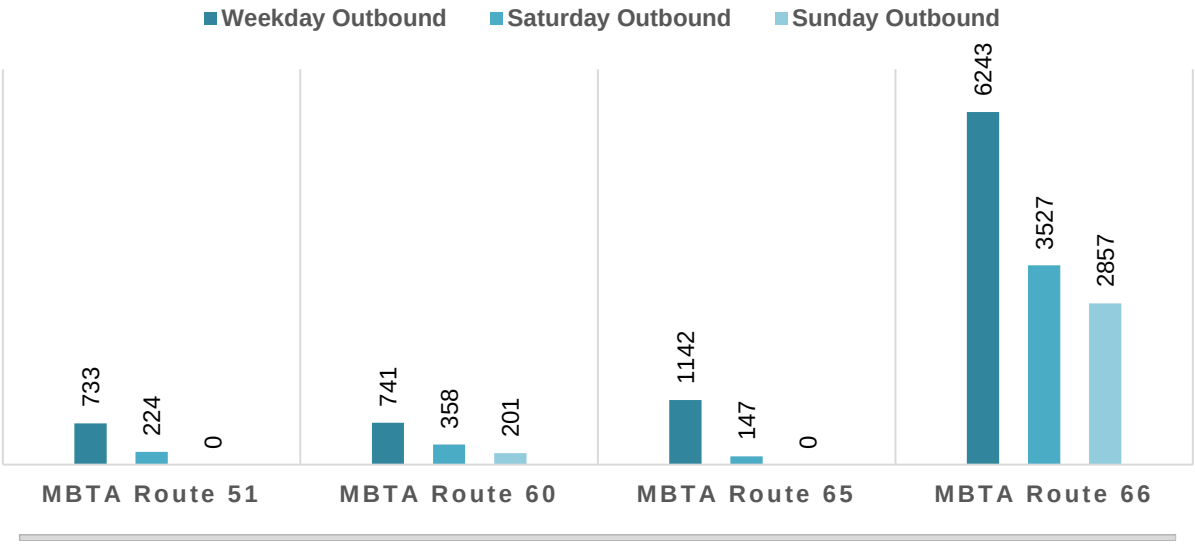
Taken from MBTA's Automated Passenger Count (APC) data, HSH looked at bus ridership trends for routes that serve the Town. Overall, MBTA Bus Route 66 has the highest ridership compared to the other bus routes. Bus Route 66 earned its second-place ranking in the highest number of ridership compared to all MBTA routes (inbound and outbound). Within Brookline, the Harvard Street at Beacon Street bus stop (bus stop #1308) in Coolidge Corner showed the highest number of inbound and outbound boarding on the weekdays at approximately 275 and 374 riders, respectively. The bus stop near Harvard Street at Shailer Street (bus stop #1306) and Harvard Street at Coolidge Street (bus stop #1375) showed the lowest number of inbound and outbound boarding on the weekdays at approximately 45 and 61 riders, respectively **(Figure 11)**. APC data also showed that the Harvard Street at Beacon Street stop had the highest number of people getting off the bus during the weekdays for both inbound and outbound travel. The Harvard Street at Beacon Street bus stop is across the street from the Coolidge Corner stop for the Green Line C branch. It is also adjacent to a high number of employment opportunities.

MBTA Bus Stops 65, 60, and 51 did not have as much ridership as MBTA Bus Route 66 but are equally important since these routes serve areas of the Town that do not have access to public transportation. All four bus routes complement the Green Line system in that they generally provide north to south connections, while Green Lines C and D provide west to east connections. Bus Route 65 has the highest weekday ridership compared to Bus Routes 60 and 51. Within Brookline, the Washington Street at Corey Road bus stop (bus stop #1274) near Washington Square showed the highest number of inbound boarding on the weekdays at approximately 160 riders. The Washington Street at Pearl Street bus stop (bus stop #1526) showed to have the highest number of outbound boarding on the weekdays at approximately 61 riders. The bus stop near Brookline Avenue at Aspinwall Avenue (bus stop #1524) and the opposite side of Aspinwall Avenue (bus stop #1557) showed the lowest number of inbound and outbound boarding on the weekdays at approximately three and four riders, respectively. Bus stops near Washington Street at Harvard Street (bus stop #1283) and Washington Street at Corey Road (bus stop #1294) showed the highest number of riders getting off the bus. Within Brookline, Washington Street at Harvard Street bus stop saw the highest number of people getting off for inbound travel. This stop is adjacent to Brookline Village, which is one of the Town's commercial neighborhoods that people visit for various services. The bus stop near Washington Street at Corey Road saw the highest number of people getting off for outbound travel. This stop is adjacent to MBTA's Green Line B Branch and a Whole Foods grocery store. MBTA Bus Routes 60 and 51 have the lowest weekday ridership compared to Bus Routes 65 and 66. The most used bus stop for Bus Route 60 within Brookline is the one located near Boylston Street at Tully Street (bus stop #19821); many people get on the bus at this location for inbound travel. The bus stop near Walnut Street at High Street (bus stop #1527) has the highest outbound boarding within Brookline. This stop is within a block away from several services along Route 9 and approximately

700 feet away from Brookline Village. Within Brookline, the bus stop near Chestnut Hill Avenue at Reservoir (bus stop #21917) has the highest number of transit riders boarding (inbound) and alighting (outbound) for Bus Route 51 at 383 and 359 riders, respectively. This bus stop is adjacent to "The Shops" at Chestnut Hill, a shopping center where many people visit to shop, eat, and watch movies. It is also important to note that Bus Routes 51 and 65 do not operate on Sundays, hence, why there is zero ridership for Sunday Inbound and Outbound data.



MBTA's 2017 total inbound ridership by route. Source: MBTA

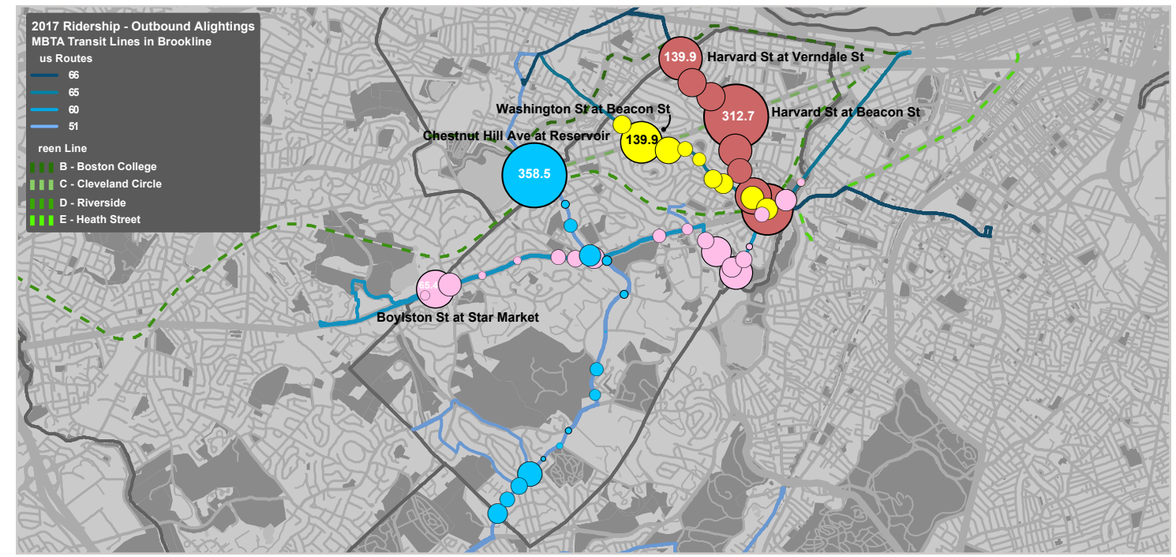


MBTA's 2017 total outbound ridership by route. Source: MBTA

Figure 11. Bus Ridership for MBTA Routes 66, 65, 60, and 52 (2017)

2017 Inbound Alightings

2017 Outbound Alightings



2017 Inbound Boardings

2017 Outbound Boardings

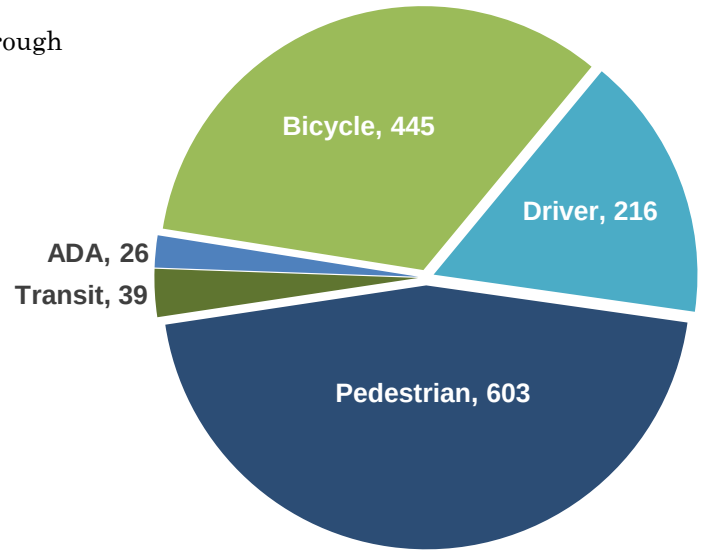
Data Source: MBTA

STAKEHOLDER INPUT

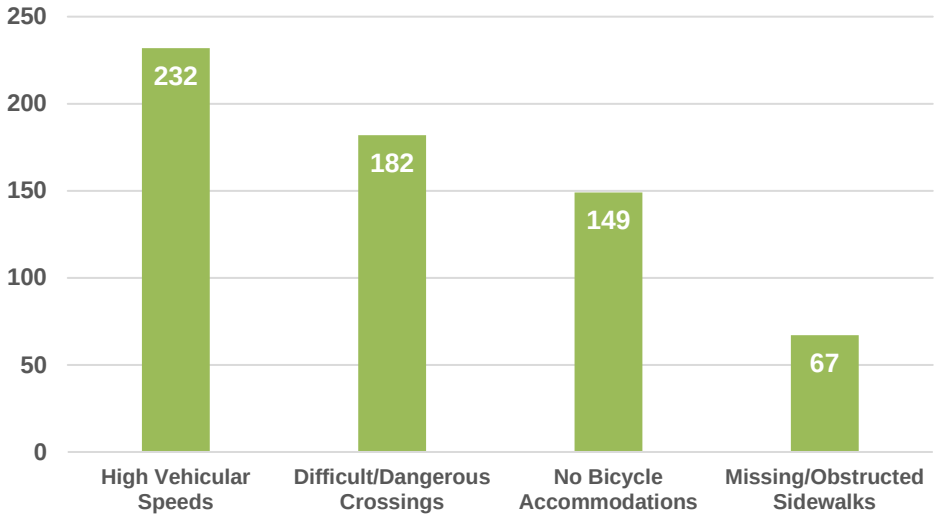
The Prioritization Plan seeks to incorporate as many ideas and visions of community members. In the beginning of the project process, HSH staff met with the Town of Brookline to initiate the project and discuss potential projects to be included in the Prioritization Project List. After the kick-off meeting, a community public meeting was held to inform the residents of the Complete Streets Funding Program and to solicit comments and project ideas on problematic areas for pedestrians, cyclists, and those with disabilities. To accommodate community members who were unable to attend the meetings in person or who preferred to leave comments following the meetings, a WikiMap, an online tool for soliciting public input, was created to allow community members to contribute to the process online. The WikiMap was posted on Brookline's public website with the purpose of gathering input from a broad range of stakeholders.

WIKIMAP

The WikiMap was created to allow community members to contribute their comments, concerns, and project ideas. It proved to be successful in capturing comments that addressed issues in Brookline's northern and southern neighborhoods. HSH collected 735 points that totaled to 1,329 individualized comments through the WikiMap (**Figure 12**). The website allowed users to provide comments by user type (e.g. Accessibility (ADA), Bicycle, Driver, Pedestrian, and Transit). From the five user types, residents provided the most feedback for the Town's pedestrian infrastructure with 603 comments (45% of the total comments). The image to the right shows how the remainder of the comments were distributed by user type. Across all user-type, the top four comments were: high vehicular speeds, difficult/dangerous crossings, no bicycle accommodations, and missing/obstructed sidewalks.



The total number of Brookline's WikiMap comments by user. Source: WikiMap



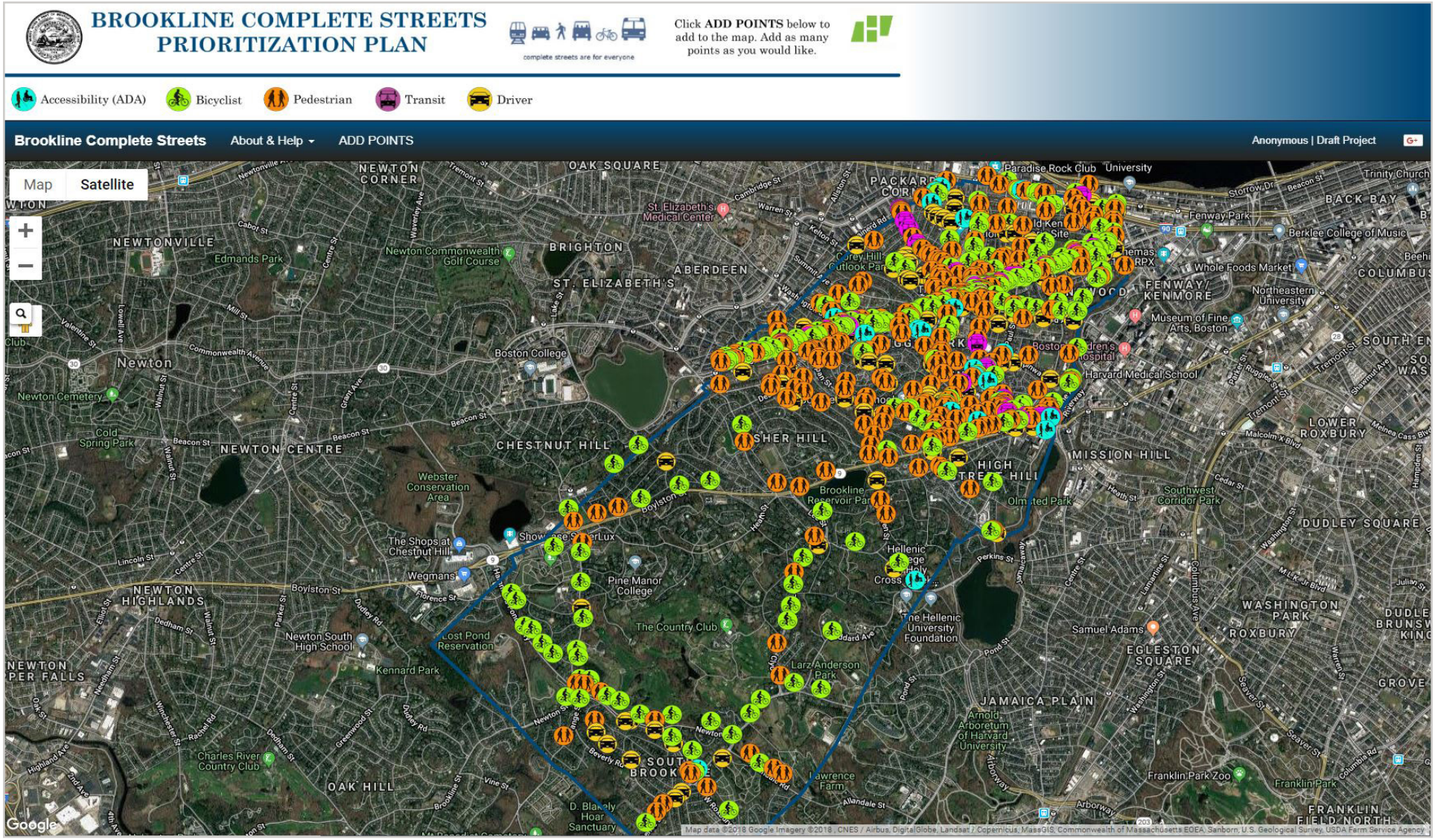
The top four WikiMap comments. Source: WikiMap

The Washington Square and Brookline Village neighborhoods received the highest number of comments regarding high vehicular speeds. Most of the comments that flagged specific locations as having high vehicular speeds were in relation to bicycle and crossing safety. Residents want to see roadway improvements that slow down vehicles, especially in areas that experience a lot of pedestrian activity and bicycle activity. Areas of the Town that received the most comments regarding difficult and/or dangerous crossings were near Washington Square and Coolidge Corner. Residents identified speeding cars, the lack of crosswalk markings, and wide roadways that make crossing time unnecessarily long as specific challenges.

