GROVE STREET CORRIDOR STUDY IN BRAINTREE

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The preparation of this document was supported
by the Federal Highway Administration through
MPO Planning Contract #112310.

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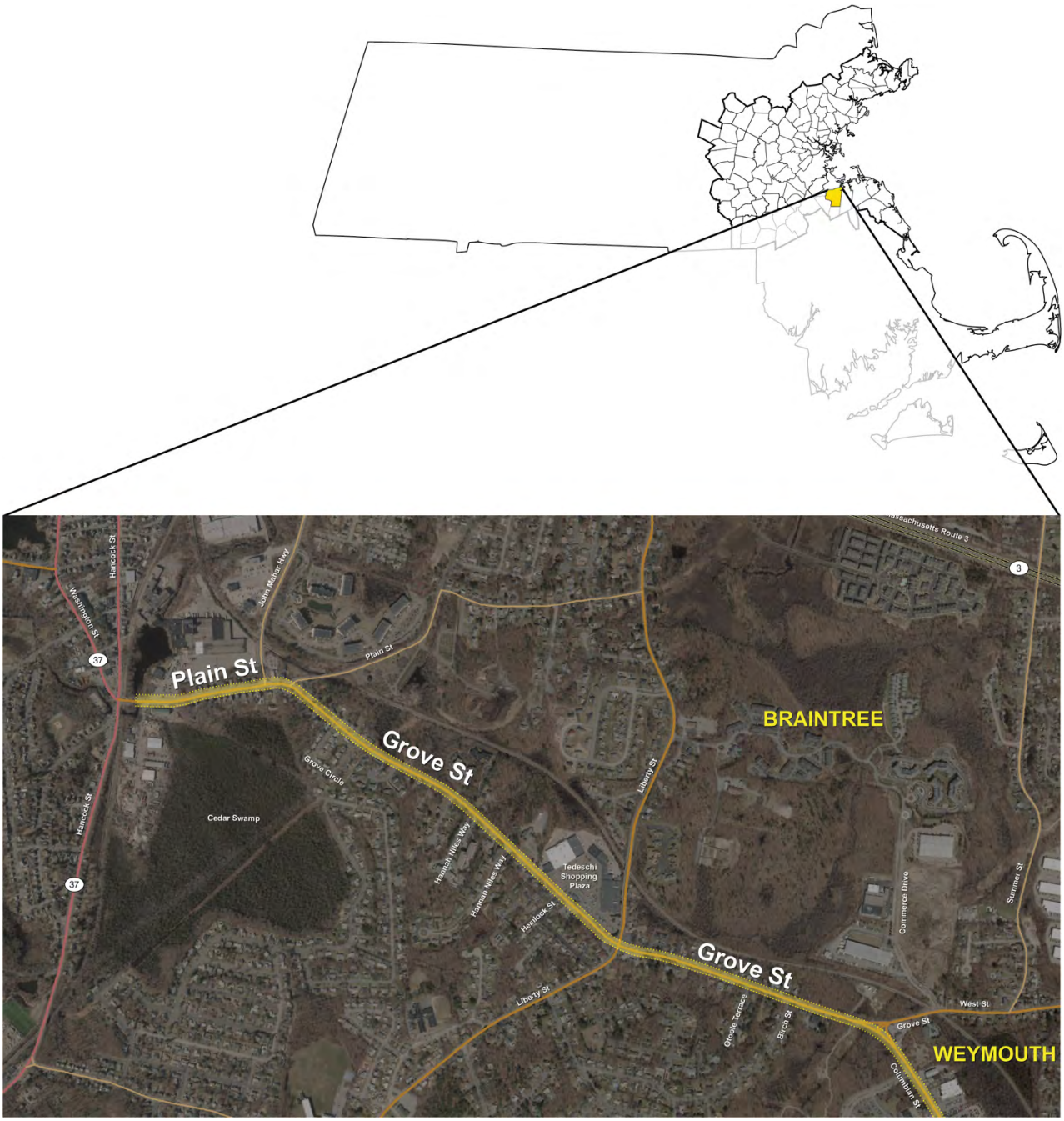
May 2022



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Abstract

The *Grove Street Corridor Study in Braintree* is one in a series of studies supported by the Boston Region Metropolitan Planning Organization that address safety, mobility, and access on the Boston region's roadways. This report identifies specific transportation issues and concerns in the Grove Street Corridor in Braintree, Massachusetts; presents an in-depth analysis of multiple transportation-related factors, such as accommodations for people who walk and bike and safe access to adjacent businesses; proposes short- and long-term improvements to address the problems; and provides a vision for the corridor's long-term development.

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Each year, the Boston Region Metropolitan Planning Organization (MPO) conducts outreach to local agencies, municipalities, the public, and other stakeholders during the development of the Unified Planning Work Program, a program of studies and research projects that provide transportation planning and technical assistance to municipalities and agencies in the Boston region. The purpose of this outreach is to gather information about specific transportation problems in the region so that studies may be conducted to analyze these issues, and projects may be developed to address these issues to improve the operation of the transportation system as a whole.

The MPO's series of *Subregional Priority Roadways* studies grew out of this information-gathering process. These studies identify safety, mobility, access, and other transportation-related concerns on specific roadways identified as requiring improvements by subregional planning groups. The studies evaluate potential multimodal solutions to the problems and then make recommendations for agencies and municipalities to implement. Each year, the Boston Region MPO chooses an arterial or collector roadway for staff to analyze, which results in recommendations for short- and long-term improvements for that roadway area.

Selecting a study area in the Boston region is a thorough and exacting process, based on many factors. In any large metropolitan region, there are many roadways that need improvement, so it can be a challenge to single out just one. However, because the MPO's *Subregional Priority Roadways* program is ongoing, MPO staff can address each problem area methodically, according to priority and regional needs.

This report focuses on the Grove Street corridor in Braintree, Massachusetts. It contains a review of existing conditions, various safety and operations analyses, and proposed short- and long-term improvements to address the problems in the study corridor.

The study corridor is approximately two miles long, comprising Plain Street, Grove Street, and Columbian Street in Braintree from Hancock Street to the Weymouth town line. Key issues and concerns identified for the corridor include the following:

- High corridor crash rate
- High vehicle travel speeds
- Recurrent traffic congestions

- Insufficient accommodation for people who walk
- Lack of accommodation for people who bike
- Lack of safe and convenient access to adjacent developments
- Safety concerns for all users, especially for those who walk and bike

The recommended short-term improvements would enhance safety for all users and improve traffic operations in the study area. With a high benefit-to-cost ratio, these short-term improvements should be considered and implemented as soon as resources are available. Among the improvements proposed at various locations in the corridor, two projects were recommended for consideration in the short term:

- Combine the two closely located crosswalks on Grove Street in the vicinity of Heritage United Methodist Church and install Rectangular Rapid Flashing Beacons and a series of pedestrian crossing warning signs and pavement markings to enhance the conspicuity of crossing activities and improve safety and access for people who walk.
- Review and retime the traffic signals at the intersections of Grove Street at Liberty Street and at Columbian Street, including increasing the pedestrian signal time for people to cross the intersection at Liberty Street.

Significantly improving the safety, mobility, and access for all users of the roadway would require a series of long-term improvements. The following major improvements are proposed for the corridor.

- Reduce travel lane width to 11.5 feet wide.
- Install street- or sidewalk-level separated bike lanes with traffic buffers on both sides of the roadway.
- Install six-foot sidewalks wherever absent and improve the existing sidewalks and expand them to six feet wide wherever applicable.
- Install five-foot grass buffers between the proposed bike lanes and sidewalks to accommodate the existing utility poles.
- Reduce driveway widths and tuning radii wherever applicable.
- Change speed limit from 40 to 35 miles per hour (mph) in the corridor, except for the curved and busy section between John Mahar Highway and Grove Circle (30 mph posted speed limit), after the implementation of the above improvements.
- Reconstruct the intersections of Grove Street at Liberty Street and at Columbian Street, with upgraded traffic signal system.

The proposed long-term improvements have several expected benefits:

- Improve accommodations and safety for people who walk, bike, and use a mobility device.
- Improve mobility and safety for people to access adjacent businesses and residences.
- Sustain appropriate travel speeds and increase safety for all users in the corridor.
- Maintain efficient traffic operations in the corridor.
- Support and enhance economic activities.
- Enhance livability for neighborhoods and the subregion.

Implementing the recommended long-term improvements in this extensive corridor would require sufficient resources. Four implementation stages can be considered for the entire corridor, as follows:

1. Grove Street between Hannah Niles Way and Liberty Street, including the intersection at Liberty Street
2. Grove Street between Plain Street and Hannah Niles Way, including the intersection at Plain Street
3. Grove Street between Liberty Street and Columbian Street
4. Columbian Street south of Grove Street, including the intersection at Grove Street

This report provides a detailed review and recommendations for improvements that address the transportation issues in the Grove Street corridor in Braintree. By addressing these problems systematically through the Subregional Priority Roadways program, the resulting improvements will help to enhance quality of life, support economic development, and improve air quality throughout the MPO region.

Chapter 1—Introduction

1.1 STUDY BACKGROUND

During development of the Unified Planning Work Program (UPWP) and the Long-Range Transportation Plan (LRTP), the Boston Region Metropolitan Planning Organization (MPO) gathers feedback from the public, municipalities, the Metropolitan Area Planning Council's subregional groups, and the Massachusetts Department of Transportation (MassDOT) to identify transportation problems in the region. These problems generally involve accommodations for people who walk and bike, freight movement, traffic bottlenecks, safety of roadway users, and safe or convenient access for abutters along roadway corridors—problems that can adversely affect the region's quality of life, economic development, and air quality.

Each year, the MPO conducts a study, *Addressing Safety, Mobility, and Access on Subregional Priority Roadways*, to identify roadway segments in the Boston region that are of concern to stakeholders, but that have not been cited in the regional needs assessment conducted for the LRTP.[1] The *Subregional Priority Roadways* studies focus on arterial or collector roadways and result in recommendations for short- and long-term improvements. Funding for the *Grove Street Corridor Study in Braintree* was documented in the federal fiscal year (FFY) 2021 UPWP, and a work program outlining the study was endorsed by the MPO board on July 16, 2020.

1.2 STUDY OBJECTIVES

The *Grove Street Corridor Study in Braintree* focused on safety, mobility and access, and specific concerns related to bicycle and pedestrian transportation, multiuse trail feasibility, and other subjects raised by stakeholders. The objectives of the study were to

- identify safety, mobility, access, and other transportation-related problems in the study corridor; and
- develop and evaluate potential multimodal solutions to the problems, including those addressing the pedestrian, bicycle, truck, and transit modes.

[1] Roadways prioritized for improvement through this needs assessment are addressed through another annual work program, Addressing Priority Corridors from the Long-Range Transportation Plan Needs Assessment.

1.3 SELECTION PROCEDURE

The MPO selected the Grove Street corridor in Braintree by assessing 21 roadway corridors in the Boston region that were identified as potential candidates for study by various sources, including (1) suggestions heard during outreach for the FFY 2021 UPWP; (2) concerns documented in meeting records from the UPWP outreach process since 2012; and (3) data from the MPO's Congestion Management Process. MPO staff assembled detailed data about these roadways and evaluated them according to the following selection criteria:

- **Safety Conditions:** The roadway has a high crash rate for its functional class, or there have been a significant number of collisions (two or more per mile) involving people who walk or bike.
- **Multimodal Significance*:*** The roadway supports transit, bicycle, or walking activity, or accommodates large numbers of heavy vehicles (trucks and buses).
- **Subregional Priority*:*** The roadway carries a significant proportion of subregional vehicle, bicycle, or pedestrian traffic and is essential for the subregion's economic, cultural, or recreational development.
- **Implementation Potential*:*** Roadway improvements are proposed or endorsed by the agency or agencies that administer the roadway and other stakeholders who voiced strong support for the improvements.
- **Regional Equity:** The roadway is situated in a subregion that has not been selected for the *Subregional Priority Roadways* study in the past two years.[2]

The selected roadways belonged to the "Old Route 128" corridor, which runs parallel to Interstate 93 and Route 3 and carries regional and local traffic. The corridor contains various land uses, including a large-scale shopping plaza (Tedeschi Plaza Shopping Center) and several commercial developments, senior living residential developments, multiunit condos and apartments, and single-family residences. In addition, there are ongoing and planned developments in the corridor.

MassDOT Highway Division District 6 recommended this roadway for study to explore Complete Streets needs and safety improvements for all users of the roadway, especially for those who walk. The Town of Braintree noted that

[2] Details of the criteria and rating system may be found in the Central Transportation Planning Staff's technical memorandum, "Selection of FFY 2021 Subregional Priority Roadway Study Location," dated December 17, 2020.

residents have expressed their concerns about this corridor because of the high crash rate and crashes caused by high vehicle travel speeds.

1.4 STUDY AREA AND DATA COLLECTION

The study corridor is about two miles long, comprising Plain Street, Grove Street, and Columbian Street in Braintree from Hancock Street to the Weymouth town line. It is a two-lane roadway classified as an Urban Minor Arterial and is under the jurisdiction of MassDOT District 6. The study area covers the corridor and its adjacent areas and connected roadways. Major cross streets in the corridor include John Mahar Highway, Plain Street, and Liberty Street. Figure 1 shows the study corridor, adjacent roadways, and major developments in the study area.

