Route 37 Priority Corridor Study in Braintree

Route 37 Priority Corridor Study in Braintree

Project Manager
Seth Asante

Project Principal
Rounaq Basu

Data Analysts
Julie Dombroski
Kathy Jacob

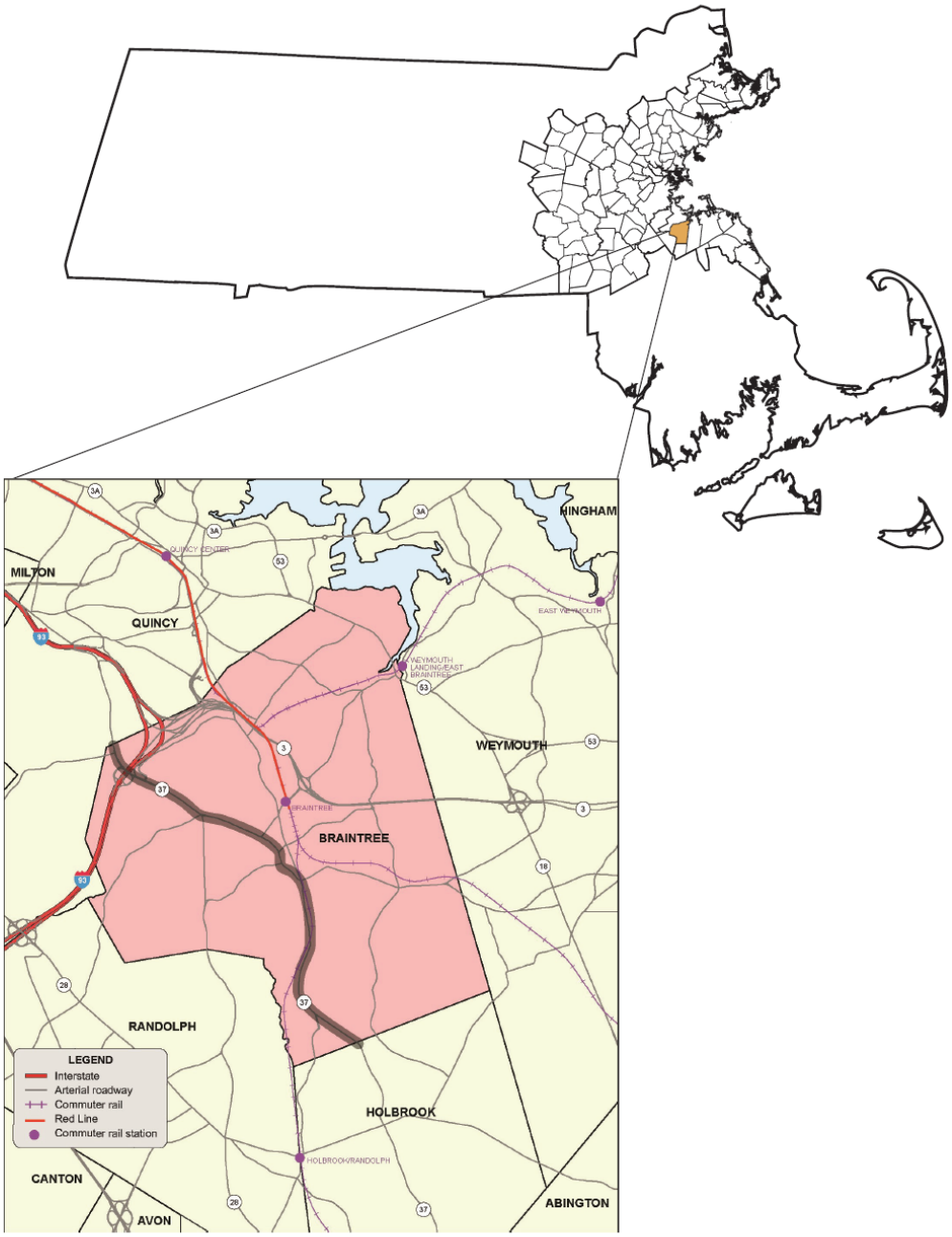
Graphics
Kenneth Dumas
Kim DeLauri

Editor
David Davenport

The preparation of this document was supported by the Federal Highway Administration through MPO Combined PL and 5303 #123114.

Central Transportation Planning Staff is directed by the Boston Region Metropolitan Planning Organization (MPO). The MPO is composed of state and regional agencies and authorities, and local governments.

August 2024



For general inquiries, contact

Central Transportation Planning Staff
State Transportation Building
Ten Park Plaza, Suite 2150
Boston, Massachusetts 02116

857.702.3700
ctps@ctps.org
ctps.org

CIVIL RIGHTS NOTICE TO THE PUBLIC

Welcome. Bem Vinda. Bienvenido. Akeyi. 欢迎. 歡迎

You are invited to participate in our transportation planning process, free from discrimination. The Boston Region Metropolitan Planning Organization (MPO) is committed to nondiscrimination in all activities and complies with Title VI of the Civil Rights Act of 1964, which prohibits discrimination on the basis of race, color, or national origin (including limited English proficiency). Related federal and state nondiscrimination laws prohibit discrimination on the basis of age, sex, disability, and additional protected characteristics.

For additional information or to file a civil rights complaint, visit www.bostonmpo.org/mpo_non_discrimination.

To request this information in a different language or format, please contact:

Boston Region MPO Title IV Specialist
10 Park Plaza, Suite 2150
Boston, MA 02116
Phone: 857.702.3700
Email: civilrights@ctps.org

For people with hearing or speaking difficulties, connect through the state MassRelay service, www.mass.gov/massrelay. Please allow at least five business days for your request to be fulfilled.

Abstract

The Metropolitan Planning Organization (MPO) corridor studies are part of the Multimodal Mobility and Infrastructure Program. The program goals are to address gaps in regional and community multimodal needs towards a safe and accessible regional transportation system. Staff to the Boston Region MPO prioritized Route 37 in Braintree for study after considering several factors, including the need to address poor safety conditions, the desire to enhance multimodal transportation, and the potential to serve transportation equity populations and prioritize the needs of marginalized communities. This report details the existing conditions, assesses safety and operational problems, discusses improvement options, and recommends implementing improvements. The recommendations, if implemented, would improve safety and multimodal transportation to support the land uses and local businesses along the corridor. In addition, the recommendations would make traffic flow and operations efficient, support bus service, and provide a welcoming environment for people walking, biking, and using assistive mobility devices.

TABLE OF CONTENTS PAGE

TABLES

FIGURES

APPENDICES

Executive Summary

ES.1 BACKGROUND

Metropolitan Planning Organization (MPO) corridor studies are part of the Multimodal Mobility and Infrastructure Program. The program goals are to address gaps in regional and community multimodal needs towards a safe and accessible regional transportation system. These gaps include safety, congestion, and multimodal mobility and accessibility issues and the studies focus on exploring strategies to address these challenges and enhance multimodal transportation modes such as increasing safety and quality of infrastructure for nonmotorized modes.

The MPO staff selected Route 37 in Braintree as the subject of a corridor study in the federal fiscal year 2023. The location was prioritized for study after considering several factors, including addressing poor safety conditions and traffic congestion, the desire to enhance multimodal transportation, the potential to serve transportation equity populations and marginalized communities, and the need to maintain regional travel capacity. Past MPO corridor studies include Route 114 in Danvers, Route 203 in Boston, Route 30 in Framingham and Natick, Route 140 in Franklin, Route 16 in Chelsea and Everett, Route 9 in Framingham and Natick, and Route 1 in Norwood. Many of the recommendations from the studies have been implemented. These corridor studies give the municipalities and the Massachusetts Department of Transportation (MassDOT) what would be required to address deficiencies in the corridors before committing to design and engineering. In addition, the studies strive to build consensus among the stakeholders and enhance the planning and design of multimodal transportation infrastructure.

ES.2 COMMUNITY ENGAGEMENT

Stakeholder participation was a crucial part of the study. MPO staff used several methods to engage stakeholders in planning improvements to Route 37 Braintree. An advisory committee of representatives from the MassDOT, Massachusetts Bay Transportation Authority (MBTA), Braintree Schools, and South Shore Chamber of Commerce was established to guide this study. Staff met with the advisory committee to kick off the study. In a second meeting, MPO staff presented the existing problems, corridor needs, and ideas for improvements for feedback. This report reflects the committee's feedback. Appendix A includes a list of task force members and comments.

In addition, staff engaged Braintree residents by launching a community survey to help determine the public's opinion about concerns and problems on Route 37

and to learn their ideas for resolving them. The online survey, posted on the Town of Braintree's websites, received 300 responses between July and August 2023. The survey questionnaire is included in Appendix A.

ES.3 EXISTING CONDITIONS AND NEEDS ASSESSMENT

With the assistance of the MassDOT Highway Division, MPO staff collected and assembled a wide range of data. Staff analyzed the data, and conducted community surveys to assess the existing conditions, identify the deficiencies, and determine the corridor needs for existing conditions and intended future uses. The process ensures that the recommendations are well informed and that all perspectives are considered.

Key concerns include poor quality sidewalks, pedestrian crossing safety issues, gaps in the sidewalk network, lack of infrastructure for biking, infrastructure noncompliance with the Americans with Disabilities Act (ADA), and high speeds of vehicles that create high-stress levels for people walking or biking. Although there are bikeable shoulders on Route 37, especially on Washington and Hancock Streets south of the corridor, they need to be marked as bike lanes and have consistent width. In addition, the shoulders end near signalized intersections, where they transition into turn lanes. There needs to be a safe transition from bike lanes into shared lanes. In addition, a considerable variation in posted speed limits throughout the corridor (25 miles per hour [mph] to 40 mph) increases stress levels for people biking.

Another key concern for users in the corridor is safety. The corridor has

- two high-crash sites eligible for Highway Safety Improvement Program funding,
- several sites with higher-than-expected number of crashes that must be prioritized for potential safety investments, and
- several top-risk sites involving risk factors such as pedestrian and bicycle, distracted and impaired driving, and younger and older drivers.

People riding the bus are challenged in the corridor in many ways, similar to walking or biking. A critical concern for people who ride the bus is delays, which affect travel time and on-time performance. Improving bus service reliability and infrastructure such as adding bus priority signals, dedicated bus stops, and safe crossing opportunities can increase ridership and prioritize needs of transportation equity populations in the corridor.

ES.4 IMPROVEMENTS

MPO staff considered feedback from the advisory committee and input from the community to develop near- and long-term improvements for the corridor.

Near-Term Improvements

The near-term improvements are generally low cost, relatively uncomplicated to implement, require minimal design efforts, and typically take fewer than five years to implement. These improvements can be included in some of MassDOT's corridor projects or through maintenance activities. The near-term recommendations include repairing sidewalks and curb ramps to meet MassDOT standards and comply with the ADA guidelines; adding countdown timers to help expedite safe pedestrian crossings; painting high-visibility crosswalks; repainting faded pavement markings; and installing advance notification signage. Additional near-term improvements include several signal upgrades: retiming signals to reduce congestion, modifying change and clearance intervals to meet MassDOT standards, and adding yellow retroreflective borders to backplates to make the signals more visible at night.

Long-Term Improvements

Long-term improvements are generally costly and require more design and engineering efforts. The recommendations for long-term improvements focus on modernizing the roadway to make it safer and multimodal. They include closing substantial gaps in the sidewalk network, adding protected or separated bike lanes, designing bus turnouts into bike lanes, and upgrading signal equipment to include bus priority signals. These long-term improvements and the proposed Braintree Complete Streets Program would increase transportation choices in the corridor to connect people to the office and industrial parks and commercial, educational, and recreational areas.

ES.5 CONCLUSION

The improvements and concepts developed in this study provide MassDOT, the Town of Braintree, and other stakeholders an opportunity to review the recommendations for addressing deficiencies in the corridor before committing design and engineering funds to a roadway improvement project. This document provides a guide for possible improvements on this roadway and the necessary information for the project proponents to initiate the project notification and review process. The stakeholders must coordinate with MassDOT to prioritize and advance the recommendations into projects. MassDOT and the Town of Braintree are not obligated to make these improvements.

If implemented, the proposed improvements offered in this report would increase traffic safety, make traffic operations more efficient, and modernize the roadway to accommodate all users. The study aligns with the Boston Region MPO's goals of increasing safety on the region's highway system, modernizing roadways to improve capacity and mobility by expanding the quantity and quality of walking and bicycling infrastructure, making transit service more efficient, reducing congestion, and preserving the transportation system.

Chapter 1—Introduction

1.1 STUDY ORIGIN

The Boston Region Metropolitan Planning Organization (MPO) has been conducting studies of roadway corridors identified through the Multimodal Mobility Infrastructure Program as needing improvements to address gaps in regional safety, multimodal transportation, transportation equity issues, and operational problems. The studies strive to build consensus among the stakeholders and enhance the planning and design of multimodal transportation infrastructure. The study's recommendations are sent to implementing agencies, which may fund improvements through various federal, state, and local sources, separately or in combination.

Past MPO corridor studies include Route 114 in Danvers, Route 203 in Boston, Route 30 in Framingham and Natick, Route 140 in Franklin, Route 16 in Chelsea and Everett, Route 9 in Framingham and Natick, and Route 1 in Norwood. Many of the recommendations from the studies have been implemented. Municipalities in the region and the Massachusetts Department of Transportation (MassDOT) have been receptive to these studies, which provide the opportunity to review conceptual options to improve a specific corridor before committing design and engineering funds to a project. Many of the studied corridors have advanced into projects, into construction, or have been implemented.

Suppose a proponent initiates a project that qualifies for state and federal funds. In that case, the study’s documentation may be helpful to both MassDOT and the project proponent for completing MassDOT Highway Division’s project initiation forms, identifying problems along the corridor, justifying the need for improvements, and providing improvement concepts to advance into the preliminary design and engineering stages. MassDOT initiates new projects through a formal three-step process using the Massachusetts Project Intake Tool (MaPIT) to identify the project needs, define project scope (initiation), and submit the project to the project review committee for approval.[1]

1.2 REPORT ORGANIZATION

This report is organized into five chapters. Chapter 1 presents an overview of MPO corridor studies and includes a summary of how corridors are selected for study, the goals and objectives for the study, and a summary of the community engagement process. Chapter 2 describes the characteristics of Route 37 and the study area's context. Chapter 3 focuses on evaluating the baseline conditions

[1] MassDOT Highway initiating a project | Mass.gov

that will inform the development of the study's purpose and needs. Chapter 4 presents the near-term and long-term corridor improvements that are consistent with the purpose and needs of the corridor and their safety and operational benefits. Chapter 5 focuses on the implementation process to advance the planning study recommendations into projects and the next steps.

1.3 STUDY APPROACH AND SELECTION PROCESS

The approach to corridor studies begins with the establishment of a universe of corridors. The MPO staff reaches out to the subregional committees, municipalities, and other stakeholders to identify corridors of interest. In addition, MPO staff reviews the Long-Range Transportation Planning Needs Assessment and refers to the MassDOT Impact Portal and GeoDOT, MPO congestion management process, and other tools to identify corridors of interest. Once the universe of corridors is established, MPO staff screens the study locations using established criteria like the Transportation Improvement Program scoring process. Staff prioritizes the corridors based on the following criteria: safety conditions, congested conditions, multimodal significance, regional significance, transportation equity, geographical distribution, and implementation potential.[2]

[2] Safety Conditions: The location has a higher-than-average crash rate for its functional class; contains a crash cluster that makes it eligible for Highway Safety Improvement Program funding; contains a crash location on MassDOT Highway Division's Top High Crash Locations Report; or has a significant number of pedestrian and bicycle crashes (two or more per mile).

Congested Conditions: The travel time index is at least 1.3. The travel time index is the ratio of the peak-period travel time to the free-flow travel time.

Multimodal Significance: The roadway carries one or more bus routes or is adjacent to a transit stop or station; it supports bicycle or pedestrian activities, or a project is planned to support these activities; it needs to accommodate pedestrians and bicyclists and improve transit on the roadway; or it has a significant amount of truck traffic serving regional commerce.

Regional Significance: The roadway is on the National Highway System; carries a significant portion of regional traffic (average daily traffic of 20,000 vehicles or more); lies within 0.5 miles of environmental-justice transportation analysis areas or zones; or is essential for the region's economic, cultural, or recreational development.

Transportation Equity: The roadway serves transportation equity populations and prioritizes the needs of marginalized communities. Improvements would eliminate the barriers to access and harmful transportation impacts experienced by these communities.

Geographical Distribution: To ensure that, over time, all subregions in the MPO's planning area receive support from the MPO in the form of UPWP planning studies, during each funding cycle, MPO staff select no more than one location per subregion to study and choose a location in a different subregion from the location studied in the preceding cycle.

Implementation Potential: The study location is proposed by the jurisdictional agency or agencies for the roadway, proposed or prioritized by a subregional group, or identified as a priority for improvement by other stakeholders.

Staff selects a corridor for study considering agency, municipal, subregional, and other public feedback. Once staff selects a study location, an advisory task force comprising of the municipality, MassDOT, business chamber/major employers, school district is established to guide the study.

1.4 STUDY LOCATION

Following the above selection process, MPO staff identified Route 37 in the Town of Braintree for study. The study location was selected from a list of 43 arterial segments in 33 municipalities in the Boston Region MPO area. MassDOT Highway Division District 6, the MassDOT Office of Transportation Planning, the Town of Braintree, Braintree Schools, and the South Shore Chamber of Commerce supported the study by collecting data needed for the analyses and reviewing study documents.

1.5 STUDY GOALS AND OBJECTIVES

The stakeholders have shown a commitment to improving conditions to transform this corridor into a route that functions for everyone by

- increasing safety for all users;
- improving the quality of walking facilities by repairing poor-quality sidewalks and closing gaps in the sidewalk network so people can walk safely in the corridor;
- incorporating high-quality bike facilities so that people can choose biking as a safe, convenient, and healthy travel mode;
- improving bus reliability and reducing travel time by reducing signal and queue delays and supporting critical first- and last-mile connections;
- improving conditions for transportation equity populations by creating safe, comfortable and accessible bus stops, good-quality sidewalks and bike lanes, and safe crosswalks; and
- supporting economic vitality and livability of the communities along the corridor with multimodal transportation improvements.

1.6 COMMUNITY ENGAGEMENT

Stakeholder participation is a crucial part of any MPO-sponsored study. Hence, MPO staff used several methods to engage stakeholders in planning improvements for corridor studies. The engagement process began with the study location selection process, during which staff considered agency, municipal, subregional, and other public feedback. An advisory committee composed of staff from MassDOT, Massachusetts Bay Transportation Authority, the Town of Braintree, the South Shore Chamber of Commerce, and Braintree

Schools was established to guide the Route 37 corridor study. MPO staff met with the advisory committee to kick off the study. During the kickoff meeting, staff discussed purpose and needs, work scope, tasks and products, and timeline. In a second meeting, MPO staff presented the existing conditions, identified corridor needs and ideas for improvements, and obtained feedback. In addition, MPO staff launched a community survey to help determine the public's opinion about concerns and problems on Route 37 in Braintree and to learn their ideas for resolving them. This report reflects the advisory committee's feedback and the community survey results. Appendix A includes a list of task force members and comments.

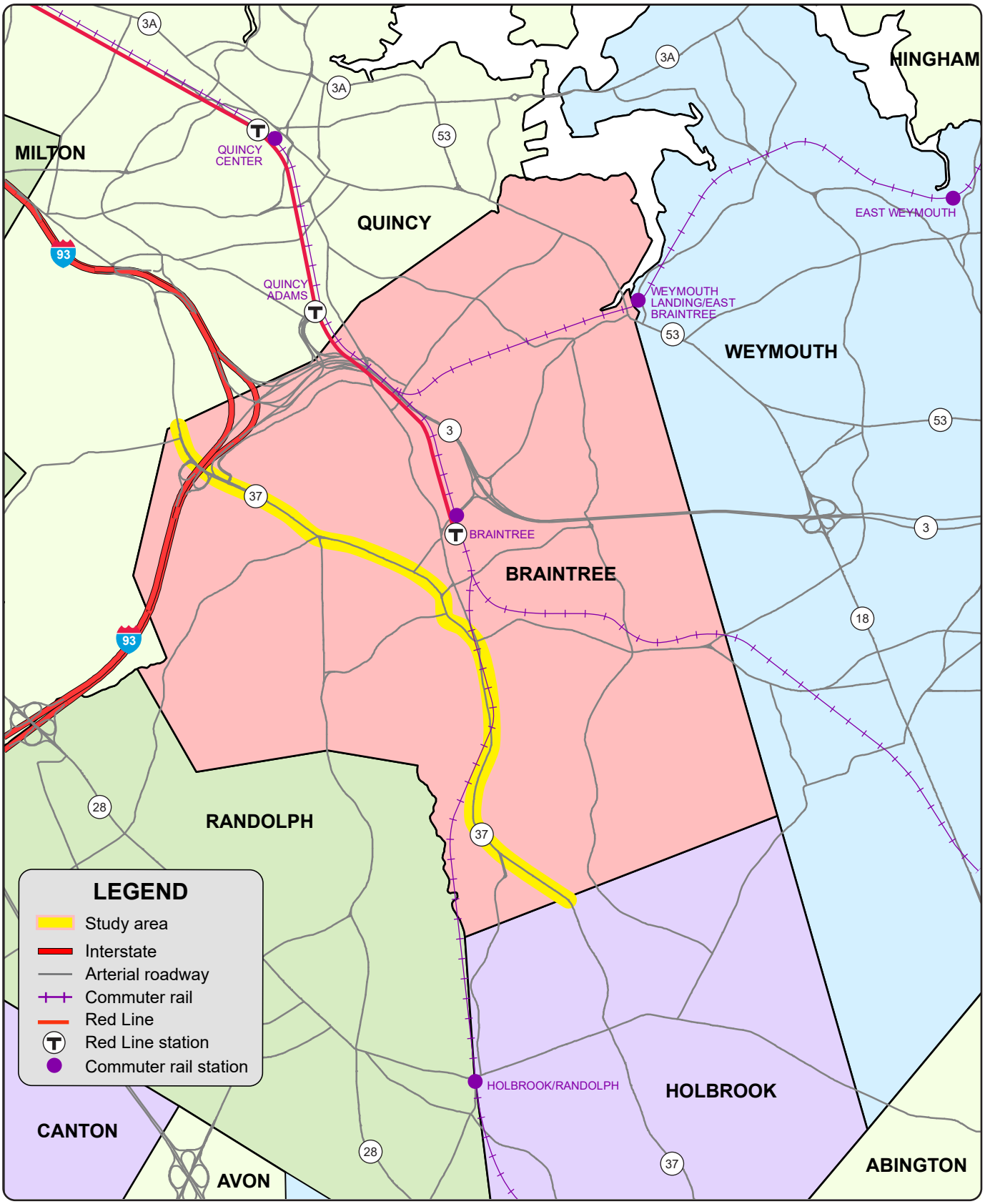
Chapter 2—Study Area

2.1 STUDY AREA

The Town of Braintree is a suburban community located 10 miles south of Boston. The town is situated at the crossroads of Interstate 93 and Route 3, which provide access to the Greater Boston area and Cape Cod. The community has access to public transportation serving Boston and Logan International Airport: the Massachusetts Bay Transportation Authority (MBTA) Red Line; the Lakeville, Middleborough, and Greenbush commuter rail lines; and the Logan Express Braintree Airport Shuttle. Braintree is a mature community of 39,143 residents (as of the 2020 Census) with a broad residential and business base positioned for controlled growth in the future.