An obstructed sidewalk on Babcock Street. Photo: HSH

The third top concern flagged by residents was the lack of safe bicycle accommodations. Although Brookline has a working comprehensive network of bicycle facilities, it can be improved on to make it safer for cyclists of all ages and abilities. Missing and/or obstructed sidewalks was the fourth top concern expressed in the WikiMap. Many residents noted various locations of sidewalks that seemed poorly designed; obstructed with poles, shrubs, and mailboxes; and in disrepair. Residents also flagged corridors that are missing sidewalks.

Figure 12. Stakeholder Input Collected via WikiMap



Data Source: HSH; WikiMap

FIRST PUBLIC INFORMATION MEETING

Brookline's public information meeting about the Complete Streets Prioritization Plan was held on June 4, 2018. The public information meeting was held in the evening and attracted over 35 Brookline residents, including advisory committee members, Transportation Board representatives, and staff from the Department of Public Works and Fire Department. A presentation was given by HSH staff speaking about the Complete Streets Funding Program, Brookline's existing conditions, and the next steps of the project. Afterwards, attendees broke out into small groups of five to six people and took part in a table activity in which people shared their concerns about the lack of pedestrian, bicycle, and transit accommodations. Concerns and project ideas were raised by residents representing different neighborhoods throughout the Town. The overarching concern from all residents was the need to have appropriate facilities that will truly improve the safety of pedestrians and cyclists that are using the street. Residents want to see more separated bicycle lanes along corridors that see a high volume of vehicles driving at high speeds. Crossing safety was also an issue shared among varying areas of the Town; residents want to see more traffic calming along local corridors that see a high volume of pedestrians throughout the day, such as the Coolidge Corner, Washington Square, and Brookline Village neighborhoods. Lastly, improving transit efficiency and arrivals through Transit Signal Priority (TSP) was a recommendation shared among residents who use the MBTA bus system. For a detailed summary of the June 2018 public meeting, refer to the Community Input Summary in the Appendix.

Tools to Assess Equity Concerns

To ensure an equitable distribution of resources for those who may greatly benefit from improved street conditions, we consider environmental justice neighborhoods and populations with disabilities. Data from the 2010 U.S. Census and the American Community Survey (ACS) 2007-2016 5-Year Estimates were used to determine Census 2010 block groups that exceed environmental justice thresholds for limited English households, low income households, and/or high minority populations.[14] Using the ACS 5-Year estimates, the percentage of persons with disabilities was calculated for each census tract. ACS is a continuous data collection effort led by the U.S. Census Bureau to measure the dynamic social and economic characteristics of the U.S. population. Since ACS replaced the decennial Census long-form, there is no disability data in the 2010 Census. Unlike the U.S. Census, ACS only provides self-reported information and so represents a sample of the total population.

[14] MassGIS Data: 2010 U.S. Census Environmental Justice Populations

ENVIRONMENTAL JUSTICE (EJ) COMMUNITIES

Brookline has 19 census block groups that exceed environmental justice thresholds for high minority populations, low income households, and limited English households. According to ACS 2016 5-Year data, Brookline's population is primarily residents who identify themselves as white (72%), followed by Asians (16% of the population). Approximately 12% of the Town's total population identify themselves as non-white alone, including black/African American, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander, some other race, and two or more races. At the census block level, all 19 census blocks met the environmental justice threshold for high percentage of minorities. Meeting the minority threshold means that the total census block population has a minority population that is greater than or equal to 25%. The census block that showed to have the highest percentage of minorities is in the most southeastern portion of Route 9. The percentage of minorities for this census block is 49%.

Although Brookline's median household income is 1.4 times more than the amount in Massachusetts (approximately $70,954 according to 2012-2016 ACS estimates) and 1.1 times more than the amount in Norfolk County (approximately $90,226 according to 2012-2016 ACS estimates. Brookline's median household income is $102,175 (according to the 2012-2016 ACS estimates). Although Brookline ranks high in median household income compared to the State and County, at the census block level, there are two areas within the Town that reaches the low-income threshold. These two census blocks are in the Brookline Village neighborhood and North Brookline. The median household incomes for these two census blocks located in Brookline Village and North Brookline are approximately $29,290 and $32,674, respectively. Meeting the low-income threshold means that the annual median household income of that census block group is equal to or less than approximately 65% of the Massachusetts state median income. Lastly, one census block meets the English-isolated threshold. This census block also meets the low income and minority thresholds. Meeting the English-isolated threshold means that 25% or more of households have no one over the age of 14 who speaks English-only or very well (**Figure 13**).

PERSONS WITH DISABILITIES

ACS respondents that self-report any of the following six disability types are considered to have a disability and are counted in the estimates: hearing difficulty, vision difficulty, cognitive difficulty, ambulatory difficulty, self-care difficulty, and independent living difficulty.[15] Overall, Brookline has at least 0.8% of persons with disabilities in a significant portion of its land area, with the exception of one census block that does not have any reported persons with disabilities is the Fisher Hill neighborhood. This census block is bounded by Clinton Road, Chestnut Hill Avenue, and Boylston Street/Route 9, as well as located near the Chestnut Hill Avenue and Reservoir Stops on the MBTA

[15] *How Disability Data are Collected from the American Community Survey,* Census.gov

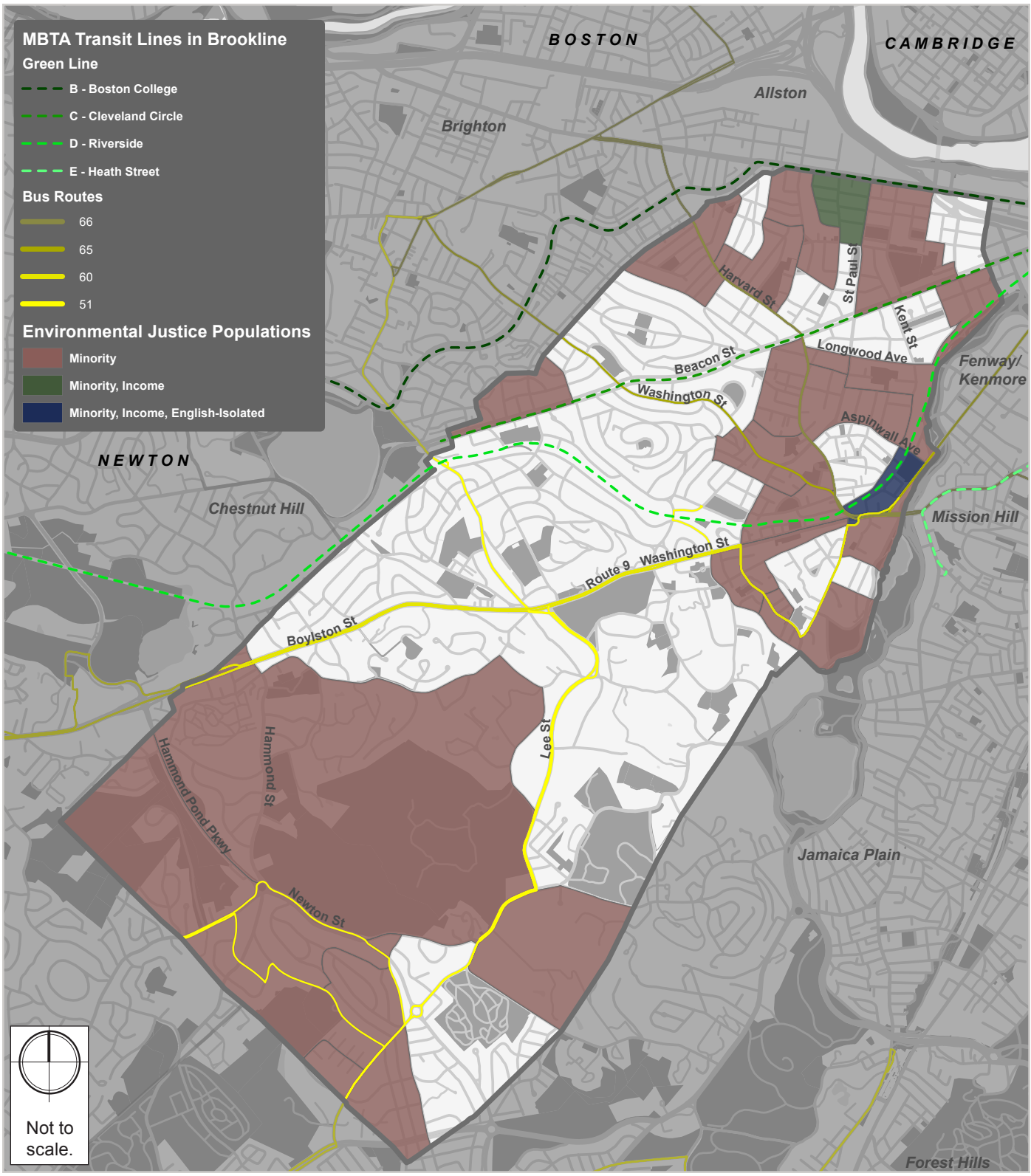
"D" Green Line stops. Fisher Hill is also a district that was listed on the National Register of Historic Places in 1985. Fisher Hill is one of the more secluded neighborhoods in the Brookline area. Most of the homes in this district are still single-family dwellings that have not been turned into apartment complexes. The highest percentage of disabled persons within Brookline is 25.8% and the lowest is 0.8%.

There are two census blocks that have relatively high percentages of disabled persons. These two census blocks are in the Coolidge Corner neighborhood (bounded by Harvard Street, Beacon Street, town line, and Winchester Street) and Brookline Village neighborhood (bounded by Kent Street, Aspinwall Avenue, Brookline Avenue, and Washington Street/Route 9). These two census blocks contain affordable housing units for disabled persons or a combination of elderly/disabled persons; housing developments for disabled persons in Coolidge Corner are the Centre Communities in Brookline and Humanity House. The large housing development for disabled persons in Brookline Village is the Village at Brookline, a housing development for general affordability needs, including low-income, the elderly, and disabled persons. Census blocks that have the lowest percentage of disabled persons (0.8% and 1.7%) are in the residential neighborhoods of High Street Hill and Emerson Gardens. These two neighborhoods are adjacent to Boylston Street/Route 9; Emerson Gardens is next to Brookline Village and High Street Hill is adjacent to Leverett Pond/Olmsted Park. The remaining portions of Brookline will have 3-16% of persons with disabilities; mainly altered by housing developments that accommodate disabled persons and are scattered throughout the town (**Figure 14**).

Overall, the percentage of disabled persons that are 65 years old and older in Brookline is 4.8%, which is higher than the percentage of disabled persons that are 18 years old to 64 years old (3.5%). Existing housing supply supports the disabilities percentage – about half of the Brookline Housing Authority' (BHA) 923-unit public housing inventory is designated for seniors and people with disabilities and these units are designed primarily to be accessible for people with mobility impairments. In addition to units owned and managed by the BHA, there are currently thirteen accessible units in Brookline listed on MassAccess, the registry for barrier-free for-sale and rental units for people with disabilities. Additionally, Brookline has thirty-seven group home units for clients of the Department of Mental Health (DMH) and thirty-seven for clients of the Department of Development Disabilities (DDS).[16]

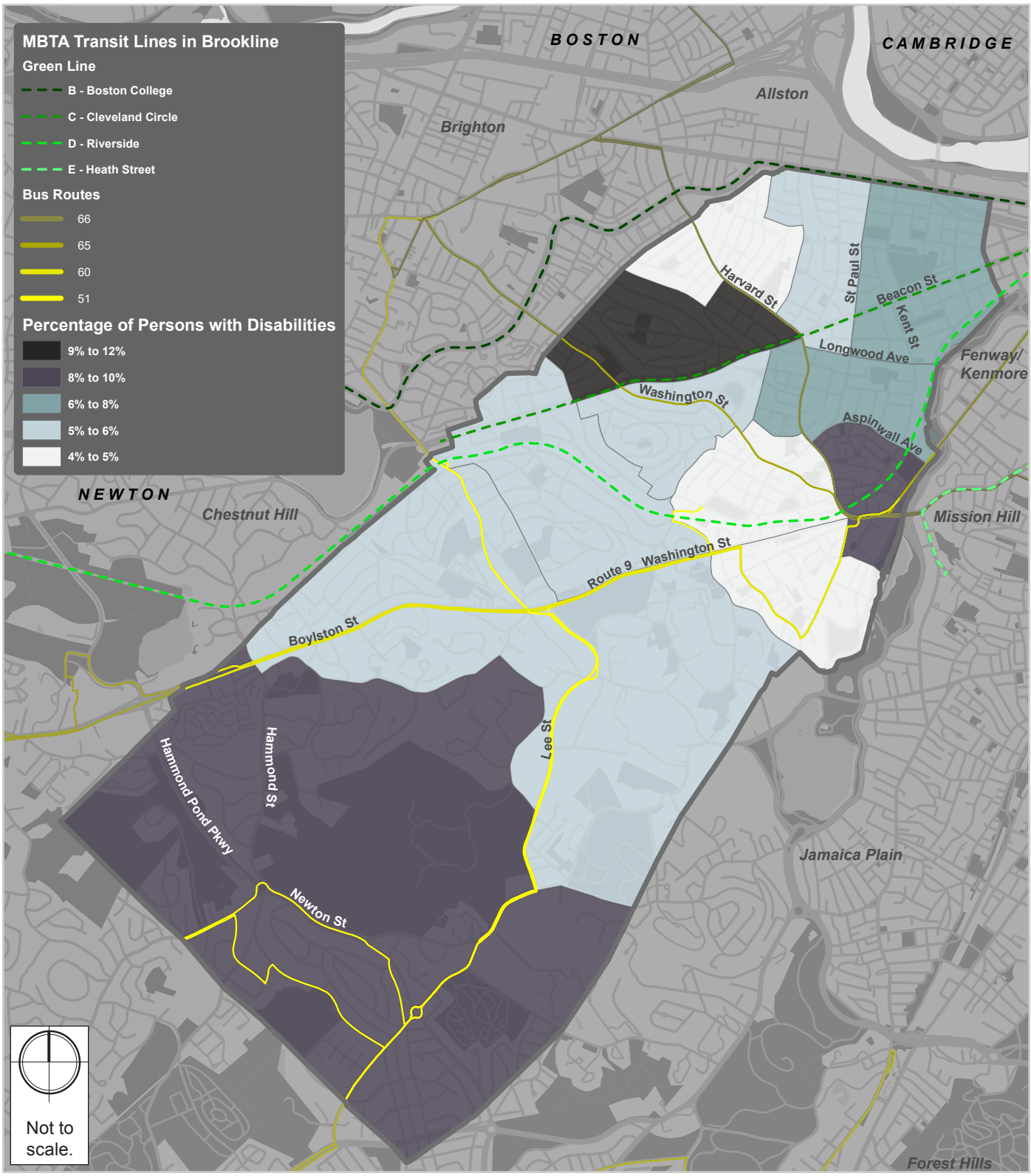
[16] Brookline Housing Needs Report, 2016 (https://www.mass.gov/files/documents/2016/11/tb/brooklineplan.pdf)

Figure 13. Environmental Justice (EJ) Populations



Data Source: MassGIS

Figure 14. Persons with Disabilities



Data Source: ACS 5-Year Estimates

Project Selection

Although trends and patterns show higher demand for improvement projects in some sections of the Town compared to others, we looked at Brookline comprehensively and proposed projects that reflect the needs and priorities of the Town, as well as the results of our tools. Each tool for measuring existing conditions and pedestrian and bicycle demand contributes to an understanding of the existing conditions in Brookline. Using these tools to determine potential project locations, we use aerial imagery, field observations, and discussions with Town officials and residents to create a list of potential projects for consideration. Projects range from low-cost and low-design projects like restriping crosswalks with high visibility paint and the installation of tactile strips on curb ramps, to higher cost projects that may require more design, such as construction of new sidewalks, road diets, and shared-use paths. Projects that have been incorporated into Brookline's Prioritization Plan were discussed with Town officials and refined to reflect current Town timelines and priorities.