At the request of MPO staff, MassDOT collected daily traffic volumes and intersection turning movement counts (including pedestrian and bicycle movements and the percentage of heavy vehicles) for this study from April 7 to April 13, 2020, a period during the COVID-19 pandemic when traffic was still less intensive than the usual conditions. Staff reviewed historical counts and MassDOT COVID-19 traffic monitoring reports and made a series of adjustments to the collected data, so that the data would reflect the normal traffic conditions that are used in a series of essential analyses in this study.

MPO staff also collected a series of data from the Town of Braintree, including land use and zoning information, traffic studies from recent proposed developments and redevelopments in the corridor, and the police crash reports for a five-year period from 2015 to 2019.

MPO staff developed a corridor user survey to gather feedback from the public on perceived and actual problems with the corridor and to solicit improvement ideas. The survey yielded helpful information in identifying the issues and concerns and in developing improvement strategies for the corridor.

1.5 STUDY ADVISORY COMMITTEE MEETINGS

During the study, MPO staff worked closely with an advisory committee comprised of representatives from the Town of Braintree, MassDOT Office of Transportation Planning, and MassDOT Highway Division District 6. (See Appendix A for a complete list of the study advisory members.)

Two advisory committee meetings were held to guide and support the study. In the first meeting (February 11, 2021), MPO staff introduced the study, received input about the corridor's issues and concerns, and coordinated data collection needs. In the second meeting (December 10, 2021), staff presented the analyses

and findings and discussed the proposed short- and long-term improvement alternatives with the advisory committee members. After the meetings, staff received comments and revised the proposed improvements accordingly.

Chapter 2—Existing Conditions and Issues

2.1 CORRIDOR OVERVIEW

The study corridor is about two miles long, comprising Plain Street, Grove Street, and Columbian Street in Braintree from Hancock Street to the Weymouth town line (Figure 1). It is a two-lane roadway, one lane in each direction, which carries approximately 14,000 to 19,000 vehicles per weekday. The entire corridor is classified as Urban Minor Arterial and is under the jurisdiction of MassDOT Highway Division District 6.

The corridor contains three signalized intersections, three uncontrolled marked crosswalks, several unsignalized intersections and commercial driveways. The three signalized intersections are Plain Street at John Mahar Highway, Grove Street at Liberty Street, and Grove Street at Columbian Street. The three marked crosswalks are all located on Grove Street, one just south of Hannah Niles Way, one near Heritage United Methodist Church, and one just north of O'Toole Terrace.

The adjacent land uses in the corridor include residential, commercial, religious, and open lands. The majority of the adjacent areas are under residential zoning, which contains mainly single-family houses and some multiunit residential developments. In addition, there are two major commercial areas: a general business district located on Grove Street near Liberty Street and a highway business district located on Columbian Street south of Grove Street.

The corridor can be roughly distinguished into four sections based on adjacent land uses and the existing roadway layouts. The first section, Plain Street between Hancock Street and Grove Street, contains mainly residential and some commercial areas. The roadway's adjacent areas are fully developed with single-family houses. It has two 12-foot travel lanes, with relatively wide shoulders (four- to six-feet) and sidewalks on both sides.

The second section of the corridor, Grove Street between Plain Street and Liberty Street, contains residential areas, a senior living community (Grove Manor Estates), a church (Heritage United Methodist Church), and a major business district that houses Tedeschi Plaza Shopping Center. The travel lanes in this section are wider than the previous section. It lacks sidewalks on the northbound side.

The third section, Grove Street between Liberty Street and Columbian Street, contains mostly residential areas, with some open spaces located near

Columbian Street. The travel lanes in this section are wide and with shoulders of inconsistent widths. It lacks sidewalks on the southbound side.

The last section, Columbian Street between Grove Street and the Weymouth town line, contains a major business park at 60 Columbian Street and a number of businesses with their own driveways and on-site parking. No sidewalks exist on either side and shoulders are generally narrow with a width of about three feet.

There are no dedicated bike lanes in the entire corridor. Shoulders are generally narrow (about two- to three-feet wide), except in some limited and discontinuous sections. Meanwhile, most sections in the corridor have a posted speed limit of 40 miles per hour (mph) and vehicles generally travel at a speed much higher than the posted speed limit.

There are no Massachusetts Bay Transportation Authority (MBTA) or local transit services in the corridor. However, there are a few regional and subregional transit services in the areas adjacent to the corridor (see Figure 2). These include a station for two MBTA commuter rail lines, Kingston/Plymouth Line and Middleborough/Lakeville Line, with stops at Braintree Station. It is a major station with a parking garage of more than 1,200 spaces that also connects the MBTA rapid transit Red Line and a number of MBTA bus routes.

Meanwhile, three MBTA bus routes, 226, 230, and 236 serve the adjacent areas. Route 226 runs between Braintree Station and Weymouth Square; Route 230 runs between Montello Station in Brockton and Quincy Center Station (via Hancock Street in Braintree); and Route 236 runs between South Shore Plaza in Braintree and Quincy Center Station.

This corridor is less than one mile from Braintree Station and is a key route for commuters from the South Shore area to access the station for Boston Downtown or other major destinations.

2.2 CORRIDOR USER SURVEY

Boston Region Metropolitan Planning Organization (MPO) staff prepared and conducted a survey to help determine the public's opinion about the issues and problems on the study corridor, and to gather ideas for resolving them. The online survey was posted on the Boston Region MPO website and published in Metropolitan Area Planning Council newsletters and social media channels and received 155 responses between March 16 and May 4, 2021.

2.2.1 Survey Questions and Answers

The survey contained the following nine questions:

1) How do you typically use the corridor?
2) Please indicate the purpose of your usual trips in the corridor.
3) Please indicate the destination of your usual trips in the corridor.
4) While driving in the corridor, what problems do you encounter?
5) While bicycling or walking along the corridor, what particular problems do you regularly encounter?
6) Please indicate any problems that keep you from walking or bicycling in the corridor.
7) Please indicate any improvements that you would like to see implemented in the corridor.
8) Where do you live?
9) Please use the space below to describe specific problem locations and improvements that you would like to see implemented in the corridor.

Multiple choice answers are allowed in Questions 1 to 7 and a single answer applies to Question 8, while Question 9 required a written response. Figure 3 shows the results from the first seven questions of the survey, with the number of respondents and the percentage of applicable answers to each question being summarized in horizontal bar charts. In addition, the number and percentage of each answer and comments in answering “other (please specify)” for Questions 1 to 8 and written comments for Question 9 are summarized in Appendix B.

Question 8 is designed to understand the geographical distribution of the respondents. The answers indicate that about 93 percent of the respondents live in Braintree and more than 60 percent of them reside within one mile of the corridor. The rest of the respondents are mostly South Shore residents: six from Weymouth, one from Hingham, one from Milton, one from Norwell, one from Scituate, and one from Randolph.

Question 9 is a free response question for the respondents to describe further viewpoints and to cover the problems and improvement ideas that the survey answers might not have included. Nearly half of the respondents left significant feedback for the question. Their comments are listed with no alterations in Appendix B.

2.2.2 Summary of Survey Results

The following list includes notable conclusions drawn from the survey.

- Almost all the respondents indicated that they usually drive in the corridor. Nearly all respondents indicated driving alone as their typical travel mode. However, a noticeable portion of respondents said that they also walk (27 percent) and/or bike (12 percent) in the corridor.
- Shopping and dining are the predominant purposes of trips made in the corridor. Social, recreational, dining, walking, and jogging trips are also prevailing in the corridor. One-third of the respondents said that they also used the corridor for commuting to work.
- Tedeschi Plaza Shopping Center area is a popular trip destination for the respondents. In addition, people also frequent the areas north and south of the shopping center and beyond the corridor.
- For people who usually drive in the corridor, traffic congestion is the issue that concerns them the most, followed by difficulty turning into and out of stores, restaurants, and side streets.
- For people who usually walk and bike in the corridor, the high speed of vehicles is the issue that concerns them the most, followed by the high volume of traffic and lack of sidewalks. Almost half of the respondents also indicated that drivers' lack of attention to people who walk and bike, lack of midblock crosswalks, and lack of bike lanes are their concerns.
- For people who are hesitant to walk or bike, the high volume of traffic and high vehicle speeds are two major reasons that deter them. In addition, lack of sidewalks, poor sidewalk conditions, drivers' lack of attention to people who walk and bike, and lack of bicycle accommodations are their other major reasons.
- Most respondents (55 to 60 percent) indicated that they would like to see improvements in increasing safety for all users, especially accommodating people who walk, reducing traffic congestion, and adding or improving access to and from adjacent commercial developments. Nearly half of respondents indicated that improving pedestrian crossings in the corridor and accommodating biking are also desirable.

Feedback from the survey was helpful to gauge community sentiment and to solicit ideas for solutions to the existing problems. Some of the ideas were considered in developing the improvement alternatives discussed in Chapter 5. MPO staff also received additional comments on the corridor's issues and concerns. These comments are included in Appendix C.

2.3 ISSUES AND CONCERNS

Based on findings from the user survey, analyses of crash data and existing traffic operations, and discussions with the study advisory members, major issues and concerns of the corridor include the following:

- **High corridor crash rate**

  The corridor has a crash rate close to the state average for urban minor arterials. Further crash data analyses indicate that the two business sections, Grove Street in the vicinity of Tedeschi Plaza Shopping Center and Columbian Street south of Grove Street, all have a crash rate much higher than the state average.

- **High vehicle travel speeds**

  In general, travel lanes in the corridor are 12 feet or wider and intersections in the corridor generally have a large layout with wide-turning radii. These factors allow vehicles to travel at excessive speeds in the corridor and at intersections. In the survey, a large portion of the users referred the high vehicle travel speeds as a major concern of the corridor.

- **Recurrent traffic congestion**

  The three signalized intersections in the corridor are usually congested during peak traffic hours, especially the intersection of Grove Street and Liberty Street. In addition, periodic congestion frequently occurs in the Grove Street section adjacent to Tedeschi Plaza Shopping Center because of blockages by vehicles waiting for traffic gaps to access the shopping center.

- **Lack of safe and convenient access to and from adjacent developments**

  People who drive usually have a difficult time to get in and out of the shopping center due to the lack of exclusive left-turn lanes on Grove Street and sufficient traffic gaps to enter Grove Street under busy traffic conditions. Meanwhile, major driveways in the corridor are generally wide and with large turning radii that is inconvenient and unsafe for people who walk and bike.

- **Insufficient accommodation for people who walk**

  Sidewalks are missing in many sections of the corridor. Meanwhile, in the corridor, crosswalks exist only at the two signalized intersections and at three uncontrolled crossing locations on Grove Street where the pedestrian crossing warning signage is insufficient.

- **Lack of accommodation for people who bike**

  There are no dedicated bike lanes in the entire corridor. The roadway shoulders are generally narrow and not suitable for bike travel.

- **Safety concerns for all users, especially for those who walk, bike, and use mobility devices**

  The mobility and access difficulties and insufficient accommodations for different modes of transportation in the corridor consequently generate safety concerns for all users, especially those who walk, bike, and use mobility devices.

These issues and concerns are about the corridor in general. The issues and concerns at specific locations in the corridor are further analyzed and identified in Chapters 3 and 4 and are summarized by location along with the proposed improvements in Chapter 5.

Chapter 3—Crash Data Analysis

3.1 CORRIDOR CRASH STATISTICS

Crash data are an essential resource for identifying safety and operational problems in a study area. Analyzing data on the number of crashes and types of collisions that occur at particular locations, and the circumstances under which crashes occur (such as the time of day and roadway surface conditions) also helps to develop improvement strategies.

For this study, Metropolitan Planning Organization (MPO) staff collected the most recent five-year (2015–19) crash reports from Massachusetts Department of Transportation (MassDOT) Crash Data Portal (https://apps.impact.dot.state.ma.us/cdp/home) for the entire corridor and conducted a series of crash data analyses.

In total, 176 crashes were recorded in the five-year period at different locations in the corridor. Major statistics analyzed from the data set including the following (see Appendix D for the crash data summarized by year):

- Crash severity: 64 crashes (36 percent) resulted in personal injuries
- Crash types
  - 74 (42 percent) rear-end collisions
  - 68 (39 percent) angle collisions
  - 16 (nine percent) single vehicle collisions
  - 12 (seven percent) sideswipe collisions (mostly opposite direction)
  - five (three percent) head-on collisions
- Two pedestrian crashes and three bicycle crashes[3]
- Weekday peak-period crashes (7:00 AM–10:00 AM and 3:30 PM–6:30 PM): 40 percent
- Crashes under daylight conditions: 79 percent
- Crashes with dry roadway conditions: 76 percent

[3] In this study, the term “pedestrian crashes” refers to crashes that involve at least one vehicle and one pedestrian; “bicycle crashes” refers to crashes that involve at least one vehicle and one bicycle. No crashes between at least one bicycle and one pedestrian were identified in the data.

3.2 CORRIDOR AND INTERSECTION CRASH RATES

Based on the five-year crash data and the estimated average daily traffic, MPO staff estimated that the entire corridor has a crash rate of 3.17 crashes per million vehicle-miles traveled (MVMT). This crash rate is close to the statewide average for minor urban arterials, which is 3.49 crashes per MVMT (updated July 2020, based on 2017 crash data).

Staff further calculated the crash rates by five consecutive segments in the corridor based on the comparable land use characteristics and daily traffic volumes. The crash rates for the five segments include

- Plain Street from Hancock Street (Route 37) to Grove Street: 3.68 crashes per MVMT;
- Grove Street from the south of Plain Street to north of Tedeschi Plaza Shopping Center: 1.51 crashes per MVMT;
- Grove Street from Tedeschi Plaza Shopping Center to the south of Liberty Street: 5.92 crashes per MVMT;
- Grove Street from the south of Liberty Street to the northwest of Columbian Street: 1.77 crashes per MVMT; and
- Columbian Street from the Grove Street to the Weymouth town line: 5.09 crashes per MVMT.