Figure 1 shows the study area and surrounding communities and streets. The study area is the half-mile buffer on either side of Route 37 that provides land use and demographic context for the corridor for the existing conditions analysis. The study corridor is the extent of the Route 37 travel corridor in Braintree, from the Quincy city line to the Holbrook town line, including crucial cross streets. Route 37 in Braintree is a state highway. It is classified as an urban principal arterial and is part of the National Highway System. The five-mile-long corridor assumes the local road names of Granite Street, Franklin Street, Washington Street, and Hancock Street. Route 37 is a two-lane, two-way roadway that widens into a four-lane, two-way roadway in the Granite Street segment. It is open to all traffic, including trucks, and its right-of-way width varies between 30 to 40 feet wide in the two-lane sections and 60 to 100 feet wide in the four-lane section. This roadway serves regional and local traffic, carrying between 16,000 and 30,000 vehicles daily. The posted speed limits vary from 25 miles per hour (mph) to 40 mph.

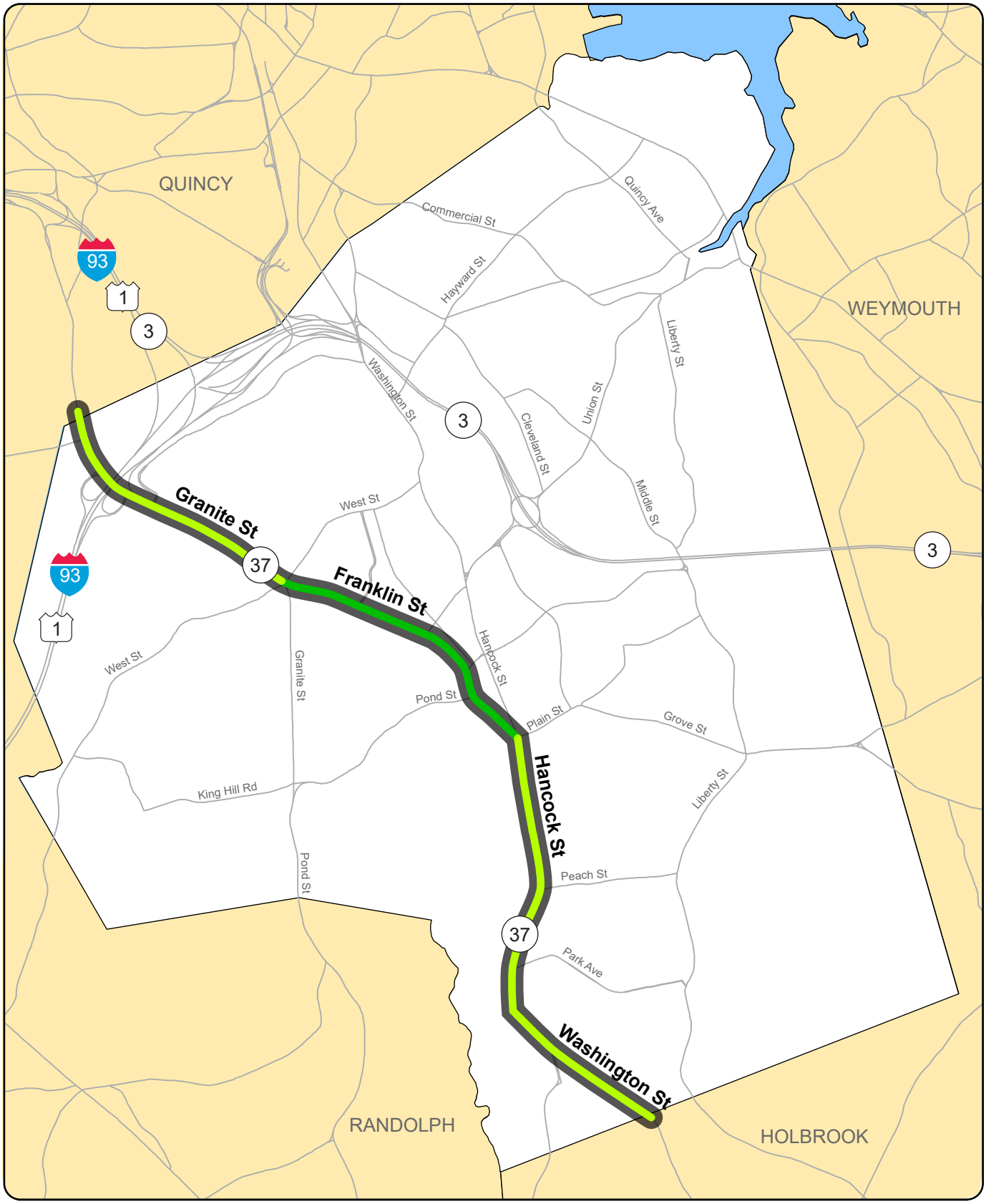
Segments of the roadway have different characteristics and contexts that define needs along the corridor. Route 37 provides access to locations with various land uses, including residential, recreational, educational, industrial, office parks, commercial, and open spaces. The corridor was divided into three segments to reflect these characteristics and contexts: Granite Street, Franklin Street, and Washington/Hancock Street segments (Figure 2).



BOSTON REGION MPO

Figure 1
Regional Map and Study Area

Route 37 Priority Corridor Study
Braintree, Massachusetts



BOSTON REGION MPO

Figure 2
Segments of Route 37

Route 37 Priority Corridor Study
Braintree, Massachusetts

2.1.1 Granite Street Segment

This segment extends 1.3 miles from the Quincy town line to Five Corners (the intersection of Granite, Franklin, and West streets). It is the northern portion of the corridor. Granite Street is a two-way, four-lane roadway that widens at the signalized intersections to accommodate turn lanes. It is open to all traffic, including trucks, and its right-of-way width varies between 60 and 100 feet. It serves multiple land uses, including office and industrial parks, commercial and retail businesses, residential, and open space. The South Shore Plaza, Braintree Hill Office Park, Wood Road Industrial Park, and the commercial businesses at Five Corners are accessible from Granite Street.

The Granite Street segment carries the highest traffic volumes in the corridor (30,000 vehicles daily). An interchange in the segment provides access to I-93 heading north to Boston and surrounding communities, Route 128 heading south to the MetroWest area, and Route 3 heading east to the Cape and Islands. The seven traffic signals in the segment are located at Wood Road, the I-93 northbound and southbound ramp-arterial junctions, Forbes Road, South Shore Plaza Road, and the south mall entrance near Braintree Kindercare. All seven signalized intersections operate with an adaptive traffic control system, in which traffic signal timing changes or adapts based on actual traffic demand. In addition, the segment contains three unsignalized intersections at Chickatawbut Road, Patridge Hill Road, and Davis Road, as well as several commercial and residential driveways.

There are sidewalks on both sides of Granite Street, but they need to be more continuous and connected. The gaps in the sidewalk network cause people walking to switch sides several times to get to their destinations. All marked crosswalks across Granite Street are located at the signalized intersections and are controlled by pedestrian-activated signals. This segment lacks bike lanes, and people biking must share the road with vehicular traffic; however, there are no signs or pavement markings to alert drivers of the presence of people biking. The segment has space constraints because of the significant differences in grades on either side of the roadway, wetlands close to the roadway, and lack of space under the I-93 bridge over Granite Street. MBTA bus service in this segment includes two bus routes: Route 236 Quincy Center Station-South Shore Plaza and Route 238 Quincy Center Station-Randolph

2.1.2 Franklin Street Segment

This segment extends 1.4 miles from Five Corners to the Plain Street intersection. It is the middle portion of the corridor and operates as a two-way, two-lane street that widens at the signalized intersection to accommodate turn

lanes. Its right-of-way width varies between 30 and 40 feet wide and is open to all traffic, including trucks. The posted speed limits range from 30 mph to 35 mph.

Franklin Street serves multiple land uses, including residential, institutional, commercial and retail businesses, and recreational. Braintree High School, Thayer Academy, Sunset Lake, and the Braintree Municipal Golf Course are in the corridor. Several east-west streets intersect Franklin Street, providing access to other parts of Braintree and beyond.

The segment carries 20,000 vehicles daily and has four signalized intersections at Summer Street, Washington Street, Pond Street, and Plain Street. All four traffic signals operate as isolated signals, and they are not interconnected with each other. Continuous and connected sidewalks are on both sides of Franklin Street, but significant sections need to be in better quality conditions. There are six locations in the segment where people walking can cross Frankin Street: four at the signalized intersections, one at the Leroy Way intersection (unsignalized), and one uncontrolled marked midblock crosswalk near MacMaster Funeral Home. This segment also lacks bike lanes because of space constraints. People biking share the road with vehicles, but there needs to be signs or pavement markings alerting drivers of the presence of people biking. The only bus service in this segment is Route 236.

2.1.3 Hancock/Washington Streets Segment

Route 37 assumes the local names of Hancock Street and Washington Street in the southernmost portion of the corridor. It extends about 2.2 miles from Plain Street to the Holbrook town line. Both streets are two-way, two-lane streets open to all traffic, including trucks. The right-of-way width is about 40 feet wide and includes seven-foot shoulders on both sides of the roadway. Hancock and Washington Streets provide access to multiple land uses, primarily residential. Other uses include commercial, institutional, and recreational. The Braintree Office Park, Highland and Liberty Elementary Schools, South Middle School, Braintree Highland Community Playground, and Cambridge Arts, Technology, and Science Braintree Campus are in the corridor. In addition, the segment serves high volumes of traffic heading to and from Holbrook and beyond.

The Hancock/Washington Streets segment carries traffic volumes similar to the Grant Street segment (25,000 vehicles daily). It has three signalized intersections, several unsignalized intersections, and commercial and residential driveways. The three traffic signals are located at Braxton Street, South Street, and Roosevelt Street and operate as isolated traffic signals. Although the segment has several unsignalized intersections, the primary two are Peach Street and Park Avenue intersections. There are continuous and connected

sidewalks on both sides of the roadway, except the western side of Washington Street between Braxton Street and Peach Street. However, a substantial portion of the sidewalks in the northern section from Plain Street to Braxton Street are in poor quality conditions. Bike lanes are present only from the Holbrook town line to Arbutus Avenue, and people biking beyond this section either ride on the sidewalks or the shoulders. The MBTA bus Route 230 runs the entire segment. Route 230 begins at Quincy Center station and operates via Braintree Station busway, Hancock Street, Washington Street, to Montello Station in Brockton.

Chapter 3—Existing Conditions Assessments

3.1 DATA COLLECTION

Before conducting the existing conditions assessments, a comprehensive data collection plan was prepared, including gathering data from existing databases maintained by the Massachusetts Department of Transportation (MassDOT), the Massachusetts Bay Transportation Authority (MBTA), the Town of Braintree, and the Metropolitan Planning Organization (MPO) for analyses. The data comprise land use information, transportation equity populations, relevant transportation assets such as signals equipment and timing information, sidewalks, and bike lanes. Additional information includes roadway inventory data and studies and projects in the corridor.

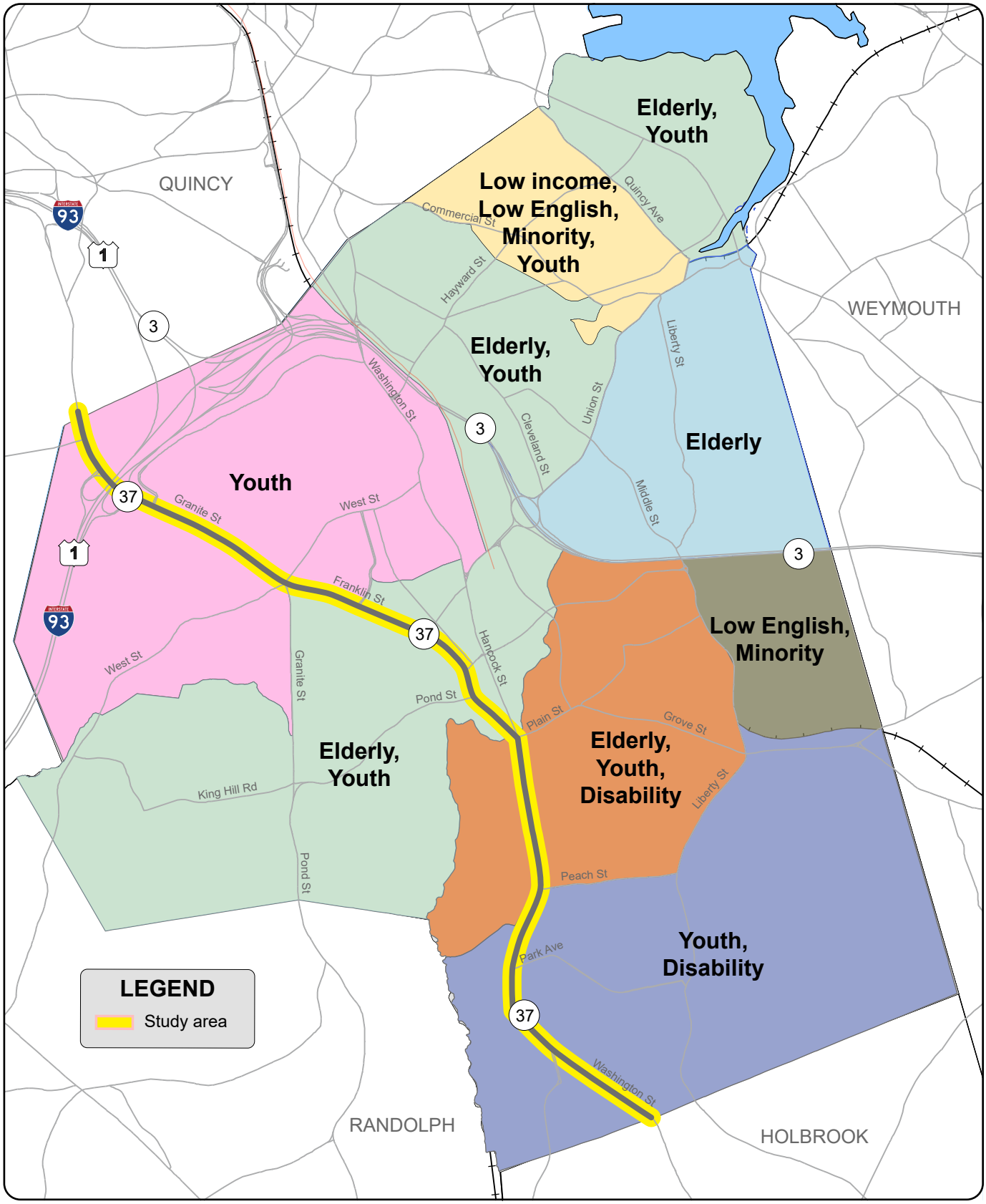
MassDOT collected data on roadway users, including volumes and mix of vehicular traffic, people walking or biking, and speeds of vehicles. Data on transit services (bus, rapid transit, and commuter rail) were from the MBTA, including ridership, operating service, and facilities. MPO staff gathered safety data on historical crashes, sites with excess expected average crash frequency, and sites with systemic risk factors such as pedestrian and bicycle-related, younger and older drivers, and impaired and distracted drivers. In addition, MPO staff developed a survey to help determine the public's opinion about concerns and problems on Route 37 in Braintree and how to resolve them.

3.2 TRANSPORTATION EQUITY POPULATIONS

The corridor includes several MPO-defined transportation equity zones where residents include low-income and minority populations, younger and older populations, and people with limited English proficiency (Figure 3). These communities are expected to benefit from safety and multimodal improvements, which can help improve quality of life by reducing crashes, increasing physical activity through walking or biking, and improving access to jobs, education centers, and health services

3.3 LAND USE

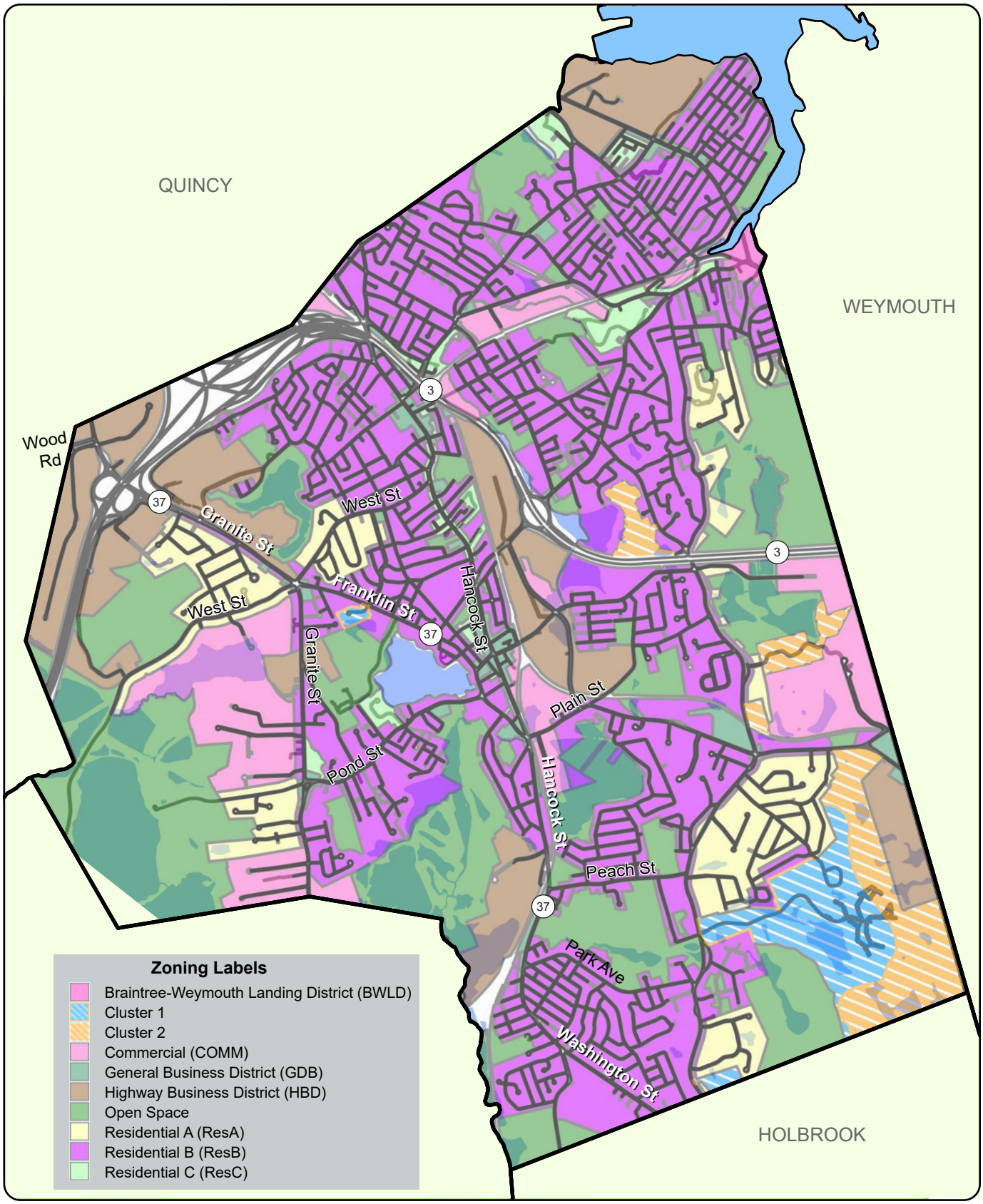
The map in Figure 4 shows the land uses in Braintree. Multiple land uses surround the Route 37 corridor, and land use intensity varies throughout the corridor. Braintree land use patterns are well established, so new uses are expected to be redeveloped or repurposed from existing parcels and properties.



BOSTON REGION MPO

Figure 3
Transportation Equity Populations

Route 37 Priority Corridor Study
Braintree, Massachusetts



BOSTON REGION MPO

Figure 4
Zoning and Land Use Map

Route 37 Priority Corridor Study
Braintree, Massachusetts

The area surrounding the Granite Street segment is zoned a Highway Business District, with large offices and industrial parks located along Wood Road, Rockdale Street, and Forbes Road. Businesses in the office and industrial parks comprise professional, life science and technology, hospitality, entertainment, commercial, and retail services. Also in the segment is the South Shore Plaza, a large shopping mall with multiple retail stores and restaurants.

At the northern end of the Franklin Street segment is the Five Corners, a major commercial center. Businesses at Five Corners include commercial retail services, offices for professional services, banks, and restaurants. Although the area surrounding Franklin Street Segment is zoned residential with single- and multi-family residences, it is mixed with educational, commercial, and recreational uses.

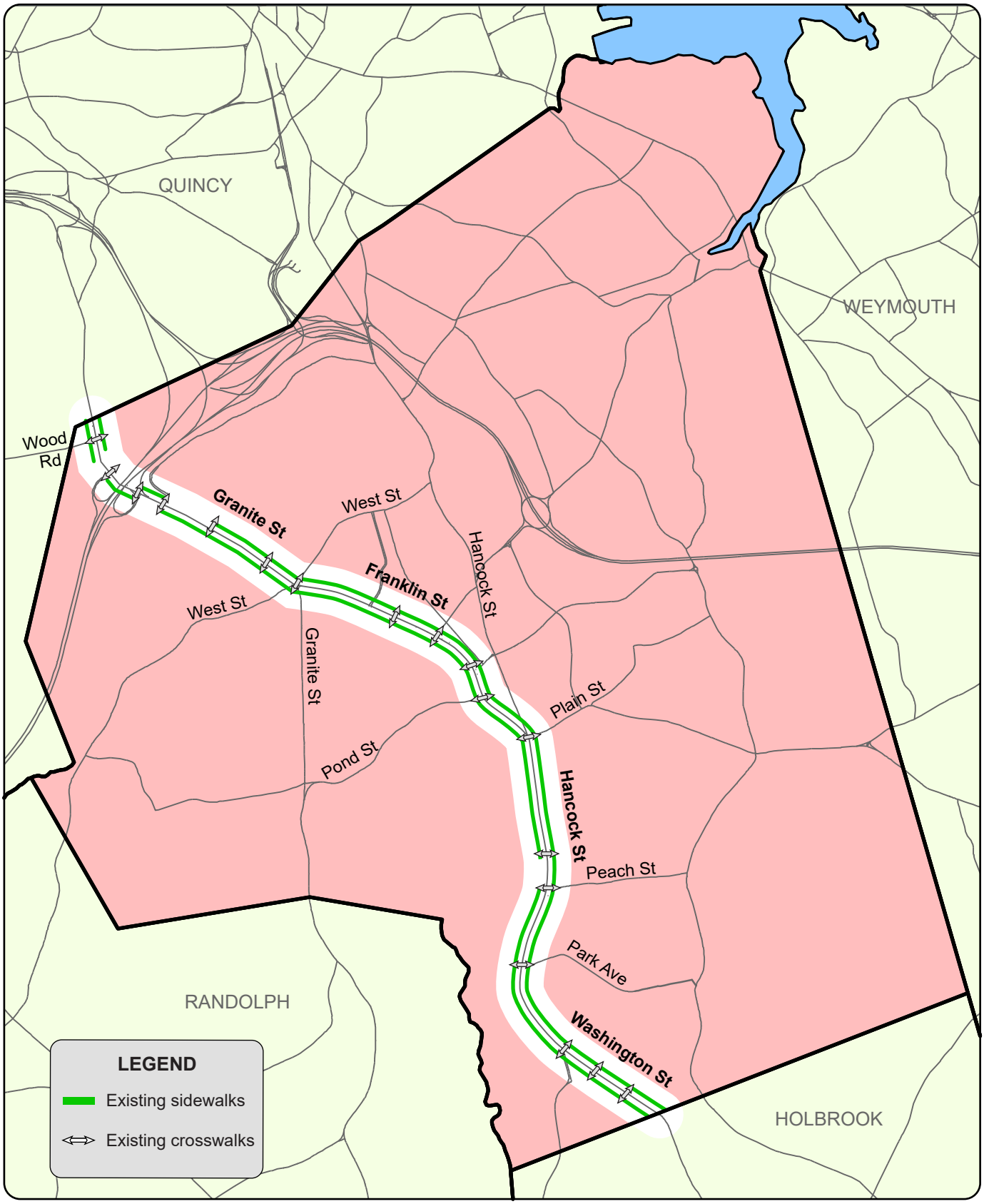
South of the corridor, the Hancock/Washington Streets segment is surrounded by multiple land uses, including residential (dominant uses), educational, open spaces, small-scale commercial retail, and industrial parks.