Project Prioritization

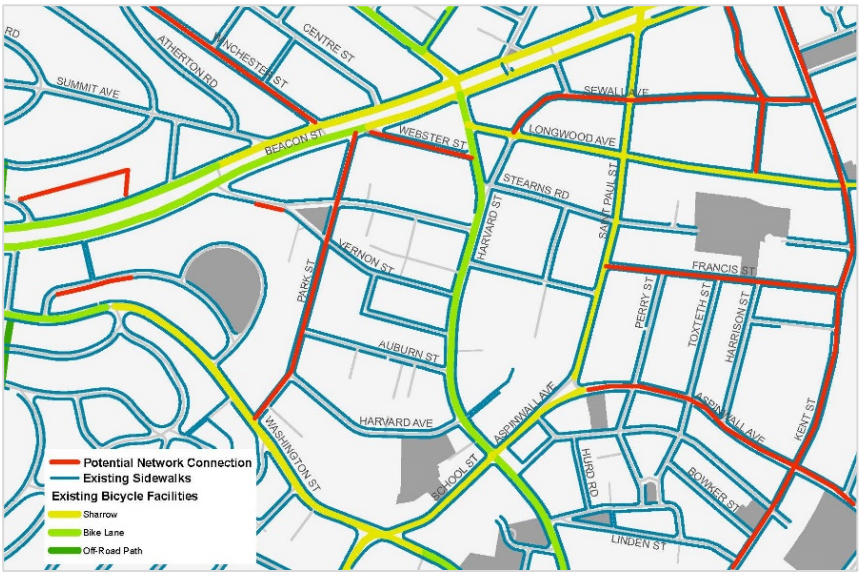
The prioritization process was completed by assessing each project based on the extent to which it addresses a range of concerns; this process ranks the projects found in Brookline's Prioritization Plan. HSH's analysis mirrors MassDOT's prioritization requirements while adding an additional layer of nuance to the prioritization of projects. For each proposed project site, values reflecting existing and, where appropriate, proposed conditions are recorded to generate a ranked list of projects. To normalize the values, each variable is scaled between zero and ten such that a higher scaled score relates to higher priority. Weights are used to reflect the desired influence of each variable in the prioritization process. An explanation of the methodology for value assignment to each category are listed below.

NUMBER OF PEDESTRIAN AND BICYCLE CRASHES ADJACENT TO PROJECT

Crash locations were considered and analyzed with an upmost priority in influencing recommendations for projects to increase safety at key crash locations around Brookline. Improving the area around Summit Avenue and Beacon Street – an intersection that has seen bicycle and pedestrian crashes nearby – was weighted as a priority in increasing pedestrian safety through improvements, such as an installation of high visibility crosswalks and ADA-compliant curb ramps, curb extensions, and updating existing pedestrian signal timing to include countdown timers to inform pedestrians of the time they have to cross Summit Avenue and Beacon Street.

NETWORK CONNECTION

Each project is assessed on whether it creates a new connection within the existing pedestrian or bicycle networks, categorized as "Full," "Partial," or "None." A full connection either connects existing acceptable pedestrian or bicycle conditions or extends the usable network. A partial network connection is one that does not connect to existing acceptable pedestrian or bicycle conditions or only closes a network gap in conjunction with other proposed projects. Projects that require phasing over multiple years are considered to provide partial network connections. A categorization of "None" would be used for a project that does not create a new facility, such as sidewalk reconstruction, or one that creates a new link unconnected to the existing sidewalk or low-stress bicycle networks.



Existing bicycle and pedestrian facilities with potential connections to create a full bicycle and pedestrian network

HIGHEST ADJACENT BIKING/WALKING PROPENSITY LEVEL

Using MAPC's Local Access Scores[17], the highest bicycle and walking propensity value (also called latent demand) within the project corridor or intersection is considered.

EXISTING BICYCLE LEVEL OF COMFORT AND EXISTING PEDESTRIAN NETWORK/LEVEL OF COMFORT

Using HSH's Bicycle Level of Comfort and Pedestrian Network maps[18], the different projects were assigned either a bicycle level of comfort or pedestrian condition value for corridors based on project type (i.e. corridor-wide or intersection specific). For corridor-wide projects that ran along multiple segments with varying comfort levels, the average comfort level is chosen. The worst condition is chosen for projects located at intersections.

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[17] For more information about the tool, refer to Page 38 of this report. Information can also be accessed by accessing the following website: http://localaccess.mapc.org/.
[18] For more information about the Bicycle Level of Comfort and Pedestrian Network maps, refer to Pages 28, 31, and 32 of this report.

PROPOSED CHANGE IN BICYCLE LEVEL OF COMFORT AND PROPOSED CHANGE IN PEDESTRIAN NETWORK/LEVEL OF COMFORT

Projects are assigned a proposed level of change in level of comfort, ranging from no improvement to high improvement. If project improvements are minor or the existing level of comfort is already high, the project is considered to have a "low" impact. If project improvements for bicycle and pedestrian comfort are anticipated to be significant, they are considered to have "medium" or "high" impact. For example, a sidewalk construction project where none existed before would generally have a high impact on pedestrian comfort than a sidewalk reconstruction project.

CROSSING IMPROVEMENT

Projects that improved the safety or accessibility of a crossing for pedestrians or cyclists were weighted higher than projects that did not. Projects that include installing high visibility crosswalks with ADA-compliant curb ramps, raised crosswalks, and updating pedestrian signal timing were scored higher than projects that do not have those improvements.

PEDESTRIAN DELAY

Looking at pedestrian signal delay is important because long pedestrian signal delay can lead to non-compliance, posing a safety concern for all road users. Bicycle and pedestrian projects located on intersections that were included in the pedestrian delay analysis[19] were ranked higher. Within the projects located on the analyzed intersections, the varying delay categories – levels A to F – that were assigned to the different intersections were given numerical values for the prioritization process.

TRANSIT DEMAND

The location of MBTA Green Lines C and D transit stops and bus ridership were considered when prioritizing transit-related projects. For projects that improved transit access and accommodations, if they were within a quarter mile distance from a Green Line C or D stop and/or bus stop with high ridership, those projects received higher scores than transit-related projects that did not.

PERCENT OF PERSONS WITH A DISABILITY

Using ACS's 5-Year Estimates, the percentages of persons with a disability within a one-quarter mile distance from a project site were calculated and used to prioritize projects. Areas of the Town that had high proportions of disabled residents were weighted higher than areas of the Town that had fewer or none disabled residents.

[19] For more information about the pedestrian delay analysis, refer to Page 26 of this report.

NUMBER OF ENVIRONMENTAL JUSTICE CENSUS BLOCK GROUPS

Using MassGIS's 2010 U.S. Census Environmental Justice Populations data[20], the number of environmental justice census block groups that intersected with a quarter mile buffer of each project corridor or intersection were scored higher than projects that did not.

NUMBER OF SENIOR OR ASSISTED LIVING FACILITIES

The number of active adult neighborhoods or assisted living facilities within one-half mile of each project corridor or intersection were counted in the prioritization of each project. Using Town resources housing developments and community centers that accommodate the elderly were located and projects in the Prioritization Plan that are within a half mile distance of the following facilities were weighted higher than projects that were not. The following facilities were identified and considered in the prioritization: Brookline Senior Center, Brookline Adult and Community Education, Centre Communities of Brookline (1550 Beacon Street, 100 Centre Street, and 112 Centre Street), Goddard at Brookline, Ruth Cowin House, Colonel Floyd Apartments (I, II), Kickham Apartments, O'Shea Apartments, Sussman House, Walnut Street Apartments, Trustman Apartments, Morse Apartments, and Village at Brookline.

SCHOOL WALK ZONE

The number of schools within one-half mile of a project was considered in the prioritization process. A one-half mile buffer was used to capture areas where residents could potentially walk to school if appropriate facilities were available. The following school were identified and considered in the prioritization: Baker School, Coolidge Corner School, Driscoll School, Heath Elementary School, Amos A. Lawrence School, Lincoln School, Pierce Elementary School, Runkle Elementary School, Brookline Early Education Program (BEEP), Brookline High School, and Diane K. Trust Center for Early Education.

STAKEHOLDER INPUT

Input from the first public meeting, WikiMap, and email communications with community members were incorporated into the list of proposed projects. To prioritize projects with the most support, projects that received the most attention from the Town (i.e., residents and Town government) and that were located within WikiMap pinpoint clusters were weighted higher compared to areas with less attention or WikiMap activity.

[20] For more information on the 2010 U.S. Census Environmental Justice Populations data, refer to Page 49 of this report.

The Prioritization Plan

The prioritization process resulted in a list of projects that aim to improve the Town's existing infrastructure and further the Town's goal of achieving a comprehensive active transportation network that would fully support Complete Streets principles in the future.

Our analysis of the Town's existing conditions is based on field observations, conversations with the Town and residents, and the visual analysis tools presented in previous sections of this report. Together, these resources help us consider where conditions are deficient, where there is demand for different active transportation modes, and where equity can be addressed. With these inputs, we looked carefully at areas with overlapping issues. For instance, if a neighborhood showed high levels of latent demand, high numbers of pedestrian and/or bicycle crashes, and low levels of comfort, that neighborhood was explored further and given potential interventions that would mitigate those preexisting negative conditions.

Trends and Patterns

Pedestrian and bicycle activities within the Town are more prevalent north of Boylston Street (Route 9). The Town's three main commercial districts – Brookline Village, Coolidge Corner, and Washington Square – that see high numbers of pedestrian and bicycle activities are located north of Boylston Street (Route 9). The street network within Brookline that is north of Route 9 is mostly laid out in a grid-like configuration, with Beacon Street and Harvard Street as the major north-south and east-west corridors, respectively. The three commercial districts in North Brookline are areas that the Town prioritizes due to high-demand destinations that many residents and Town visitors of all ages. They also have the potential to become more vibrant centers if provided with infrastructure that that would allow cyclists and pedestrians to travel safely through the area.

Bicycle facilities are present in these neighborhoods; however, the existing facilities are worn out and do not provide enough protection from vehicles. HSH's BLOC analysis shows that Beacon Street and Harvard Street, despite the existing bicycle lanes and sharrows, still have low levels of comfort. Bicycle crashes between 2011-2015 occurred primarily along Beacon Street and Harvard Street, specifically within the three commercial districts. Beacon Street and Harvard Street are also heavily-traveled roadways for vehicles that drive at high speeds; this existing condition warrants facilities that should offer more protection than bicycle lanes and sharrows. A long-term alternative that would improve safety and comfort is separated bicycle lanes. Separated bicycle lanes provide physical barriers (e.g., bollards or removable curbs) between the bicycle lane and vehicular travel lane. A short-term recommendation is to repaint the bicycle lane markings that are worn out. Pedestrian issues were also identified along Beacon Street and Harvard Street, specifically within

these three districts. Although sidewalks are present throughout Brookline Village, Coolidge Corner, and Washington Square, crossing safety was an overlying concern for residents who took part in the First Public Meeting and WikiMap. Intersections that have crosswalks require improvements such as curb extensions and RRFBs to improve pedestrian visibility.

The portion of Brookline that is south of Route 9 is mostly composed of large single-family homes, with The Shops at Chestnut Hill located in the southwestern portion of the Town. Major roadways within South Brookline are Hammond Pond Parkway, Hammond Street, Clyde/Lee Street, Newton Street, and VFW Parkway. These roadways connect to Route 9, Newton, and Boston. Major destinations in South Brookline are the Brookline Country Club, The Shops at Chestnut Hill, and Larz Anderson Park. The bicycle network is minimal in this portion of the Town. Many of the roadways that people would take to get to South Brookline are winding roadways with high vehicular volumes and speeds. To create a safe and comfortable bicycle network, the types of bicycle facilities that would need to be constructed are ones that provide separation for cyclists from vehicles. Separated bicycle lanes would be ideal for roadways like Clyde/Lee Streets and Newton Street; they would provide vertical separation for cyclists from vehicles. Unlike the sidewalks in North Brookline, sidewalks in South Brookline are in poor condition or are segmented and missing. Clyde/Lee Street is a corridor that has sidewalks; however, a large portion of the road has sidewalks that are in poor condition and could benefit from widening and reconstruction.

Brookline is well-served by various MBTA routes. Green Lines C and D branches and Bus Routes 66, 65, 60, and 51 serve various neighborhoods within the Town. The Green Line D Branch runs on a private surface right-of-way that is grade separated from adjacent roadways. This line sees the most ridership during morning and evening commute hours, as well as during Red Sox games. The Green Line C Branch runs on-street and along the median of Beacon Street in Brookline. Since it must follow traffic signal controls at signalized intersections, riders often suffer longer travel time during morning and evening peak congestion. Residents have expressed the need to incorporate Transit Signal Priority (TSP) to prioritize the Green Line C Branch at signalized intersections along Beacon Street. In 2017, MBTA started the Transit Signal Priority Pilot Program to test out TSP technology along specific transit routes. The intersection of Carlton Street and Beacon Street that serves the Green Line C Branch was one of several traffic signals that were included in the program. The pilot proved to be successful and the program was extended to include future pilots for nine additional traffic signals along Beacon Street.[21] MBTA's bus network is another transit option that residents use to get around Town and to adjacent municipalities. Bus Route 66 sees the heaviest ridership compared to the other three routes that serve the Town and is the third busiest MBTA route on weekdays.[22] Like the Green Line C Branch, residents want to see transit improvements for Bus

[21] https://mbta.com/news/2017-10-23/mbta-expand-transit-signal-prioritization-boston-brookline-cambridge
[22] Refer to Page 40 for more information on bus ridership.

Route 66 that will improve the continuous delay residents experience in the weekdays and weekends. TSP technology, complemented with a bus rapid transit (BRT) system, would significantly improve the efficiency of this route within Brookline.

Prioritization Plan

The final prioritization plan is outlined in the MassDOT Tier 2 document, which will be used by the Town to schedule the construction of Complete Streets for the coming years shown in **Table 1**. Project types are defined in **Table 2**, the Eligible Project Worksheet, provided by MassDOT. HSH's analysis mirrors MassDOT's prioritization criteria of Environmental Justice, Safety, ADA Accessibility, Pedestrian Mobility, Bicycle Mobility, Transit Operations and Access, Vehicular Operations, and Freight Operations, while adding an additional layer of nuance to the prioritization of projects, as outlined in **Table 3**.