Note that the segment of Grove Street has a very high crash rate due to intensive activities at the shopping plaza and most of the crashes in the Columbian Street segment were in the vicinity of the intersection at Grove Street. Appendix E contains worksheets showing the crash rate calculations for the entire corridor and the five different segments in the corridor.

Staff also calculated the crash rates at major intersections in the corridor, based on the yearly average of MassDOT crash data and the estimated intersection traffic counts. The crash rates for the signalized intersections are as follows:

- Plain Street at Hancock Street: 0.27 crashes per million entering vehicles (MEV)
- Plain Street at John Mahar Highway: 0.23 crashes per MEV
- Grove Street at Liberty Street: 0.53 crashes per MEV
- Grove Street at Columbian Street: 0.61 crashes per MEV
- Columbian Street at the driveway of the 60 Columbian Street development: 0.09 crashes per MEV

The average crash rate for MassDOT District 6 signalized intersections is 0.71 crashes per MEV (updated June 2018, based on 2016 crash data). None of the intersections have a crash rate higher than the district average. The crash rate at the intersection of Grove Street at Columbian Street is considered to be comparable to the district average.

Among the unsignalized intersections, Plain Street at the driveway of the Registry of Motor Vehicles (RMV) is estimated to have the highest crash rate of 0.53 crashes per MEV. The rate is slightly higher than the average crash rate for unsignalized intersections in MassDOT District 6, which is 0.52 crashes per MEV.

Appendix F contains worksheets showing the crash rate calculations for all the signalized and unsignalized intersections in the corridor.

3.3 COLLISION DIAGRAMS

To investigate safety and operational problems further, MPO staff constructed collision diagrams for the entire corridor at major intersections and in the roadway segments between those intersections, based on the recent five-year crash data. Appendix G presents eight collision diagrams for eight consecutive sections in the corridor. It also includes information on the crashes in each section (indexed by chronological order of occurrence) summarized in a lookup table following each collision diagram. The information includes crash date and time, severity (property damage only, nonfatal injury, fatality, or unknown), manner of collision type (rear-end, angle, single vehicle, rear-to-rear, sideswipe [same or opposite direction], head-on, or unknown), road surface conditions, weather conditions, most harmful event, vehicle actions prior to crash, and driver contributing code.

Key findings from collision diagram analysis and factors that might have affected safety and operations at major intersections and roadway segments in the corridor are summarized below.

Plain Street at Hancock Street and Washington Street (Figure F-1 and Table F-1)

- The intersection has a large layout and is congested during peak hours.
- Fourteen crashes were recorded in the recent five-year period.
- Four crashes occurred on the eastbound approach (Washington Street).
- Two crashes occurred in the middle of the intersection between a westbound left-turning vehicle and a northbound through vehicle, one of which caused personal injuries.

- Half of the crashes (seven in total) were rear-end collisions
- Other crashes are scattered all over the intersection with no distinct patterns.

Plain Street at RMV Driveway (Figure F-1 and Table F-1)

- During peak hours, Plain Street traffic is busy and, at times, vehicles on the RMV driveway (under stop-control) have difficulties entering the intersection.
- Eleven crashes were recorded in the recent five-year period.
- Approximately half of the total crashes (five in total) occurred between a westbound through vehicle and a southbound left-turning vehicle, one of which was an injury crash.
- One crash involved a cyclist traveling westbound on Plain Street and a vehicle turning left onto the RMV driveway from Plain Street eastbound.

Plain Street at John Mahar Highway and at Grove Street (Figure F-2 and Table F-2)

- This section of Plain Street contains two intersections near each other, one signalized at John Mahar Highway and one unsignalized at Grove Street.
- The short section of Plain Street between the two intersections is usually congested during peak hours.
- Fourteen crashes were recorded in the recent five-year period.
- Majority of the crashes (nine in total) occurred on the roadway between the two intersections. Five of them were rear-end collisions.

Grove Street between Plain Street and Hannah Niles Way (Figure F-3 and Table F-3)

- This roadway section has a relatively wide travel lane in each direction, with a number of side streets from adjacent residential areas.
- Sixteen crashes were recorded in the recent five-year period.
- A majority of the crashes (13 in total) occurred in the section between Grove Circle and Stone Crest Drive, where a roadside commercial building exists, and the roadway is wide and curved.
- One crash involved a deer crossing Grove Street and a driver who traveled straight in the northbound lane attempting to avoid it and crashed into a roadside stone wall.

Grove Street between Hannah Niles Way and Liberty Street (Figure F-4 and Table F-4)

- This is a busy section in the corridor. It contains single- and multi-family residential areas, a church (Heritage United Methodist Church), and a major commercial district (Tedeschi Plaza Shopping Center).
- Eighteen crashes were recorded in the recent five-year period.
- Majority of the crashes (12 in total) occurred in the vicinity of the shopping plaza, including eight at the intersection of the plaza's main driveway and Hemlock Street and three in the area north of the intersection.
- Two crosswalks are located near each other in the section between Hannah Niles Way and the church, just north of the busy shopping center. Fortunately, only two crashes were recorded in the recent five-year period. One involved three vehicles in a rear-end collision and one involved a cyclist and a vehicle travelling southbound near the crosswalk at Hannah Niles Way.

Grove Street at Liberty Street (Figure F-5 and Table F-5)

- The intersection of Grove Street at Liberty Street carries significant regional and local traffic and is near the shopping plaza. Traffic is usually congested during peak hours.
- Thirty-seven crashes were recorded in the most recent five-year period. All of them were related to the intersection operations, except two at the plaza's driveway at Liberty Street and one at the plaza's driveway at Grove Street.
- Eight angle collisions at the intersection involved a northbound left-turning vehicle and a southbound vehicle.[4]
- Six rear-end collisions occurred on Grove Street just east of the intersection, potentially due to traffic congestion in the section.

Grove Street between Liberty Street and Columbian Street (Figure F-6 and Table F-6)

- This section contains mainly residential areas, with a relatively wide travel lane in each direction.

[4] The intersection does not provide dedicated travel lanes and signal phases for left turns at all approaches, and it has a high proportion of left turns, especially on the Liberty Street northbound.

- Twenty-seven crashes were recorded in the most recent five-year period.
- Most of the crashes (21) were rear-end collisions and dispersed throughout the section.
- One bicycle crash involved a cyclist and a vehicle travelling southbound.

Grove Street at Columbian Street (Figure F-7 and Table F-7)

- The intersection has a large layout with wide turning radii. It is congested during peak hours, especially on the southbound approach of Grove Street.[5]
- Thirty-three crashes were recorded in the intersection vicinity in the most recent five-year period.
- Noticeably, 13 crashes were identified as angle collisions that involved a southbound left-turn vehicle colliding with a northbound through vehicle.

Columbian Street between Grove Street and Weymouth Town Line (Figure F-8 and Table F-8)

- This section contains only commercial land uses, with a major office park at 60 Columbian Street.
- Six crashes were recorded in the recent five-year period.
- Four crashes were identified as angle collisions that involved a vehicle turning to and from the adjacent developments and colliding with a vehicle in the traffic on Columbian Street.
- One crash involved a pedestrian crossing Columbian Street and a vehicle exiting from an adjacent business.

The findings from collision diagrams are useful for identifying safety and operational problems and developing improvement alternatives at major intersections and specific roadway segments in the corridor. The findings are further discussed in the context of proposed improvements in Chapter 5.

[5] The southbound approach does not have an exclusive left-turn lane and operates under a lagging protected left-turn signal phase. Meanwhile, left-turn vehicles on the approach have to cross two northbound travel lanes, with limited sight distances under heavy traffic.

Chapter 4—Roadway Operations Analysis

To analyze the existing roadway operations, Metropolitan Planning Organization (MPO) staff requested Massachusetts Department of Transportation's (MassDOT) assistance in collecting automatic traffic recorder (ATR) counts on the approaching roadways and intersection turning movement counts (TMC) for this study. The ATR counts include daily traffic volumes and spot speed counts and the TMCs include pedestrian and bicycle counts at the intersections.

The data collection was performed from April 7 to April 13, 2021, a period that traffic started to increase from the spring in 2020 when the COVID-19 pandemic was prevalent.[6] However, the traffic had not reached the pre-pandemic level, according to MassDOT COVID-19 traffic monitoring reports.[7]

Staff reviewed historical counts and MassDOT COVID-19 traffic monitoring reports for major roadways in District 6 and made a series of adjustments to the collected data, so that the data being used in these operational analyses would reflect the normal pre-pandemic traffic conditions.

4.1 DAILY TRAFFIC VOLUMES

Daily traffic volumes are the fundamental data for analyzing traffic intensity and patterns in a roadway corridor. Staff used the ATR counts collected on weekdays from April 7 to April 13 as the basis to estimate the annual average weekday traffic volumes at key locations in the corridor (see Appendix H for the originally recorded counts by hour).

Staff estimated the annual average weekday daily traffic (AAWDT) in two steps: (1) applying axle adjustment (one percent reduction) and seasonal adjustment (eight percent reduction) factors to the recorded volumes, and (2) increasing the factored volumes by seven and one-half percent to represent the normal traffic conditions based on the analysis of MassDOT traffic monitoring reports.

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[6] Governor Baker's COVID-19 Order #5, which prohibited gatherings of more than 25 people, was issued on March 15, 2021.

[7] Since April 2020, MassDOT continually monitored the impacts of COVID-19 on the state's transportation network, including roadways and transit services, and published weekly traffic volumes at permanent count stations in the state, with comparison of the volumes in the same period in 2019, on the MassDOT Mobility Dashboard (https://mobility-massdot.hub.arcgis.com).

Figure 4 shows the estimated 2021 average weekday traffic volumes. The numbers in the graphic are average weekday directional AAWDT volumes representing the normal traffic conditions in 2021. The two tables in the graphic further summarize the data by count location, originally recorded volume, estimated AAWDT from the recorded volumes, and the final adjusted AAWDT by directions and in combination.

In general, the corridor carries an average daily traffic volume of about 14,000 to nearly 19,000 vehicles per weekday. The Grove Street sections adjacent to Tedeschi Plaza Shopping Center carry the highest daily traffic ranging from 16,000 to nearly 19,000 vehicles per weekday. The section of Plain Street west of John Mahar Highway carries the least daily traffic of about 14,000 vehicles per weekday. The Columbian Street section carries about 16,500 vehicles per weekday.

4.2 INTERSECTION TURNING MOVEMENT COUNTS

In addition to daily traffic counts, MassDOT collected TMCs at major intersections in the study corridor, including vehicle movements (by vehicle classifications), bicycle movements, and pedestrian crossings. These counts were collected during the morning peak period (6:00 AM–10:00 AM) and the evening peak period (2:00 PM–6:00 PM) on Thursday, April 8, 2021, and during the midday peak period (10:00 AM–2:00 PM) on Saturday, April 10, 2021. Appendix I contains these counts summarized by hourly and 15-minute intervals.

Figure 5 shows the weekday AM and PM peak hour TMCs at major intersections in the corridor, based on the TMCs recorded on April 4. The intersection of Grove Street at Liberty Street carried about 2,100 vehicles in the AM peak hour and nearly 2,700 vehicles in the PM peak hour. The intersection of Grove Street at Columbian Street carried about 1,650 vehicles in the AM peak hour and about 2,300 vehicles in the PM peak hour. The intersection of Plain Street at John Mahar Highway carried about 1,200 vehicles in the AM peak hour and about 1,800 vehicles in the PM peak hour.

Staff found that the volumes in these counts are generally lower than those collected in recent years before the pandemic by comparing them with historical counts at major intersections in the corridor.[8] The analysis observed the following traffic volume and pattern changes:

[8] The historical data include two main resources: (1) available traffic counts in and around the study area from MassDOT Transportation Data Management System (Massachusetts

- In the morning, the peak hour traffic decreased significantly and shifted to one half an hour later from 7:15 AM–8:15 AM to 7:45 AM–8:45 AM.[9]
- In the evening, the peak hour traffic decreased less significantly and remained in the same time period around 4:45 PM–5:45 PM.
- Both the AM and PM traffic periods had a more flattened peak pattern. The AM peak period shifted to later than usual in the period around 7:45 AM–10:15 AM. The PM peak period expanded to more than three hours and started much earlier, such as 2:30 PM or 2:45 PM.
- The through movements generally had a higher proportion of reduction than the other turning movements at the intersections in the corridor.

Based on this analysis, staff increased the recorded turning movements at the count locations by 25 to 30 percent in AM peak hour and by eight to 10 percent in the PM peak hour to represent normal pre-pandemic traffic conditions, except the intersection of Grove Street at Liberty Street. Staff used the peak hour TMCs at the intersection directly from a recent transportation study for the redevelopment of 60 Columbian Street (see Appendix J for the original counts collected on Thursday, March 21, 2019).[10] Using the counts at this key intersection as the basis, staff made additional adjustments to the counts at other intersections through a count-balancing process.