3.4 MULTIMODAL TRANSPORTATION

The Route 37 corridor supports several land uses with the potential to generate and attract walking, biking, driving, and transit trips. Automobiles are the primary access to all the land uses along the corridor. Biking, walking, and bus service accommodations are in the corridor, but they need improvements due to poor quality conditions, gaps and connectivity issues, and limited availability.

3.4.1 Walking and Biking Modes

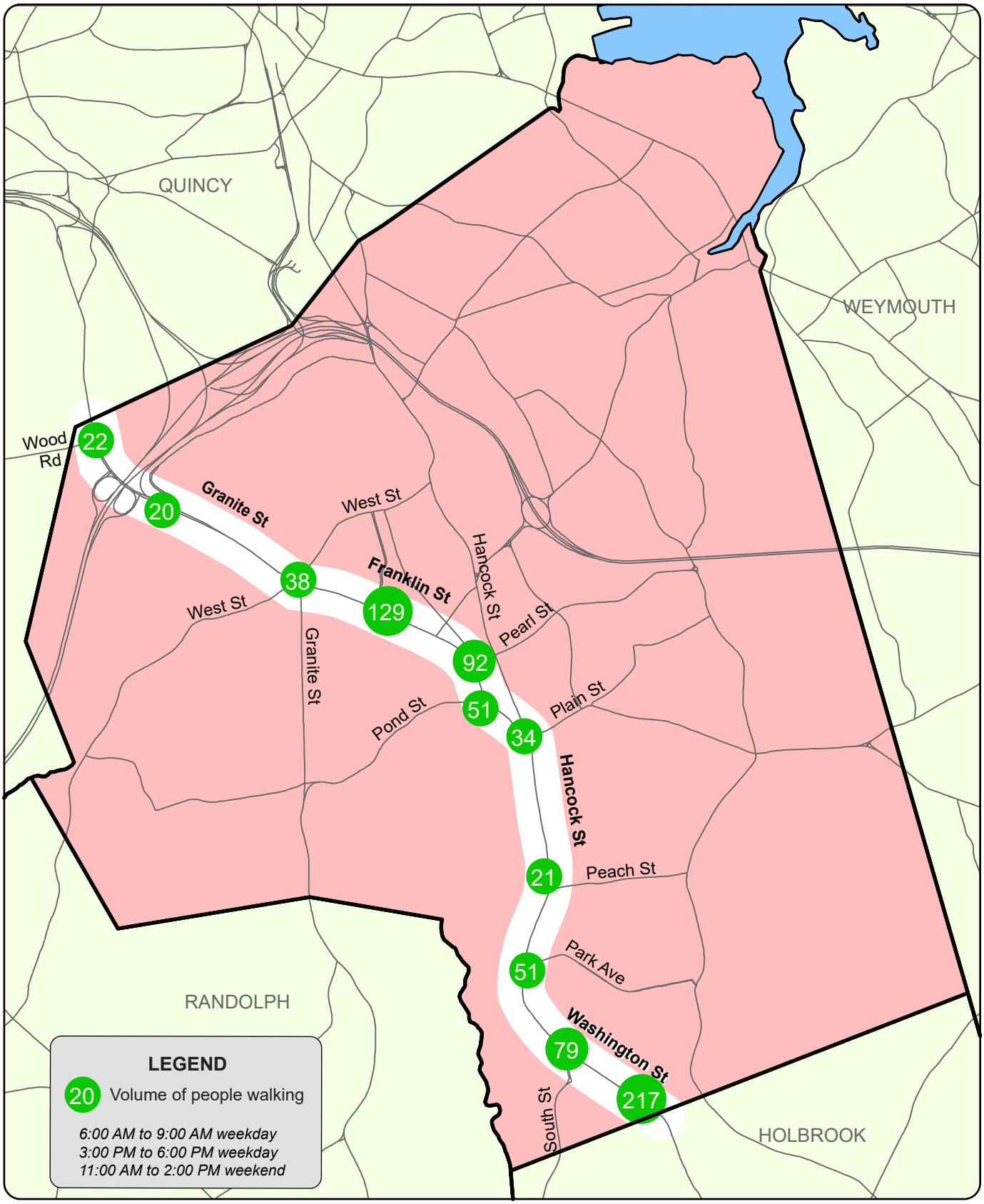
Figure 5 shows the locations where there are sidewalks and crosswalks. Sidewalks are present on Route 37 for about 90 percent of its length. However, there are gaps in the sidewalk network on Granite Street, which causes people to use crosswalks to switch sides several times to get to their destinations. In addition, all three roadway segments have poor-quality sidewalk conditions, which create challenges for people walking or using assistive mobility devices. Figure 6 shows walking volumes at the study intersections.



BOSTON REGION MPO

Figure 5
Existing Sidewalks and Crosswalks

Route 37 Priority Corridor Study
Braintree, Massachusetts



BOSTON REGION MPO

Figure 6
Volume of People Walking

Route 37 Priority Corridor Study
Braintree, Massachusetts

People walking on Route 37 can safely cross it at the signalized intersections, where crosswalks have pedestrian-activated signals and curb ramps. In addition to signalized intersections, people walking can also cross Route 37 at six marked midblock crosswalks across Route 37: one near Park Avenue controlled by a pedestrian signal, one near the Braintree Highland Community Playground controlled by a Rectangular Rapid Flashing Beacon (RRFB), and four near Leroy Way, McMaster Funeral Home near Taylor Street, Peach Street, and Arbutus Avenue that are uncontrolled. Because of the high volumes and speeds of vehicles, some uncontrolled marked crosswalks would need upgrades such as RRFB to improve safety. Together, the spacing between the crosswalks is about as far apart as 0.25 miles (1300 feet) and does not create a barrier between businesses and neighborhoods east and west of Route 37. Table 1 shows the number of people biking. The low number may be attributed to a need for safer biking infrastructure and high vehicle speeds and volumes, which create a high-stress environment and safety concerns for people biking.

Table 1
Number of People Biking

Location	Volume
Granite Street at Wood Road/Rockdale Street	5
Granite Street at I-93 southbound ramp junction	2
Granite Street at Forbes Road	1
Granite Street at KinderCare/South Mall Entrance	6
Granite Street at Franklin Street and West Street (Five Corners)	10
Franklin Street at Leroy Way	19
Franklin Street at Washington Street	11
Washington Street at Pond Street	11
Washington Street at Hancock Street/Plain Street	5
Washington Street at Braxton Street	4
Washington Street at Park Avenue/Standish Avenue	4
Washington Street at South Street	1
Washington Street at Roosevelt Street	25

Walking and Biking Levels of Service (LOS)

The roadway infrastructure primarily affects the quality of walking and biking travel, such as whether there are sidewalks, crosswalks, curb ramps, or bike lanes. The quality of walking and biking travel is also affected by the character of the roadway and factors that contribute to the safety and security of people, such as the speed and volume of vehicles and comfort and convenience. MPO staff developed LOS tools that grade a given roadway on its quality of walking and biking travel and whether it reflects these objectives: safety, system preservation,

capacity management and mobility, and economic vitality.[3] Based on this evaluation, the quality of walking on Route 37 was rated *poor* or *fair* regarding safety, system preservation, capacity management and mobility, and economic vitality. Bicycle LOS was rated unacceptable regarding safety, system preservation, capacity management and mobility, and economic vitality. The assessment indicates that the roadway needs improvements to safely accommodate people walking and biking. The ratings from this assessment tool are in Appendix B.

Challenges for People Walking and Biking

People walking and biking in the corridor face several challenges. Following the analysis of crash data, field survey, review of signal data and layouts, and recommendations from road safety audits, these challenges were identified, some of which are summarized below.

Walking Challenges

- Pedestrian-involved crashes: Five crashes involving people walking along Route 37.
- Gaps in sidewalks: Gaps in the sidewalk network on Granite Street and Hancock-Washington Street segments.
- Poor sidewalk conditions: Uneven sidewalk surfaces, broken with cracks, overgrown vegetation, and obstacles such as utility poles that reduce width to less than four feet. All three segments exhibit these deficiencies.
- Lack of leading pedestrian intervals at signalized intersections with concurrent pedestrian phases (Wood Road intersection).
- Noncompliant Americans with Disabilities Act (ADA) curb ramps: At the I-93 ramp-arterial junctions and intersections of the mall entrances.
- Inadequate street lighting: Poor lighting on Route 37 poses safety and security concerns for people walking.

Biking Challenges

- Lack of bicycle infrastructure for people biking.
- High-stress environment for people biking due to high vehicle speeds and volumes.

[3] Ryan Hicks and Casey-Marie Claude, *Pedestrian Level-of-Service Memorandum*, Technical Memorandum to the Boston Region Metropolitan Planning Organization, January 19, 2017; Casey-Marie Claude, *Development of a Scoring System for Bicycle Travel in the Boston Region,* Technical Memorandum to the Boston Region Metropolitan Planning Organization, November 8, 2018.

- Issues with bikeable shoulders: Although bikeable shoulders are present on the Hancock/Washington Streets segment, they are not marked as bike lanes.
- Lack of connectivity for bike trips between Route 37 and crossing arterials.

3.4.2 Transit Mode

Figure 7 shows the MBTA service in or near the study area, including the Red Line station and commuter rail station at Braintree Station and three bus routes:

- 230 Quincy Center Station-Montello Station
- 236 Quincy Center Station-South Shore Plaza
- 238 Quincy Center Station-Randolph

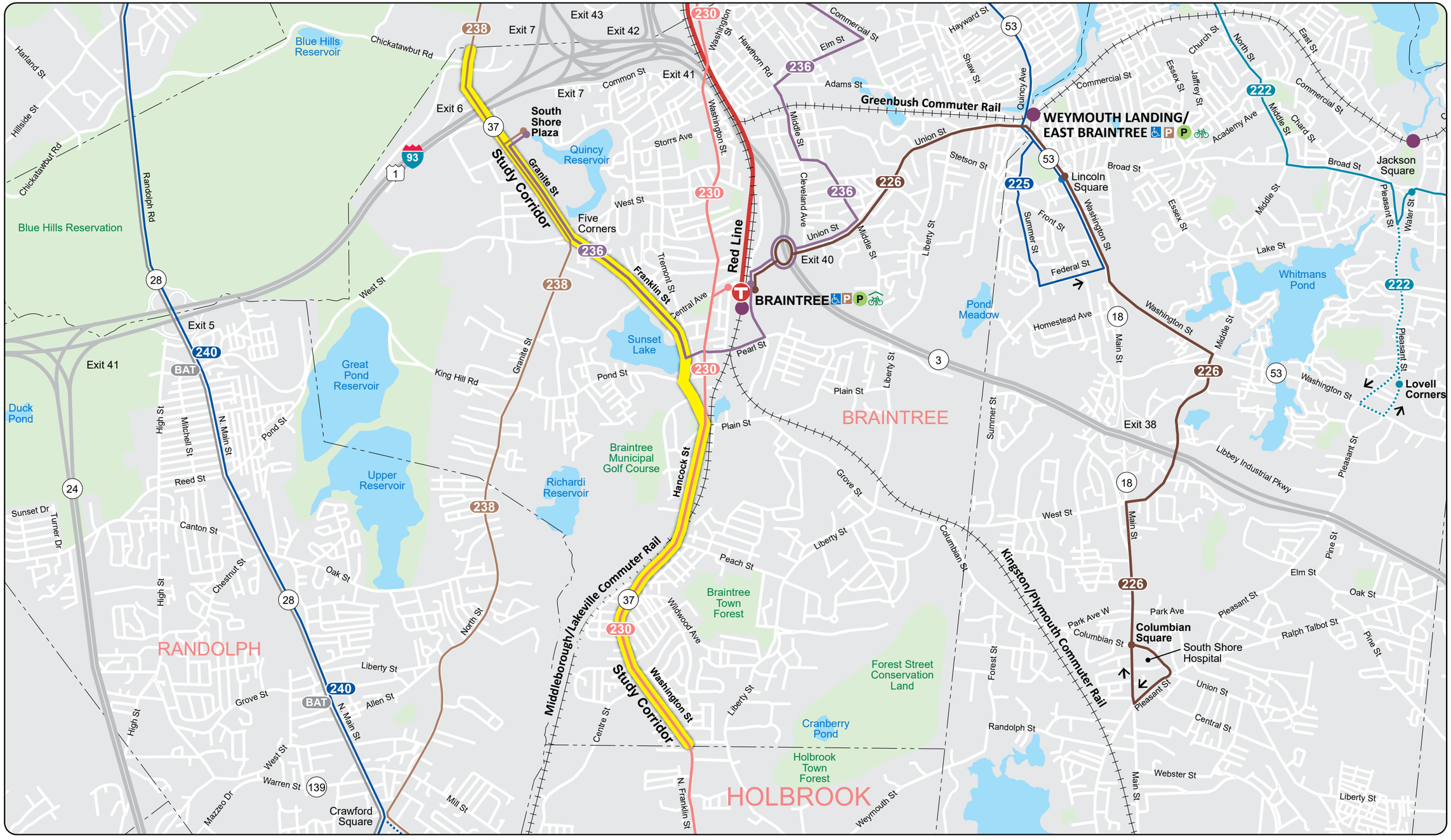
Rail Service

Red Line

Braintree station is the southern terminal for one of two Red Line branches and is also a stop on the Middleborough and Kingston commuter rail lines. The station includes a parking garage under construction and contains 1,300 spaces as built and 350 open spaces with additional temporary spaces available at two surface lots on Ivory Street. As of July 2023, Red Line service from Braintree operates every 18 minutes on weekdays and every 22 minutes on weekends. Ridership at Braintree Station on a sample day of September 2022 was 2,630 total boardings, with 1,529 boarding between 6:00 AM and 9:00 AM. On a sample day of April 2023, all-day boardings from Braintree were 1,497, with 651 boarding between 6:00 AM and 9:00 AM due to speed restrictions and a reduction in peak period scheduled service.

Commuter Rail

The commuter rail service at Braintree station presently consists of 27 inbound and 25 outbound trips to/from Boston on weekdays, 15 of which are from Middleborough and 12 from Kingston. There are 18 inbound and 17 outbound trips on weekends. As mitigation for the Red Line service issues, fare policy changes have significantly increased commuter rail ridership from Braintree Station to Boston. Draft manual counts undertaken by Central Transportation Planning Staff at Braintree station from 6:00 AM to 9:00 AM in July 2023 show more than 600 passengers boarding commuter rail trains to Boston.



BOSTON REGION MPO

Figure 7
Transit Services Around Route 37, Braintree

Route 37 Priority Corridor Study, Braintree, Massachusetts

Bus Service

Route 230

Route 230 begins at Quincy Center station and operates via Braintree Station busway, Hancock Street, and Washington Street to Montello Station in Brockton. Service operates every 25–30 minutes in the peak, every 60 minutes midday on weekdays and Saturdays, every 75 minutes in the evenings, and every 90 minutes on Sundays. Fall 2022 MBTA total Route 230 ridership data collected from automatic passenger counters was 788 riders on weekdays, 435 on Saturdays, and 260 on Sundays. Fall 2019 average weekday ridership was 1,359. The route has retained 57 percent of 2019 weekday ridership and rising.

Route 236

Route 236 begins at Quincy Center station and operates via Hancock Street, Washington Street, and Granite Street into South Shore Plaza. Morning rush-hour service only operates between Quincy Center and Braintree station, and the route operates to South Shore Plaza at all other times. Service operates every 60 minutes on midday, PM peak, evenings, Saturdays, and Sundays. Fall 2022 MBTA total Route 236 ridership data collected from automatic passenger counters was 376 on weekdays, 375 on Saturdays, and 243 on Sundays. In Fall 2019, the average weekday ridership was 491. The route has maintained 76 percent of 2019 weekday ridership.

Route 238

Route 238 begins at Quincy Center station and operates via Hancock Street, Washington Street, Franklin Street, Granite Street, and South Shore Plaza to Crawford Square or Randolph/Holbrook Commuter Rail Station. Service operates every 25 minutes in the AM peak, 65 minutes middays, 40 minutes in the PM peak, 60 minutes on Saturdays, and every 80 minutes on evenings and Sundays.

Fall 2022 MBTA total Route 238 ridership data collected from automatic passenger counters was 965 on weekdays, 648 on Saturdays, and 361 on Sundays. Fall 2019 weekday ridership was 1,438. The route has maintained 67 percent of 2019 weekday ridership and is rising.

Challenges for People Taking Transit

People taking bus transit in the corridor face similar challenges for walking and biking. Specific challenges for bus riders are

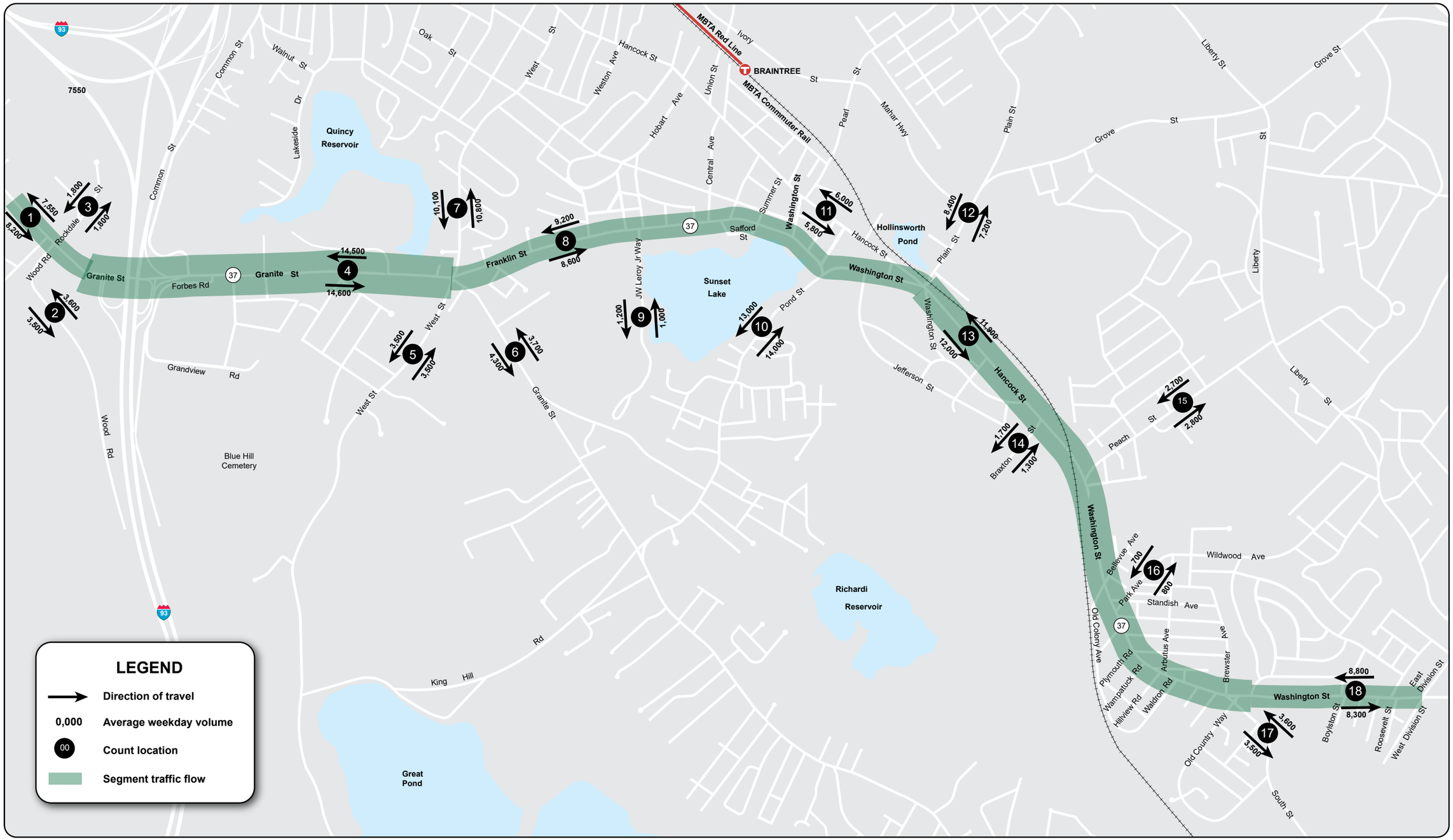
- on-time performance due to traffic congestion;
- lack of dedicated bus turnouts with accessible features such as curb ramps and crosswalks could present safety problems for riders;

- lack of bus shelters: Only two bus stops in the corridor have bus shelters—at South Shore Plaza and Roosevelt Street. Inclement weather could impact people's decisions to take the bus; and
- lack of bus priority signals to reduce delays and critically congested segments of the corridor.

3.4.3 Driving Mode

Traffic Volumes and Speed

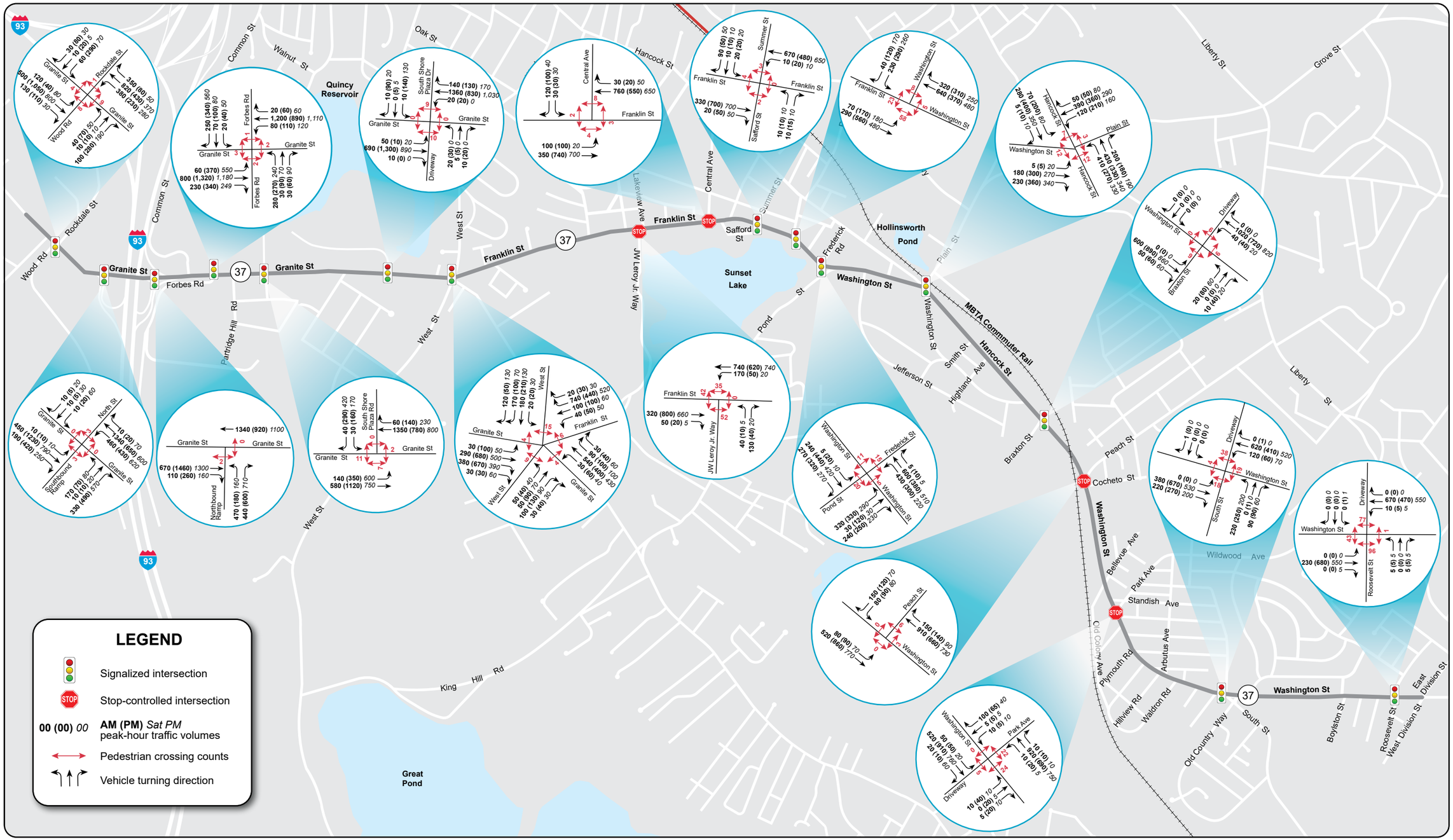
MassDOT Highway Division's Traffic Data Collection collected traffic data for the study. Automatic traffic recorder (ATR) counts were collected from Monday, May 1, 2023, to Friday, May 5, 2023. The ATR counts included daily traffic volumes, speeds, and traffic mix (light and heavy vehicles). MassDOT also collected turning-movement counts (TMC) in the study area on Thursday, May 4, 2023, and Saturday, May 6, 2023. The TMC counts were performed during the weekday AM peak travel period (6:00 AM to 9:00 AM) and weekday PM peak travel period (3:00 PM to 6:00 PM), and during the weekend (11:00 AM to 2:00 PM). In all cases, heavy vehicles, pedestrians, and bicycles were recorded separately. Figures 8 and 9 show the average weekday traffic volumes and the turning-movement volumes at 16 intersections during weekday AM and PM peak hours and the Saturday PM peak hour. Figure 10 shows the measured speeds and posted speed regulations for the corridor. The average speeds are consistent with the posted speed regulations, but the 85th percentile speeds are higher than those of the posted speed regulations in all three segments of the corridor. Speeding is a major concern, especially in the Franklin Street and Hancock/Washington Street segments where residential neighborhoods and schools surround these segments. Many respondents to the community survey commented on this issue. The traffic and speed data are included in Appendix C.