Table 1. ***MassDOT Prioritization Plan***

massDOT

Complete Streets Funding Program Project Prioritization Plan

Municipality Brookline
MassDOT District 6
Date 8/31/2018
Name/Title Todd Kirrane, Transportation Administrator

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X, Y Coordinate** (MA State Plane meter)	**Project End Location: X, Y Coordinate** (MA State Plane meter, corridor projects only)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	**Safety**	**ADA Accessibility**	**Pedestrian Mobility**	**Bicycle Mobility**	**Transit Operations and Access**	**Vehicular Operations**	**Freight Operations**	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
3	Harvard Street (Coolidge Corner section) Bicycle Improvements	Repaint faded bicycle lane and sharrow markings on the southbound and northbound sides of Harvard Street, from Vernon Street to the Town of Brookline/City of Boston borders (i.e. ~525 Harvard Street) (~4750 ft). Bicycle lanes will be 5 ft in width. Install wayfinding signage that will orient bicyclists and pedestrians to major destinations within Coolidge Corner and other neighborhoods within a biking and walking distance; signage should include destination name, directional markers, distance (for bicyclists and pedestrians). Wayfinding signs will comply to the MUTCD.	Yes	Harvard Street from Vernon Street to Boston City Line	231207, 898750	230512, 899886	Complete Streets Needs Assessment	B2 B7 B8 P4	X			X				No	$27,000	$27,000	N/A	3 months	April 2019
5	Babcock Street at Harvard Street Intersection -Leading Pedestrian Interval and Bicycle Box	Including Leading Pedestrian Interval (LPI) (2) on Babcock Street. Update pedestrian signal heads (6) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road. Include Accessible Pedestrian Signals (APS) with audible and vibrotactile indications for pedestrians who don't use visual cues. The Estimated Project Cost assumes a new signal controller is needed. Replace standard crosswalks to high visibility crosswalks and include ADA-compliant curb ramps (3). Install a bicycle box on the southbound side of Harvard Street to allow left turn onto Babcock Street.	Yes	Babcock Street at Harvard Street	231044, 899282		Complete Streets Needs Assessment	S3 S4 P2 P3 P11 P9 P12 B13	X	X	X	X				No	$72,000	$72,000	N/A	6 months	April 2019
9	Longwood Avenue at Harvard Street Intersection - Curb Extensions	Tighten curb radii on the northeast side of Harvard Street. Install a curb extension on the southeast side of Harvard Street. Install ADA-compliant curb ramps on all crosswalk landings for the existing high visibility crosswalks at this intersection (4).	Yes	Longwood Avenue at Harvard Street	231232, 899067		Complete Streets Needs Assessment; Bicycle/Pedestrian Audit	S6 P2 P3 P8 P9	X	X	X					No	$28,000	$28,000	N/A	3 months	April 2019
10	Beacon Street at Harvard Street Intersection - Two-Stage Queue Boxes	At the intersection of Beacon Street at Harvard Street, install (2) two-stage queue bicycle boxes on Beacon Street to turn onto Harvard Street (northbound and southbound approaches).	No	Beacon Street at Harvard Street	231202, 899152		Complete Streets Needs Assessment; Bicycle/Pedestrian Audit	B13	X			X				No	$8,000	$8,000	N/A	3 months	April 2019
19	Harvard Avenue at Harvard Street Intersection - Curb Extensions and RRFB	Install (1) high visibility crosswalk with ADA-compliant curb ramps, curb extensions, and a Rectangular Rapid Flashing Beacon (RRFB) across Harvard Street. Supplement RRFB with standard pedestrian crossing warning signs and markings.	Yes	Harvard Avenue at Harvard Street	231216, 898521		Complete Streets Needs Assessment	P2 P3 P8 P9 P12	X	X	X					No	$79,000	$79,000	N/A	3 months	April 2019
26	MBTA Route 66 Bus Stop Improvements within Brookline - Accessibility Improvements	Install (1) high visibility crosswalk on Harvard Street (adjacent to Vernon Street) supplemented with ADA-compliant curb ramps. This would improve access to the MBTA 66 Bus Stop #1371.	Yes	Harvard Street from Boylston Street (Route 9) to Boston City Line	231204, 898753		Complete Streets Needs Assessment	P2 P9 T1 P3	X				X			No	$10,000	$10,000	N/A	3 months	April 2019
44	Heath Street at Woodland Road Intersection - RRFB and Crossing Improvements	Tighten curb radii on both sides of Woodland Road. Install (1) high visibility crosswalks with ADA-compliant curb ramps. Install Rectangular Rapid Flashing Beacons (RRFBs) to increase driver yielding compliance to pedestrians across Heath Street (adjacent to Woodland Road). Supplement RRFBs with standard pedestrian crossing warning signs and markings.	Yes	Heath Street at Woodland Road	228131, 896954		Complete Streets Needs Assessment; Bicycle/Pedestrian Audit	S6 P2 P3 P9 P12	X	X	X					No	$133,000	$133,000	N/A	6 months	April 2019
47	Washington Street at Greenough Street Intersection - RRFB	Install a Rectangular Rapid Flashing Beacon (RRFB) to increase driver yielding compliance to pedestrians across Washington Street (adjacent to Greenough Street). Supplement RRFBs with standard pedestrian crossing warning signs and markings. This is one of several corridors residents take to get to Brookline High School. Upgrade one curb ramp on Washington Street (northbound side) to be ADA compliant. All other crosswalk landings have curb ramps that are ADA-compliant.	Yes	Washington Street at Greenough Street	230905, 898399		Complete Streets Needs Assessment	P2 P3 P9 P12	X	X	X					No	$42,000	$42,000	N/A	3 months	April 2019
7	Longwood Avenue Pedestrian Improvements	Upgrade (10) existing standard crosswalks to be high visibility crosswalks with ADA-compliant curb ramps, as well as upgrade pedestrian signals to include Accessible Pedestrian signal (APS) with audible and vibrotactile indications for pedestrians who don't use visual clues, at the following locations on Longwood Avenue: adjacent to St. Paul Street (4), Kent Street (4), Chapel Street (2). Install (1) new high visibility crosswalk with ADA-compliant curb ramps, across Longwood Avenue (adjacent to Chapel Street). Install (1) pedestrian-scale lighting on the south side of Longwood Avenue (adjacent to Sewall Avenue).	Yes	Longwood Avenue from Harvard Street to Chapel Street	231228, 899072	232043, 898959	Complete Streets Needs Assessment; Bicycle/Pedestrian Audit	P2 P9 P11 S9 P3	X	X	X					No	$289,000	$289,000	N/A	6 months	April 2020
33	Weybridge Road at Washington Street Intersection - Curb Extensions	Reduce the curb radii on the north side of Weybridge Road at Washington Street to shorten the pedestrian crossing distance, improve visibility between pedestrians and vehicles, and slow down turning vehicles. Install ADA-compliant curb ramps on crosswalk landings (2).	Yes	Weybridge Road at Washington Street	230849, 898484		Complete Streets Needs Assessment	P2 P8 P9 P3	X		X					No	$44,000	$44,000	N/A	3 months	April 2020
43	Tappan Street (between Blake Road and Greenough Street) Contraflow Bicycle Lane and Sharrows	Install 5-ft contraflow bicycle lanes and sharrows on Tappan Street, from Blake Road to Greenough Street (important to note: (1) the direction of the one-way changes when Tappan Street reaches Greenough Street, (2) may have to move parking to the opposite side) (~600 ft).	No	Tappan Street from Blake Road to Greenough Street	230846, 897948	230397, 898120	Complete Streets Needs Assessment	B2 B8	X			X				No	$4,000	$4,000	N/A	3 months	April 2020
49	Soule Recreation at Hammond Street Raised Crosswalk (Option A)	Replace (1) high visibility crosswalk on Hammond Street (adjacent to 650 Hammond Street) to a raised high visibility crosswalk with ADA-compliant curb ramps.	Yes	650 Hammond Street	227786, 896888		Complete Streets Needs Assessment	P2 P3 P9	X	X	X					No	$22,000	$22,000	N/A	3 months	April 2020

Table 1. ***MassDOT Prioritization Plan Continued...***

massDOT

Complete Streets Funding Program Project Prioritization Plan

Municipality Brookline
MassDOT District 6
Date 8/31/2018
Name/Title Todd Kirrane, Transportation Administrator

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X, Y Coordinate** (MA State Plane meter)	**Project End Location: X, Y Coordinate** (MA State Plane meter, corridor projects only)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	**Safety**	**ADA Accessibility**	**Pedestrian Mobility**	**Bicycle Mobility**	**Transit Operations and Access**	**Vehicular Operations**	**Freight Operations**	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
56	Soule Recreation at Hammond Street RRFB (Option B)	Repaint (1) high visibility crosswalk on Hammond Street (adjacent to 650 Hammond Street) with ADA-compliant curb ramps and install a Rectangular Rapid Flashing Beacon (RRFB). Supplement RRFBs with standard pedestrian crossing warning signs and markings.	Yes	650 Hammond Street	227786, 896889		Complete Streets Needs Assessment	P2 P3 P9 P12	X	X	X					No	$42,000	$42,000	N/A	3 months	April 2020
13	Beacon Street at Harvard Street Intersection - Pedestrian Signal Timing Improvements	Update pedestrian signal heads (14) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road and optimize pedestrian signal timing. Note: Pedestrian signal timing at this intersection already incorporates Leading Pedestrian Interval (LPI) and Accessible Pedestrian Signal (APS).	No	Beacon Street at Harvard Street	231205, 899144		Complete Streets Needs Assessment	S3 P11	X	X	X					No	$31,000	$31,000	N/A	3 months	April 2021
16	MBTA Route 66 Bus Stop Improvements within Brookline - Shelters, Benches, and Bicycle Racks	Install bus shelters at appropriate sites throughout the Harvard Street corridor, such as the following locations: Beacon Street at Harvard Street (adjacent to Trader Joes and Brookline Bank) outbound (Stop #1372) and inbound (Stop #1308) stops (2), Verndale Street at Harvard Street inbound (Stop #11302) stop. Install bus benches at appropriate sites throughout the Harvard Street corridor, such as the the following location: Marion Street at Harvard Street inbound stop (Stop #1309). Install bicycle racks at the following locations: Beacon Street at Harvard Street (adjacent to Trader Joes and Brookline Bank) outbound (Stop #1372) and inbound (Stop #1308).	Yes	Harvard Street (from Verndale Street to Marion Street)	231500, 897991	230508, 899884	Complete Streets Needs Assessment	T2 T3 B3					X			No	$53,000	$53,000	N/A	6 months	April 2021
27	Corey Street/Dean Road at Beacon Street Intersection - Pedestrian Signal Timing Improvements	Install a crosswalk with ADA-compliant curb ramps across Corey Road/Dean Road (adjacent to the MBTA Green Line tracks). Update existing pedestrian signal timing to include Leading Pedestrian Interval (LPI) timing to allow pedestrians and cyclists to begin crossing the intersection a few seconds before vehicles. The Estimated Project Cost assumes a new signal controller is needed. Update pedestrian signal heads (14) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road.	Yes	Corey Street/Dean Street at Beacon Street	229503, 898650		Complete Streets Needs Assessment	S3 S4 P9 P2 P3 P11	X	X	X					No	$109,000	$109,000	N/A	6 months	April 2021
40	MBTA Route 51 Bus Stop Improvements within Brookline - Accessibility Benefits	Install (2) high visibility crosswalks, supplemented with ADA-compliant curb ramps, at the following location on Chestnut Hill Avenue: one at 85-ft north of Bus Stop #21835 (near Channing Rd) and the other adjacent to Buckminster Road (on the same side as Bus stop #11917). Install (2) pedestrian scale lighting adjacent to bus stops along the MBTA 51 corridor, specifically near bus stops #51918 and #61835.	Yes	Chestnut Hill Avenue from Buckminster Road to Clyde/Lee Street at Newton Street	229106, 898059	229514, 895608	Complete Streets Needs Assessment	P2 P3 P9 S9 T1	X	X	X		X			No	$47,000	$47,000	N/A	3 months	April 2021
45	Clinton Road at Chestnut Hill Avenue Intersection - RRFB, Curb Extension, and Crossing Improvements	For the eastern crosswalk, install a curb extension on the westbound side of Clinton Road to reduce the crossing distance. Tighten curb radii on the eastbound side of Clinton Road. Install ADA-compliant curb ramps on the crosswalk landings on Clinton Road. Install (1) high visibility crosswalk with ADA-compliant curb ramps across Chestnut Hill Avenue. Install a Rectangular Rapid Flashing Beacon (RRFB) across Chestnut Hill Avenue to increase driver yielding behavior to pedestrians at this intersection. Supplement RRFBs with standard pedestrian crossing warning signs and markings.	No	Clinton Road at Chestnut Hill	228973, 898284		Complete Streets Needs Assessment	P2 P3 P8 P9 P12 S6 T1	X	X	X					No	$90,000	$90,000	N/A	3 months	April 2021
46	MBTA Route 60 Bus Stop Improvements within Brookline - Accessibility Benefits	Install (4) high visibility crosswalks, supplemented with ADA-compliant curb ramps, at the following locations; (2) on High Street (adjacent to to Cumberland Avenue and Edgehill Road, (1) on Cumberland Avenue (adjacent to High Street), and (1) on Edgehill Road (adjacent to High Street). Install (2) pedestrian scale lighting adjacent to bus stops along the MBTA 60 corridor, specifically near bus stops #1531 (adjacent to Cypress Street/Rice Street intersection) and #1528 (adjacent to High Street/Edgehill Road intersection).	Yes	Cypress Street from Rice Street to High Street; High Street from Cypress Street to Cumberland Avenue	230967, 897488	231390, 897571	Complete Streets Needs Assessment	P2 P3 P9 S9 T1	X	X	X		X			No	$69,000	$69,000	N/A	3 months	April 2021
14	Green Street at Harvard Street Intersection - RRFB and Crossing Improvements	Install curb extensions by approximately 7 ft on Green Street (NW corner) and Harvard Street (NE corner). Install a sidewalk bump-out by approximately 7 ft on Harvard Street (SE corner). The two curb extensions and sidewalk bump-out will shorten crossing distance at the intersection of Green Street at Harvard Street and significantly improve the ability of pedestrians to see and be seen by approaching traffic on Harvard Street. Repaint (2) high visibility crosswalks and install ADA-compliant curb ramps on all crosswalk landings. Install Rectangular Rapid Flashing Beacons (RRFBs) on Harvard Street (adjacent to Green Street) to increase driver yielding behavior to pedestrians. Supplement RRFBs with standard pedestrian crossing warning signs and markings. Note: For the SE corner sidewalk bump-out, the sidewalk drain and manhole adjacent to the curb will have to be accounted for.	No	Green Street at Harvard Street	231140, 899208		Complete Streets Needs Assessment	S13 P2 P3 P8 P9 P12	X	X	X					No	$118,000	$118,000	N/A	3 months	April 2022
35	Riverway/Emerald Necklace Bicycle Path Connection to Parkway Road and Netherlands Road	Formalize the dirth path directly across 8 Parkway Drive to be a 10-ft bicycle and pedestrian off-road trail connection to the Riverway/Emerald Necklace Path (~30 ft). Two ADA-compliant curb ramps will have to be constructed at the both ends of the trail connection. Install appropriate directional/wayfinding signage to alert trail users of the connection (on Parkway Road and Riverway/Emerald Necklace Path). This will connect the Riverway/Emerald Necklace Bicycle Path to the contra-flow bicycle lane on Parkway Road and Netherlands Road; therefore adding on to the Emerald Necklace regional network. Wayfinding signs will comply to the MUTCD.	Yes	8 Parkway Drive	232031, 898398		Complete Streets Needs Assessment	B7 B10 P2 P3 P4	X			X				No	$13,000	$13,000	N/A	6 months	April 2022