Figure 6 shows the final adjusted weekday AM and PM peak hour TMCs at major intersections in the corridor. The counts indicate that under normal traffic conditions on an average weekday, the intersection of Grove Street at Liberty Street could carry nearly 2,700 vehicles in the AM peak hour and about 3,000 vehicles in the PM peak hour. The intersection of Grove Street at Columbian Street could carry about 2,000 vehicles in the AM peak hour and nearly 2,600 vehicles in the PM peak hour. The intersection of Plain Street at John Mahar Highway could carry about 1,650 vehicles in the AM peak hour and nearly 2,000

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government webpage https://www.mass.gov/traffic-volume-and-classification) and (2) traffic impact study conducted in 2019 for the redevelopment of 60 Columbian Street in Braintree.

[9] The peak hour alternation mainly refers to the Grove Street and Columbian Street sections of the corridor. There were no sufficient historical data to compare the counts in the Plain Street section of the corridor.

[10] *Transportation Impact Assessment: 60 Columbian Street, Braintree, Massachusetts*, Prepared for Brigham and Women's Physicians Organization by VHB (Vanasse Hangen Brustlin) Incorporated, May 13, 2019. The study adjusted the original counts (five percent increase for the AM peak hour and four percent increase for the PM peak hour) to represent the busy traffic scenario.

vehicles in the PM peak hour. The other intersections in the corridor would carry a traffic volume of about 1,350 to 1,550 vehicles per AM peak hour and about 1,500 to 1,900 vehicles per PM peak hour.

The counts also indicate that the intersection of Grove Street at Liberty has a high proportion of left turns on the Grove Street northbound approach and on both approaches of Liberty Street (especially on the northbound), and a high proportion of right turns on the Liberty Street northbound approach. The intersection of Grove Street at Columbian Street has a high proportion of left turns on the southbound approach (Grove Street) and a high proportion of right turns on the northbound approach (Columbian Street). The intersection of Plain Street at John Mahar Highway has a high proportion of left turns on the southbound approach (John Mahar Highway) and a high proportion of right turns on the westbound approach (Plain Street).

The TMCs that MassDOT collected for this study also include Saturday, April 10, 2021, midday peak-period and peak-hour counts. Analysis of the Saturday peak-hour counts indicates that the traffic movement patterns in the Saturday peak hour are similar to that in the PM peak hour at major intersections in the corridor, and the Saturday peak-hour traffic volumes generally are about five to 10 percent lower than those in the PM peak hour.

4.3 PEDESTRIAN AND BICYCLE VOLUMES

In addition to traffic volumes, the intersection TMCs—conducted in the extended four-hour peak periods in the weekday morning and evening and on Saturday midday—also provided pedestrian crossing counts and bicycle counts by turning movements on each approach for this study.

The pedestrian crossing counts in the AM and PM peak hours at major intersections in the corridor are shown in Figure 5 and Figure 6.[11] On the count date, the intersection of Grove Street at Liberty Street had about three to five pedestrian crossings per peak hour. The corridor sections adjacent to Tedeschi Plaza Shopping Center also carried noticeable pedestrian activities. The intersection of Grove Street at the plaza's middle driveway and Hemlock Street had about five to six pedestrian crossings per peak hour. The crosswalk at the heritage United Church had about one to two pedestrians crossing Grove Street

[11] The data from MassDOT Mobility Dashboard indicate that pedestrian and bicycle activities generally did not decrease, and they even increased somewhat in some urban areas during the pandemic. Therefore, the pedestrian and bicycle counts in this study were not adjusted and the same numbers of pedestrian crossings were used in Figures 5 and 6.

per peak hour. The counts also indicate that there were about five pedestrians walking along Grove Street between Plain Street and Liberty Street in the AM or PM peak hour.

The counts in other hours of the AM or PM peak period (total four hours in each period) generally observed a similar or a smaller number of pedestrian crossings at the various intersections in the corridor.

Review of the bicycle counts at the major intersections indicate that about one to three cyclists traveled along the corridor during the weekday AM or PM peak period. On a fair-weather Saturday (April10, 2021), there were about two to five cyclists traveling in the corridor from 10:00 AM to 2:00 PM.

There are no sidewalks on the east side of Grove Street north of Liberty Street, no sidewalks on the west side of Grove Street south of Grove Street. Most sections of the corridor have no bicycle accommodations in the entire corridor and limited crosswalks across Grove Street. These may have discouraged walking and biking activities in the corridor. In addition, the counts were performed in early April when the weather was still relatively cold and there could have been more people walking and more biking activities in other warmer months of the year.

4.4 HEAVY VEHICLE VOLUMES

It is essential to examine the amount of truck and bus traffic in a study corridor, as an unusually high percentage of these heavy vehicles may seriously impact roadway operations.[12]

Staff reviewed vehicle classifications in the TMCs and identified the percentages of heavy vehicles within the total traffic at major locations in the corridor. On average, heavy vehicles accounted for approximately three to five percent of the corridor traffic in the AM peak hour, and approximately one to two percent in the PM and Saturday peak hours. These percentages are regarded as normal for an urban minor arterial.

[12] Heavy vehicles include single-unit trucks (Federal Highway Administration [FHWA] Vehicle Classes 5 to 7), articulated trucks (single- and multi-trailer trucks, FHWA Vehicle Classes 8 to 13), and buses (FHWA Vehicle Class 4). Vehicles on a single frame with two axles and six tires (dual rear wheels) (FHWA Vehicle Class 5) include trucks and recreational vehicles. Passenger cars of any type and all other two-axle, four-tire vehicles (FHWA Vehicle Class 3), such as pickups, vans, mini-buses, ambulances, motorhomes, and trailers (even a passenger car pulling a trailer) are not considered heavy vehicles.

The percentage of heavy vehicle traffic by direction of approach to the major intersections was calculated in the intersection capacity analyses and the traffic simulation models used for this study. The capacity analyses detailed in the following sections indicate that the existing volumes of heavy vehicles do not seriously affect traffic operations at the intersections studied.

4.5 INTERSECTION CAPACITY ANALYSES

Based on the observed and estimated TMCs, MPO staff constructed peak-hour traffic models for the entire corridor and conducted capacity analyses for major intersections using Synchro, a traffic analysis and simulation program.[13] The model set consisted of weekday AM and PM peak hour models and scenarios, including signal retiming under the assumed existing conditions and proposed improvement alternatives under the projected future traffic conditions in 2030.

Figure 7 shows the results of weekday AM and PM peak-hour capacity analyses for the observed 2021 traffic conditions at major intersections in the corridor and the level of service (LOS) each intersection provides.

The LOS was determined based on criteria from the Highway Capacity Manual (HCM).[14] The HCM defines LOS, using a qualitative scale from A to F, for signalized and unsignalized intersections as a function of the average vehicle control delay.[15] For the intersections in a metropolitan urban area, LOS A, B, and C are considered desirable; LOS D and E are considered acceptable; and LOS F is considered undesirable.

Based on the observed counts on April 8, 2021, the intersection capacity analyses indicate that major intersections in the corridor generally operated at acceptable LOS in the AM or PM peak hour. This primarily resulted from the traffic reduction during the pandemic (see the analysis in Section 3.2).

Figure 8 shows the results of weekday AM and PM peak-hour capacity analyses at major intersections in the corridor for the estimated 2021 normal (non-pandemic) traffic conditions. Based on the estimated 2021 traffic volumes (Figure

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[13] Synchro Version 10.3 was used for the analyses. This software is developed and distributed by Trafficware Ltd. It can perform capacity analyses and traffic simulation (when combined with SimTraffic) for an individual intersection or a series of intersections in a roadway network.

[14] *Highway Capacity Manual 2010*, Transportation Research Board of the National Academies, Washington, DC.

[15] Control delay quantifies the increase in travel time that a vehicle experiences due to a traffic signal or other type of control. It also provides a surrogate measure for driver discomfort and fuel consumption.

6), the intersection capacity analyses indicate that the signalized intersection of Grove Street at Liberty Street would operate at an undesirable LOS F, with average delay of more than one and one-half minutes per vehicle in the AM peak hour. Though it would operate at acceptable overall LOS D in the PM peak hour, all the approaches, except the Grove Street southbound, would operate with an average delay of approximately one minute or more.

At the signalized intersection of Grove Street at Columbian Street, the westbound approach (Grove Street) would operate at LOS E with an average delay of approximately one minute in the AM peak hour and at LOS F with an average delay of nearly one and one-half minutes in the PM peak hour.

For the unsignalized intersections, all the stop-controlled approaches would operate at acceptable LOS, except the middle driveway from Tedeschi Plaza Shopping Center to Grove Street. The through and left-turn shared approach on the driveway would operate at an undesirable LOS F with average delay of two minutes or more per vehicle during the AM and PM peak hours when the Grove Street traffic is busy.

Staff also explored opportunities of retiming signals at the three signalized intersections and found that all have the potential to improve from the existing timing settings. These options are discussed in Chapter 5. Details of Synchro capacity analysis reports for the major intersections in the weekday AM and PM peak hour under the 2021 observed and estimated traffic conditions are included in Appendices K and L.

4.6 ROADWAY TRAVEL SPEEDS

One of the major concerns raised by the town residents is the generally high travel speeds in the corridor. In order to examine the prevailing travel speeds versus regulated speeds, MPO staff requested that MassDOT help collect spot-speed data during the period when automatic traffic counts were being conducted.

Figure 9 shows the existing speed regulations and estimated 85th percentile speed at selected locations in the corridor, based on spot-speed counts collected from automatic traffic recorders. The 85th percentile speed is the speed at or below which 85 percent of vehicles passing a given point are traveling, and it is the principal value used to establish speed controls by MassDOT. It is generally regarded as the prevailing speed at a location where the speed data is collected.

The corridor has three speed regulations:

1. 30-mph speed limit: Plain Street and Grove Street between John Mahar Highway and Grove Circle
2. 35-mph speed limit: Plain Street between Hancock Street and John Mahar Highway and Grove Street between Hannah Niles Way and Liberty Street
3. 40-mph speed limit: Grove Street between Grove Circle and Hannah Niles Way and the rest of the sections in the corridor (Grove Street south of Liberty Street and Columbian Street south of Grove Street)

The regulated speed limit in each zone applies to both directions of the roadways in corridor. The 85th percentile speeds estimated from the data indicate that vehicles generally traveled about three to five mph higher than the regulated speeds, except the Grove Street northbound section between Tedeschi Plaza Shopping Center and Heritage Methodist Church. The prevailing speed there is almost 10 mph higher than the 35-mph regulated speed. It is concerning that drivers tend to speed up after they pass the busy commercial section and may not pay attention to the upcoming crosswalk near the church.

The proposed long-term improvements described in this report with the reduction of travel lane width and the addition of separated bicycle lanes would potentially reduce travel speeds in the corridor. At the design stage, a consistent 35 mph speed limit could be considered for the entire corridor, except the 30-mph speed zone near Plain Street. It should be maintained with the same regulation, due to its curvature and limited sight distances. In the near term, if the speed regulation in the aforementioned section is to be changed, an engineering study, based on speed data collected from radar or laser guns, would have to be undertaken.[16]

4.7 EXISTING ROADWAY LAYOUTS AND POTENTIAL RECONFIGURATIONS

The corridor is a two-lane roadway and generally has a right-of-way width of about 60 feet. Based on the existing street layouts and adjacent land uses, the corridor can be distinguished into four roadway sections:

1. Plain Street between Hancock Street and Grove Street
2. Grove Street between Plain Street and Liberty Street
3. Grove Street between Liberty Street and Columbian Street
4. Columbian Street between Grove Street and Weymouth Town Line

[16] To establish or modify speed controls, MassDOT requires the collection of speed data by radar gun or laser gun at critical locations at intervals not to exceed 0.25 miles, in addition to vehicle trial runs in the study area.

Figures 10 to 13 show the existing roadway cross section and potential reconfiguration alternatives in the four roadway sections. In each of the roadway sections, the cross section represents a typical layout in or near the tightest right-of-way area. It exhibits the view of a southbound driver in the corridor.

Plain Street between Hancock Street and Grove Street

The top graphic in Figure 10 shows that the existing roadway contains a 12-foot-wide travel lane, an eight-foot shoulder, and a six-foot sidewalk in each direction. Field observations indicate that one to two vehicles could occasionally occupy the relatively wide shoulders. As the adjacent areas are fully built, with continuous sidewalks on both sides, two potential reconfigurations are proposed within the existing street layout: (1) to reduce the travel lane to 11.5-foot and install a street-level bike lane (five feet wide) with a traffic buffer (three and half feet wide) in each direction; and (2) to reduce the travel lane to 11.5-foot and install a raised bike (six feet wide) with a roadway shoulder of two and half feet wide (see the middle and bottom graphics of Figure 10).

Grove Street between Plain Street and Liberty Street

The section contains mainly residential land uses (single-family houses and apartments), a senior living community (Grove Manor Estates), a church, and a major business district (Tedeschi Plaza Shopping Center). The top graphic in Figure 11 shows the existing roadway layout near the shopping center. It contains a 12.5-foot-wide travel lane and a six-foot shoulder in each direction. Sidewalks (five to six feet wide) exist only on the southbound side and utility poles exist mainly on the northbound side.

The middle and bottom graphics of Figure 11 show two potential reconfiguration alternatives for this roadway section: (1) to reduce the travel lane to an 11.5-foot lane and install a street-level bike lane (five feet wide) with a traffic buffer (three and half feet wide) in each direction, and to install five-foot grass buffers (to accommodate the existing utility poles) and six-foot sidewalks on the northbound side; and (2) to reduce the travel lane to an 11.5-foot lane and install a sidewalk-level bike lane (five feet wide) with a sidewalk buffer (two to five feet wide) and a roadway shoulder (two feet wide) in each direction, and to install six-foot sidewalks with five-foot buffers on the northbound side.