BOSTON REGION MPO

Figure 8
Average Weekday Traffic Volumes

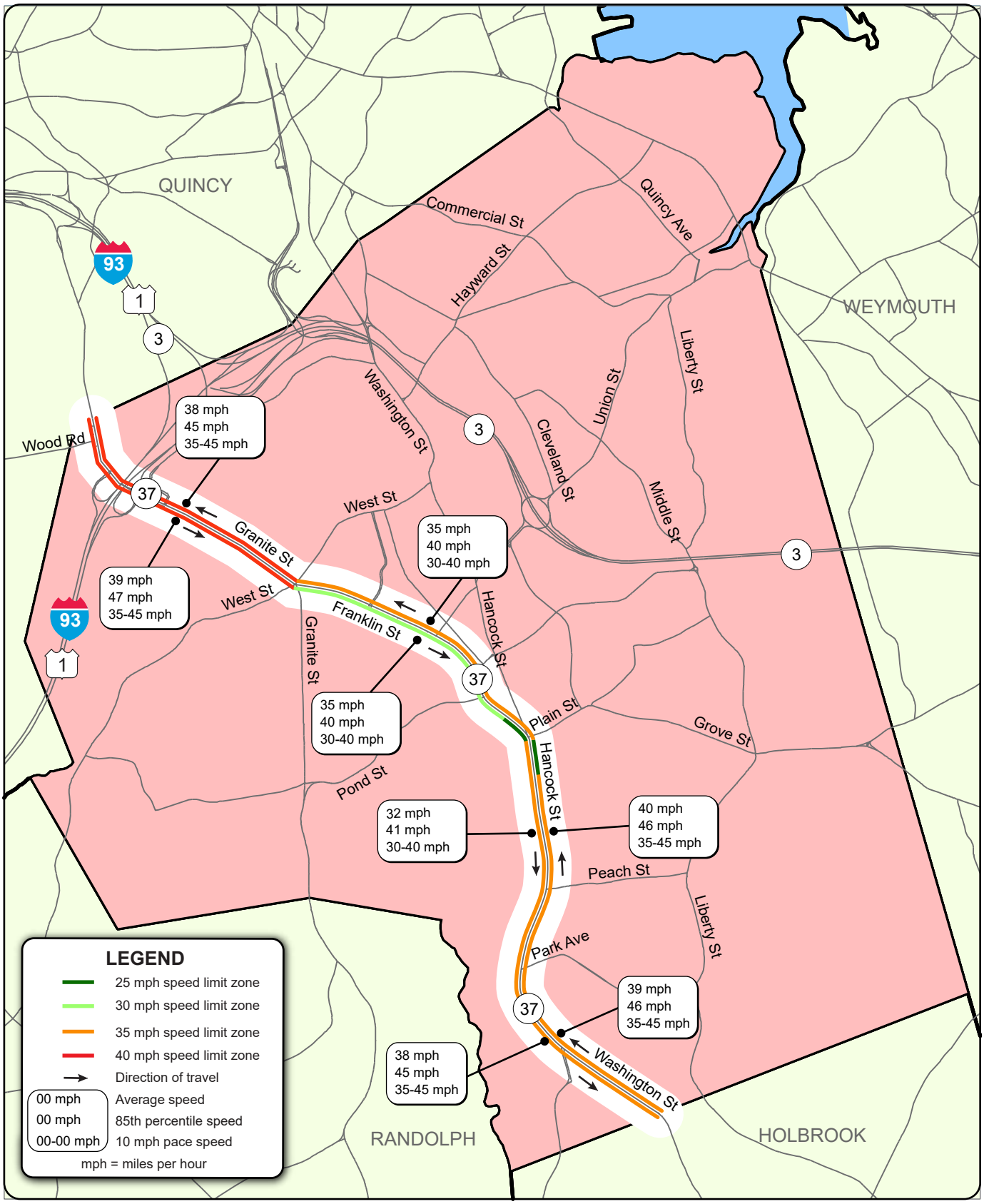
Route 37 Priority Corridor Study, Braintree, Massachusetts



BOSTON REGION MPO

Figure 9
2023 Existing Conditions
Peak-Hour Turning Movement Volumes

Route 37 Priority Corridor Study, Braintree, Massachusetts



BOSTON REGION MPO

Figure 10
Existing Conditions
Measured Speeds and Speed Regulations

Route 37 Priority Corridor Study
Braintree, Massachusetts

Intersection Levels of Service

MPO staff conducted traffic-operations analyses consistent with the Highway Capacity Manual's methodologies.[4] These methodologies are used to assess traffic conditions at signalized and unsignalized intersections and to rate the LOS from A to F. LOS A represents the best operating conditions (little to no delay). In contrast, LOS F represents the worst operating conditions (long delay). LOS E represents operating conditions at capacity (the limit of acceptable delay). Table 2 presents the control delays associated with each LOS for signalized and unsignalized intersections. Figures 11 through 12 show the analysis results for the weekday AM, weekday PM, and Saturday PM peak periods, respectively. The intersection LOS analyses are included in Appendix D. The following intersections were found to operate under congested conditions and have long queues during peak travel hours.

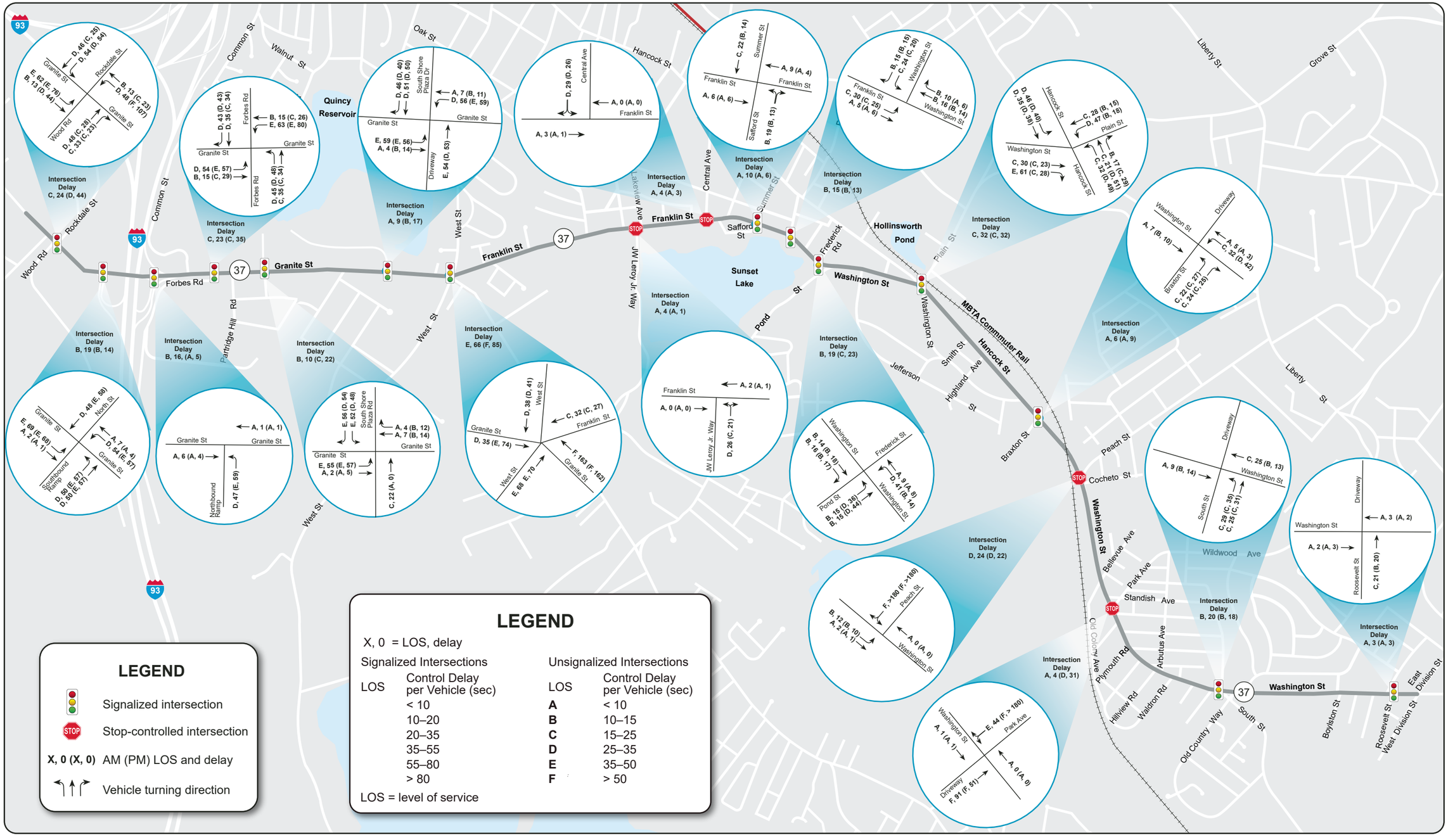
- Granite Street at Wood Road/Rockdale Street
- Granite Street at Forbes Street
- Granite Street at Franklin Street and West Street (Five Corners)
- Washington Street at Franklin Street
- Washington Street at Plain Street and Hancock Street
- Washington Street at Peach Street

Table 2
Intersection Level of Service Criteria

Level of Service	Signalized Intersection Control Delay (seconds per vehicle)	Unsignalized Intersection Control Delay (seconds per vehicle)
A	<10	<10
B	10–20	10–15
C	20–35	15–25
D	35–55	25–35
E	55–80	35–50
F	>80	>50

Source: Highway Capacity Manual 2010.

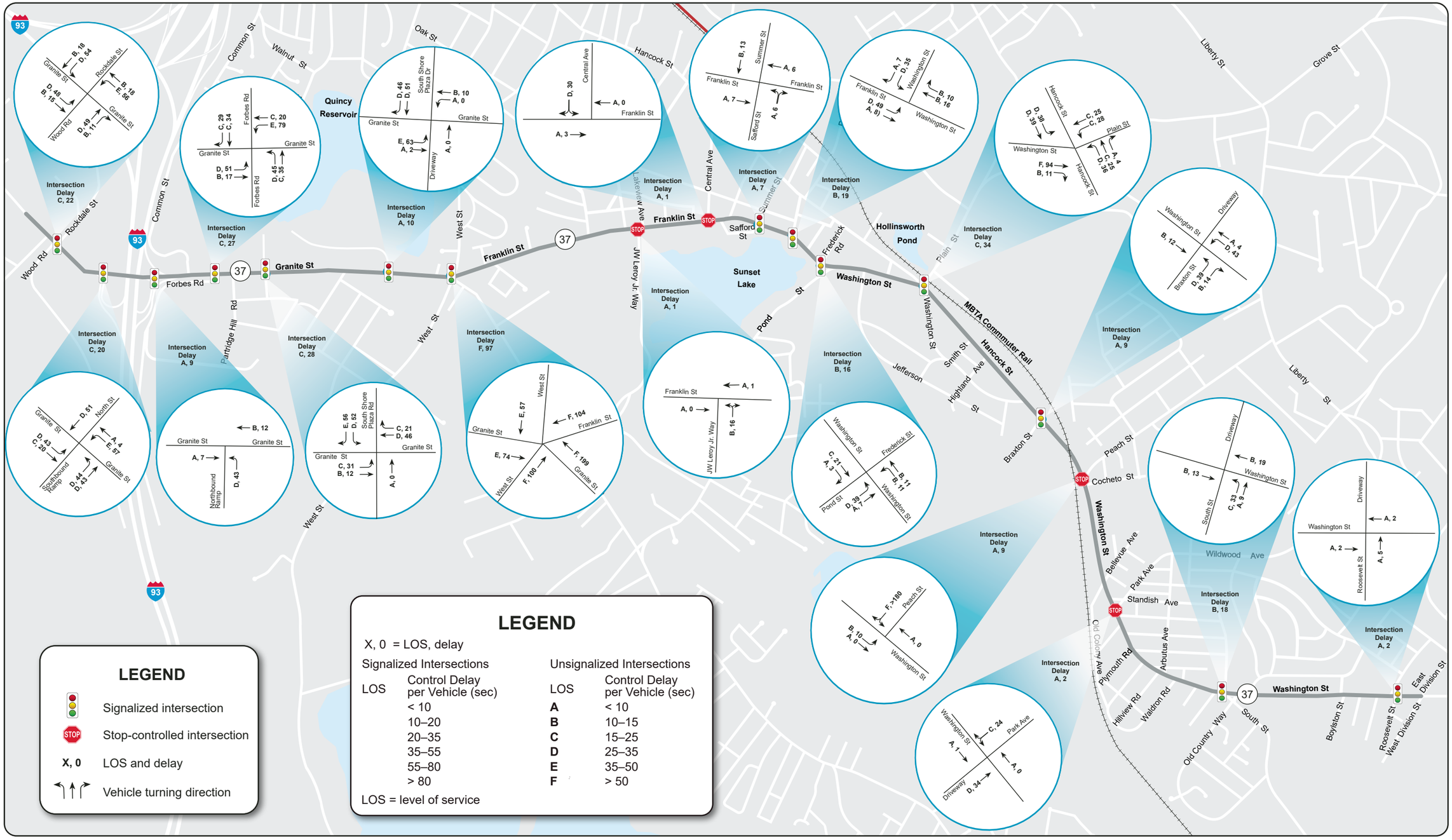
[4] Transportation Research Board of the National Academies, *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis,* Washington, DC, September 2020; CUBIC, Trafficware Inc., Synchro plus SimTraffic, Version 11.1 Build 1 version 6 (11.1.1.6), Sugar Land, Texas.



BOSTON REGION MPO

Figure 11
2023 Existing Conditions
Weekday Peak-Hour LOS and Delays

Route 37 Priority Corridor Study, Braintree, Massachusetts



BOSTON REGION MPO

Figure 12
2023 Existing Conditions
Weekend Saturday Peak-Hour LOS and Delays

Route 37 Priority Corridor Study, Braintree, Massachusetts

3.5 TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic control signals are valuable devices for controlling vehicular and pedestrian and bicycle traffic. They assign the right-of-way to various traffic movements and thereby strongly influence traffic flow. Traffic control signals that are properly designed, located, operated, and maintained will provide orderly movement of traffic, and reduce congestion and the frequency and severity of certain types of crashes, especially right-angle collisions. Justifying the need for a traffic control signal at an unsignalized intersection involves analyzing factors related to the existing traffic operations and safety conditions at the intersection, as well as the potential to improve these conditions. The *Manual on Uniform Traffic and Control Devices* (MUTCD) lists nine traffic signal warrants that justify installing a traffic signal. The warrants are listed in Table 3. Using the methodology outlined in the MUTCD, staff performed detailed traffic signal warrant analyses to determine whether the installation of a traffic control signal at two intersections are justified and if signalizing the intersections would improve safety and traffic operations.

- Franklin Street and Leroy Way intersection. Leroy Way provides access to Braintree High School and during school opening and closing periods, a police detail controls traffic at the intersection to allow students to cross Franklin Street and school traffic on Leroy Way to enter Franklin Street safely.
- Washington Street and Peach Street intersection. This intersection is located on a horizontal and vertical curve that limits sight distances on the approach of Peach Street. During peak travel periods when volumes on Washington Street are high, it is difficult to turn out of Peach Street.

Table 3 presents the results of the traffic signal warrant analyses for these intersections. Detailed traffic signal warrant analysis worksheets are included in Appendix D. Existing conditions at the intersection of Franklin Street and Leroy Way satisfied two of the nine warrants. The intersection has a low crash rate, and traffic delays on Leroy Way occur only during the school opening and closing periods. Existing conditions at the intersection of Washington Street and Peach Street satisfy three of the nine warrants. The intersection had 24 crashes from 2016 and 2020 and Peach Street experienced delays and queuing during weekdays AM and PM peak travel periods. Based on the results of the signal warrant and intersection capacity analyses, MPO staff recommend that MassDOT consider installing a traffic signal at the intersection of Washington Street and Peach Street. MPO staff do not recommend installing a traffic signal at the intersection of Franklin Street and Leroy Way; however, an upgraded high-visibility crosswalk, such as a RRFB, is recommended for the intersection.

Table 3
Results of the Traffic Signal Warrant Analysis

Warrant	Franklin Street at Leroy Way	Washington Street and Peach Street
Warrant 1, Eight-Hour Vehicular Volume	Not satisfied	Satisfied
Warrant 2, Four-Hour Vehicular Volume	Satisfied	Satisfied
Warrant 3, Peak Hour	Satisfied	Satisfied
Warrant 4, Pedestrian Volume	Not satisfied	Not satisfied
Warrant 5, School Crossing	Not satisfied	Not satisfied
Warrant 6, Coordinated Signal System	Not satisfied	Not satisfied
Warrant 7, Crash Experience	Not satisfied	Not satisfied
Warrant 8, Roadway Network	Not satisfied	Not satisfied
Warrant 9, Intersection Near a Grade Crossing	Not satisfied	Not satisfied

Source: Central Transportation Planning Staff.

3.6 CRASHES

Crash data for Route 37 from January 2016 through December 2020 was used to assess safety in the corridor. Analyses include a summary of crash statistics, including severity, collision type, weather and ambient light conditions, and mode of travel. Analysis results are summarized in Table 4 for the high-crash intersections and intersections with fatal crashes.

Table 4
Summary of Intersection Crashes

Crash Variable	Wood Road	North Street	Forbes Road	Five Corners	Plain Street	Peach Street	South Street
Total number of crashes	28	22	92	97	37	24	6
Severity	--	--	--	--	--	--	--
Property damage only	11	13	56	65	22	15	2
Nonfatal injury	14	9	35	32	14	8	3
Fatality	0	0	0	0	0	1	1
Not reported/unknown	3	0	2	1	1	0	0
Crash Type	--	--	--	--	--	--	--
Single vehicle	5	1	11	8	3	3	1
Rear-end	8	9	24	19	19	12	1
Angle	11	11	45	61	11	9	4
Head-on	0	0	4	4	1	0	0
Sideswipe, same direction	3	1	7	4	2	0	0
Sideswipe, opposite direction	1	0	2	2	1	0	0
Not reported/unknown	0	0	0	0	0	0	0

Ambient Light Conditions	--	--	--	--	--	--	--
Daylight	23	18	55	74	26	17	5
Dark—lighted roadway	3	4	34	19	11	6	1
Dark—unlit roadway	0	0	0	1	0	0	0
Dark—unknown	0	0	0	0	0	0	0
Dawn	1	0	3	3	0	1	0
Dusk	1	0	1	0	0	0	0
Unknown/other	0	0	0	1	0	0	0
Involved pedestrian(s)	1	0	0	1	0	1	0
Involved bicyclist(s)	2	0	0	0	0	0	0
Occurred during peak periods*	17	9	33	55	18	17	0
Wet or icy pavement conditions	1	9	18	23	10	11	0
Dark conditions (lit or unlit)	5	4	38	26	11	7	1

*Peak periods are 6:00 AM to 9:00 AM and 3:00 PM to 6:00 PM, Monday through Friday.
Source: Central Transportation Planning Staff.

- There were two fatal crashes: one pedestrian-related crash on the western side of Washington Street where there is no sidewalk just north of Peach Street intersection and one crash at the intersection of Washington Street and South Street.
- Injury crashes at the intersections ranged from 33 to 50 percent.
- Rear-end and angle crashes were the common crash types; they represent between 70 to 90 percent of the crashes.
- The majority of the crashes occurred during daylight conditions. However, nighttime (lit or unlit) crashes ranged between 11 and 30 percent.
- Weekday peak period crashes represented between 36 to 61 percent of the crashes

3.6.1 Collision Diagrams

MPO staff prepared collision diagrams for the Highway Safety Improvement Program (HSIP) crash clusters and high-crash locations to examine patterns and factors contributing to the crashes listed below. The diagrams are included in Appendix E.

- High frequency of angle crashes within the intersections. The likely causes are poor signal visibility, distracted and impaired driving, excessive speeds on the approaches, inadequate signal timing, and congestion.
- High frequency of rear-end crashes on Granite Street approaches. Probable causes are driver distraction, inattention, impaired driving,

vehicles following too close, speeding, inadequate signal timing or phasing, and poor visibility of signals.