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31A	Thorndike Street, Hamilton Road, Abbottsford Road, Lawton Street Intersection - Raised Intersection and Crossing Improvements (Option A)	To improve pedestrian movement within this intersection, extend curbs that are adjacent to Thorndike Street, Hamilton Road, and Abbottsford Road. Install stop signs entering the intersection at Thorndike Street, Hamilton Road, and Abbottsford Road. Install a raised intersection. Install (4) high visibility crosswalks with ADA-compliant curb ramps.	Yes	Thorndike Street, Hamilton Road, Abbottsford Road, Lawton Street Intersection	230826, 900019		Complete Streets Needs Assessment; Bicycle/Pedestrian Audit	P2 P3 P8 P9 S8	X	X	X					No	$250,000	$250,000	N/A	6 months	April 2022
17	Cypress Street Pedestrian Signal Timing and Crossing Improvements	Install missing ADA-compliant curb ramps on all crosswalk landings throughout the Cypress Street corridor. At the intersection of Stanton Road at Cypress Street, install a raised intersection and (2) high visibility crosswalks on Cypress Street. At the intersection of Washington Street at Cypress Street, update (8) existing pedestrian signal timing to include Leading Pedestrian Interval (LPI) timing to allow pedestrians and cyclists to begin crossing the intersection a few seconds before vehicles (Washington Street at Cypress Street intersection already has countdown signals and Accessible Pedestrian Signals (APS)). At the intersection of Tappan Street at Cypress Street, update (3) existing pedestrian signal timing to include LPI, APS, and countdown signal timer. The Estimated Project Cost assumes a new signal controller is needed.	Yes	Cypress Street from Boylston Street to Washington Street	230820, 897814	231039, 898315	Complete Streets Needs Assessment	S3 S4 S8 P2 P3 P11	X	X	X					No	$221,000	$221,000	N/A	6 months	April 2023
20	Aspinwall Avenue at Brookline Avenue Intersection - Pedestrian Signal Timing and Crossing Improvements	Replace the (3) standard crosswalks to (3) high visibility crosswalks with ADA-compliant curb ramps. Update existing pedestrian signal timing to include Leading Pedestrian Interval (LPI) timing to allow pedestrians and cyclists to begin crossing the intersection a few seconds before vehicles. Update pedestrian signal heads (6) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road. Include Accessible Pedestrian Signals (APS) with audible and vibrotactile indications for pedestrians who don't use visual cues. The Estimated Project Cost assumes a new signal controller is needed. Install "No Turn on Red" (2) signage for right-turns on Brookline Avenue and Aspinwall Avenue.	Yes	Aspinwall Avenue at Brookline Avenue	231996, 898328		Complete Streets Needs Assessment	S3 S4 S7 P2 P3 P9 P11 P12	X	X	X					No	$85,000	$85,000	N/A	6 months	April 2023
53	Strathmore Road at Beacon Street Intersection - RRFBs	Install (2) Rectangular Rapid Flashing Beacons (RRFBs) on eastbound and westbound sides of Beacon Street (adjacent to Strathmore Road). Supplement RRFBs with standard pedestrian crossing warning signs and markings. Upgrade all curb ramps to be ADA compliant.	Yes	Strathmore Road at Beacon Street	229079, 898531		Complete Streets Needs Assessment	P2 P3 P9 P12	X	X	X					No	$65,000	$65,000	N/A	3 months	April 2023
15	Summit Avenue at Beacon Street Intersection - Crossing Improvements	Remove the traffic median on Summit Avenue. Extend the sidewalk on the northbound side of Summit Avenue from 3 Summit Avenue to Beacon Street. Extend the curb on the northbound side of Summit Avenue to shorten crossing distance. Repaint the two standard crosswalks to high visibility crosswalks with ADA-compliant curb ramps. Install a high visibility crosswalk with ADA-compliant curb ramps on Beacon Street (adjacent to Summit Avenue), specifically east of the existing crosswalk. Update pedestrian signal heads (14) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road and optimize pedestrian signal timing. Note: Pedestrian signal timing at this intersection already incorporates Leading Pedestrian Interval (LPI) and Accessible Pedestrian Signal (APS).	No	Summit Avenue at Beacon Street	230841, 899033		Complete Streets Needs Assessment	S3 S13 P2 P3 P8 P9 P11	X		X					No	$73,000	$73,000	N/A	9 months	April 2024
21	Brookline Avenue Bicycle Accommodations	On the southbound side, from Parkway Drive to Aspinwall Avenue, install a bicycle lane with a width of 5 ft, supplemented with intersection bicycle crossing markings at the intersection of Aspinwall Avenue at Brookline Avenue (~160 ft). On the southbound side, from Pearl Street to Washington Street/Route 9, install a bicycle lane with a width of 5 ft that transitions into a through pocket bicycle lane, with dashed lines signifying the start of the merge area (~100 ft before the intersection). Remove the traffic median located on Brookline Avenue (adjacent to Washington Street/Route 9) to provide room for the pocket bicycle lane. Install sharrows, supplemented with "Bicycle May Use Full Lane" signage (R4-11) at key points to indicate a shared road environment between cyclists and vehicles, at the following locations: (1) from Aspinwall Avenue to Pearl Street (Southbound Side, ~900 ft) and (2) from Washington Street/Route 9 to Parkway Drive (Northbound Side, ~1460 ft). When the northbound sharrows break at River Road, install clear/visible wayfinding signage at the entrance of the Emerald Necklace shared use path (adjacent to River Road) to advise cyclists that they have the option to use the shared use path to continue their journey northbound. Wayfinding signs will comply to the MUTCD.	Yes	Brookline Avenue from Parkway Drive to Aspinwall Avenue	231757, 898011	232029, 898359	Complete Streets Needs Assessment	S1 B2 B7 B13	X			X				No	$31,000	$31,000	N/A	3 months	April 2024
22	Greenough Street (near Brookline High School) Slow Streets (Option A)	Install a contraflow bicycle lane and sharrows on Greenough Street, from Tappan Street to Davis Street (~300 ft). Install (3) raised crosswalks with ADA-compliant curb ramps at the following locations: (1) adjacent to Davis Street, (2) adjacent to Tappan Street, and (3) adjacent to the front entrance of Brookline High School (in front of the steps).	No	Greenough Street from Tappan Street to Davis Avenue	230583, 898047	230652, 898119	Complete Streets Needs Assessment	B2 B8	X	X	X	X				No	$76,000	$76,000	N/A	6 months	April 2024
32	Greenough Street (near Brookline High School) Shared Use Path (Option B)	Formalize the paved path that is located across Brookline High School (between the benches and Cypress Field) to become a bidirectional shared use path with a width of 10 ft from Davis Avenue to Tappan Street (~322 ft). This would require signage at each end of the path to make path use clear to users. Install bicycle racks along this path.	No	Greenough Street from Tappan Street to Davis Avenue	230583, 898047	230652, 898119	Complete Streets Needs Assessment	B3 B10	X		X	X				No	$38,000	$38,000	N/A	6 months	April 2024
37	Aspinwall Avenue at Kent Street - Pedestrian Signal Timing and ADA Improvements	Update all crosswalks to include ADA-compliant curb ramps on all crosswalk landings (8). Update existing pedestrian signal timing to include Leading Pedestrian Interval (LPI) timing to allow pedestrians and cyclists to begin crossing the intersection a few seconds before vehicles. Update pedestrian signal heads (6) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road. Include Accessible Pedestrian Signals (APS) with audible and vibrotactile indications for pedestrians who don't use visual cues. The Estimated Project Cost assumes a new signal controller is needed.	Yes	Aspinwall Avenue at Kent Street	231834, 898434		Complete Streets Needs Assessment	S3 S4 S7 P2 P3 P9 P11	X	X	X					No	$106,000	$106,000	N/A	6 months	April 2024

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38	Hammond Street Raised Cycle Tracks	Reduce travel lanes on Hammond Street between Horace James Circle and Boylston Street (Route 9) to three lanes with a two-way turn lane in the middle (an exception to the road diet would be at the two ends of the street where Hammond Street meets Horace James Circle and Boylston Street (Route 9)). Remove shoulders and replace with raised, sidewalk level cycle tracks (as per side: 6.5 ft bicycle lane, with 1 ft of buffer space for portions adjacent to a travel lane and 3 ft of buffer space for portion adjacent to on-street parking) (~4700 ft).	Yes	Hammond Street from Horace James Circle to Boylston Street (Route 9)	227647, 897175	227762, 895652	Complete Streets Needs Assessment	B11	X			X				No	$1,725,000	$400,000	TBD, $1,325,000	18 months	April 2025
31B	Thorndike Street, Hamilton Road, Abbottsford Road, Lawton Street Intersection -Traffic Circle (Option B)	Install a neighborhood traffic circle to improve pedestrian and vehicular movement and safety within this intersection. Install (4) high visibility crosswalkwith ADA-compliant curb ramps. Extend curbs that are adjacent to Thorndike Street, Hamilton Road, and Abbottsford Road.	Yes	Thorndike Street, Hamilton Road, Abbottsford Road, Lawton Street Intersection	230826, 900019		Complete Streets Needs Assessment; Bicycle/Pedestrian Audit	P2 P3 P9 S6 S18	X	X	X					No	$750,000	$400,000	TBD, $350,000	6 months	April 2027
1	Beacon Street at Washington Street Intersection - Pedestrian Signal Timing and Crossing Improvements	Update pedestrian signal heads (14) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road and optimize pedestrian signal timing. Note: Pedestrian signal timing at this intersection already incorporates Leading Pedestrian Interval (LPI) and Accessible Pedestrian Signal (APS).Replace all (7) standard crosswalks located on Beacon Street Street to high visibility crosswalks and upgrade all existing curb ramps to be ADA-compliant.	No	Beacon Street at Washington Street	230045, 898828		Complete Streets Needs Assessment	S3 P2 P3 P9 P12	X	X	X					No					
2	Beacon Street Eastbound (between Harvard Street and Boston City Line) Bicycle Improvements	Upgrade bicycle facilities to protect cyclists from moving vehicles and the door zone of parked cars. Install a curb-side bicycle lane (that is 5 ft in width) protected from moving motor vehicles by the parked lane and separated from the parking lane by a 3-foot buffer. Install bicycle racks in front of Trader Joe's (located on Beacon Street).	Yes	Beacon Street from Harvard Street to Boston City Line, eastbound side only	231208, 899149	232398, 899598	Complete Streets Needs Assessment	B3 B11	X			X				No					
4	Harvard Street (Brookline Village section) Bicycle Improvements	Install (2) dashed bicycle lanes that are 5 ft in width with green material through the intersection of Washington Street at Harvard Street and across the signal-controlled intersection in front of Stop and Shop on the northbound side. Repaint faded bicycle lane and sharrow markings on the southbound and northbound sides of Harvard Street, from Station Street to Vernon Street (~2540 ft). The bicycle lane should be 5 ft in width. Install wayfinding signage that will orient bicyclists and pedestrians to major destinations within Brookline Village and other neighborhoods within a biking and walking distance; signage should include destination name, directional markers, distance (for bicyclists and pedestrians).	Yes	Harvard Street from Station Street to Vernon Street	231464, 898045	231207, 898750	Complete Streets Needs Assessment	B2 B7 B8 B13	X			X				No					
6	Washington Street Corridor Wayfinding Signage	Install wayfinding signage that will orient bicyclists and pedestrians to major destinations along the Washington Street corridor and other neighborhoods within a biking and walking distance; signage should include destination name, directional markers, distance (for bicyclists and pedestrians).	Yes	Washington Street from Harvard Street to Boston City Line	229664, 899132	231408, 898130	Complete Streets Needs Assessment	B7 P4				X				No					
8	Beacon Street Corridor Wayfinding Signage	Install wayfinding signage that will orient bicyclists and pedestrians to major destinations along the Beacon Street corridor and other neighborhoods within a biking and walking distance; signage should include destination name, directional markers, distance (for bicyclists and pedestrians).	Yes	Beacon Street from Ayr Road to St. Mary's Street	232391, 899602	228957, 898499	Complete Streets Needs Assessment	B7 P4			X	X				No					
11	MBTA Route 65 Bus Stop Improvements within Brookline - Accessibility Improvements	Install (3) new high visibility crosswalks, supplemented with ADA-compliant curb ramps on Washington Street: adjacent to Greenough Circle, Bartlett Street, and Gardner Path. Install (9) pedestrian scale lighting adjacent to bus stops along the MBTA 65 corridor.	Yes	Washington Street from Harvard Street to Boston City Line	229662, 899128	231407, 898126	Complete Streets Needs Assessment	P2 P3 P9 S9 T1	X	X	X		X			No					
12	MBTA Route 66 Bus Stop Improvements within Brookline - Transit Signal Priority	Install Transit Signal Priority (TSP) technology for the MBTA 66 Bus Route at signalized intersections throughout the entire Harvard Street corridor (within Brookline town boundaries). Explore the feasibility of dedicated bus lanes to supplement the TSP technology.	Yes	Harvard Street from Boylston Street (Route 9) to Boston City Line	231500, 897991	230508, 899884	Complete Streets Needs Assessment	T4 T9					X			No					
18	Centre Street Pedestrian Crossing Improvements	Install a raised intersection and high visibility crosswalks with ADA-compliant curb ramps across Centre Street located in front of the Center Communities of Brookline building. At the intersection of Williams Street at Centre Street, update (8) existing pedestrian signal timing to include Leading Pedestrian Interval (LPI), Audible Pedestrian Signals (APS), and countdown signal timers. Install a high visibility crosswalk with ADA-compliant curb ramps across Centre Street (adjacent to Wellman Street).	No	Centre Street from Beacon Street to Fuller Street	230654, 899409	231054, 899111	Complete Streets Needs Assessment	P2 P3 P9	X	X	X					No					
23	Newton Street (between West Roxbury Parkway and Horrace James Circle) Raised Cycle Tracks	On Newton Street, from Horace James Circle to West Roxbury Parkway, install raised, sidewalk level cycle tracks on both sides of Newton Street (as per side: 6.5 ft bicycle lane, with 1 ft of buffer space for portions adjacent to a travel lane and 3 ft of buffer space for portion adjacent to on-street parking) (~2300 ft). Install 5-ft wide dashed bicycle lanes and/or bicycle boxes at specific intersections throughout the corridor to alert motorists to expect and yield to bicycle traffic.	Yes	Newton Street from West Roxbury Parkway to Horrace James Circle	228434, 895274	227762, 895652	Complete Streets Needs Assessment	B2 B11 B13	X			X				No					
24	Park Street Bicycle Priority Lanes	Install bicycle priority lanes on the northbound and southbound sides of Park Street, between Marion Street and Washington Street (~1390 ft).	Yes	Park Street from Marion Street to Washington Street	230979, 898916	230833, 898527	Complete Streets Needs Assessment	B8	X			X				No					

Table 1. ***MassDOT Prioritization Plan Continued...***

massDOT

Complete Streets Funding Program Project Prioritization Plan

Municipality Brookline
MassDOT District 6
Date 8/31/2018
Name/Title Todd Kirrane, Transportation Administrator