Grove Street between Liberty Street and Columbian Street

The section contains mostly residential land uses (single-family houses) and open spaces located near Columbian Street. The travel lanes in this section are wider than the previous two roadway sections, with a width of about 12.5 to 14 feet. The top graphic in Figure 12 shows that it also contains shoulders of

variable widths of about five to eight feet. Sidewalks (five to six feet wide) exist only on the northbound side (from Birch Street to Liberty Street) and in a short southbound section (from O'Toole Terrace to Birch Street) and utility poles exist mainly on the southbound side.

Two potential reconfiguration alternatives are proposed in this roadway section: (1) to reduce the travel lane to an 11.5-foot lane and install a street-level bike lane with a traffic buffer in each direction, and to install grass buffers and six-foot sidewalks on the southbound side; and (2) to reduce the travel lane to an 11.5-foot lane and install a sidewalk-level bike lane with a sidewalk buffer and a roadway shoulder in each direction, and to install six-foot sidewalks on the southbound side. The proposed reconfiguration layouts are similar to the previous section, except that the additional sidewalks and the grass buffers for utility pole accommodations are located on the southbound side.

Columbian Street between Grove Street and Weymouth Town Line

This section currently contains only commercial and business land uses. Although the roadway between Grove Street and the development on 60 Columbian Street contains four travel lanes, it is a two-lane roadway extending beyond the Weymouth town line. As shown in Figure 13, the existing layout contains a 12- to 14-foot travel lane and a three- to four-foot shoulder in each direction. No sidewalks exist and utility poles exist mainly on the southbound side.

Two potential reconfiguration alternatives are proposed in this roadway section: (1) to reduce the travel lane to an 11.5-foot lane, install a five-foot street-level bike lane with a traffic buffer and six-foot sidewalks in both directions; and (2) to reduce the travel lane to an 11.5-foot lane and install a five-foot sidewalk-level bike lane with a sidewalk buffer and a roadway shoulder and six-foot sidewalks in both directions. The grass buffers are wider on the southbound side, to accommodate the existing utility poles.

In summary, staff developed two potential reconfiguration alternatives for the corridor based on the analyses of existing roadway layouts and adjacent land uses in different sections. Either of them would significantly improve the safety and accommodation for people who walk and bike, through provisions of sufficient and comfortable sidewalks and separated bike lanes (Alternative 1 at street level and Alternative 2 at sidewalk level), while maintaining efficient traffic flow in the corridor. They have a similar overall layout that provides a framework for developing improvement strategies in different sections and at critical locations of the corridor.

Chapter 5—Proposed Improvements

Based on the analyses in the previous chapters, Metropolitan Planning Organization (MPO) staff developed a series of short- and long-term improvements to address safety and operational problems in the corridor. The proposed short-term improvements could be implemented within three years at a relatively low cost. The long-term improvements are more complicated and cover larger areas, thus requiring intensive planning and design, and significant funding.

This chapter contains six sections. The first section outlines the corridor improvement objectives and design strategies based on the identified issues and concerns for the corridor. The next four sections review the existing roadway conditions, discuss issues and concerns, and propose short- and long-term improvements for four consecutive but distinct roadway sections in the corridor. The last section in this chapter provides an overview of the proposed long-term improvements under the projected 2030 traffic conditions.

5.1 CORRIDOR IMPROVEMENT OBJECTIVES AND DESIGN STRATEGIES

Based on the identified key issues and concerns and discussions with the advisory members, MPO staff developed the following objectives to improve the safety, mobility, and access for all users of the corridor:

- improve safety for all users of the corridor
- maintain safe travel speeds in the corridor
- improve and provide safe and comfortable accommodations for people who walk and bike
- provide safe and convenient access to adjacent businesses and residences
- enhance access management to reduce traffic conflicts
- minimize delays and increase safety at intersections while maintaining efficient traffic flow in the corridor

To achieve the objectives, staff applied the following design strategies to the proposed improvement alternatives:

- reduce travel lane width to 11.5 feet wide
- reduce intersection layout and turning radii

- add sidewalks where absent and expand existing sidewalks to at least six feet wide where applicable
- improve safety and operations at existing crosswalks and add crosswalks where needed
- provide separated bike lanes wherever applicable
- provide sufficient buffer from traffic for people who walk and bike
- modify intersections and access to and from developments to improve safety and mobility for all users

5.2 PLAIN STREET BETWEEN HANCOCK STREET AND POND STREET

This section discusses Plain Street between Hancock Street and Grove Street, including the intersection of Plain Street at Grove Street. The adjacent land uses include mostly residential and some commercial areas, with the roadway mostly abutted by single-family houses (Figure 10). The section contains two intersections in close proximity, one signalized at John Mahar Highway and one unsignalized at Grove Street.

5.2.1 Issues and Concerns

In summary, these are the major issues and concerns identified for this roadway section:

- The roadway section between John Mahar Highway and Grove Street is frequently congested during peak hours, as it is short and curved with limited storage space. Several crashes occurred in this section in recent years.
- A noticeable number of crashes occurred at the intersection of Plain Street and the Registry of Motor Vehicles (RMV) driveway. The driveway is wide, and the stop sign at the approach is small and not very visible.
- No dedicated bike lanes exist for people to bike in the section. Although shoulders of four to six feet wide exist on Plain Street west of John Mahar Highway, they are occasionally occupied by parked vehicles.
- The roadway's adjacent areas are almost built up, with little room for multimodal improvements.

5.2.2 Proposed Short-Term Improvements

In the short term, this study proposes the following improvements for consideration:

- Increase the stop sign size to 36 inch by 36 inch on Plain Street westbound at Grove Street.
- Examine the feasibility of adding backplates and retroreflective borders to the existing signal displays at the intersection of Plain Street and John Mahar Highway.
- Increase the stop sign size to 36 inch by 36 inch and double up the signs at the RMV driveway.
- Examine the feasibility of restriping Plain Street west of John Mahar Highway to include street-level separated bike lanes by reducing the existing travel lanes to 11.5 feet wide (Figure 10).

5.2.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general and at the intersections of Plain Street at John Mahar Highway and at Grove Street. Figure 14 shows the conceptual plan of the proposed improvements.[17]

The section in general

- Maintain the existing roadway layout on Plain Street west of John Mahar Highway.
- Widen Plain Street from John Mahar Highway to Grove Street under the available right-of-way.
- Reduce the travel lanes to 11.5 feet wide.
- Add street-level separated bike lanes or raised bike lanes with traffic buffers.[18]

[17] This is a preliminary planning study that does not incorporate detailed design of the proposed improvements. Figures 14 to 18, the proposed improvements conceptual plans, exhibit the layout and approximate dimensions of key elements in the proposed reconfiguration Alternative 1 that contains street-level separated bike lanes for the different roadway sections in the corridor (Section 4.7). They can also be used to gauge the proposed reconfiguration Alternative 2 that contains sidewalk-level or raised bike lanes, as both alternatives have a similar layout except that Alternative 2 would require slightly more space for sidewalk buffers in a few roadway sections in the corridor.

[18] Based on a quick review of the existing right-of-way from the MassGIS level-3 Parcel data, the separated bike lanes are considered feasible only on the southbound side of the roadway between John Mahar Highway and Grove Street. At the design stage, they should be further considered to be installed on both sides of the roadway, with more precise land surveys and other opportunities such as minor land takings. Meanwhile, a bike box can be considered on

- Improve the existing sidewalks and expand them to at least six feet wide wherever applicable.
- Further study the feasibility of installing separated bike lanes on John Mahar Highway and Ivory Street between this corridor and Braintree Station.[19]

Plain Street at John Mahar Highway

- Reduce turning radii and shorten crossing distances.
- Slightly widen the south side to accommodate a bike lane continuing through the intersection.
- Extend westbound left-turn storage length to 175 feet.
- Upgrade traffic signal system and signal displays with backplates and retroreflective borders.
- Retime traffic signal as needed in the future.[20]

Plain Street at Grove Street

- Maintain stop-control operation.
- Widen the Plain Street eastbound to add a short left-turn lane (with 50-foot storage) and to install a bike lane (five-foot minimal).
- Reduce turning radii and shorten crossing distances on the Plain Street westbound approach.
- Extend westbound left-turn storage length to 175 feet.
- Upgrade traffic signal system and signal displays with backplates and retroreflective borders.
- Retime traffic signal as needed in the future.[21]

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the southbound approach for left turns from Plain Street to John Mahar Highway, if the left-turn demand justifies the installation.

[19] This study corridor, John Mahar Highway, and Ivory Street, form a major route for South Shore commuters and residents to reach Braintree Station; safe and convenient accommodation for people who bike along this route is highly desirable. The further study could examine the potential of converting the existing four-lane roadway to a two- to three-lane roadway with separated bike lanes on both sides.

[20] This intersection is being coordinated with the traffic signal at the rail crossing on John Mahar Highway in the north where drivers experience extensive delays during the train crossings. Further north on John Mahar Highway at Pearl Street, drivers also experience extensive delays, especially making the northbound left turns to Pearl Street. Currently, this intersection operates at acceptable level of service (LOS) under both the observed and estimated traffic conditions. In the future, this and the intersections of John Mahar Highway at the rail crossing and at Peal Street should be studied together for signal timing and coordination improvements.

5.3 GROVE STREET BETWEEN PLAIN STREET AND LIBERTY STREET

This section discusses Grove Street between Plain Street and Liberty Street, including the intersection of Grove Street at Liberty Street. It has wider travel lanes than the previous section and lacks sidewalks on the northbound side (Figure 11). It contains mainly residential zones, a church (Heritage United Methodist Church), and a major business district. The district, including Tedeschi Plaza Shopping Center, the intersection of Grove Street at Liberty Street, the businesses adjacent to the intersection, is the busiest section in the corridor that carries high traffic volume and considerable pedestrian activities. Meanwhile, survey respondents commented that they would walk to the shopping area if safer and more convenient accesses are provided.

5.3.1 Issues and Concerns

In summary, these are major issues and concerns regarding this roadway section:

- No sidewalks exist on the northbound side, except a short section from the northern edge of the shopping center to Hannah Niles Way. Sidewalks in the section are fragmental due to wide driveways with large turning radii.
- Two crosswalks are located closely (within 175 feet) in the section between Hannah Niles Way and the church. They have insufficient warning signage to alert drivers.[22]
- No dedicated bike lanes exist for people to bike. Although the section between Sunnyside Lane and Hannah Niles Way has shoulders of approximately five feet or slightly wider in both directions, vehicles usually travel at fast speeds of more than 40 mph.

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[21] This intersection is being coordinated with the traffic signal at the rail crossing on John Mahar Highway in the north where drivers experience extensive delays during the train crossings. Further north on John Mahar Highway at Pearl Street, drivers also experience extensive delays, especially making the northbound left turns to Pearl Street. Currently, this intersection operates at acceptable LOS under both the observed and estimated traffic conditions. In the future, this and the intersections of John Mahar Highway at the rail crossing and at Peal Street should be studied together for signal timing and coordination improvements.

[22] As the roadway is relatively wide, the crosswalks would be more conspicuous to drivers if the pedestrian crossing warning signs are installed on both sides in both directions. Currently they exist only on one side in each direction and the warning sign at the crosswalk near the church is absent in the southbound direction. Meanwhile, the warning sign on the northbound side at the crosswalk near Hannah Niles Way is obscured by a utility pole and overgrown vegetation.

- The intersection of Grove Street and Liberty Street is usually congested during the AM and PM peak hours, as it carries heavy regional and local traffic and lacks essential dedicated turning lanes and signal phases on all approaches.
- The intersection has a high crash rate and a high proportion of left-turn crashes.
- The Grove Street section along Tedeschi Plaza Shopping Center is also congested during the peak hours. The section had a number of crashes in recent years, with a noticeable cluster at the intersection of Grove Street at Hemlock Street and the shopping center's middle driveway.
- There are three driveways connecting the shopping center to Grove Street. Given the busy traffic on Grove Street and random pedestrian crossings, they should be under stop-control but only the middle driveway has a stop sign in place.

5.3.2 Proposed Short-Term Improvements

In the short term, this study proposes the following improvements for this roadway section:

- Consider consolidating the two closely located crosswalks into one and installing Rectangular Repaid Flashing Beacons (RRFB) to enhance the standard pedestrian crossing warning signs and location plaques on both sides in both directions of the roadway (Figure 15).[23, 24, 25]
- Install a Yield Here To Pedestrians regulatory sign (MUTCD R1-5 or R1-5a) along with a yield line (shark's teeth) pavement marking at about 30 feet from the crosswalk on the northbound and southbound approaches.

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[23] Currently the two crosswalks have a low use rate of about one crossing per hour during the day time. The north side of the crosswalk near Hannah Niles Way has a limited landing area with overgrown vegetation. The crosswalk near the church is located away from the main walkway leading to the church. Meanwhile, people may cross the roadway at locations other than the two crosswalks. Combining them into one crosswalk located near the church's main walkway with the RRFB's reinforcement of drivers' attention to pedestrian crossing activities would encourage people to use the crosswalk and significantly improve their safety.

[24] According to Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD) Interim Approval for Optional Use of Pedestrian-Actuated Rectangular Rapid-flashing Beacons at Uncontrolled Marked Crosswalks* (IA-21, dated March 21, 2018), an RRFB shall only be installed to supplement a post-mounted pedestrian crossing warning sign (MUTCD W11-2) with a diagonal downward arrow plaque (MUTCD W16-7P) located at or immediately adjacent to an uncontrolled marked crosswalk.