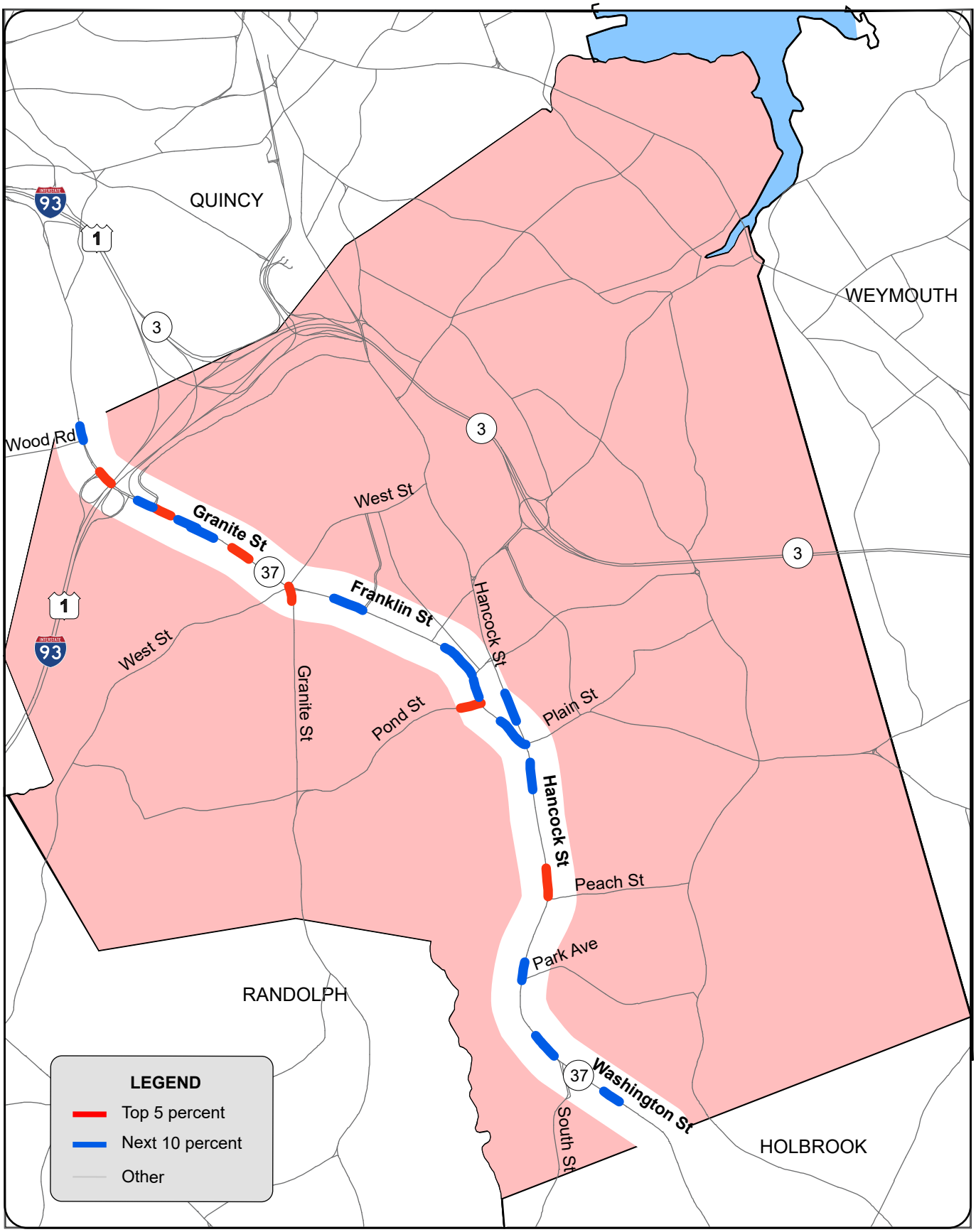
- High frequency of nighttime crashes on the approaches of Granite Street. Possible causes are poor visibility or lighting and poor sign quality.
- Three crashes involving people in crosswalks at Wood Road intersection. Likely causes of these crashes are restricted sight distance, inadequate protection for people walking and biking, inadequate signal phasing, and inattention
- Failed to yield the right of way, disregarded traffic control, and inattention were significant contributing factors

3.6.2 Excess Expected Crashes

MPO staff used MassDOT's crash-based screening tool to identify sites with excess expected average crash frequency that ranked in the top 5 percent and the next 10 percent in the MPO region. Figure 13 is a map of the sites with excess crash frequencies. Excess expected average crash frequency is the difference between expected and predicted average crash frequencies. If the predicted average crash frequency (crashes per year under idealized circumstances) is significantly less than the expected average crash frequency, it suggests that correctable factors are elevating the average crash frequency. These sites have a high potential for safety improvement.

3.6.3 Systemic Risk-Based Sites

Staff used MassDOT's risk-based screening tool to identify sites with the most significant risk of fatal and injury crashes based on risk factors identified for the emphasis areas in the Strategic Highway Safety Plan. Table 5 presents the primary and secondary risk sites. All three corridor segments have primary risk sites for risk factors such as older and younger drivers, distracted and impaired driving, and occupant protection. There was no primary risk site related to pedestrians and bicycles in the corridor, but all three segments had secondary risk sites pertaining to pedestrians and bicycles.



BOSTON REGION MPO

N

Figure 13
Locations with Excess Expected Crashes Fatal and Injury (2013–17), Based on MPO Ranking

Route 37 Priority Corridor Study
Braintree, Massachusetts

Table 5
Risk-Based Primary and Secondary Sites in the Corridor

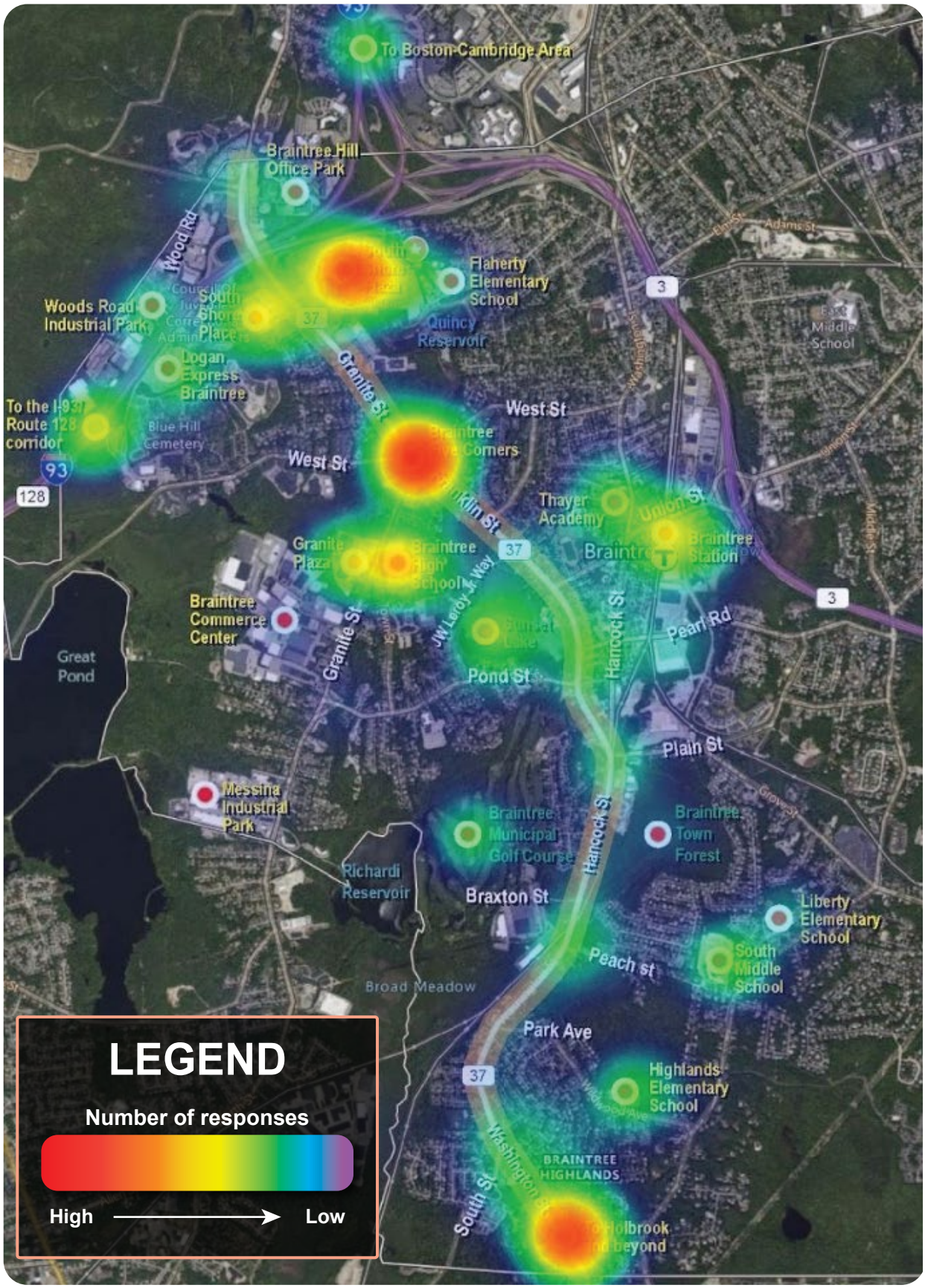
Emphasis Area	Primary Risk Site	Secondary Risk Site
Pedestrian and bicycle-related	None	Granite Street Franklin Street
Lane departure	None	Granite Street Hancock Street Washington Street
Older driver	Granite Street Central Street Hancock Street	Franklin Street Washington Street
Younger driver	Granite Street Franklin Street Hancock Street Washington Street	Granite Street Franklin Street
Distracted driving	Franklin Street Hancock Street Washington Street	Granite Street Franklin Street Washington Street
Impaired driving	Franklin Street	Granite Street Washington Street
Occupant protection	None	Granite Street Franklin Street Hancock Street Washington Street
Speeding	None	Franklin Street

3.7 COMMUNITY SURVEY

Staff developed a survey to help determine the public's opinion about concerns and problems on Route 37 in Braintree and how to resolve them. The online survey received 300 responses in July and August 2023. Figures 14 through 16 show the typical destinations in Braintree for respondents using Route 37 and the locations where respondents typically feel unsafe. The survey questionnaire, responses, and specific comments are included in Appendix F.

- Most respondents travel on Route 37 almost every day and typically drive in the corridor (86 percent), which underscores the automobile-centric nature of the corridor. However, a small proportion (20 percent) of the respondents also said they walk, bicycle, or take a bus in the corridor.
- A majority (90 percent) of the trips are work-, shop-, and recreation-related trips.
- Nearly 70 percent of the respondents travel outside of Braintree when they are using Route 37.

- Typical destinations in Braintree for respondents using Route 37 are South Shore Plaza, Five Corners, Braintree High School, and Braintree Station.
- Challenges for respondents who drive on Route 37 include
    - traffic congestion,
    - long wait times at intersections with traffic lights,
    - difficulty turning into or out of the side streets and driveways; and
    - difficulty crossing Route 37.
- Challenges for respondents who walk or bike on Route 37 include
    - poor quality sidewalks and gaps in the sidewalk network,
    - a lack of bike lanes,
    - high speeds of vehicles,
    - limited safe crossing opportunities, and
    - safety concerns.
- Thirty percent of the respondents who drive on Route 37 feel unsafe in the corridor, while 60 percent of the respondents who bike in the corridor feel unsafe in the corridor.
- Only 25 percent of respondents who walk or bike on Route 37 rate the nighttime conditions as good or very good, while 70 percent of respondents who drive on Route 37 rate the nighttime conditions as good or very good.
- Sixty percent of the respondents rate conditions of sidewalks along Route 37 as poor or very poor.
- Although most respondents reported driving in the corridor, they seemed highly receptive to improving facilities for walking and biking.
- Ninety percent of respondents support adding safer crossing opportunities and walking and biking infrastructure on Route 37.

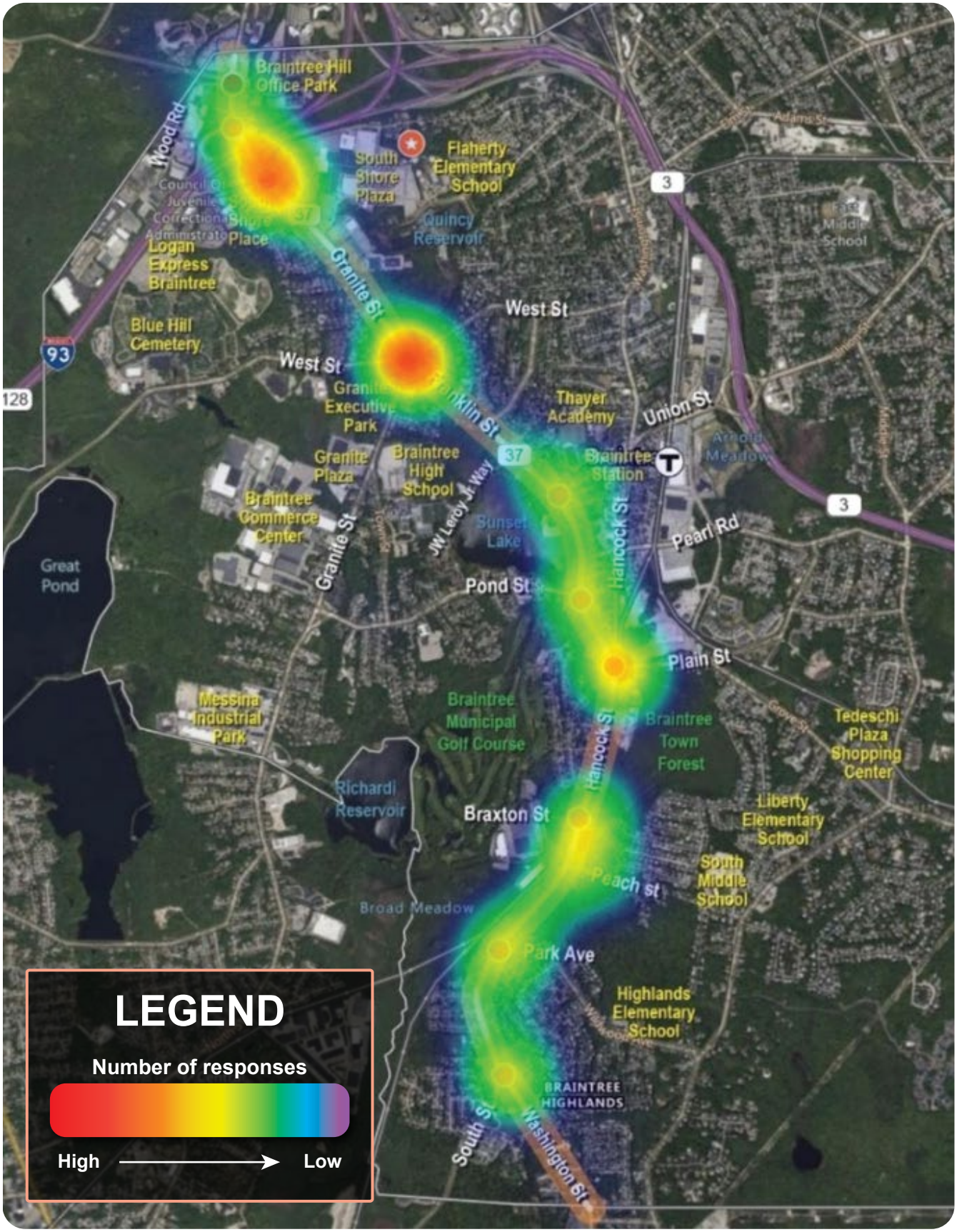


BOSTON REGION MPO

N

Figure 14
Typical Destinations for People using Route 37

Route 37 Priority Corridor Study
Braintree, Massachusetts

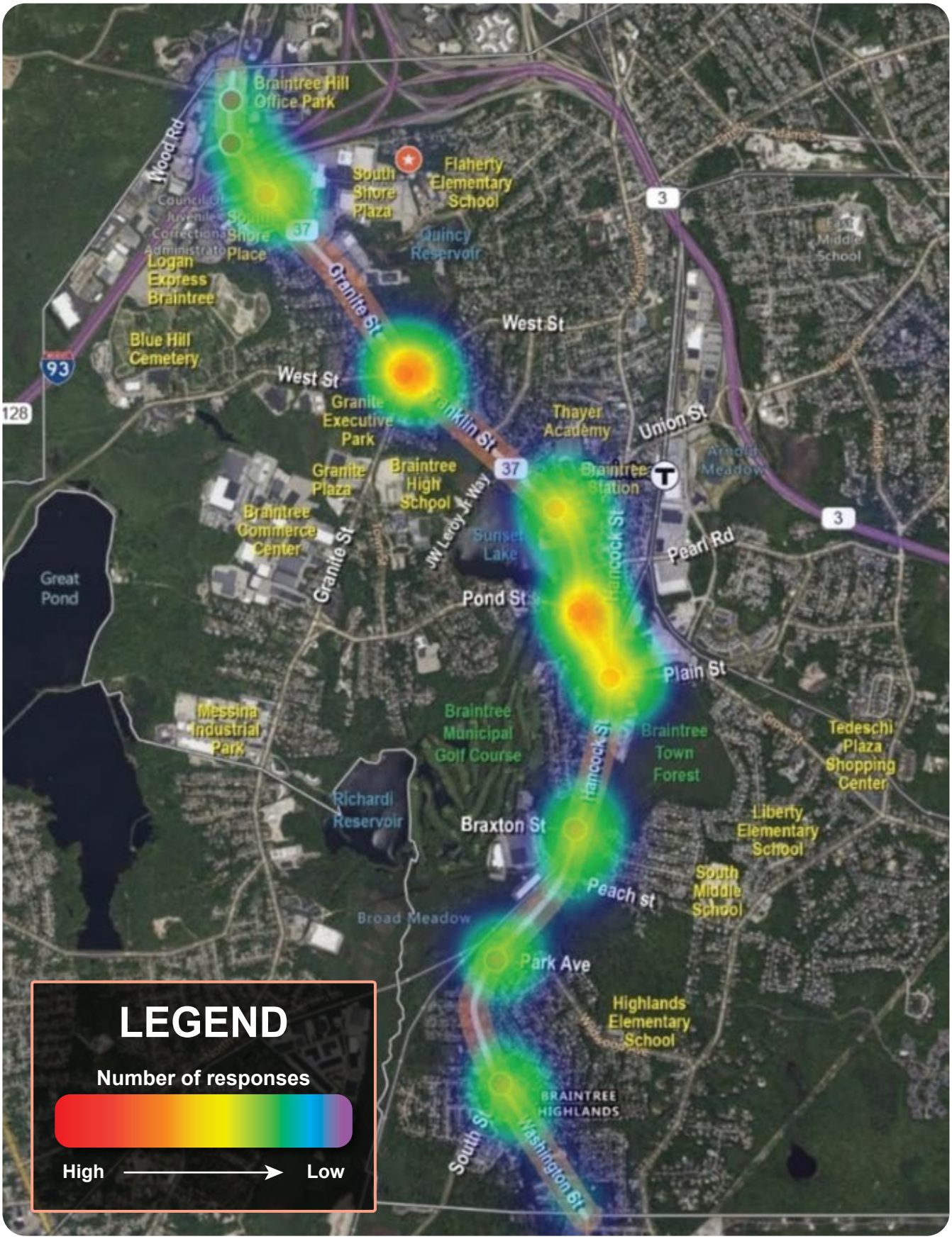


BOSTON REGION MPO

N

Figure 15
Locations Where People Feel Unsafe Driving

Route 37 Priority Corridor Study
Braintree, Massachusetts



BOSTON REGION MPO

N

Figure 16
Locations Where People Feel Unsafe Walking, Biking, or Using Assistive Mobility Device

Route 37 Priority Corridor Study
Braintree, Massachusetts

3.8 NEEDS ASSESSMENT

The presence of multiple land uses, including residential and commercial development, office and industrial parks, and educational and recreational areas adjacent to the corridor, creates an essential need for improving safety and multimodal mobility to access these types of land uses. Consequently, many of the issues in the Route 37 corridor arise from the multimodal roles the corridor serves or needs to serve. The following weaknesses, strengths, and needs of the corridor were identified through analysis of data, information gathered from a community survey, and feedback from the advisory committee.

3.8.1 Corridor Weaknesses

- Automobile-centric corridor that needs multimodal improvements
- Poor quality sidewalk conditions
- Gaps in the sidewalk network on Granite Street and Washington Street infrastructure
- Lack of bike infrastructure
- High vehicle speeds and volumes present safety concerns for people walking, biking, and driving
- Long waits at signalized intersections for people walking, taking the bus, and driving
- Localized traffic congestion at the following intersections:
    - Granite Street and Wood Road/Rockdale Street
    - Granite Street and Forbes Road
    - Five Corners
    - Franklin Street and Washington Street
    - Washington Street, Hancock Street, and Plain Street
    - Washington Street and Peach Street
- Three pedestrian and bicycle-related crashes in crosswalks at the intersection of Granite Street and Wood Road/Rockdale Street
- Two HSIP intersection crash clusters at the following intersections:
    - Granite Street and Forbes Road
    - Five Corners
- Five sites with excess expected crash sites in the top five percent of MPO ranking:
    - Granite Street segment at I-93 southbound ramp junction
    - Granite Street segment at Forbes Street
    - Granite Street at Five Corners
    - Hancock Street and Washington Street segment at Plain Street

    - Washington Street segment between Braxton Street and Plain Street
- Outdated traffic signal timings and signal equipment
- Lack of bus turnouts and bus priority service
- Poor street lighting in the corridor

3.8.2 Corridor Strengths

- Opportunities for multimodal transportation (walking, biking, driving, riding the bus, and using assistive mobility devices)
- Opportunities to improve access and connections to neighborhoods, workplaces, businesses, economic opportunities, and open space
- Major corridor with multiple land uses and transportation equity populations
- Opportunities to improve livability and quality of life of surrounding neighborhoods
- Vital link in the regional transportation system, including connections to the Route 128, Interstate 93, and Route 3, Commuter Rail, Red Line, and Braintree Station

3.8.3 Corridor Needs

In its current configuration, the corridor has significant deficiencies that impact the safety of users, mobility, and residents' quality of life and access to businesses and land uses along the corridor. The primary needs for improving the Route 37 corridor are safety, mobility, and accessibility. Multimodal mobility enhancements in the corridor can increase safety, connect users to recreational parks, open spaces, businesses, commercial centers, and educational institutions, and encourage people to take bus transit. The corridor needs include but are not limited to the following:

- Roadway amenities such as good-quality sidewalks, accessible curb ramps, and safe crossing opportunities.
- Quality infrastructure that meets the needs of people walking, biking, using assistive mobility devices, taking the bus, and driving.
- Infrastructure upgrades to improve safety and security for all users.
- Redesigns of the roadway and intersections to calm traffic, reduce high-vehicle speeds, and create a friendly environment for people walking and biking.
- Retime and optimize traffic signal systems to reduce congestion.

Chapter 4—Proposed Improvements

4.1 PROJECTS AND STUDIES

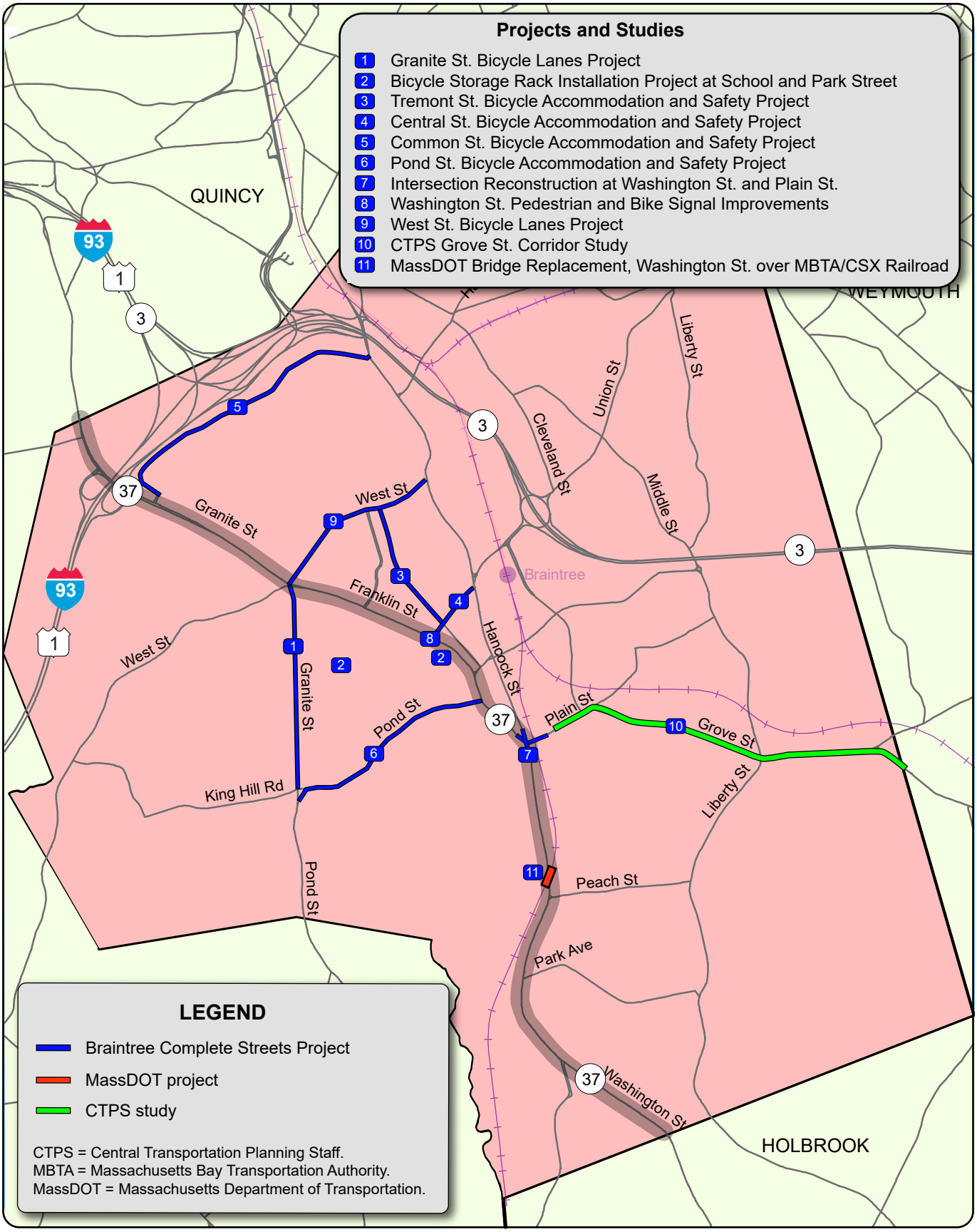
Identifying and reviewing recently completed, ongoing, and planned projects for the corridor is essential before developing additional improvements. This information was sourced from the Massachusetts Department of Transportation (MassDOT) project information database, construction and project updates from Braintree Public Works, and studies conducted by the Metropolitan Planning Organization (MPO). MPO staff reviewed the Braintree Complete Street Prioritization Program and extracted planned projects in the study corridor. Also, staff researched the publication database of the MPO to identify previous studies on Route 37 and its intersecting streets. Figure 17 shows the relevant projects and studies in the corridor.