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X, Y Coordinate** (MA State Plane meter)	**Project End Location: X, Y Coordinate** (MA State Plane meter, corridor projects only)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	**Safety**	**ADA Accessibility**	**Pedestrian Mobility**	**Bicycle Mobility**	**Transit Operations and Access**	**Vehicular Operations**	**Freight Operations**	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
25	Clyde Street/Lee Street Green Way	From Newton Street to Boylston Street (Route 9), reduce the number of travel lanes to two (one lane per direction) and install raised cycle tracks in both directions (as per side: 6.5 ft bicycle lane, with 1 ft of buffer space for portions adjacent to a travel lane and 3 ft of buffer space for portion adjacent to on-street parking). Consider maintaining four lanes at the intersections of Lee Street at Boylston Street (Route 9) and Clyde Street at Newton Street to maintain efficient flow of traffic (~1.3 miles). Considering the limits and scope of this project, it will need to be phased out.	Yes	Clyde Street/Lee Street from Newton Street to Boylston Street (Route 9)	229508, 895609	229593, 897394	Complete Streets Needs Assessment	B11	X			X				No					
28	Newton Street (between St. Paul's Avenue and Grove Street) Raised Cycle Tracks	From St Paul's Avenue to Grove Street, install raised, sidewalk level cycle tracks on both sides of the road (as per side: 6.5 ft bicycle lane, with 1 ft of buffer space for portions adjacent to a travel lane and 3 ft of buffer space for portion adjacent to on-street parking) (~3500 ft). Install dashed bicycle lanes with a width of 5 ft and/or bicycle boxes at specific intersections throughout the corridor to alert motorists to expect and yield to bicycle traffic.	Yes	Newton Street from St. Paul's Avenue to Grove Street	230136, 895486	229137, 895265	Complete Streets Needs Assessment	B2 B11 B13	X			X				No					
29	MBTA Route 65 Bus Stop Improvements within Brookline - Shelters and Benches	Install bus shelters and/or benches at appropriate sites throughout the Washington Street corridor, such as the following locations: 684 Washington Street Inbound (Stop #1277), Washington Street at Winthrop Path Inbound (Stop #1278), Washington Street at Beacon Street Inbound (Stop #1276), Washington Street at Beacon Street Outbound (Stop #1292).	Yes	Washington Street from Harvard Street to Boston City Line	229662, 899128	231407, 898126	Complete Streets Needs Assessment	T3					X			No					
30	Station Street at Washington Street Intersection - Crossing Improvements	Replace the (2) standard crosswalks to (2) high visibility crosswalks with ADA-compliant curb ramps.	Yes	Station Street at Washington Street	231467, 898046		Complete Streets Needs Assessment	P2 P3 P9	X	X	X					No					
34	Station Street at Washington Street Intersection - Bicycle Box and Detection	On Washington Street (southbound), install bicycle detection at this intersection to separate the bicycle left-turn movement onto Station Street from conflicting vehicle movement on Washington Street going the opposite direction. Supplement bicycle detection with a bicycle box and appropriate signage so that bicyclists know that the intersection has detection, as well as know where to position their bicycle to activate the signal. This would increase safety at this busy intersection that provides access to the Brookline Village (T) stop, Blue Bikes Station, One Brookline Place, and Leverett Pond.	Yes	Station Street at Washington Street	231459, 898043		Complete Streets Needs Assessment	B13	X			X				No					
36	Washington Street (between Salisbury Road and Beacon Street) RRFB and Crossing Improvements	Reconstruct sidewalks on the northwest bound side of Washington Street, from Salisbury Road to Beacon Street (~400 ft). The sidewalks should be 5 ft in width. Install Rectangular Rapid Flashing Beacons (RRFBs) to increase driver yielding behavior to pedestrians across Washington Street (adjacent to Salisbury Road/Driscoll Elementary School). Supplement RRFBs with standard pedestrian crossing warning signs and markings. Install (4) ADA-compliant curb ramps on all crosswalk landings. Install a curb extension on the northwest bound side of Washington Street to shorten crossing distance at the intersection of Washington Street at Beacon Street.	Yes	Washington Street from Salisbury Road to Beacon Street	229936, 898938	230028, 898850	Complete Streets Needs Assessment	P2 P3 P8 P9 P12 S13	X	X	X					No					
39	Newton Street (between Grove Street and West Roxbury Parkway) Buffered Bicycle Lanes	From Grove Street to South Street, install buffered bicycle lanes with a total width of 7 ft (includes buffer widths) on both sides of the road (~1700 ft). Where the corridor narrows (between South Street to West Roxbury Parkway), install a bicycle lane with a width of 5 ft on both sides (~700 ft). Install dashed bicycle lanes with a width of 5 ft and/or bicycle boxes at specific intersections throughout the corridor to alert motorists to expect and yield to bicycle traffic.	Yes	Newton Street from Grove Street to West Roxbury Parkway	229137, 895265	228434, 895274	Complete Streets Needs Assessment	B2 B11 B13	X			X				No					
41	Freeman Street Sharrows and Bicycle Racks	Install sharrows in both directions from Babcock Street to Amory Street (~1760 ft). Install "Bicycle May Use Full Lane" signage (R4-11) at key points throughout the corridor to indicate a shared road environment between cyclists and vehicles. Install bicycle racks near Dexter Park to make bicycle parking more accessible in this area.	Yes	Freeman Street from Babcock Street to Amory Street	231221, 899753	231751, 899688	Complete Streets Needs Assessment	B4 B8	X			X				No					
48	Clyde Street/Lee Street Sidewalk Reconstruction and Pedestrian Crossing Improvements	Reconstruct and widen sidewalks to 5 ft on southbound sides along Clyde Street, from Newton Street to the intersection of Clyde Street at Clyde Street/Lee Street (i.e. 246 Clyde Street) (~1700 ft). Update all existing high visibility crosswalks (2) to include ADA-compliant curb ramps on all landings. Install a high visibility crosswalk with ADA-compliant curb ramps on Clyde Street (adjacent to 246 Clyde Street).	Yes	Clyde Street from Newton Street to Clyde Street at Lee Street	229504, 895608	229505, 896098	Complete Streets Needs Assessment	P1 P2 P3 P9 P10	X	X	X					No					
50	Tappan Street (between Blake Road and Beacon Street) Advisory Lanes and Sharrows	Install sharrows in both directions in two locations: (1) from Beacon Street to Garrison Road (~348 ft) and (2) Gardner Road to Blake Road (~560 ft). Install advisory lanes that are 4 ft in width (per direction) from Garrison Road to Gardner Road (~2100 ft). To indicate a shared lane environment for bicyclists and vehicles, install appropriate signage distributed at key points throughout the whole corridor (as a required supplement to advisory lanes). Note: Advisory lanes require municipalities to file a Request to Experiment to the Federal Highway Administration.	No	Tappan Street from Blake Road to Beacon Street	230397, 898120	229769, 898720	Complete Streets Needs Assessment	S1 B2 B7 B8	X			X				No					
51	333 Washington Street Bicycle Racks	Install (2) bicycle racks near Brookline Town Hall, particularly under the parking lot side of the overhang outside of the town hall entrance to provide protection from the weather.	Yes	333 Washington Street	231284, 898231		Complete Streets Needs Assessment	B3				X				No					
52	Ivy Street Contraflow Buffered Bicycle Lane and Sharrows	Extend the contraflow buffered bicycle lane that currently exists west of Carlton Street to St. Mary Street (~550 ft). The contraflow buffered bicycle lane should be 5 ft in width. Install sharrows going the direction of vehicular traffic (~550 ft).	No	Ivy Street from Carlton Street to St. Mary Street	232195, 899722	232364, 899695	Complete Streets Needs Assessment	B11 B8	X			X				No					

Table 1. ***MassDOT Prioritization Plan Continued...***

Complete Streets Funding Program Project Prioritization Plan

Municipality Brookline
MassDOT District 6
Date 8/31/2018
Name/Title Todd Kirrane, Transportation Administrator

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X, Y Coordinate** (MA State Plane meter)	**Project End Location: X, Y Coordinate** (MA State Plane meter, corridor projects only)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	**Safety**	**ADA Accessibility**	**Pedestrian Mobility**	**Bicycle Mobility**	**Transit Operations and Access**	**Vehicular Operations**	**Freight Operations**	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
54	Freeman Street Pedestrian Signal Timing and Crossing Improvements	Update existing pedestrian signal timing at the intersection of Pleasant Street at Freeman Street to include Leading Pedestrian Interval (LPI) timing to allow pedestrians and cyclists to begin crossing the intersection a few seconds before vehicles. Update pedestrian signal heads (8) to replace the "flashing red hand" with pedestrian countdown timers to inform pedestrians of how many seconds they have left to cross the road. Include Accessible Pedestrian Signals (APS) with audible and vibrotactile indications for pedestrians who don't use visual cues. Update the pedestrian signals at the intersection of St. Paul Street at Freeman Street to be concurrent pedestrian phasing with LPI, APS, and countdown signals. Install missing ADA-compliant curb ramps on all crosswalk landings throughout the Freeman Street corridor.	Yes	Freeman Street at Pleasant Street	231222, 899756	231752, 899691	Complete Streets Needs Assessment	S3 S4 P2 P3 P9 P11	X	X	X					No					
55	St. Mary's Street Sharrows	Install sharrows in both directions from Beacon Street to Mountfort Street (~780 ft). Install "Bicycle May Use Full Lane" signage (R4-11) at key points throughout the corridor to indicate a shared road environment between cyclists and vehicles.	Yes	St. Mary's Street from Beacon Street to Mountfort Street	232390, 899615	232386, 899847	Complete Streets Needs Assessment	B8	X			X				No					
57	Woodland Road (section East of Hammond Street) - Advisory Lanes	Install advisory lanes that are 5 ft in width (per direction) from Hammond Street to Heath Street (~2460 ft). Assume two 6-ft advisory lanes and a 12-ft center travel lane. To indicate a shared lane environment for bicyclists and vehicles, install appropriate signage distributed at key points throughout the whole corridor (as a required supplement to advisory lanes). Note: Advisory lanes require municipalities to file a Request to Experiment to the Federal Highway Administration.	Yes	Woodland Road from Hammond Street to Heath Street	227778, 896390	228131, 896953	Complete Streets Needs Assessment; Bicycle/Pedestrian Audit	S1 B2 B7	X			X				No					
58	Beacon Street Transit Improvements	Install Transit Signal Prioritization (TSP) infrastructure at signals servicing the MBTA Green "C" Line throughout the entire corridor of Beacon Street (9).	Yes	Beacon Street from Ayr Road to St. Mary's Street	232398, 899592	228965, 898489	Complete Streets Needs Assessment	T4					X			No					
59	John Fitzgerald Kennedy National Historic Site Bicycle Racks	Install (2) bicycle racks in front of the John Fitzgerald Kennedy National Historic Site (83 Beals Street) to make bicycle parking more accessible in this area.	Yes	83 Beals Street	231037, 899681		Complete Streets Needs Assessment	B3				X				No					

Table 2. ***Complete Streets Eligible Project Worksheet***

If a project or element does not appear in this list it may still be eligible for funding. The applicant should provide justification for the decision based upon the classification of comparable projects.

S - Traffic & Safety	**B - Bicycle Facilities**	**P - Pedestrian Facilities**	**T - Transit Facilities**
S1. Pavement markings or signage that provides a new separate accommodation for bicycle, pedestrian or transit modes	**B1**. Improvement of shared use paths (non-safety related)	**P1**. Sidewalk repairs (tree roots, uplifted panels, etc.)	**T1**. Improving transit connections for pedestrians, including: ramps, providing and/or moving crosswalks, signing
S2. Removal of protruding objects (pedestrian path of travel, bicycle, vehicular or transit facility)	**B2**. Designated bicycle lanes	**P2**. Providing ADA/AAB compliant curb ramps	**T2**. Improving transit connections for bicyclists, including: providing secure bicycle parking, signing
S3. Pedestrian signal & timing (minor updates)	**B3**. Bicycle parking fixtures and/or shelters at transit and other locations	**P3**. Detectable warning surfaces	**T3**. Transit shelter
S4. Changing pedestrian signal timing (i.e., lead pedestrian interval)	**B4**. On-street bicycle parking	**P4**. Pedestrian wayfinding signs	**T4**. Transit signal prioritization
S5. Radar speed feedback ("Your Speed") signs	**B5**. Provide bicycle-safe drain grates and other hardware	**P5**. Providing new sidewalks	**T5**. Bus pull-out areas
S6. Reducing corner radii to lower vehicle speeds and/or decrease pedestrian crossing distances	**B6**. Bicycle boulevards	**P6**. Providing pedestrian buffer zones	**T6**. Railroad grade crossings improvements (signs, flange way fill, etc.)
S7. Additional regulatory signing (for existing regulations)	**B7**. Bicycle wayfinding signs	**P7**. Pedestrian Refuge Islands	**T7**. Transit contra-flow lanes
S8. Speed humps/speed tables	**B8**. Shared lane markings (sharrows)	**P8**. Curb extensions at pedestrian crossings	**T8**. Park-n-ride facilities
S9. Street lighting	**B9**. Bike route signs	**P9**. Crosswalks	**T9**. Transit-only lanes
S10. Road diets	**B10**. New shared use paths	**P10**. Widening existing sidewalks	**TO**. Tansit Facilities - Other
S11. Speed attenuation devices	**B11**. Designated Separated Bicycle Lane	**P11**. Accessible pedestrian signals	
S12. Roadway resurfacing or micro surfacing if restriping for new bicycle lanes	**B12**. Elimination of hazardous conditions on shared use paths	**P12**. New or improved crossing treatments at intersections, midblock, etc. including RRFB's and HAWK signals	
S13. Intersection reconstruction – reducing complexity and crossing distance	**B13**. Intersection treatments (bicycle signals, bicycle detection, bike lane extensions, turn boxes)	**P13**. New pedestrian accommodations at existing traffic signals	
S14. New curbing or edging on uncurbed streets.	**BO**. Bicycle Facilities - Other	**P14**. Interim public plazas	
S15. Addition of or widening of shoulders		**P15**. Traffic re-routing to create pedestrian zones	
S16. Intersection signalization (major updates/upgrades & new Installation)		**P16**. Providing medians with ADA/AAB-compliant design	
S17. Traffic calming measures		**PO**. Pedestrian Facilities - Other	
S18. Roundabouts			
SO. Traffic & Safety - Other			

Source: Accommodating Bicycle and Pedestrian Travel: A Recommended Approach; United States Department of Transportation Federal Highway Administration, May 7, 2012.

Table 3. Complete Streets Needs Comparison Table: MassDOT vs. HSH

MassDOT	Howard Stein Hudson
Environmental Justice Populations	Environmental Justice Factors
	Persons with Disabilities
Safety	Pedestrian and Bicycle Crashes
ADA Accessibility	ADA Accessibility
Pedestrian Mobility	Pedestrian Local Access Score
	Pedestrian Level of Comfort
	Proposed Change in Pedestrian Level of Comfort
Bicycle Mobility	Bicycle Local Access Score
	Bicycle Level of Comfort
	Proposed Change in Bicycle Level of Comfort
Transit Mobility	APC Bus Ridership

The prioritization criteria outlined by MassDOT are expanded upon by Howard Stein Hudson to provide a more nuanced analysis of proposed projects.

Project Descriptions

The following describes major project types and specific projects that are scheduled for the first year in Brookline's Prioritization Plan.

FIRST-YEAR PROJECT TYPES

Brookline's Prioritization Plan is comprehensive in terms of the types of installations that are recommended under the Complete Streets Funding Program. All project types that are recommended were carefully considered, taking into account feasibility, adjacent vulnerable populations served, deficient conditions, and resident and Town stakeholder needs. In addition to the project types that are described below, other project types that residents can expect to see in the Prioritization Plan for future years are mentioned below (listed by user type):

- **Pedestrian:** Raised crosswalks, raised intersections, sidewalk reconstruction, benches;
- **Bicycle:** Shared use path (benefits pedestrians also), contraflow bicycle lanes, advisory lanes, standard bicycle lanes, separated bicycle lanes, sharrows, bicycle detection, bicycle racks;
- **Transit:** Transit signal priority (TSP), bus benches/shelters; and
- **Other:** Wayfinding signage.

BICYCLE BOXES

Bicycle boxes, also known as advanced stop boxes, help cyclists turn across traffic or to navigate a bicycle lane switch from one side of the road to the other. They are intended to address right-hook conflicts at intersections. They provide a place in front of vehicular stop lines for bicyclists to queue at a red light, giving cyclists visibility and priority in moving through the intersection on green. The boxes increase safety by getting bicycles through the intersection before vehicular traffic attempts to overtake them, thus addressing right-hook conflicts with motorists. Right-hook crashes are a significant problem for bicyclists when drivers to their immediate left do not

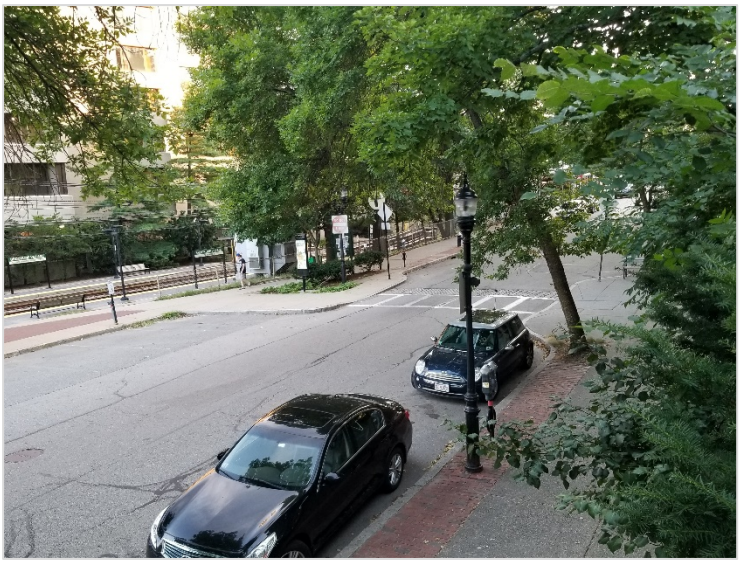
A bicycle box on Beacon Street, adjacent to Webster Street. Photo: HSH

see them and make a right turn, thus hitting or cutting off the cyclist.

A typical bicycle box is designed with an advanced stop line, green textured thermoplastic marking with a bicycle stencil, intersection striping, and regulatory signage including no-turn-on-red. They are most appropriate where bicycle traffic is being encouraged or already is heavy. They are best placed at signalized intersections with moderate to high traffic flows.[23]

CURB EXTENSIONS

Curb extensions, also known as bulb outs, are a type of traffic calming. They extend the sidewalk into the roadway, usually at the width of a parking lane, to narrow the roadway and provide additional pedestrian space. They are extensions of the curb line into the street, across the parking lanes to the edge of the travel lane. Curb extensions, a type of traffic calming strategy, reduce the distance and time pedestrians are exposed to vehicular traffic, as well as increase pedestrian visibility and the ability to see oncoming traffic on the road. Other advantages of curb extensions are they add sidewalk space that can be used for additional greenspace and slow the speed of turning vehicles by tightening the curb radii.