[25] The installation of RRFB at this location complies with the guidelines of FHWA Technical Report: *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* (FHWA-SA-17-072, updated July 2018).

- Clear overgrown vegetation in the area, especially on the northbound side.
- Retime the traffic signal at the intersection of Grove Street and Liberty Street under the existing phasing sequence, with the pedestrian signal being increased from 22 seconds to 27 seconds.[26, 27]
- Examine potential in adding backplates and retroreflective orders on the existing signal displays.
- Install stop signs at the north and south driveways of the shopping center to require drivers to stop and observe traffic and pedestrians before entering Grove Street.

5.3.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general, the intersection of Grove Street at Liberty Street, and the section in the vicinity of Tedeschi Plaza Shopping Center. Figures 15 and 16 show the conceptual plans of the proposed improvements.

The section in general

- Reduce the travel lanes to 11.5 feet wide.
- Install street- or sidewalk-level separated bike lanes with traffic buffers on both sides of the roadway.
- Install six-foot sidewalks on the northbound side.
- Improve the existing sidewalks on the southbound side and expand them to six feet wide wherever applicable.
- Install five-foot grass buffers on the northbound side between the proposed bike lanes and sidewalks to accommodate the existing utility poles.
- Reduce driveway widths and tuning radii wherever applicable.

[26] The existing signal operation includes an exclusion pedestrian signal phase of 22 seconds. Two crosswalks at the intersection have a crossing distance of nearly 70 feet. The increase to 27 seconds would provide more sufficient time for people to complete their crossings at the two crosswalks (based on estimation by using MUTCD's guideline of 3.5 feet per second walking speed).

[27] The retiming would enhance pedestrian safety and improve the intersection traffic operations especially in the AM peak hour. Appendix M presents the AM and PM peak hour capacity analyses with the retiming plans under the estimated 2021 normal traffic conditions.

- Change speed limit from 40 miles per hour (mph) to 35 mph in the section between Grove Circle and Hannah Niles Way after the roadway is reconfigured with the above improvements.

Grove Street at Liberty Street

- Reconstruct the intersection under the existing right-of-way.[28]
- Add necessary turning lanes and rearrange the following travel lanes[29]
  - Eastbound (Grove Street): convert the existing two lanes into three that include a left-turn lane of at least 75 feet long, a through lane, and a through and right-turn shared lane.
  - Westbound (Grove Street): convert the existing two lanes into three that include a left-turn lane of about 200 feet long, a through lane, and a right-turn lane of about 50 feet long.
  - Northbound (Liberty Street): convert the existing two lanes into three that include a left-turn lane of at least 175 feet long, a through lane, and a right-turn lane of about 75 feet long.
  - Southbound (Liberty Street): convert the existing two lanes into a left-turn lane (about 150-feet long) and a through and right-turn shared lane.
- Provide bike lanes continuing through the intersection on Grove Street.[30]
- Upgrade traffic signal system and signal displays with backplates and retroreflective borders.

Grove Street in the vicinity of Tedeschi Plaza Shopping Center

- Proposed Improvements at the middle driveway (and Hemlock Street):[31]

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[28] With the reductions of travel lanes to 11 to 11.5 feet wide and turning radii, the proposed intersection layout is feasible under the existing right-of-way without increasing the pedestrian crossing distance.

[29] The proposed layout was selected from a number of reconfiguration alternatives tested with projected 2030 AM and PM peak-hour traffic conditions. Appendix M contains detailed intersection capacity analyses for this proposed alternative, including the estimated average traffic queue on all the travel lanes.

[30] At the design stage, the bike lane on Grove Street southbound should be further refined so as to reduce conflicts between people biking continuing straight and southbound right-turn traffic.

[31] The proposed improvements at the three driveways should be regarded as a complete set for the entire section set, which should be designed and implemented together. Particularly, those proposed for the north and south driveways could be implemented only after the improvements at the middle driveway are completed.

- Install traffic signal and coordinate it with the new signal at Liberty Street.[32]
- Install crosswalks on all approaches with pedestrian signals and an exclusive signal phase.
- Add a left-turn exclusive lane on the Grove Street southbound approach.

- Proposed Improvements at the south driveway:
  - Reduce driveway width and turning radii.
  - Install stop signs on both sides at suitable locations (not to obstruct the drivers' view of Grove Street traffic and pedestrian activities).
  - Prohibit left turns from the driveway during the AM and PM peak hours.
- Proposed Improvements at the north driveway:
  - Reduce driveway width and turning radii.
  - Install a stop sign on the right side at a suitable location.
  - Prohibit left turns from the driveway.

5.4 GROVE STREET BETWEEN LIBERTY STREET AND COLUMBIAN STREET

This section discusses Grove Street between Liberty Street and Columbian Street. It contains mostly residential areas, with some open spaces located near Columbian Street (Figure 12). The travel lanes in this section are wide and with wide shoulders. Sidewalks exist only on the northbound side and utility poles exist mainly on the southbound side.

5.4.1 Issues and Concerns

In summary, these are major issues and concerns regarding this roadway section:

- No sidewalks exist on the southbound side, except a short section between O'Toole Terrace and Birth Street.

[32] Staff conducted a quick review of the intersection's traffic signal needs based on the available automatic traffic recorder and turning movement counts data collected on April 8, 2021, with no adjustments. The analysis indicated that a traffic signal could be considered at this location, as the counts satisfied the MUTCD Traffic Control Signal Warrant 1 (eight-hour vehicular volumes) and Warrant 2 (four-hour vehicular volumes).

- A crosswalk exists on Grove Street just north of O'Toole Terrace. It situates at a slightly downhill location where vehicles usually travel at high speeds.[33]
- No dedicated bike lanes exist for people to bike. Although some sections have shoulders of about five feet or slightly wider, vehicles usually travel at fast speeds of more than 40 mph throughout the section (under 40-mph speed regulation).
- Crashes occurred at various locations throughout the section, with a noticeable number of them identified as multiple-vehicle, rear-end, and out-of-control single-vehicle collisions.
- Birch Street is a local road that contains mainly residential areas. According to the area's residents, making left turns to and from Birch Street usually encounters excessive delays during peak hours.[34]

5.4.2 Proposed Short-Term Improvements

In the short term, this study proposes the following improvements for consideration:

- Restripe the travel lanes to 11.5 to 12 feet wide with shoulders of approximately five feet on both sides of the roadway.
- Install a Yield Here To Pedestrians regulatory sign (MUTCD R1-5 or R1-5a) along with a yield line (shark's teeth) pavement marking at about 30 feet from the crosswalk on the southbound approach and at about 50 feet from the crosswalk on the northbound approach.

5.4.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general, at the uncontrolled crossing location, and at the intersection at Birch Street (Figure 17):

- Reduce the travel lanes to 11.5 feet wide.

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[33] The crosswalk was installed a few years ago. It is well equipped with the pedestrian crossing warning sign (MUTCD W11-2) and a diagonal downward arrow plaque (MUTCD W16-7P) on both sides in both directions of the roadway. Due to the high vehicle travel speeds of more than 40 mph, a RRFB is not considered suitable unless the roadway is redesigned with a 35 mph speed limit or lower.

[34] Birch Street situates diagonally between Grove Street and Liberty Street. It is possible that a major portion of left turns from Grove Street to Birch Street (and right turns from Birch Street to Grove Street) is cut-through traffic intending to avoid the congested intersection of Grove Street and Liberty Street during peak hours.

- Install street- or sidewalk-level separated bike lanes with traffic buffers on both sides of the roadway.
- Install six-foot sidewalks on the southbound side.
- Improve the existing sidewalks on the northbound side and expand them to six feet wide wherever applicable.
- Install five-foot grass buffers on the southbound side between the proposed bike lanes and sidewalks to accommodate the existing utility poles.
- Reduce driveway widths and tuning radii wherever applicable.
- Change the speed limit from 40 mph to 35 mph for the entire section after the roadway is reconfigured with the above improvements.
- Install RRFB to supplement the pedestrian warning crossing signs at the uncontrolled crosswalk on Grove Street (north of O'Toole Terrace).[35]
- Continue monitoring traffic conditions at the intersection of Grove Street and Birch Street and further study the needs for improvement measures.[36]

5.5 COLUMBIAN STREET BETWEEN GROVE STREET AND WEYMOUTH TOWN LINE

This section discusses Columbian Street between Grove Street and Weymouth town line, including the intersection of Grove Street and Columbian Street. It is a two-lane roadway, except a four-lane section between Grove Street and the driveway of the business park at 60 Columbian Street. The two intersections are signalized and under coordination. The adjacent areas of the roadway are all

[35] According to the guidelines of the FHWA technical report (FHWA-SA-17-072), RRFB is not suitable for roadways with a posted speed limit of 40 mph or higher. A Pedestrian Hybrid Beacon (PHB) can be considered for such roadways if it meets the installation guidelines—based on speed, pedestrian volume, vehicular volume, and crossing length—as provided in Section 4F.01 of the MUTCD. At this location, the installation of PHB does not meet the minimum requirement of 20 pedestrian crossings per hour. Therefore, staff recommend adding RRFB at this location as a long-term improvement measure after the roadway's posted speed limit is changed to 35 mph.

[36] Based on the counts collected for this intersection on April 8 and 10, 2021, there were approximately 10 to 15 left turns per hour (approximately 20 to 30 in the PM or Saturday peak hour) to and from Birch Street. These volumes do not support the installation of a separated left turn either on Grove Street or on Birch Street. Meanwhile, pedestrian crossing improvement measures such as PHB and RRFB do not meet the installation guidelines by MUTCD and FHWA Technical Report (FHWA-SA-17-072). As such, staff proposed no improvements at the moment but recommend monitoring traffic condition, especially when traffic returns to normal following the pandemic.

zoned as business districts. No sidewalks exist on either side and utility poles exist mainly on the southbound side (Figure 13).

5.5.1 Issues and Concerns

In summary, these are major issues and concerns regarding this roadway section:

- No accommodations for people who walk.
- No dedicated bike lanes exist for people to bike, and the shoulders are generally narrow (about three feet or less).
- The intersection at Columbian Street has a large layout with wide turning radii.
- Traffic congestion at the intersection mainly occurs on the southbound approach of Grove Street. The approach does not have a dedicated left-turn lane and left turns are operated under a permissive-protected phase (lagging protective). During peak hours (especially in the PM), left-turn vehicles usually queue up and impede through traffic movements. Meanwhile, vehicles turning left there have to cross two northbound travel lanes under heavy traffic conditions.
- Nearly 30 crashes occurred at the intersection in recent five years. Almost half of them were angle crashes involving a southbound left-turn vehicle colliding with a northbound through vehicle.
- The large open area south of the intersection is occupied by wetlands and should remain intact.

5.5.2 Proposed Short-Term Improvements

In the short term, this study proposes the following improvements for consideration:

- At the intersection of Grove Street and Columbian Street, change the southbound left-turn operation from permissive-protective (lagging protective) to protected-permissive (leading protective) mode and retime the traffic signal under the existing cycle length.[37]

[37] The retiming with the alteration of southbound left-turn operation would potentially reduce the crashes at the intersection (especially the southbound left-turn and rear-end collisions), while maintaining the same LOS and the coordination with the signal at the business park. Appendix L presents the AM and PM peak hour capacity analyses with the retiming plans under the estimated 2021 normal traffic conditions.

- Examine the potential of adding backplates and retroreflective orders on the existing signal displays.

5.5.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general, the intersection of Grove Street at Columbian Street, and the intersection of Columbian Street at the driveway of 60 Columbian Street. Figure 10 shows the conceptual plan of the proposed improvements.

The section in general

- Reduce the travel lanes to 11.5 feet wide.
- Install street- or sidewalk-level separated bike lanes with traffic buffers on both sides of the roadway.
- Install six-foot sidewalks on both sides of the roadway.
- Install five-foot grass buffers on the southbound side between the proposed bike lanes and sidewalks to accommodate the existing utility poles.
- Install two- to three-foot grass buffers on the northbound side between the proposed bike lanes and sidewalks.
- Reduce driveway widths and tuning radii wherever applicable.
- Install eight- to 10-foot multiuse path on the southbound side from Grove Street to the driveway at 60 Columbian Street for people walking and biking.
- Change speed limit from 40 mph to 35 mph after the roadway is reconfigured with the above improvements.

Grove Street at Columbian Street

- Reduce the northbound through lanes from two to one.
- Reduce intersection layout and turning radii.
- Install crosswalks with pedestrian signals.
- Provide a multiuse path (shared by people who walk and people who bike) through the intersection.
- Upgrade traffic signal system and signal displays with backplates and retroreflective borders.

Columbian Street at the Driveway of 60 Columbian Street

- Change the two northbound travel lanes to one through lane and one exclusive left-turn lane.

- Install crosswalks with pedestrian signals.
- Upgrade traffic signal system and signal displays with backplates and retroreflective borders.
- Maintain signal coordination with the intersection of Grove Street and Columbian Street.

5.6 OVERVIEW OF PROPOSED LONG-TERM IMPROVEMENTS UNDER PROJECTED 2030 TRAFFIC CONDITIONS

To further examine the effect of the proposed long-term improvements at the various locations described above, staff constructed traffic models for projecting traffic conditions in the study corridor to the horizon year 2030. Staff projected the 2030 traffic volumes by using growth factors estimated from the Boston Region MPO's regional transportation planning model. The models project that traffic in the study area would increase by three percent (about 0.3 percent annually) in the AM peak period and two percent (about 0.25 percent annually) in the PM peak period from 2021 to 2030.