4.2 NEAR-TERM IMPROVEMENTS

The corridor would immensely benefit from near-term improvements. The time frame considered near-term is typically less than five years, and the costs of improvements are under $50,000. The near-term improvements can be funded through maintenance budgets or included in MassDOT's projects currently in design. Most near-term improvements typically do not require design and engineering efforts. These improvements include installing new signs, upgrading old signs, marking pavement, painting high-visibility crosswalks, upgrading curb ramps to Americans with Disabilities Act (ADA) standards, and installing countdown timers for pedestrians. Other near-term improvements are adding bike detection, upgrading signal-head sections, adding backplates with yellow retroreflective borders, and repairing substandard sidewalks. Tables 6 through 8 present the near-term improvements in the corridor, including the cost category, and jurisdiction.

4.3 LONG-TERM IMPROVEMENTS

The time frame categorized as *long-term* is typically more than five years. Long-term improvements require design and engineering efforts and larger funding sources. The long-term improvements address safety and multimodal transportation needs, such as increased safety for people who walk, bicycle, or ride the bus, and support livable communities and economic vitality. They include safety improvements, such as major signal equipment and timing upgrades, bus signal priority, the addition of separated or protected bike facilities, construction of new sidewalks, reconstruction of sidewalks of poor quality, and reconstruction of intersections. Tables 9 through 11 present the long-term improvements in the corridor, including the cost category, and jurisdiction. Figures 18 through 26 show details of the near- and long-term improvements.



BOSTON REGION MPO

Figure 17
Projects and Studies Near Route 37

Route 37 Priority Corridor Study
Braintree, Massachusetts

Table 6
Near-Term Improvements in the Granite Street Segment

Issue	Improvement	Cost	Jurisdiction
Pedestrian safety	Consider adding Leading Pedestrian Intervals (LPI) to the Wood Road/Rockdale Street signal phasing to increase pedestrian safety in crosswalks.*	Low	MassDOT
Pedestrian safety	Consider enhanced pedestrian signing for the Wood Road/Rockdale Street intersection, such as the Turning Vehicles Yield to Peds sign (R10-15).	Low	MassDOT
Pedestrian safety	Consider adding stop signs and crosswalks to the approach of Chickatawbut Road.	Low	DCR
Pedestrian safety	Evaluate and provide crosswalks where sidewalks end and continue on the other side of the roadway such as on North Street and Granite Street north leg at Wood Road.	Low	MassDOT
Pedestrian safety	Consider painting high-visibility crosswalks at the intersections of Wood Road/Rockdale Street.	Low	MassDOT
Pedestrian safety	Consider installing signs to remind motorists that they should expect to see and share the road with people who bike (W11-1 and W16-1P or R4-11).	Medium	MassDOT
Safety	Review and consider installing speed limit signs at regular distances to inform users of speed regulations.	Medium	MassDOT
Safety	Evaluate and consider adjusting change (yellow) and clearance (all red) intervals to meet MassDOT standards and to reduce rear-end crashes at signalized intersections.	Medium	MassDOT
Safety	Evaluate and consider aligning the existing signal heads better with their respective lanes.	Medium	MassDOT
Safety	Evaluate and consider installing advance intersection lane and traffic control signs to increase safety.	Low	MassDOT

Note: Low cost = less than $10,000. Medium cost = $10,001 to $50,000. High cost = more than $50,000.
* Leading Pedestrian Intervals (LPI) is used to establish pedestrian presence in crosswalk prior to providing green ball indications for drivers.
DCR = Department of Conservation and Recreation. MassDOT = Massachusetts Department of Transportation.

Table 7
Near-Term Improvements in the Franklin Street Segment

Issue	Improvement	Cost	Jurisdiction
Safety	Consider adding stop signs, stop lines, and crosswalks on minor road approach to Route 37.	Medium	MassDOT
Pedestrian safety	Consider working with residents and businesses to prohibit parking on sidewalks or shoulders.	Low	MassDOT/ Braintree
Safety	Consider painting “Do Not Block Intersection” pavement markings at the intersection of Washington Street and Pond Street. PM peak-period congestion at the Plain Street intersection causes traffic queues that regularly extend into the intersection of Pond Street and Washington Street.	Low	MassDOT
Bicyclist safety	Consider adding “Share the Road” signs (W11-1 and W16-1P) in the segment or shared-lane markings.	Medium	MassDOT
Safety	Review and consider installing speed limit signs at regular distances.	Medium	MassDOT
Safety	Provide dynamic speed feedback signs to reduce speed in the segment.	Medium	MassDOT
Safety	Consider painting lane-use arrow markings on the westbound approach of Plain Street.	Low	MassDOT
Safety	Consider trimming vegetation on the approach of Central Street to increase visibility.	Low	MassDOT
Safety	Review and update signal indications (left turns) for Plain Street westbound traffic to eliminate driver confusion.	Medium	MassDOT

Note: Low cost = less than $10,000. Medium cost = $10,001 to $50,000. High cost = more than $50,000.
MassDOT = Massachusetts Department of Transportation.

Table 8
Near-Term Improvements in the Hancock Street and Washington Street Segment

Issue	Improvement	Cost	Jurisdiction
Pedestrian safety	Consider installing advance pedestrian warning signs for the signalized midblock crosswalk near Park Avenue to alert drivers and reduce red-light running.	Low	MassDOT
Safety	Review and consider installing speed limit signs at regular distances.	Medium	MassDOT
Safety	Provide dynamic speed feedback signs in the segment.	Medium	MassDOT

Safety	Consider adding signal backplates with yellow retroreflective borders to the signal heads at these intersections: • Washington Street at Braxton Street • Washington Street at Roosevelt Street.	Medium	MassDOT
Safety	Consider trimming tree branches obscuring traffic signal heads at the Braxton Street intersection.	Low	MassDOT
Safety	Consider installing signal ahead signs (W3-3) on Washington Street for drivers approaching the traffic signal at the intersection with Braxton Street.	Low	MassDOT

Note: Low cost = less than $10,000. Medium cost = $10,001 to $50,000. High cost = more than $50,000. MassDOT = Massachusetts Department of Transportation.

Table 9
Long-Term Improvements in the Granite Street Segment

Issue	Improvement	Cost	Jurisdiction
Pedestrian safety	Consider constructing new sidewalks to close the gaps in the sidewalk network.	High	MassDOT
Pedestrian safety	Evaluate and provide continuous and connected sidewalks on the western side of Granite Street to prevent people walking from switching sides.	High	MassDOT
Pedestrian safety	Evaluate and upgrade curb ramps to ADA standards at these intersections: • Chickatawbut Road • I-93 ramp junctions • Middle Mall entrance (South Shore Plaza Road) • Five Corners.	High	MassDOT/ DCR
Bike safety	As the land uses along Granite Street changes, consider reconstructing Granite Street and making cross sectional design changes to accommodate safe walking and biking infrastructure and bus transit accommodation.	High	MassDOT
Bike safety	Evaluate and install bike detection at all signalized intersections in the segment.	Medium	MassDOT
Safety	Evaluate and consider adding backplates with yellow retroreflective borders to the signal heads to increase visibility at night.	High	MassDOT
Safety	Evaluate and upgrade signal equipment (span-wire mounts to mast-arm mounts, one signal head per lane, countdown timers, accessible pedestrian signal) to increase safety.	High	MassDOT
Pedestrian safety	Evaluate and install a crosswalk on all approaches to signalized intersections	Medium	MassDOT

	(requires new pedestrian signals and signal timing updates)		
Safety	Review and set target speeds in segments consistent with the corridor context and current land uses. Requires a speed study and traffic calming measures to reduce speeds to the target.	High	MassDOT
Safety	Consider measures to calm traffic and reduce speeding in the segment during off-peak periods, such as narrow lanes, adding shoulders, and timing signals to reduce speeding opportunities.	High	MassDOT
Safety	Consider installing pavement treatments to prevent distracted driving.	Medium	MassDOT
Safety	Evaluate and provide better lighting at night to reduce crashes during dark conditions.	High	MassDOT/ Braintree
Safety	Consider improving the visibility of signals and signs at Forbes Street and Five Corners intersections to reduce the angle and rear-end crashes.	Medium	MassDOT
Bus transit operations	Consider working with MBTA to incorporate bus signal priority into the traffic signal system.	High	MassDOT/ MBTA

Note: Low cost = less than $10,000. Medium cost = $10,001 to $50,000. High cost = more than $50,000. ADA = Americans with Disabilities Act. DCR = Department of Conservation and Recreation. MassDOT = Massachusetts Department of Transportation. MBTA = Massachusetts Bay Transportation Authority.

Table 10
Long-Term Improvements in the Franklin Street Segment

Issue	Improvement	Cost	Jurisdiction
Pedestrian safety	Evaluate and install a Rectangular Rapid Flashing Beacon for the crosswalk across Franklin Street at JW Leroy Way.	Medium	MassDOT
Pedestrian safety	Consider adding RRFB or crossing signs (W11-2 and W16-7P) for the midblock crosswalks across Franklin Street near McMaster Funeral Home.	Medium	MassDOT
Pedestrian safety	Consider countdown timers at these intersections: • Franklin Street at Washington Street • Washington Street at Pond Street • Washington Street at Hancock Street and Plain Street.	Medium	MassDOT
Pedestrian safety	Consider reconstructing sidewalks on both sides of Franklin Street.	High	MassDOT
Safety	Conduct a Road Safety Audit for the Washington, Hancock, and Plain Street intersections.	Medium	MassDOT

Safety	Evaluate and consider adding signal backplates with yellow retroreflective borders to the signal heads at these intersections: • Franklin Street at Washington Street • Washington Street at Pond Street • Washington Street at Hancock Street and Plain Street.	High	MassDOT
Congestion	Consider retiming these traffic signals with current data: • Franklin Street at Washington Street • Washington Street at Pond Street • Washington Street at Hancock Street and Plain Street.	High	MassDOT
Safety	Review and set target speed regulations consistent with the corridor context and land use. Requires speed study and other measures to achieve the target and improvement measures to achieve the target speed.	High	MassDOT
Safety	Evaluate and provide better lighting at night to reduce crashes during dark conditions.	High	MassDOT
Bus transit operations	Consider working with MBTA to incorporate bus signal priority into the signal system.	High	MassDOT

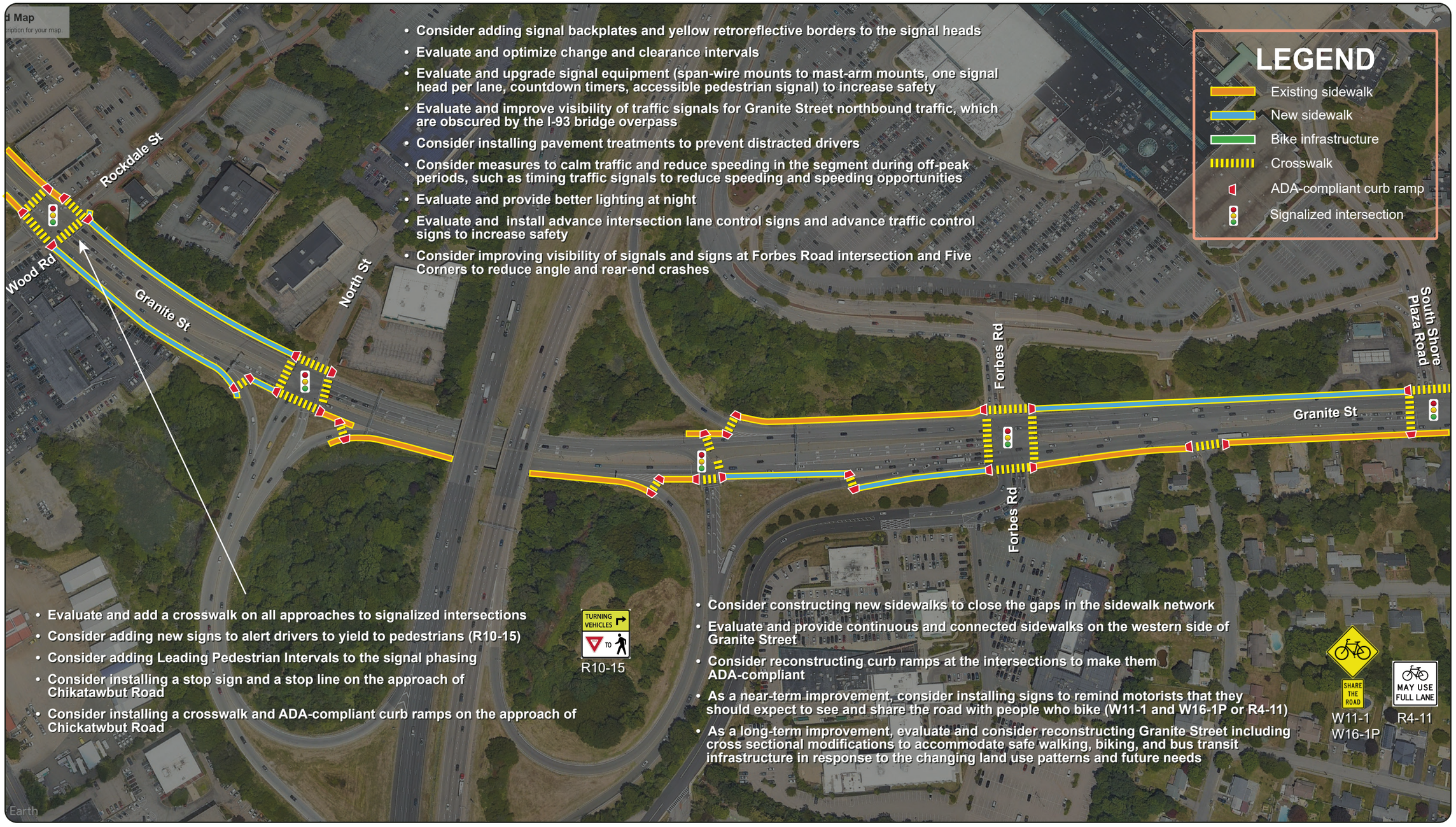
Note: Low cost = less than $10,000. Medium cost = $10,001 to $50,000. High cost = more than $50,000. MassDOT = Massachusetts Bay Transportation Authority. MBTA = Massachusetts Bay Transportation Authority. RRFB = Rectangular Rapid Flashing Beacon.

Table 11
Long-Term Improvements in the Hancock Street/Washington Street Segment

Issue	Improvement	Cost	Jurisdiction
Pedestrian safety	Consider installing a sidewalk on the western side of Washington Street between Braxton Street and Peach Street.	High	MassDOT
Pedestrian safety	Consider reconstructing sidewalks on both sides of Hancock Street.	High	MassDOT
Pedestrian safety	Consider upgrading the uncontrolled marked crosswalk on Route 37 between Arbutus Avenue and Hillview Road to an RRFB.	Medium	MassDOT
Bicycle safety	Consider installing separated bike lanes on Washington Street and Hancock Street from Arbutus Avenue to Plain Street. There is space in the roadway pavement width for the improvements.	High	MassDOT
Safety	Evaluate and provide better lighting at night to reduce crashes during dark conditions.	High	MassDOT

Safety	Consider installing pavement treatments to prevent distracted driving.	Medium	MassDOT
Safety and congestion	Consider signalizing the Peach Street intersection to improve traffic safety and reduce congestion and speeding.	High	MassDOT
Safety	Review and set target speed regulations consistent with the corridor context and land use. Requires speed study and improvement measures to achieve the target speed such as narrower lanes, adding bike lanes, bus turnouts, and installation of a traffic signal.	High	MassDOT
Safety	Consider installing traffic calming measures to reduce the speeds of vehicles (narrow lanes, signals, bike lanes, and bus turnouts).	High	MassDOT
Congestion	Consider retiming the traffic signal at Braxton Street with current data.	Medium	MassDOT
Bus transit operations	Consider working with MBTA to incorporate bus signal priority into the signal system.	High	MassDOT
Bus transit operations	Consider incorporating bus turnouts into any future separated bike lanes in the segment.	Medium	MassDOT

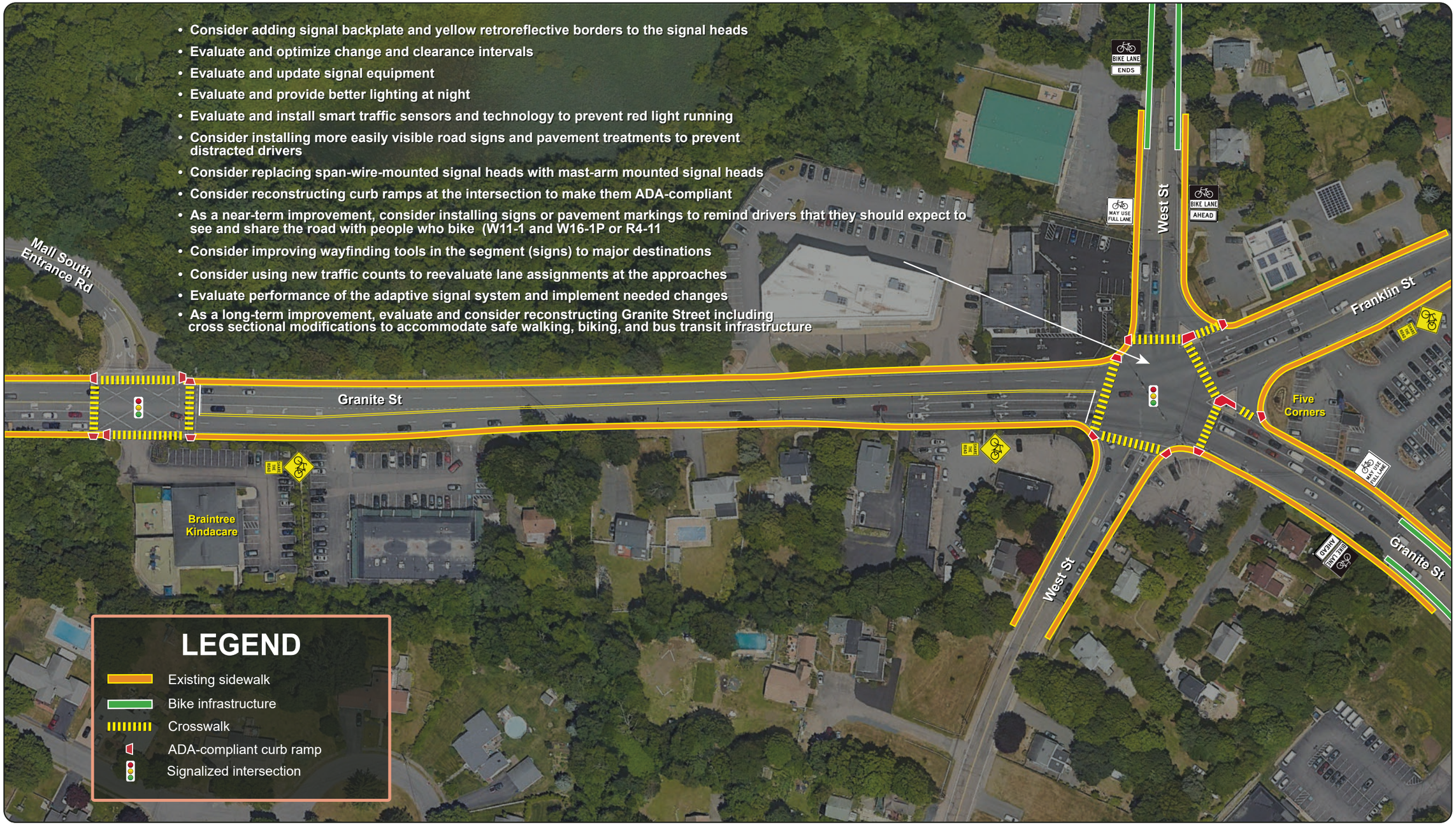
Note: Low cost = less than $10,000. Medium cost = $10,001 to $50,000. High cost = more than $50,000. MassDOT = Massachusetts Bay Transportation Authority. MBTA = Massachusetts Bay Transportation Authority. RRFB = Rectangular Rapid Flashing Beacon.