Curb extensions on both sides with high visibility crosswalks on Station Street, adjacent to the Brookline Village MBTA stop. Photo: HSH

A study done for the Oregon Department of Transportation and Federal Highway Administration (FHWA) suggests that curb extensions contribute to a significant reduction in the average number of vehicles that pass a waiting pedestrian before yielding to the pedestrian. Pedestrians approaching from the curb extension experienced a vehicle yielding sooner than those coming from non-curb extensions side of a crosswalk. This reduction in the average number of passing vehicles yielding is best explained by the increased visibility offered by the curb extension.[24]

[23] National Association of City Transportation Officials (NACTO) (www.nacto.org)
[24] https://nacto.org/docs/usdg/pedestrian_safety_impacts_of_curb_extensions_randal.pdf

LEADING PEDESTRIAN INTERVAL (LPI)

Leading Pedestrian Intervals (LPIs) are a traffic signalization strategy that assigns pedestrians an advanced 3-5 seconds (or longer) signal to begin crossing the streets before motorists get a green light. Given even a few seconds of priority, a pedestrian can establish position in the crosswalk and be more visible to turning drivers. LPIs do not require physical reconstruction; however, sometimes new push buttons and controllers are needed. A paper published by the Transportation Research Board (TRB) found LPIs can reduce pedestrian-vehicle collisions by as much as 60%.[25] In San Francisco, the intersection with the highest rate of pedestrian injuries from left-turn vehicle crashes saw those incidents dropped to zero after an LPI was installed.[26] In 2016, a study of 104 intersections by the New York City Department of Transportation (NYCDOT) found that pedestrian and bicycle fatalities declined by nearly 40% at locations where LPIs were installed.[27]

RECTANGULAR RAPID FLASHING BEACONS (RRFB)

RRFBs are user-actuated LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks. They can be activated by pedestrian push buttons or by a passive pedestrian detection system. They can be installed on either two-lane or multi-lane roadways.[28] When the system is activated, the RRFBs emit rapid, alternating amber LED bursts of light to warn motorists that pedestrians are at the crossing.

RRFBs have proven to have a positive effect on motorist awareness. A study completed by the Virginia Department of Transportation showed that RRFB installation provides an increase in yielding rates and speed reduction when the RRFB system is activated.[29]

A set of RRFBs on Longwood Avenue, adjacent to Avenue Louis Pasteur in Boston. Photo: HSH

[25] https://nacto.org/wp-content/uploads/2015/04/safety_effectiveness_of_lpi_fayish.pdf
[26] https://www.sfmta.com/blog/giving-pedestrians-head-start
[27] http://www.nyc.gov/html/dot/downloads/pdf/left-turn-pedestrian-and-bicycle-crash-study.pdf
[28] https://safety.fhwa.dot.gov/intersection/conventional/unsignalized/tech_sum/fhwasa09009/
[29] http://www.virginiadot.org/vtrc/main/online_reports/pdf/15-r22.pdf

HIGH VISIBILITY CROSSWALKS WITH ADA-COMPLIANT CURB RAMPS

A high visibility crosswalk in Kendall Square, Cambridge. Photo: HSH

High visibility crosswalks are markings on the roadway that define the appropriate paths for pedestrians. They also serve the purpose of informing drivers of pedestrian movements. There are two primary crosswalk marking styles: standard marking in which there are two parallel lines and continental style (also known as high visibility) in which there are two parallel lines with bars spaced in between the parallel lines, as shown in the image at the left. Crosswalk locations should reflect pedestrian desire lines while also considering the safest locations to cross (where there is the least amount of exposure to conflicts with other modes). Crosswalks are usually found at midblock uncontrolled crossings, signalized intersections, and unsignalized intersections. All the high visibility crosswalks that are included in the Prioritization Plan are supplemented with ADA-compliant curb ramps. As a requirement under ADA standards, high visibility crosswalks must incorporate ADA-compliant curb ramps. ADA establishes guidelines for the construction of ramps to accommodate the needs of individuals using mobility devices that the Town usually considers when constructing ramps. The incorporation of high visibility materials into a pedestrian crossing establishes a clear pedestrian path and reinforces the potential presence of pedestrians to motorists.

FIRST-YEAR PROJECT NARRATIVES

The projects that were chosen for Brookline's first-year Tier 3 submission address issues that were flagged by existing reports/recommendations, residents, and HSH's data collection. The project types were chosen to alleviate deficient. The location of each project type was also chosen based on the amount of feedback given by residents on the WikiMap and the first public meeting, gaps resulted in HSH's data collection, and chosen based on anticipated projects that the Town is going to see in the next year (e.g., Babcock Street at Harvard Street's bicycle box to supplement the 2018 construction of Babcock Street's traffic calming project that includes curb extensions, bicycle lane, and sharrows throughout the whole corridor). Some projects were found in prior reports and studies completed by the Town, such as Coolidge Corner's bicycle improvements that include repainting existing bicycle lanes along Harvard Street.

COMPLETE STREETS PROJECTS IN THE COOLIDGE CORNER NEIGHBORHOOD

Coolidge Corner is centered at the intersection of Harvard Street and Beacon Street in North Brookline. This neighborhood is very accessible across all modes; the MBTA Green Line C Branch

has a stop at the intersection of Beacon Street and Harvard Street, considered to be the heart of the neighborhood. The MBTA Bus Route 66 runs along Harvard Street and has inbound and outbound stops, also at the intersection of Beacon Street and Harvard Street. Additionally, Harvard Street and Beacon Street are heavily traveled roadways that many drivers from Brookline and adjacent communities drive through to get to Boston or the destinations within the area. Harvard Street is an Urban Principal Arterial and a high-volume corridor that is a key bus route for MBTA Bus Route 66 that connects Harvard Square in Cambridge to Dudley Station in Boston. Cyclists also share the right lane on both directions of Beacon Street, while Harvard Street has a combination of sharrows and bicycle lanes on the northbound and southbound sides. Providing the safest commute for all commuters traveling through this neighborhood is important in preserving the eclectic and vibrancy of this neighborhood.

Harvard Street and Beacon Street are two of Brookline's most heavily used corridors. The heavy retail activity that is identified in this area is the reason why the roadway segments of Harvard Street and Beacon Street rates high in MAPC's local access score analysis. These two corridors are highly utilized and connect densely populated areas with local destinations that are within a walking or biking distance away. This demand is supported by the existing services in the area and its proximity to MBTA stops for the Green Line C Branch and Route 66 inbound and outbound routes. The Green Line C Branch and Bus 66 are two transit routes that continuously see a significant number of ridership throughout the week, including weekends. Areas that show high utilization are ideal candidates for Complete Streets improvements that promote safe and comfortable pedestrian and bicycle environments.

The Coolidge Corner neighborhood is adjacent to many populations of varying needs. Within the project limits of Harvard Street, there are four Environmental Justice (EJ) communities that consist of high minority groups.[30] There are also twelve elderly/assisted living facilities and four public schools within a half mile distance to this intersection. Some of these facilities include: the Brookline Senior Center, Sussman House, and Center Communities of Brookline, Colonel Floyd Apartments, Kickham Apartments, and Morse Apartments, Brookline Adult and Community Education, and The Village at Brookline. Additionally, four schools are within a half mile distance to this neighborhood. Those schools are The Coolidge Corner School, Diane K Trust for Early Education, Amos A. Lawrence School, and Pierce Elementary School. Making sure this area is well-served by safe street alleviates the barriers for children to safely walk or bike along this neighborhood. Parents are more likely to feel comfortable allowing their children to walk or bike to/from school when sidewalks or

[30] The way the state's Executive Office of Energy and Environmental Affairs' (EEA) define high minority is if any block group contains 25% or more minority, that census block will be counted under the state's environmental justice communities. Data is taken from the following Census 2010 redistricting table: Table P2: Hispanic or Latino, and not Hispanic or Latino by race.

bicycle facilities are present, there are safe street crossings, and when vehicles are enforced to reduce their speeds

Babcock Street at Harvard Street: LPI and Bicycle Box

The Complete Streets project at the intersection of Babcock Street and Harvard Street is an improvement that will benefit cyclists and pedestrians. The project will enhance safety for cyclists turning left onto Babcock Street from Harvard Street and pedestrians crossing Babcock Street. Infrastructure that will be improved through this project includes pedestrian signal and timing, new ADA-compliant curb ramps, accessible pedestrian signals, high visibility crosswalks, and intersection treatments for bicycles (e.g., bicycle box on Harvard Street). This retrofit project, intended to make cycling and walking safer and more pleasant near this intersection, will apply for Tier 3 funding in 2019 and is estimated to cost $72,000.

MassDOT Crash Reports show one pedestrian-motor vehicle crash occurred at this intersection in November 2011. The nature of the crash was a vehicle heading in the northbound direction, turning right onto Babcock Street. Within 300 feet of the intersection, six pedestrian-motor vehicle crashes occurred (including the pedestrian crash in the immediate area); fortunately, all six were non-fatal crashes. The upgrade to high visibility crosswalks with ADA compliant curb ramps would improve the visibility of people crossing at a longer distance than the existing standard crosswalk and the LPI would allow pedestrians a few seconds head start to cross the street before cars and cyclists turn left from the southeast approach of Harvard Street; this would significantly improve any future pedestrian-vehicle conflict.

Residents who attended the first Public Meeting and took part in the WikiMap expressed the concern of the lack of adequate time for pedestrians to cross at this intersection. A WikiMap comment, well-supported by other residents, stated that pedestrian timing on this intersection is too short. Residents want to see more protected time to cross Harvard Street and Babcock Street before vehicles have the right to turn. This project would also supplement the traffic calming project along Babcock Street that includes new crosswalks with curb extensions, a Rectangular Rapid Flashing Beacon, and new bicycle accommodations that include northbound shared lane markings and a southbound bicycle lane.

The intersection of Babcock Street and Harvard Street. Photo: HSH

Beacon Street at Harvard Street: Two-Stage Queue Bicycle Boxes

This Complete Streets project at the intersection of Beacon Street and Harvard Street is an improvement that will benefit cyclists. The project aims to enhance safety for cyclists turning left on Harvard Street. Specific Complete Streets infrastructure that will be improved through this project includes intersection treatments for bicycles (e.g., bicycle boxes on the Beacon Street northbound and southbound approaches). This retrofit project, intended to make cycling safer and more pleasant near this intersection, will apply Tier 3 funding in 2019 and is estimated to cost $8,000.

The intersection of Beacon Street and Harvard Street. Photo: HSH

MassDOT Crash Reports showed three bicycle-motor vehicle crashes that occurred in years 2011, 2014, and 2015. The crash that occurred in 2011 involved a vehicle traveling westbound and colliding with a cyclist while the vehicle was turning right at the intersections. The crash in 2014 involved a vehicle colliding with a cyclist while the vehicle was changing lanes. The crash in 2015 involved a vehicle traveling eastbound on Beacon Street and side-swiping an adjacent cyclist. Within 300 feet of the intersection, 12 bicycle-motor vehicle crashes were reported to MassDOT between 2011 and 2015. Installing two-stage queue bicycle boxes at this intersection will offer cyclists a safe way to make left-turns at this multi-lane intersection. It will also reduce future turning conflicts between cyclists and motor vehicles.

Bicycle Improvements: Bicycle Lanes, Shared Lane Markings, and Wayfinding

This Complete Streets project anticipated for the Coolidge Corner neighborhood is an improvement that will benefit cyclists. The project aims to enhance safety for cyclists traveling through Coolidge Corner. Infrastructure that will be improved through this project includes designated bicycle lanes, shared lane markings (also known as sharrows), and wayfinding signs for cyclists and pedestrians along the portion of Harvard Street that is located within the Coolidge Corner neighborhood. This retrofit project, intended to make cycling safer and more pleasant in this neighborhood, will apply for Tier 3 funding in 2019 and is estimated to cost $27,000.

As expressed in the Town's WikiMap and First Public Meeting, cycling is one of the main modes that people take to get to Coolidge Corner. MassDOT Crash Reports show there were approximately 32 bicycle-motor vehicle crashes between 2011-215 that occurred within 300 feet of the Harvard Street corridor, specifically from Vernon Street to the Boston town line. Of these thirty-two crashes, the most common cause of these vehicle crashes included right-hook accidents in which drivers are passing cyclists to make a right turn and collides with the cyclists in the process. The bicycle improvements that are recommended for this area include painting bicycle lanes and sharrows on

both the northbound and southbound sides of Harvard Street, specifically from Vernon Street to the Brookline/Boston municipal boundary. The new bicycle lanes and sharrows will be supplemented with wayfinding signage to orient both cyclists and pedestrians to major destinations with Coolidge Corner and adjacent neighborhoods within cycling and walking. Wayfinding signage will provide an excellent way to assist cyclists and pedestrians who are unfamiliar with the neighborhood, to orient themselves and easily find their way to major attractions or destinations. Improving the bicycle network in this portion of Brookline can tremendously impact the way people see how safe cycling is in the Town. When there are appropriate bicycle facilities marked to provide a safe space for cyclists to travel through and to the area, cyclists feel safe and other users of the road see that. Seeing that experience can have a great impact in their mode shift.

Longwood Avenue at Harvard Avenue: Curb Extensions

This Complete Streets project at the intersection of Harvard Street and Longwood Avenue is an improvement that will benefit pedestrians. The project will enhance safety for pedestrians crossing Harvard Street or Longwood Avenue. Infrastructure that will be improved through this project includes reducing curb radii to address high-speed turning movements by drivers and decrease pedestrian crossing distances, providing ADA-compliant curb ramps on all crosswalk, and installing curb extensions to visually and physically narrow Longwood Avenue and Harvard Street, thus creating safer and shorter crossings for pedestrians. This retrofit project, intended to make walking safer and more pleasant near this intersection, will apply for Tier 3 funding in 2019 and is estimated to cost $28,000.

A vehicle passing through the intersection of Longwood Avenue and Harvard Avenue while a pedestrian crosses Harvard Street. Photo: HSH

MassDOT Crash Reports show one non-fatal pedestrian-motor vehicle crash that occurred at this intersection in 2011. The nature of the crash was a vehicle driving in the southbound direction of Harvard Street and collided with a pedestrian crossing the street. Within 300 feet of the intersection,

10 pedestrian-motor vehicle crashes occurred (including the pedestrian crash in the immediate area); fortunately, all 10 were non-fatal crashes. The curb extensions and curb radii tightening will significantly improve the visibility of people crossing both Longwood Avenue and Harvard Street, as well as shorten the crossing distances. It will also help slow the vehicular speeds and increase the yielding rate of vehicles, resulting in a safer and more pleasant intersection.
Residents who took part in the WikiMap expressed concern about the lack of vehicle attention towards pedestrians when turning onto Longwood Avenue and Harvard Street. Residents expressed the need to make drivers aware of people crossing the street. Comments state that this is a dangerous intersection, in which residents who have crossed this intersection have almost collided with vehicles at different occurrences.

MBTA ROUTE 66 BUS STOP IMPROVEMENTS: ACCESSIBILITY IMPROVEMENTS

This Complete Streets project at the intersection of Harvard Street and Vernon Street is an improvement that will benefit pedestrians and transit users. The project aims to enhance safety for pedestrians and transit users crossing Harvard Street (adjacent to Vernon Street). Infrastructure that will be improved through this project include installing high visibility crosswalks with ADA-compliant curb ramps that will improve transit connections for pedestrians. This retrofit project, intended to make walking safer and more pleasant near this intersection, will apply for Tier 3 funding in 2019 and is estimated to cost $10,000.

The intersection of Vernon Street at Harvard Street. Photo: HSH

Adjacent to this intersection is MBTA's Bus Route 66 outbound stop towards Harvard Square in Cambridge. Bus Route 66 is one of MTBA's high ridership routes. It brings residents to/from Harvard Square to Dudley Square in in Boston. The Bus Route 66 outbound stop on Harvard Street (opposite side of Vernon Street) saw an average of 77 people getting on and 87 people getting off the bus during the weekdays in Fiscal Year 2017. During the weekend, this bus stop saw an average of 115 people getting on and 106 getting off the bus in Fiscal Year 2017.

MassDOT Crash Reports show one pedestrian-motor vehicle crash occurred at this intersection in 2012. The nature of the crash was a vehicle was heading in the eastbound direction on Vernon Street and collided with a pedestrian as Vernon Street meets Harvard Street. Within 300 feet of the intersection, four pedestrian-motor vehicle crashes occurred (including the pedestrian crash in the immediate area); fortunately, all six where non-fatal crashes. The installation of high visibility crosswalks with ADA-compliant curb ramps on Harvard Street will define an appropriate path for pedestrians and inform drivers of pedestrian crossing the street. It will also improve the visibility of people crossing from a longer distance. There is no crosswalk across Harvard Street for people to immediately get to Bus Route 66's outbound stop. Currently, people would have to walk approximately 130 feet along Harvard Street and of the opposite direction of where the bus stop is located.