Figure 19 summarizes the weekday AM and PM peak hour intersection capacity analyses for major intersections in the corridor under the projected 2030 traffic conditions. With the proposed long-term improvements, all the intersections would operate at an acceptable level of service (LOS D or better) during the weekday AM and PM peak hours.

Synchro capacity analysis reports for major intersections in the study corridor are included in Appendix N. These reports present the results of the analysis of the 2030 weekday AM and PM peak-hour traffic conditions, under the assumption that the proposed improvements are implemented.

The analysis indicates that the proposed long-term improvements would improve traffic operations and the accommodation and safety for people who walk at critical locations of the corridor, especially at the intersections of Grove Street at Liberty Street and at Columbian Street. Meanwhile, as analyzed in the previous sections of this chapter, they would significantly enhance the mobility and safety of all users in the corridor.

Chapter 6—Summary and Recommendations

This study provides a vision for the long-term development of the Grove Street corridor in Braintree and presents a series of improvements that would support the corridor to operate safely and efficiently for all people who walk, bike, and drive, or ride with others in the corridor. The recommendations included are based on a series of analyses that were performed to identify safety and operational problems in the corridor and to develop short- and long-term improvement alternatives.

The recommended short-term improvements could enhance safety for all users and improve traffic operations in the study area. With a high benefit-to-cost ratio, these short-term improvements should be considered and implemented as soon as resources are available. Among the improvements proposed at various locations in the corridor, two projects were recommended for consideration in the short term:

- Combine the two closely located crosswalks on Grove Street in the vicinity of Heritage United Methodist Church and install Rectangular Rapid Flashing Beacons and a series of pedestrian crossing warning signs and pavement markings to enhance the conspicuity of crossing activities and improve safety and access for people who walk.
- Review and retime the traffic signals at the intersections of Grove Street at Liberty Street and at Columbian Street, including increasing the pedestrian signal time for people to cross the intersection at Liberty Street.

To significantly improve the safety, mobility, and access for all users of the roadway would require a series of long-term improvements. The following major improvements are proposed for the corridors:

- Reduce travel lane width to 11.5 feet wide.
- Install street- or sidewalk-level separated bike lanes with traffic buffers on both sides of the roadway.
- Install six-foot sidewalks wherever absent and improve the existing sidewalks and expand them to six feet wide wherever applicable.
- Install five-foot grass buffers between the proposed bike lanes and sidewalks to accommodate the existing utility poles.
- Reduce driveway widths and tuning radii wherever applicable.
- Change the speed limit from 40 to 35 miles per hour (mph) in the corridor, except the curved and busy section between John Mahar Highway and

Grove Circle (30 mph posted speed limit), after the implementation of the above improvements.

- Reconstruct the intersections of Grove Street at Liberty Street and at Columbian Street, with an upgraded traffic signal system.

The proposed long-term improvements have a number of expected benefits:

- Improve accommodations and safety for people who walk, bike, and use a mobility device.
- Improve mobility and safety for people to access adjacent businesses and residences.
- Sustain appropriate travel speeds and increase safety for all users in the corridor.
- Maintain efficient traffic operations in the corridor.
- Support and enhance economic activities.
- Enhance livability for neighborhoods and the subregion.

Implementing the recommended long-term improvements in this corridor of approximately two miles long would require sufficient resources. Four implementation stages can be considered for the entire corridor, as follows:

1. Grove Street between Hannah Niles Way and Liberty Street, including the intersection at Liberty Street
2. Grove Street between Plain Street and Hannah Niles Way, including the intersection at Plain Street
3. Grove Street between Liberty Street and Columbian Street
4. Columbian Street south of Grove Street, including the intersection at Grove Street

Depending on the available and potential resources, the Town of Braintree could consult with Massachusetts Department of Transportation (MassDOT) District 6 and reprioritize the implementation stages by rearranging, combining, or dividing the four proposed segments.

Meanwhile, achieving the proposed Complete Streets vision for the corridor via the recommended improvements would require significant effort and collaboration on the part of all stakeholders, including the Town of Braintree, residents, business owners, and MassDOT. All parties must concur on how the

recommendations should be realized in a resourceful and fiscally responsible manner.

The next steps toward implementation are for the town to identify priority sections and work with MassDOT District 6 to initiate a project. For municipalities to initiate roadway projects, MassDOT developed an online tool for submission. The Massachusetts Project Intake Tool, also known as MaPIT, is a web-based application designed to help proponents map, create, and initiate projects with available in-house geographic information system (GIS) resources. The tool can be accessed from the GeoPass webpage of Massachusetts GIS for Transportation website, https://massdothpi.esriemcs.com/mapit.

To move a project from the initiation to the development stage, the Town of Braintree must obtain favorable assessment from MassDOT's Project Review Committee, start the project design process, and identify potential funding sources by coordinating with MassDOT and the Boston Region MPO.

MPO staff will continue to support this work by assisting with further project planning and the funding process. In addition, staff will continue monitoring the progress toward implementing this study's recommendations via the MPO's Unified Planning Work Program Study Recommendations Tracking Database.

Appendix O contains details about the various steps in MassDOT's project development process, including a schematic timetable. Information about the project development process may be found on MassDOT's website, at https://www.mass.gov/service-details/project-development-process.

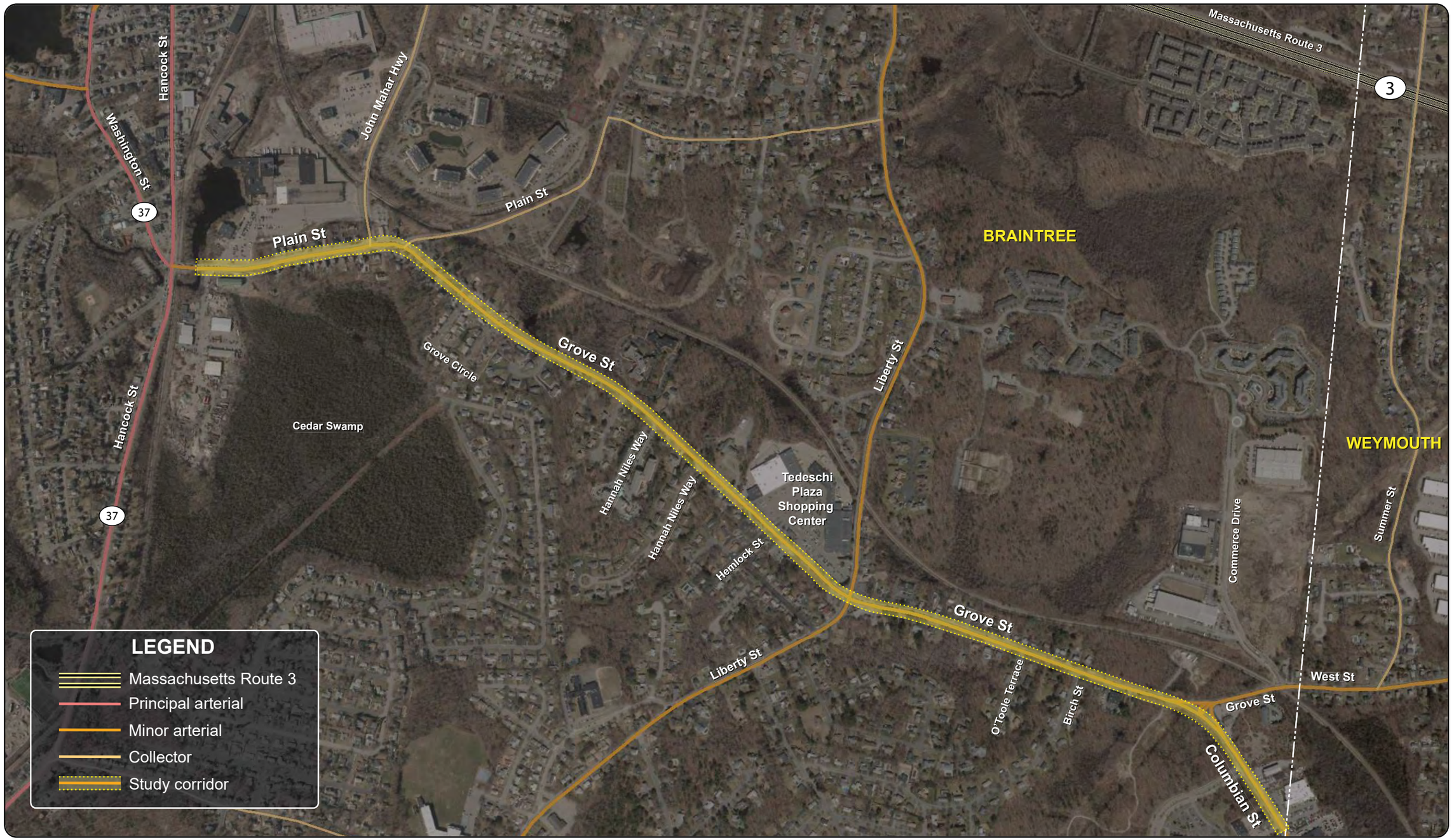

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Figure 1
Study Area Map
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