BOSTON REGION MPO

Figure 18
Proposed Improvements for Granite Street Segment

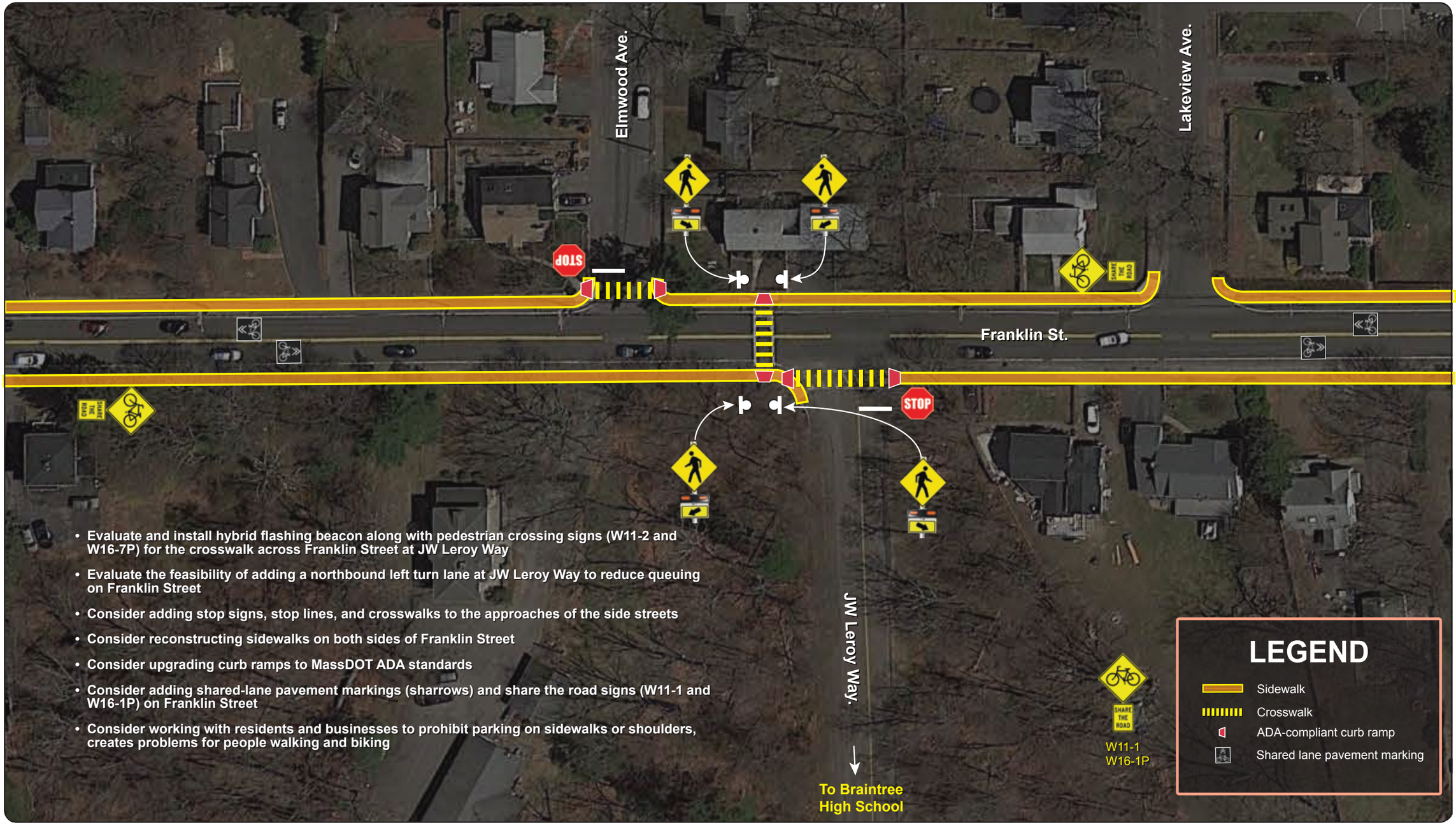
Route 37 Priority Corridor Study, Braintree, Massachusetts



BOSTON REGION MPO

Figure 19
Proposed Improvements at Five Corners

Route 37 Priority Corridor Study, Braintree, Massachusetts



BOSTON REGION MPO

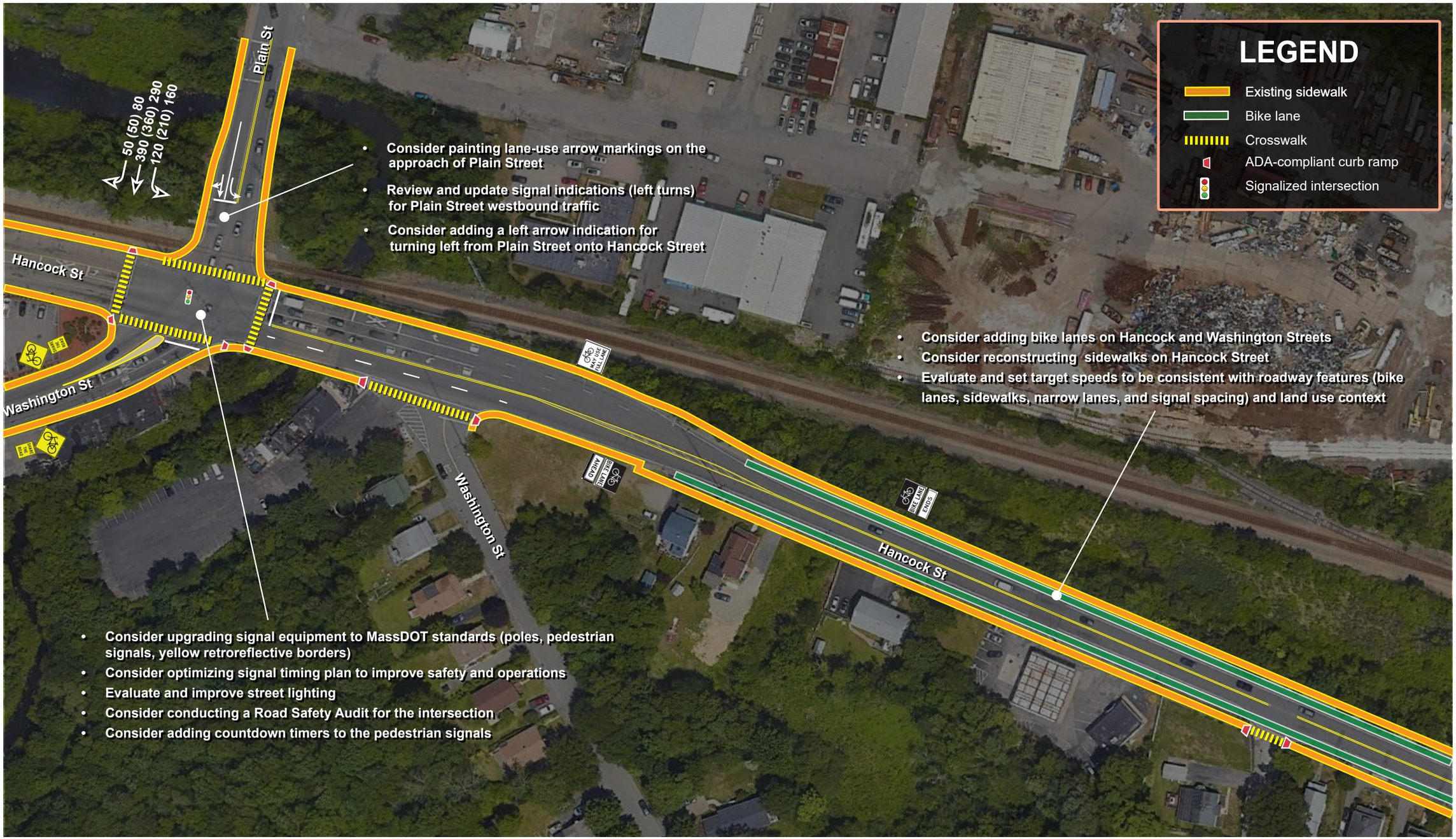
Figure 20
Proposed Improvements
Franklin Street at J.W. Leroy Way

Route 37 Priority Corridor Study,
Braintree, Massachusetts

BOSTON REGION MPO

Figure 21
Proposed Improvements
Washington Street from Franklin Street to Pond Street

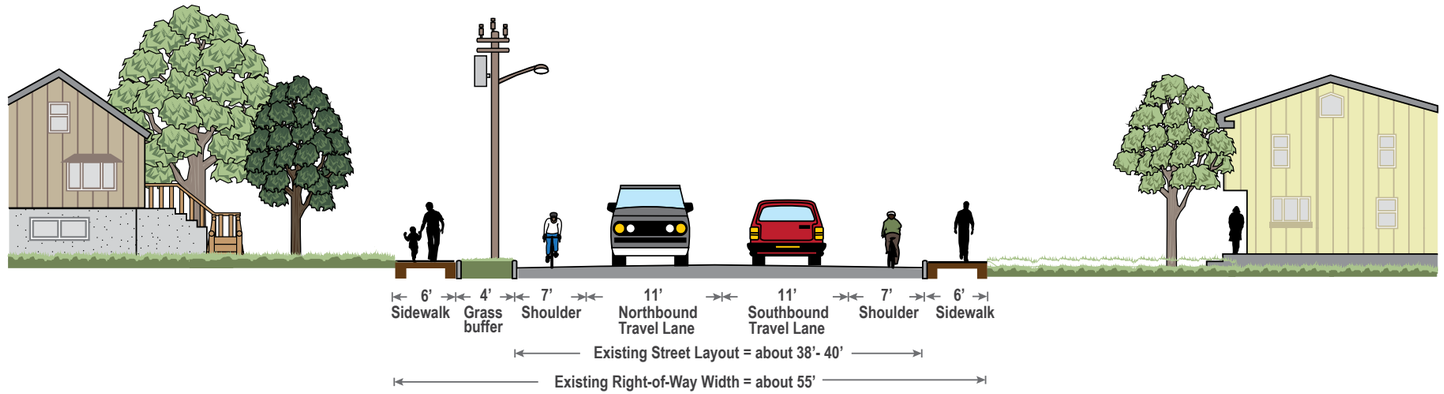
Route 37 Priority Corridor Study,
Braintree, Massachusetts



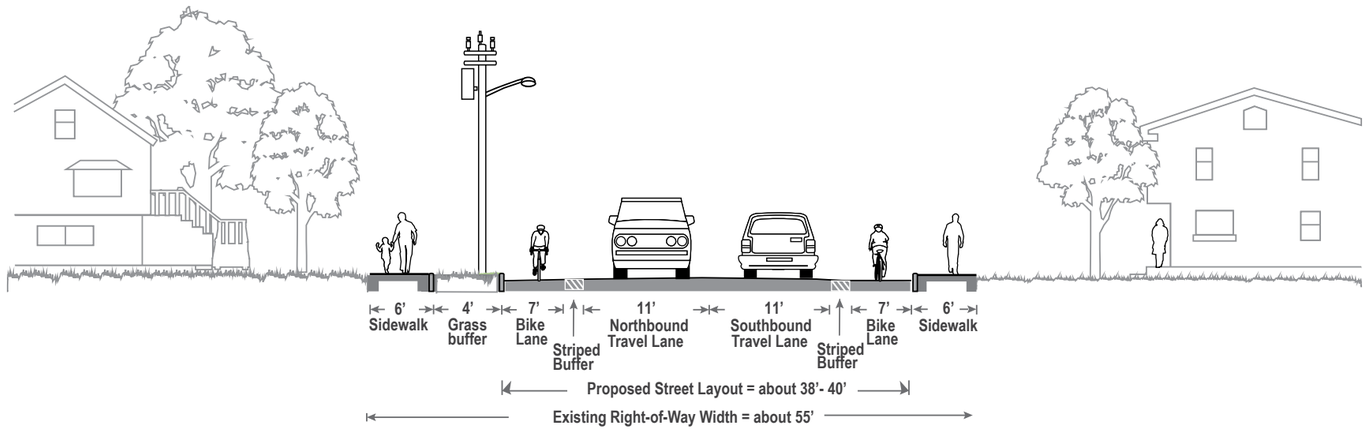
BOSTON REGION MPO

Figure 22
Proposed Improvements
Washington Street at Hancock Street and Plain Street

Route 37 Priority Corridor Study, Braintree, Massachusetts



Existing Roadway Cross Section

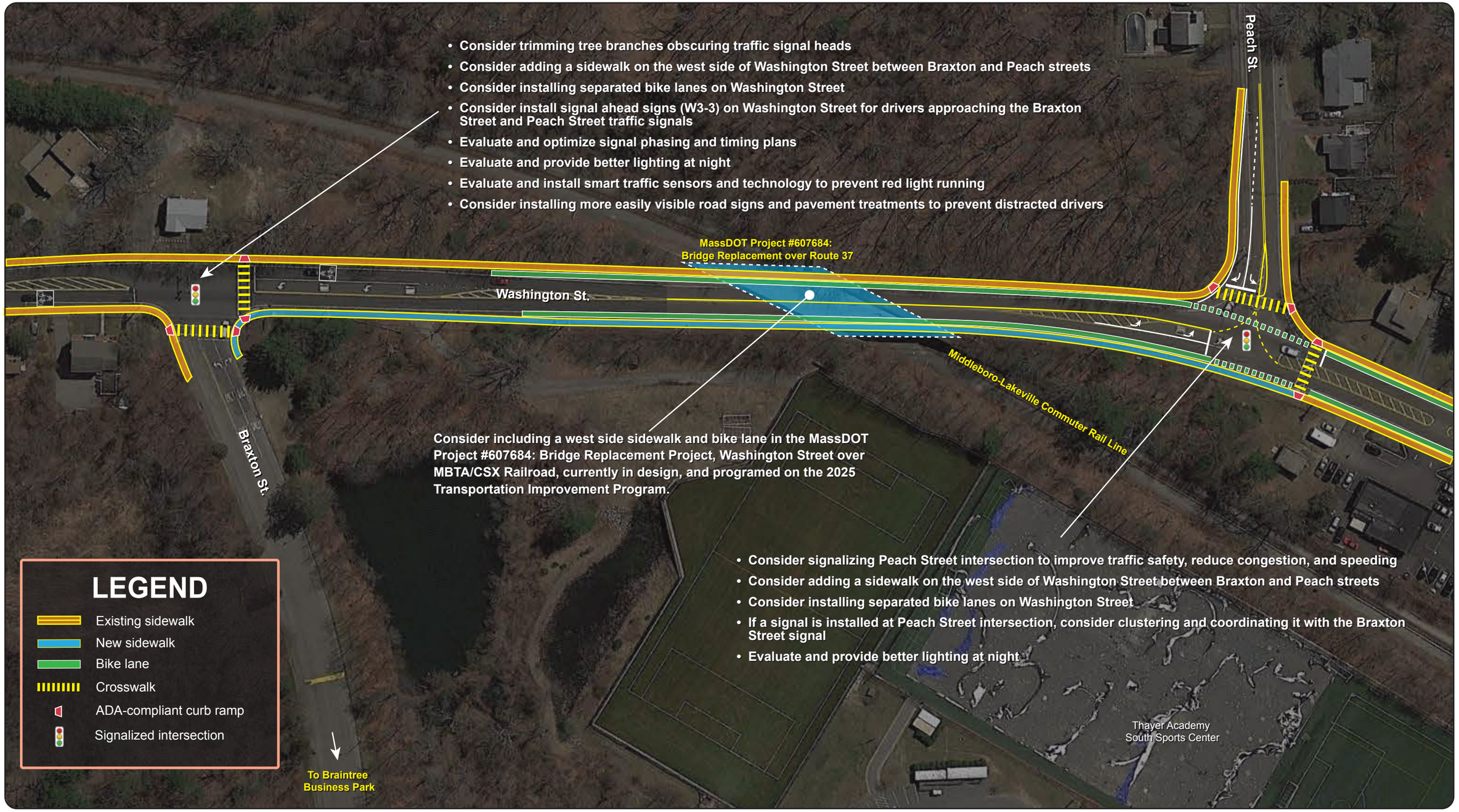


Potential Improvements

BOSTON
REGION
MPO

Figure 23
Proposed Improvements
Proposed Cross Section Modifications for Hancock/Washington Streets Segment

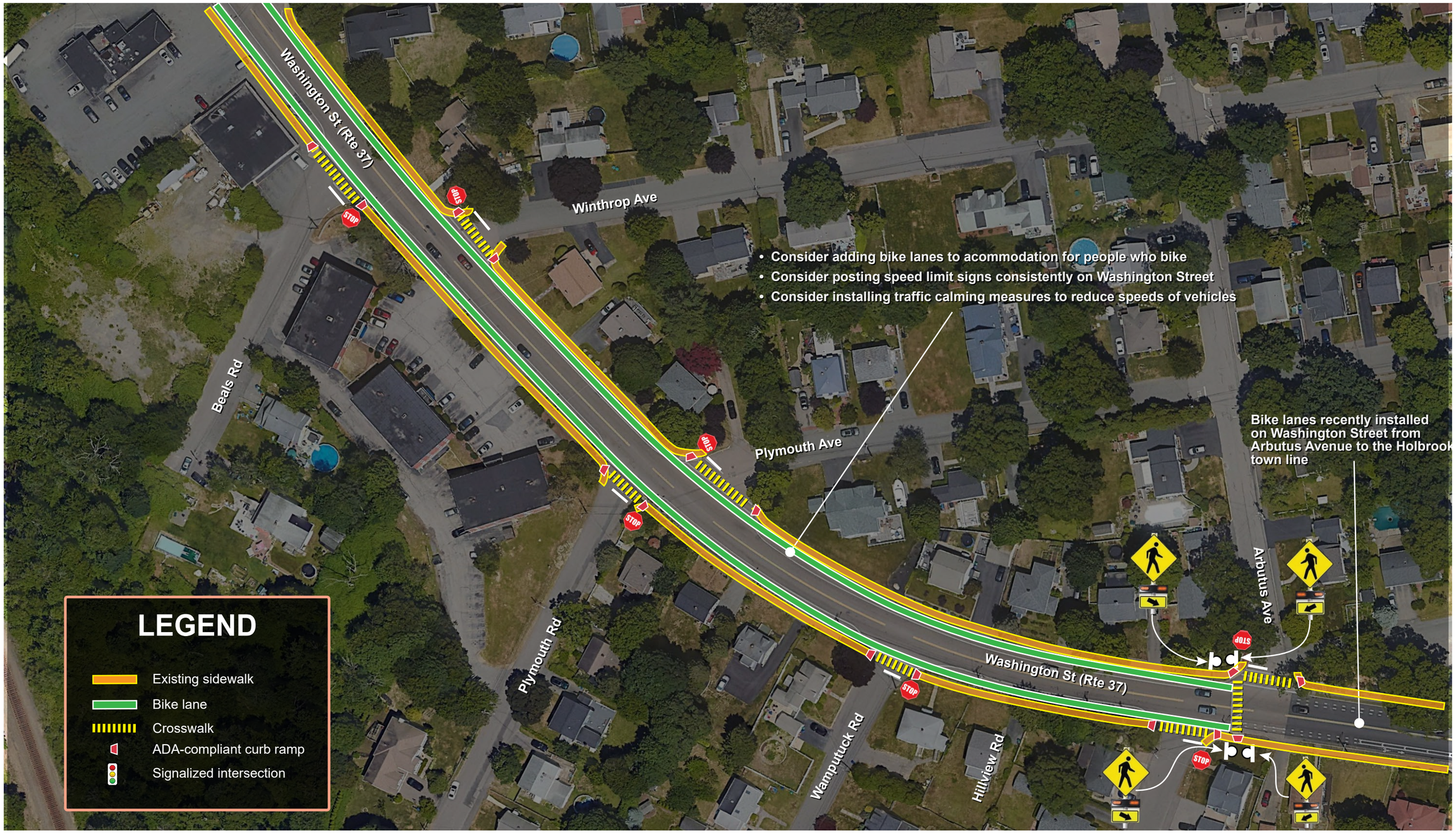
Route 37 Priority Corridor Study,
Braintree, Massachusetts



BOSTON REGION MPO

Figure 24
Proposed Improvements
Washington Street from Braxton Street to Peach Street

Route 37 Priority Corridor Study,
Braintree, Massachusetts



BOSTON REGION MPO

Figure 25
Proposed Improvements
Washington Street at Arbutus Avenue

Route 37 Priority Corridor Study, Braintree, Massachusetts

4.3 OPERATIONAL IMPACTS OF PROPOSED IMPROVEMENTS

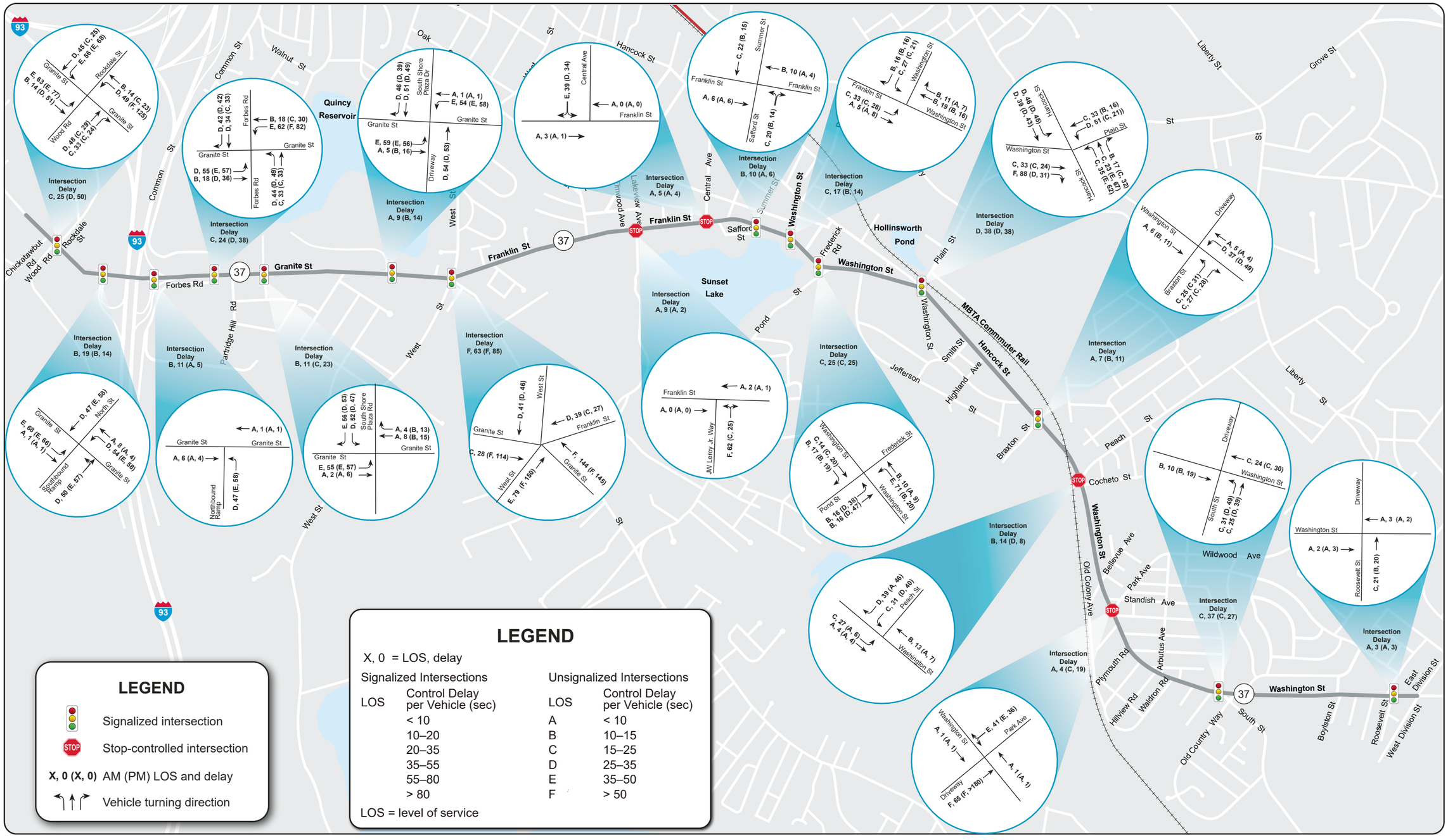
The Boston Region MPO's transportation planning model (TDM 23) was used to forecast traffic for this study. The model's socioeconomic components are derived from forecasts produced by the Metropolitan Area Planning Commission. TDM 23 was adopted for travel demand modeling for the Long-Range Transportation Plan. Using this model, staff projected that between now and 2035, traffic volumes on Route 37 in Braintree would grow by approximately 0.679 percent annually in the AM peak and PM peak periods. These growth rates also apply to traffic volumes on the intersecting streets, as they are usually developed for areas, not specific streets. Figures 26 through 29 show the Level of Service (LOS) projected for 2035 with and without the proposed improvements.

Table 12 presents the measures of effectiveness of the no-build and build scenarios. The analysis indicated that by 2035, if no improvement is implemented in the corridor, travel conditions would worsen, total delays could increase by 29 percent, total travel time could increase by 18 percent, and greenhouse gas emissions would increase by 16 percent during the AM and PM peak travel periods. If the proposed improvements are implemented, travel conditions in 2035, such as total delays, travel time, and greenhouse gas emissions, are expected to increase slightly or remain at 2023 levels.