WASHINGTON STREET AT GREENOUGH STREET: RRFB

This Complete Streets project at the intersection of Greenough Street and Washington Street is an improvement that will benefit pedestrians. The project aims to enhance safety for pedestrians crossing Washington Street by providing a RRFBs that will significantly increase vehicle yielding rates and reduce vehicle speeds. This pedestrian safety improvement project, intended to make walking safer and more pleasant near this intersection, will apply for Tier 3 funding in 2019 and is estimated to cost $42,000.

The intersection of Greenough Street and Washington Street. Photo: Bing Maps

Washington Street is one of Brookline's heavily used corridors that connects to Washington Square and Brookline Village. Within a quarter mile distance, people can reach The Public Library of Brookline (Brookline Village location), Town Hall and the Brookline Village neighborhood, and various commercial and community services. The proximity of Brookline High School on Greenough Street and moderate retail activity that's identified along Washington Street are the reasons why the roadway segments of Washington Street and Greenough Street – as they join to form a T-type intersection – rate moderate in MAPC's local walking access score analysis. Having a high local

walking access score means these two corridors are highly utilized and connect densely populated areas with local destinations that are within a walking distance. This demand is supported by the existing services in the area and its proximity to MBTA stops for Bus Route 65 inbound and outbound stops. Areas that show moderate-to-high utilization are great candidates for Complete Streets improvements that promote safe and comfortable pedestrian environments.

Additionally, this intersection is within an Environmental Justice (EJ) census block in which the population within the census block has a relatively high percentage of minorities. There are also seven elderly/assisted living facilities within a half mile distance to this intersection. Some of these facilities include: the Brookline Adult and Community Education Center, Center Communities of Brookline, and O'Shea House. The census blocks that are adjacent to this intersection contain approximately 6% of persons with disabilities, as implied by the number of assisted living facilities that are in close proximately to the area.

Two schools – Brookline High School on Greenough Street and Pierce Elementary School on Harvard Street– are within a quarter mile distance to this intersection. Making sure this area is well-served by safe streets alleviates the barriers for children to safely get to school. Parents are more likely to feel comfortable allowing their children to walk to school when sidewalks are present, there are safe street crossings, and when vehicles are enforced to reduce their speeds. The residential neighborhoods of Griggs Park and Harvard Avenue need to access this intersection to get to Brookline High School. The proposed RRFBs at this intersection will help improve the vehicle yielding rates and speed reduction at this intersection. Making sure that motorists slow down for pedestrian using this intersection is vital in creating a wholesome Complete Streets network in Brookline. Brookline has the base to implement effective Complete Streets projects that can truly have a positive impact on residents' lives, as well as a positive change in perspective of what it truly means to be a Complete Streets municipality.

HARVARD AVENUE AT HARVARD STREET: CURB EXTENSIONS AND RRFB

This project at the intersection of Harvard Avenue and Harvard Street is an improvement that will benefit pedestrians. The project will enhance safety, visibility, and ADA accessibility for pedestrians crossing Harvard Street. Specific infrastructure that will be improved through this project includes a RRFBs that will increase vehicle yielding rates, high visibility crosswalks with ADA-compliant curb ramps across Harvard Street, and curb extensions on Harvard Street that will allow pedestrians to be more visible to drivers. This pedestrian safety improvement project, intended to make walking safer and more pleasant near this intersection, will apply for Tier 3 funding in 2019 and is estimated to cost $79,000.

As stated on the WikiMap and Public Meeting, many people find this intersection to be dangerous, especially for families with children who attempt to cross Harvard Street. Due to the high concentration of children near this intersection, making sure that people can get around is important. Single-family homes, local playgrounds, and the Alexander Technique Learning Center are the land uses that can be found along Harvard Avenue. Within the immediate Harvard Avenue/Harvard Street intersection, various services are available, such as the Little Corner House on the northwest side of the intersection, locally-owned businesses along the southwest and northeast sides of the intersection, and Walgreens on the southwest side of the intersection. Stop and Shop is also located within a block away. MassDOT Crash Reports show one pedestrian-motor vehicle crash that occurred in July 2012 within 300 feet of the intersection. The nature of this crash was a vehicle heading in the eastbound direction of Aspinwall Avenue and colliding with a pedestrian at the intersection of Aspinwall Avenue and Harvard Street. The proposed RRFBs will give roadway priority to residents who are trying to cross Harvard Street. The proposed curb extensions will give pedestrians smaller crossing distances and more visibility crossing Harvard Street.

A father and son and a woman trying to cross Harvard Street from Harvard Avenue. Photo: Google Maps

At this intersection, Harvard Street showed to have a high MAPC local pedestrian access score. Having a high local access score means that the corridor is highly utilized and connects densely populated areas with local destinations that are within a walking distance. This is supported by the existing services in the area and its proximity to MBTA stops for Bus Route 66 inbound and outbound stops.

Additionally, this intersection is within an Environmental Justice (EJ) census block in which the population within the census block has a relatively high percentage of minorities. There are eight elderly/assisted living facilities and four schools that are within a half mile distance to this intersection. Some of the elderly/assisted living facilities include: The Village at Brookline, Brookline Adult and Community Education Center, Colonel Floyd Apartments, and Walnut Street Apartments. The four schools that are adjacent to this area include: Amos A. Lawrence School, Brookline High School, Pierce Elementary School, and a location of Brookline Early Education Program. The census blocks that are adjacent to this intersection contain approximately 6% of persons with disabilities, as implied by the number of assisted living facilities that are in close proximately to the area.

HEATH STREET AT WOODLAND ROAD: RRFB AND HIGH VISIBILITY CROSSWALK

The Heath Street at Woodland Road RRFBs and High Visibility Crosswalk Project will focus on improving pedestrian safety, visibility, and ADA accessibility. Specific Complete Streets infrastructure that will be improved through this project include RRFBs that will increase vehicle yielding rates, tightening the intersection configuration, and installing high visibility crosswalks with ADA-compliant curb ramps that will allow pedestrians to be more visible to drivers. This pedestrian improvement project will apply for Tier 3 funding in 2019 and is estimated to cost $133,000.

View of Heath Street with the Woodland Road exit on the right-hand side. Photo: Bing Maps

Various family-oriented destinations are clustered near the Heath Street/Woodland Road intersection. For instance, Soule Recreation Center is located at the southwestern side of the intersection and one of several entrances to Pine Manor College is located at the southeastern side. Other destinations such as the former Baldwin School, Pine Manor College, Dane Estate, and Annenberg Library are located within a quarter mile distance to the intersection.

Additionally, this this area is within an immediate distance to an Environmental Justice (EJ) census block in which the population within the census block has a relatively high percentage of minorities. This project would supplement an anticipated roadway project on Hammond Street at Woodland Road intersection that is currently in the design development phase and currently before the Town's

Transportation Board for approval. This proposed project includes curb tightening and crosswalk installation at the intersection of Hammond Street and Woodland Road.

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Appendix

Brookline CSPP PIM Community Input Summary

INVITEES:	Brookline residents and stakeholders, HSH	HSH PROJECT NO.:	2016052.13
LOCATION:	Brookline Town Hall	DATE:	06/04/2018

Scan 615 (Townwide) – Many residents were concerned with major roads that lacked bicycle facilities. This group noted that there are no bike facilities along Newton Street, even though this corridor is wide enough for both separated bike AND pedestrian facilities. Hammond Street is a high-speed corridor with two bidirectional lanes – this group suggested a road diet to accommodate protected bike lanes and safe pedestrian crossings. A contraflow bike lane for one block of Sumner Road was suggested – Sumner Road currently has sharrows at where the street meets Buckminster Road up to where the road turns to Blake Road. Contraflow bike lanes may not be feasible – there is potential to extend the sharrows from Buckminster Road to Boylston Street (Route 9). Located in Fisher Hill, Sumner Road provides direct connection to Brookline High School.

Scan 614 (6 Town Neighborhoods) – Topics this group discussed circled around pedestrian signal issues and improvement ideas in North Brookline, near Route 9, and Chestnut Hill, as well as bike facilities project ideas in North Brookline/Coolidge Corner. Within the North Brookline/Coolidge Corner/JFK neighborhood, this group wants to see a contraflow bike lane for the first block of Ivy Street. Ivy Street is currently a one-way street. There is currently a contraflow bike lane along Ivy Street that start from Carlton Street and ends once Ivy approaches Essex Street. The contraflow bike lane would be from Carlton Street to St. Mary's Street. This group wants to see a separated/protected bicycle path for the entire length of Beacon Street (both directions). It was mentioned that the traffic light on Harvard Street/Stedman Street intersection does not turn on if there are only bicycles waiting for the traffic light to turn on. For the area along Route 9, the group stated that the light along Cypress Street is not activated for bicyclists, similar situation to Harvard Street/Stedman Street intersection. A pedestrian-related recommendation for the intersection of Davis Ave/Washington Street is to change the pedestrian signals to Leading Pedestrian Intervals (LPI) – this group states that drivers turning right from Davis Ave do not yield to pedestrians. How can we protect pedestrians at this intersection? Within the Chestnut Hill neighborhood, crosswalks need to be safer – either through improving the lighting or creating a pedestrian island to shorten crossing distances and making it more attractive to walk along this area, particularly near Boylston Street, Hammond Street, Tully Street area. An overall statement the group made is that at intersections that currently have pedestrian-only phase, once converted to concurrent phasing,

pedestrians lose diagonal crossing, but how much does that even save time? More green-pedestrian phase vs. less/longer pedestrian phase that would allow diagonal crossing?

Scan 613 (Townwide) – This group focused on all modes – biking, walking, and transit improvements. Comments for area south of Route 9 – this group noted very dangerous conditions for biking and pedestrians at the Hammond/La Grange traffic circle. At Route 9/High St/Harvard Street, this intersection is difficult for bicyclists and pedestrians. Noted within the pedestrian delay analysis, residents confirmed that Brookline Ave/Aspinwall Ave intersection is dangerous for both pedestrians and cyclists. This area is particularly dangerous when there is a high number of vehicles passing through during peak commute hours. Roadway alignment is fine, traffic conditions and vehicular movements through this intersection is dangerous. An improvement on pedestrian signal would highly benefit this area. For the C-train corridor (Harvard St), this group suggested giving the C-train traffic the right of way at traffic stops – the red light should change to green when it's immediately safe and when the train arrives. Also, along Harvard St, there are poor sidewalk conditions – particularly along the portions with brick that can be hazardous for some people. At the intersections of Lawton/Harvard St and Thorndike/Harvard Street, residents have had to negotiate with cars when entering/crossing these intersections. Lastly, the group mentioned a missing link to Summit Ave from Winchester Road in the path system.

Scan 612 (6 Town Neighborhoods) – Not a lot of feedback on this map. This group noted the confusing intersection alignment of Lawton St/Thorndike St/Abbottsford Rd/Hamilton Rd. This group noted the need for a traffic signal at the intersection of Thorndike/Harvard St.

Scan 611 (Town Neighborhoods) – Discussions within this group involved improving pedestrian and bicycle connectivity. There was a general comment regarding improving the lighting (potentially throughout the Town) to make it more inviting. Comments made for the North Brookline/Coolidge Corner neighborhood include marking a clear path for cyclists and pedestrians, particularly along Essex Street going towards Commonwealth Ave/Boston University, to address any confusion. What may be great for this area in North Brookline is signage to show miles and/or minutes to get to popular destinations in Boston from Brookline that Brookline residents may often commute to (e.g. B.U., Harvard University, MIT, etc). There are sharrows along Essex Street, however, because of the current intersection alignment, the route to get to BU is unclear and it looks like cyclists must backtrack to Mountfort St. There is a pedestrian island with crossings that cyclists can use – I think clearly marking this island as a potential route for cyclists would have positive advantages. It's unclear where this particular concern/idea is recommended but the group suggested clear markings for cyclists to stop at red lights (comment given for North Brookline/Coolidge Corner neighborhood). This group wanted to see more pedestrian access to alleys and cut-throughs with no car access, within the Washington Square neighborhood. Also, within Washington Square, the U-turn onto Beacon Street outbound, striping and signage is unclear. People are unsure whether drivers can

enter Driscoll School via Westbourne Terrace – they do not think so. A popular concern within this group was the pedestrian bridge located between Boylston Street and White Place – many residents want this bridge to be fixed. It was also noted to create a pedestrian bridge at the intersection of Aspinwall/Brookline Ave – this may not be feasible, or it should be prioritized low considering there are other recommendations that can improve this intersection.

Scan 610 (Town Neighborhoods) – Discussions within this group were focused around pedestrians and cyclists. Adjacent to the neighborhoods, this group identified issues such as missing curb cuts in Griggs Park and transitioning Park street as a one-way corridor with a separated bikeway and better sidewalks. Sidewalk accessibility for the elderly and disabled seemed to be a general concern for this group. For North Brookline/Coolidge Corner area, this group was concerned with significant wait time for crossing streets and bike accommodations. For example, the pedestrian signals are not timed properly with reference to the turning lights at the intersection of Marion St and Beacon St. This group wants to see leading pedestrian interval signal system at Babcock Street crossing Harvard Street. The intersection of Fuller St/Harvard St was also noted to have a long wait time for the crossing cycle length. It was also noted that Hawes Street has missing crosswalks. Shifting to bike-related concerns, this group wants to see protected bicycle lanes on Beacon Street, feasible by removing parking. Parking removal was also suggested for Harvard Street to accommodate bicycle lanes. There also needs to be police enforcement on Harvard Street for illegal use of bike lanes (?) from Coolidge Corner to JFK Crossing. Within Brookline Village, this group identified intersections that have long/unsynchronized pedestrian walk times, such as the intersections of Washington/Cypress/School St and Davis Ave/Harvard St. A suggestion related to transit accommodations was to change on-street parking lanes to bus and bike lanes during commuting rush hour on Harvard Street. Within the Chestnut Hill neighborhood, this group suggested converting parking lanes on Heath Street to eastbound contraflow bike lane during the morning rush hour.

Scan 609 (Town Neighborhoods) –This group left one comment regarding bicycle access within Brookline Village. This group wants a clear pathway for cyclists coming to Brookline Village down Washington Street and coming from the western portion of Brookline to maneuver Brookline Village intersections to get to Pearl Street and then the Muddy River Path.

Scan 608 (Townwide) – The main concern for this group was the lack of bicycle accommodations. This group wants to see cycle tracks on both sides of St. Paul, as well as the whole length of Beacon Street. Residents want to see a cycle track on both sides of the Cypress Street corridor, Beacon Street corridor, Cypress Street corridor, and Longwood corridor. Intersection-related comments include improving Beacon Street crossings for cyclists on Harvard, Street, St. Paul, Kent Street, and Carlton Street. Residents want to see delineator posts on the corner of Ivy and Carlton. Pedestrian concerns were the focus for the Hammond Pond Parkway, Newton Street, and Goddard Avenue. Residents

want to see sidewalks and bike lanes on Hammond Pond Parkway and Newton Street, crosswalks across Newton Street, and more public transportation to serve South Brookline.

Scan 607 (Townwide) – Discussions within this group include accommodations that would address issues that relate to pedestrians. This group wants to see pedestrian level lighting at key spots along Longwood Avenue and improved pedestrian signals along Beacon Street, Washington Street, and Harvard Street. For Dean Street/Beacon Street, there is an issue with cross safety that can be addressed by improving the pedestrian signals. This group wants to have as many concurrent pedestrian signals town-wide since they don't negatively affect vehicular traffic.

Scan 606 (Town Neighborhoods) – This group focused on pedestrian improvements in Brookline Village. For Aspinwall Ave/Kent Street, pedestrian signal visibility is poor, and sidewalks are too narrow. Residents want to see high visibility crosswalks along Kent Street, adjacent to the following streets: Brook Street and Linden Street. High visibility crosswalks along Station Street were also desired, especially as the street approaches the Brookline Village MBTA Green Line stop entrance.

Scan 605 (Townwide) – Discussions within this group was minimal. Residents in this group want to see more bicycle route continuity across and through Town. This group also raised the question, "Would $400,000 fund a significant stretch of road that includes a buffered bicycle lane?" The answer is yes, if the project is broken down in to sections and each section is one project in the Plan (assuming each section is up to $400K).

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