Table 12
Measures of Effectiveness

Measures of Effectiveness	Peak Period	2023 Existing	2035 No Build	2035 Build
Total Delay (hours)	AM	222	270 (21%)	222 (0%)
Total Delay (hours)	PM	342	430 (26%)	333 (-3%)
Total Delay (hours)	Sat PM	274	352 (29%)	304 (11%)
Total Travel Time (hours)	AM	531	627(18%)	546 (3%)
Total Travel Time (hours)	PM	676	796 (18%)	690 (2%)
Total Travel Time (hours)	Sat PM	591	692 (17%)	643 (9%)
Total Emissions (Kg)	AM	64	73 (14%)	67 (5%)
Total Emissions (Kg)	PM	82	95 (16%)	78 (-5%)
Total Emissions (kg)	Sat PM	70	79 (13%)	75 (7%)

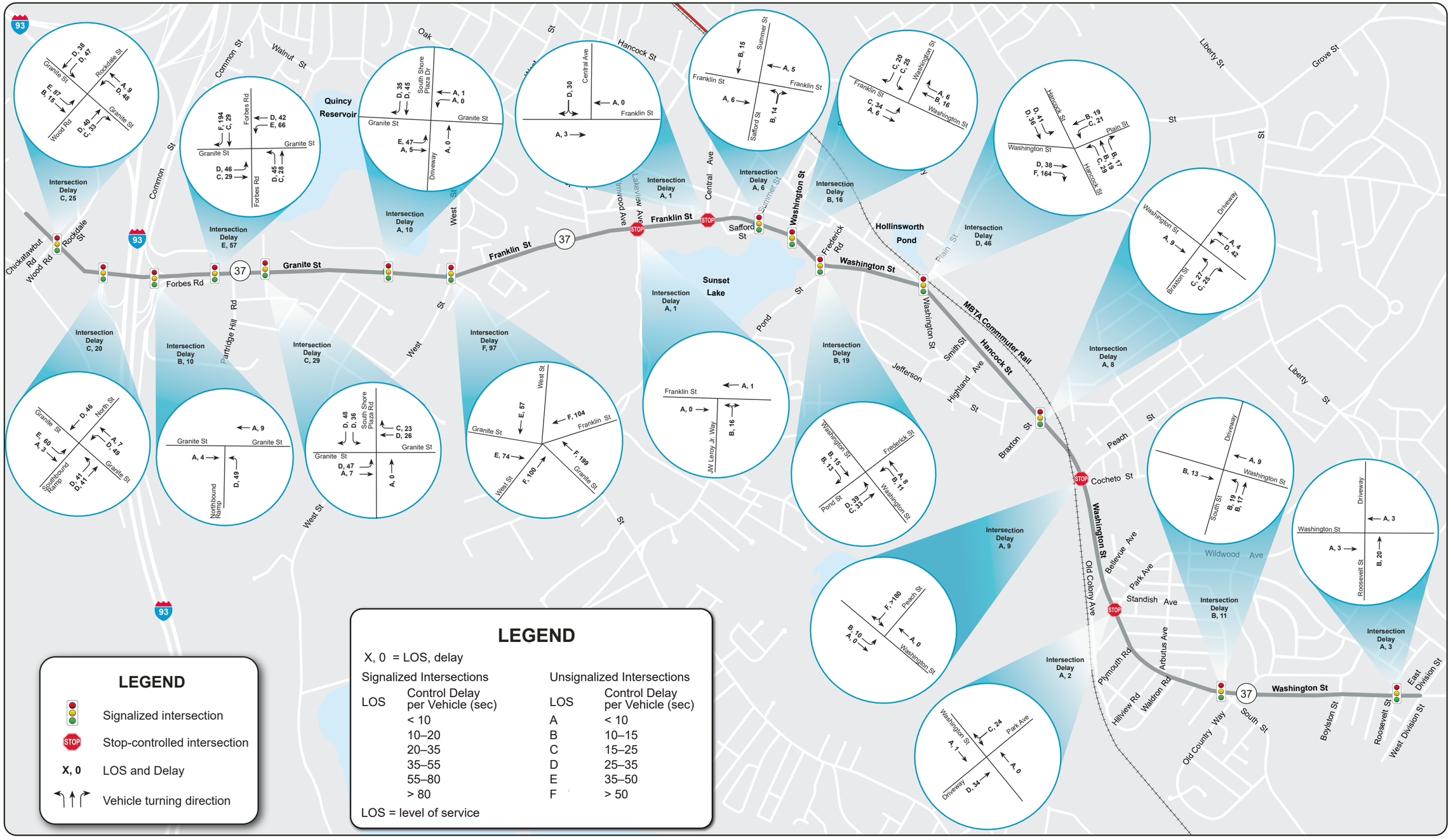
Note: The value in the parenthesis is the percentage change from existing conditions



BOSTON REGION MPO

Figure 26
2035 No-Build Conditions
Weekday Peak-Hours LOS and Delays

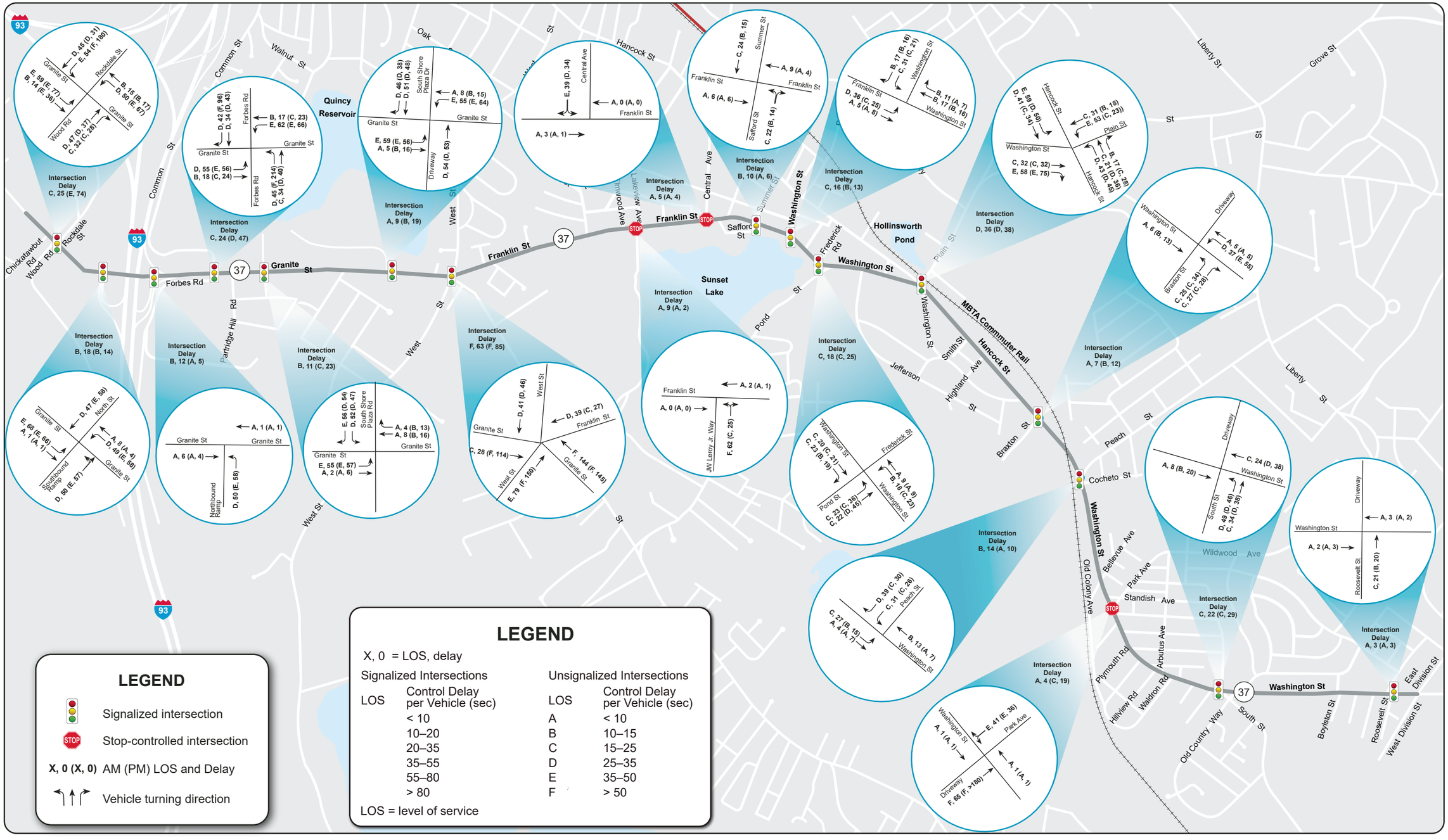
Route 37 Priority Corridor Study, Braintree, Massachusetts



BOSTON REGION MPO

Figure 27
2035 No-Build Conditions
Weekend Saturday Peak-Hour LOS and Delays

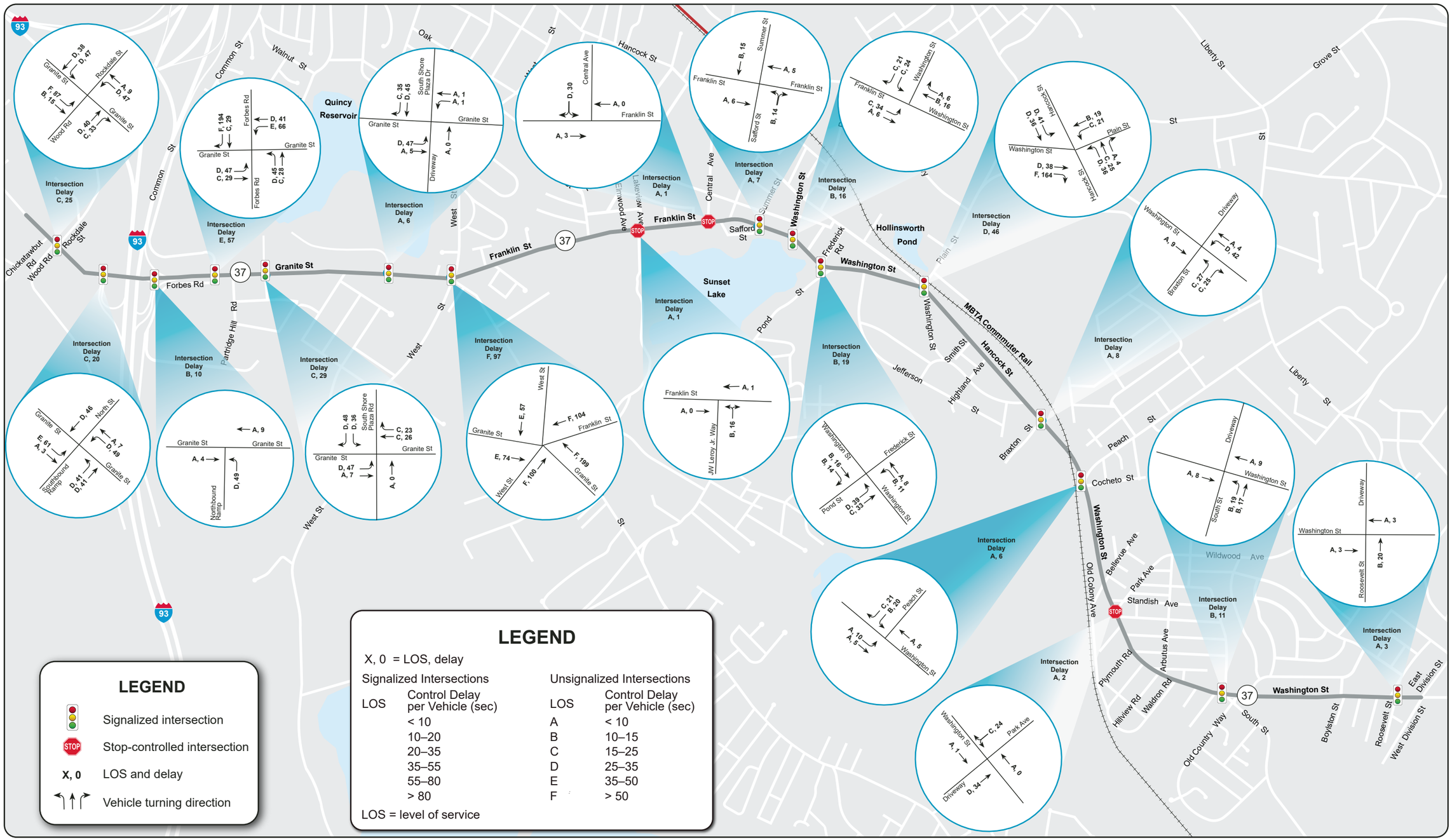
Route 37 Priority Corridor Study, Braintree, Massachusetts



BOSTON REGION MPO

Figure 28
2035 Build Conditions
Weekday Peak-Hours LOS and Delays

Route 37 Priority Corridor Study, Braintree, Massachusetts



LEGEND

- Signalized intersection
- Stop-controlled intersection
- X, 0 — LOS and delay
- Vehicle turning direction

LEGEND

X, 0 = LOS, delay

Signalized Intersections		Unsignalized Intersections	
LOS	Control Delay per Vehicle (sec)	LOS	Control Delay per Vehicle (sec)
	< 10	A	< 10
	10–20	B	10–15
	20–35	C	15–25
	35–55	D	25–35
	55–80	E	35–50
	> 80	F	> 50

LOS = level of service

BOSTON REGION MPO

Figure 29
2035 Build Conditions
Weekend Saturday Peak-Hour LOS and Delays

Route 37 Priority Corridor Study, Braintree, Massachusetts

4.4 FUTURE WALKING AND BIKING LOS

MPO staff evaluated what the future LOS for people walking and biking would be if the walking and biking infrastructure improvements from this study were implemented. Based on the assessment, all three segments of Route 37 were rated *good* in terms of meeting the MPO's goals for safety, capacity management and mobility, and system preservation, and *fair* for economic vitality because of the prioritization of safe accommodations for people who walk.

Route 37 was rated *excellent* in terms of meeting the MPO's goals for safety, capacity management and mobility, system preservation, and economic vitality for the Hancock/Washington Street segment because of the prioritization of safe accommodations for people who bike.

Route 37 Granite Street segment was rated excellent in terms of meeting MPO goals for safety, capacity management and mobility, and system preservation, and *satisfactory* for economic vitality because of the prioritization of safe accommodations for people who bike.

Route 37 Franklin Street segment was rated unacceptable for biking (same as existing conditions) because there was no space in the segment to install bike lanes. In this segment people biking would have to share the road with vehicles; staff proposed installing signs and pavement markings to increase awareness for people biking. Appendix B contains results of the LOS scorecard analyses.

4.5 SAFETY IMPACTS OF PROPOSED IMPROVEMENTS

Each proposed improvement was chosen to target specific safety and operational deficiencies in the study area. Safety improvements must reduce injury crashes and fatalities in the light of limited financial resources. So, it is helpful for stakeholders to understand how much a particular safety improvement, or set of safety improvements, can reduce crashes. A crash modification factor is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site.[5] These estimates have been developed by comparing crashes before implementation of a safety improvement against crashes after implementation. Table 13 presents some of the safety benefits of the proposed improvements.

[5] US Department of Transportation Federal Highway Administration, Crash Modification Factors Clearinghouse, April 2022, Crash Modification Factors Clearinghouse (cmfclearinghouse.org)

Table 13
Benefits of Proposed Improvements

Improvements	Safety Benefit	Reference
Install rectangular rapid flashing beacon	Up to 47 percent reduction in pedestrian crashes	(CMF ID: 9024) NCHRP Research Report 841 Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments, (2017).
Install pedestrian hybrid beacon	Up to 55 percent reduction in pedestrian crashes Up to 29 percent reduction in total crashes Up to 15 percent reduction in severe injury and fatal crashes	(CMF ID: 9020) Zegeer et al. NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. TRB, (2017). (CMF ID: 2911, 2917) Fitzpatrick, K. and Park, E.S. Safety Effectiveness of the HAWK Pedestrian Crossing Treatment, FHWA-HRT-10-042, (2010)
Provide pedestrian countdown timers	Up to 9 percent reduction in all crashes	(CMF ID: 8790) Kigali, A. et al. "Developing Crash Modification Factors to Quantify Impacts of Pedestrian Countdown Signals to Drivers." Presented at the 96th Annual Meeting of the Transportation Research Board, Paper No. 17-05178, Washington, D.C., (2017
Install high-visibility crosswalk	Up to 40 percent reduction in pedestrian injuries	(CMF ID: 4123) Chen, L., C. Chen, and R. Ewing. The Relative Effectiveness of Pedestrian Safety Countermeasures at Urban Intersections - Lessons from a New York City Experience. (2012).
Improve highway lighting	Up to 28 percent reduction in nighttime injury crashes.	(CMF ID: 436) Elvik, R. and Vaa, T. Handbook of Road Safety Measures. Oxford, United Kingdom, Elsevier, (2004).
Improve intersection lighting	Up to 42 percent reduction in pedestrian crashes. Up to 38 percent reduction in nighttime crashes	(CMF ID: 436, 433, 192) Elvik, R. and Vaa, T. Handbook of Road Safety Measures. Oxford, United Kingdom, Elsevier, (2004) (CMF ID: 2376) Ye et al. A Simultaneous Equations Model of Crash Frequency by Collision Type for Rural Intersections, 87th Annual Meeting of the Transportation Research Board, (2008).
Install advance yield or stop marking.	Up to 25 percent reduction in pedestrian crashes	(CMF ID: 9017) Zeeger et al. Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments, FHWA, (2017).
Provide sidewalks	Up to 40 percent reduction in pedestrian crashes.	(CMF ID: 11246) Abou-Senna et al. Investigating the correlation between sidewalk and pedestrian safety, 2022.
Implement road diets	Between 19 percent and 47 percent reduction in total crashes	(CMF ID: 5554, 2841) Evaluation of Lane Reduction “Road Diet” Measures on Crashes, FHWA-HRT-10-053, (2010).
Provide roadway shoulders	Up to 71 percent reduction in crashes involving pedestrians walking along roadways.	Gan et al. Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects. Florida DOT, (2005).

Improvements	Safety Benefit	Reference
Install leading pedestrian intervals	Up to 13 percent reduction in pedestrian-vehicle crashes at intersections.	(CMF ID: 9918) Goughnour, E. et al. "Safety Evaluation of Protected Left-Turn Phasing and Leading Pedestrian Intervals on Pedestrian Safety." Report No. FHWA-HRT-18-044. Federal Highway Administration. (October 2018)
Install bike lanes	Converting traditional or flush-buffered bicycle lanes to separated bicycle lanes with flexible delineator posts can reduce bicycle/vehicle crashes by up to 53 percent. Bicycle lane additions can reduce crashes by up to 49 percent on urban four-lane undivided collectors and local roads.	(CMF ID: 11296) Developing CMFs for Separated Bicycle Lanes. FHWA-HRT-23-025, (2023). (CMF ID: 10738, 10742) Development of Crash Modification Factors for Bicycle Lane Additions While Reducing Lane and Shoulder Widths. FHWA-HRT-21-012, (2021).
Add stop signs/stop lines	Up to 10 percent reduction in total crashes Up to 37 percent reduction in injury and fatal crashes	(CMF ID: 8867, 8870, 8874, 8893) T. Le et al. "Safety Effects of Low-Cost Systemic Safety Improvements at Signalized and Stop-Controlled Intersections," 96th Annual Meeting of the Transportation Research Board, Paper Number 17-05379, January 2017.
Modify clearance/ change times to ITE standards	Up to 50 percent reduction in red light running. Up to 14 percent reduction in all crashes	(CMF ID: 380, 384) NCHRP Report 731: Guidelines for Timing Yellow and All-Red Intervals at Signalized Intersections, (2011).
Add yellow retroreflective borders to signal heads	Up to 15 percent reduction in nighttime crashes	Sayed, T., Leur, P., and Pump, J., “Safety Impact of Increased Traffic Signal Backboards Conspicuity.” 2005 TRB 84th Annual Meeting: Compendium of Papers CD-ROM, Vol. TRB#05-16, Washington, D.C., (2005).
Conduct road safety audits	Between 10 percent to 60 percent reduction in crashes	Road Safety Audits: An Evaluation of RSA Programs and Projects, FHWA-SA-12-037; and FHWA Road Safety Audit Guidelines, FHWA-SA-06-06
Provide high-surface friction treatment	Up to 20 percent reduction in crashes at intersections Up to 48 percent reduction in crashes at horizontal curves	(CMF ID: 10342,10333) Merritt et al. Development of Crash Modification Factors for High Friction Surface Treatments. FHWA, (2020). (CMF ID: 2259) NCHRP Report 617: Accident Modification Factors for Traffic Engineering and ITS Improvements, (2008)
Provide dedicated turn lanes	28 percent to 48 percent reduction in crashes for the left turn lane 14 percent to 26 percent reduction in total crashes in the right turn lane	(CMF ID: 260, 268, 285, 289) Harwood et al. Safety Effectiveness of Intersection Left- and Right-Turn Lanes. FHWA-HRD-02-089, (2002). (CMF ID: 6096) Persaud et al. Safety Evaluation of Offset Improvements for Left-Turn Lanes. FHWA-HRT-09-035, (2009).

Improvements	Safety Benefit	Reference
Implement speed management	Appropriate Speed Limits for All Road Use	
Implement transit signal priority	Up to 12 percent reduction in all crashes	CMF ID: 11232) Ali, MD. S.et al. Quantifying the Safety Benefits of Transit Signal Priority Using Full Bayes Before–After Study. Journal of Transportation Engineers, Part A: Systems, Vol. 148 (1): 04021102, (2022).
Improve signal visibility	Up to 13 percent of all crashes	(CMF ID 1433) Sayed, T. et al. "Evaluating the Safety Impacts of Improving Signal Visibility at Urban Signalized Intersections." 2007 TRB 86th Annual Meeting: Compendium of Papers CD-ROM, Vol. TRB#07-135, Washington, D.C., (2007) (CMF ID 1411-13) El-Basyouny et al. "Investigating the Effect of Collision Aggregation on Safety Evaluations using Multivariate Linear Intervention Models: Case Study of Signal Head Upgrade Program." Presented at the Transportation Research Board 91st Annual Meeting, Paper No. 12-2093, January 22-26, 2012.

Notes:
CMF ID: 00000 = Each CMF has a unique identification number in the Clearinghouse. Using this search field means that only the CMF ID field will be searched. This will allow you to jump straight to a particular CMF if you know the ID number.
CMF = Crash Modification Factor. FHWA = Federal Highway Administration. HAWK = High-Intensity Activated Crosswalk Beacon (or Pedestrian Hybrid Beacon). ITE = Institute of Transportation Engineers. TRB = Transportation Research Board.

Chapter 5—Conclusion and Next Steps

The proposed improvements would significantly improve mobility in the Route 37 corridor by supporting walking, biking, and transit modes connecting employment centers, schools, and recreational areas. The walking and biking infrastructure improvements would be more beneficial if they were also connected to the proposed Complete Streets improvements on local roads, especially on side streets connecting to Route 37. Route 37 abuts and runs through several transportation equity neighborhoods in Braintree, and these improvements would increase the safety and mobility of those neighborhoods. Bus turnouts proposed in the new bike lanes and bus signal priority would improve safety and operations. Overall, the proposed improvements would increase safety for all users, give people more transportation choices, and promote smart growth.

The improvements developed in this study provide Massachusetts Department of Transportation (MassDOT), the Town of Braintree, and other stakeholders an opportunity to review options for addressing deficiencies in the corridor before committing design and engineering funds to a roadway improvement project. Project development is the process that takes transportation improvements from planning concept to construction. Successful implementation of the improvements would require cooperation among stakeholders. This study provides the necessary information for the project proponents to initiate the project notification and review process. MassDOT's Massachusetts Project Intake Tool (MaPIT) provides the platform to begin this process. After completing these initial steps, the proponents can start preliminary design and engineering and begin working with the Metropolitan Planning Organization to program funding for the projects in the Transportation Improvement Program. Appendix G contains an overview of the project development process.