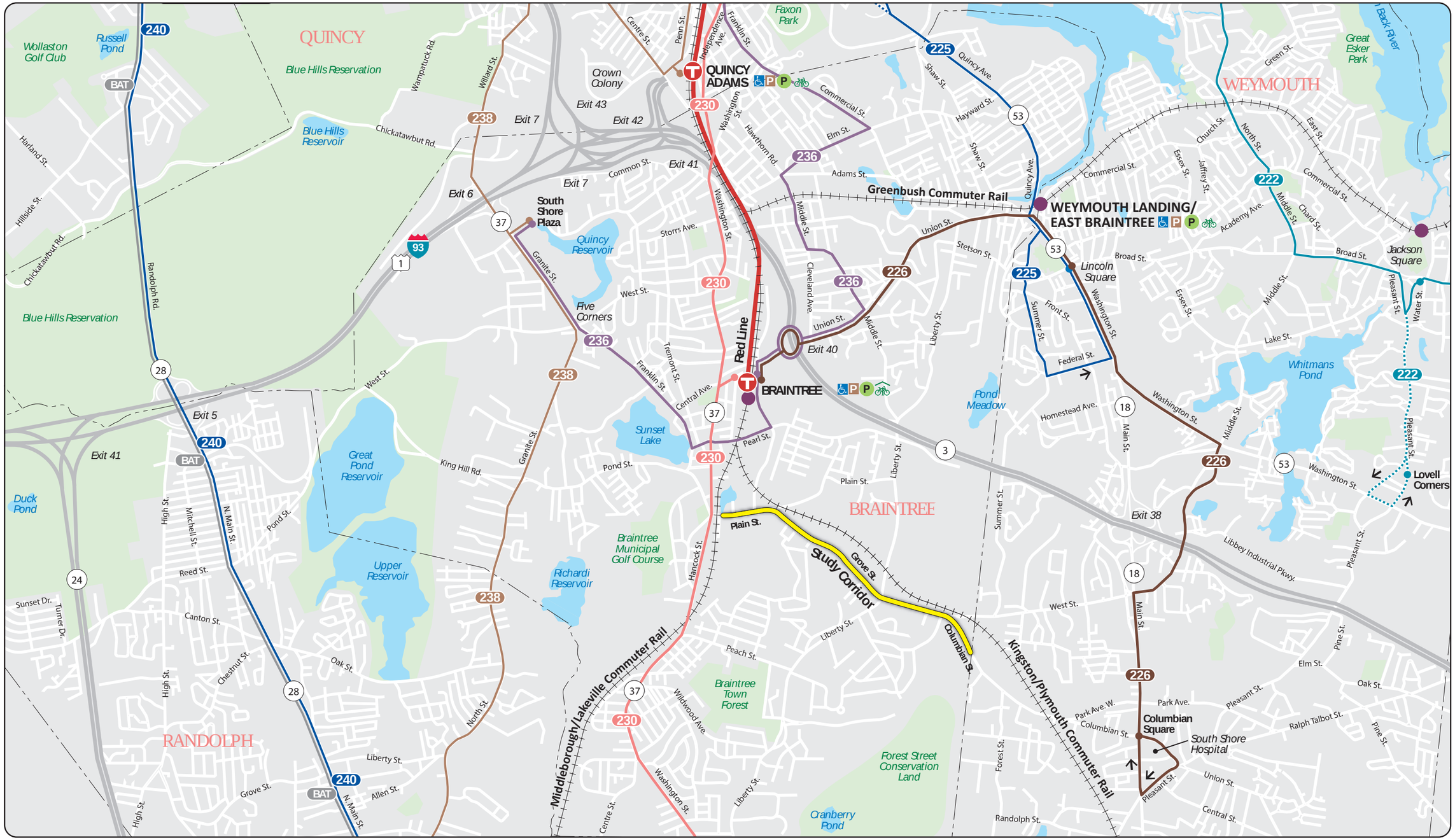

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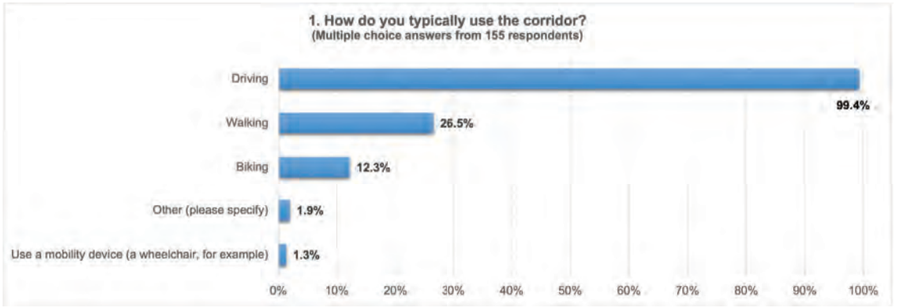
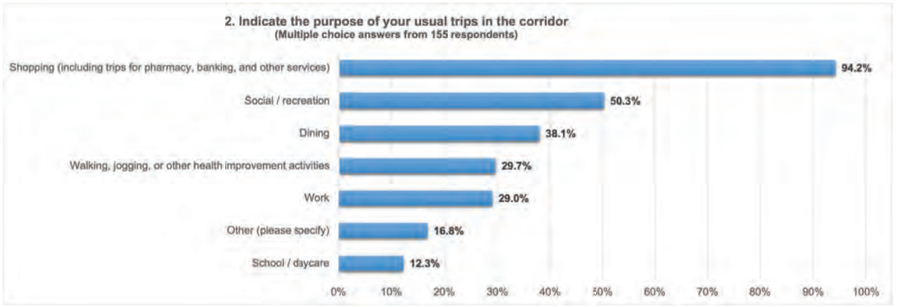
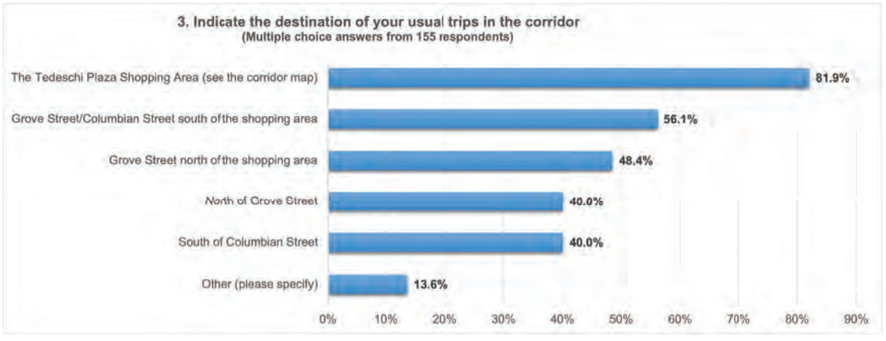
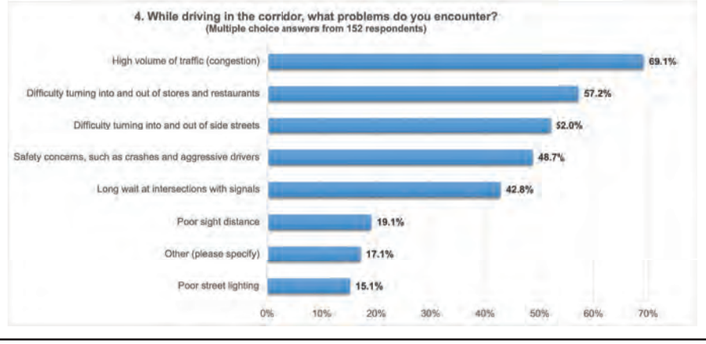
Figure 2
Transit Services in the Area
Grove Street Corridor in Braintree

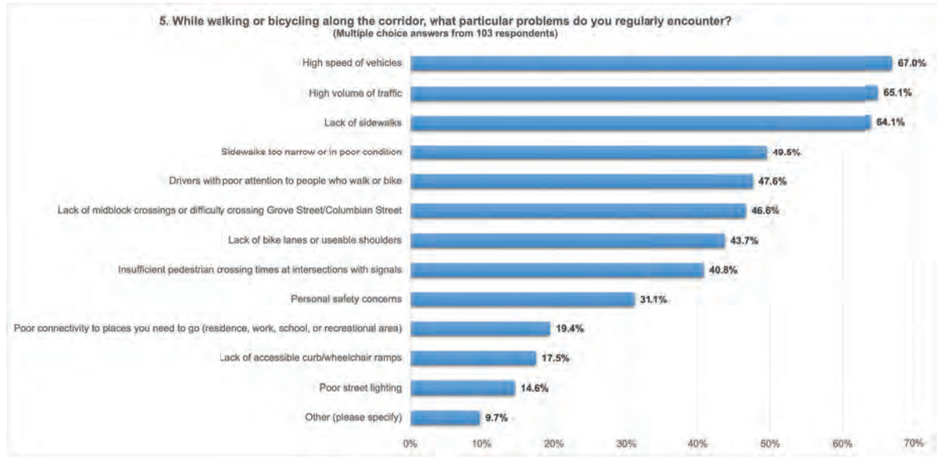
Addressing Safety, Mobility, and Access on Subregional Priority Roadways

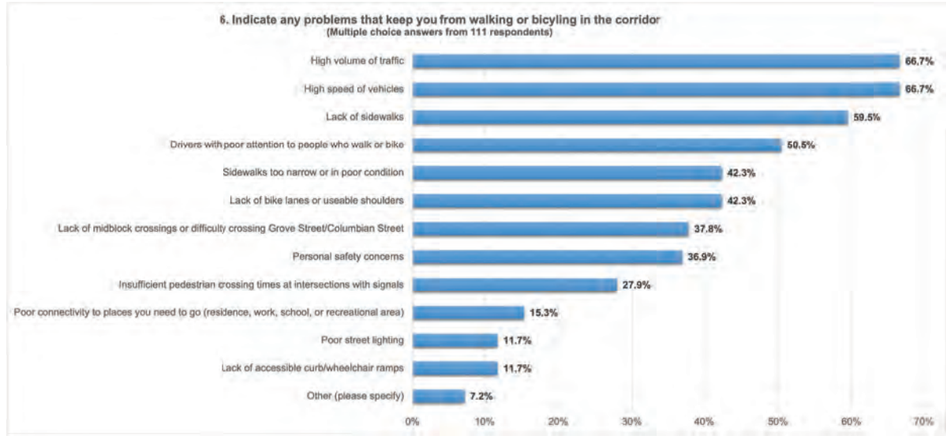












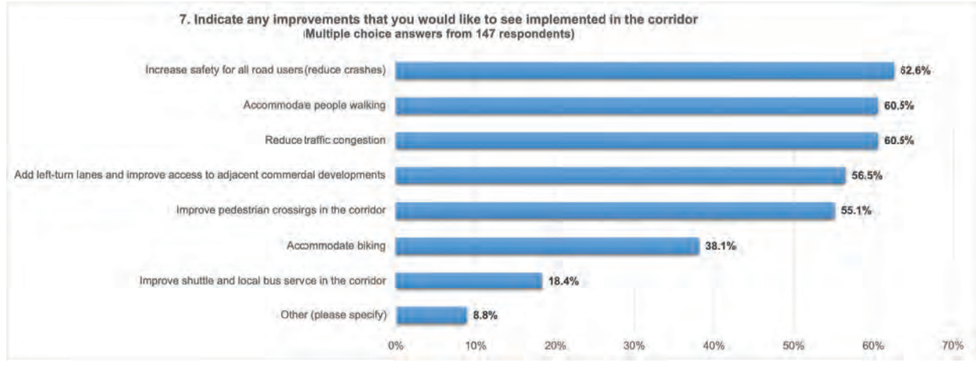
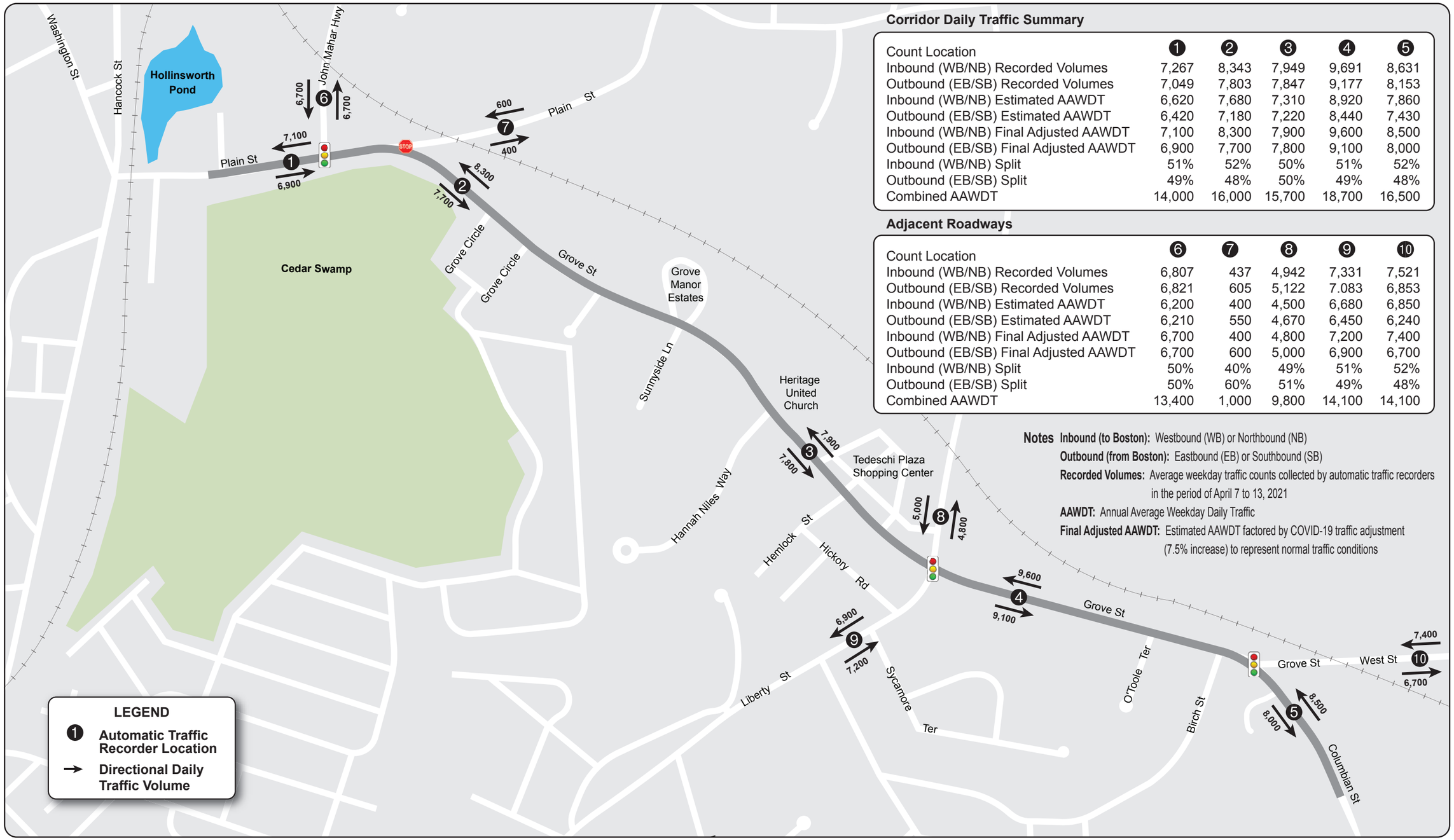


Figure 3
Corridor User Survey Questions and Results
Grove Street Corridor in Braintree



Corridor Daily Traffic Summary

Count Location	❶	❷	❸	❹	❺
Inbound (WB/NB) Recorded Volumes	7,267	8,343	7,949	9,691	8,631
Outbound (EB/SB) Recorded Volumes	7,049	7,803	7,847	9,177	8,153
Inbound (WB/NB) Estimated AAWDT	6,620	7,680	7,310	8,920	7,860
Outbound (EB/SB) Estimated AAWDT	6,420	7,180	7,220	8,440	7,430
Inbound (WB/NB) Final Adjusted AAWDT	7,100	8,300	7,900	9,600	8,500
Outbound (EB/SB) Final Adjusted AAWDT	6,900	7,700	7,800	9,100	8,000
Inbound (WB/NB) Split	51%	52%	50%	51%	52%
Outbound (EB/SB) Split	49%	48%	50%	49%	48%
Combined AAWDT	14,000	16,000	15,700	18,700	16,500

Adjacent Roadways

Count Location	❻	❼	❽	❾	❿
Inbound (WB/NB) Recorded Volumes	6,807	437	4,942	7,331	7,521
Outbound (EB/SB) Recorded Volumes	6,821	605	5,122	7.083	6,853
Inbound (WB/NB) Estimated AAWDT	6,200	400	4,500	6,680	6,850
Outbound (EB/SB) Estimated AAWDT	6,210	550	4,670	6,450	6,240
Inbound (WB/NB) Final Adjusted AAWDT	6,700	400	4,800	7,200	7,400
Outbound (EB/SB) Final Adjusted AAWDT	6,700	600	5,000	6,900	6,700
Inbound (WB/NB) Split	50%	40%	49%	51%	52%
Outbound (EB/SB) Split	50%	60%	51%	49%	48%
Combined AAWDT	13,400	1,000	9,800	14,100	14,100

Notes
Inbound (to Boston): Westbound (WB) or Northbound (NB)
Outbound (from Boston): Eastbound (EB) or Southbound (SB)
Recorded Volumes: Average weekday traffic counts collected by automatic traffic recorders in the period of April 7 to 13, 2021
AAWDT: Annual Average Weekday Daily Traffic
Final Adjusted AAWDT: Estimated AAWDT factored by COVID-19 traffic adjustment (7.5% increase) to represent normal traffic conditions

BOSTON REGION MPO

Figure 4
Average Weekday Traffic Volumes
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

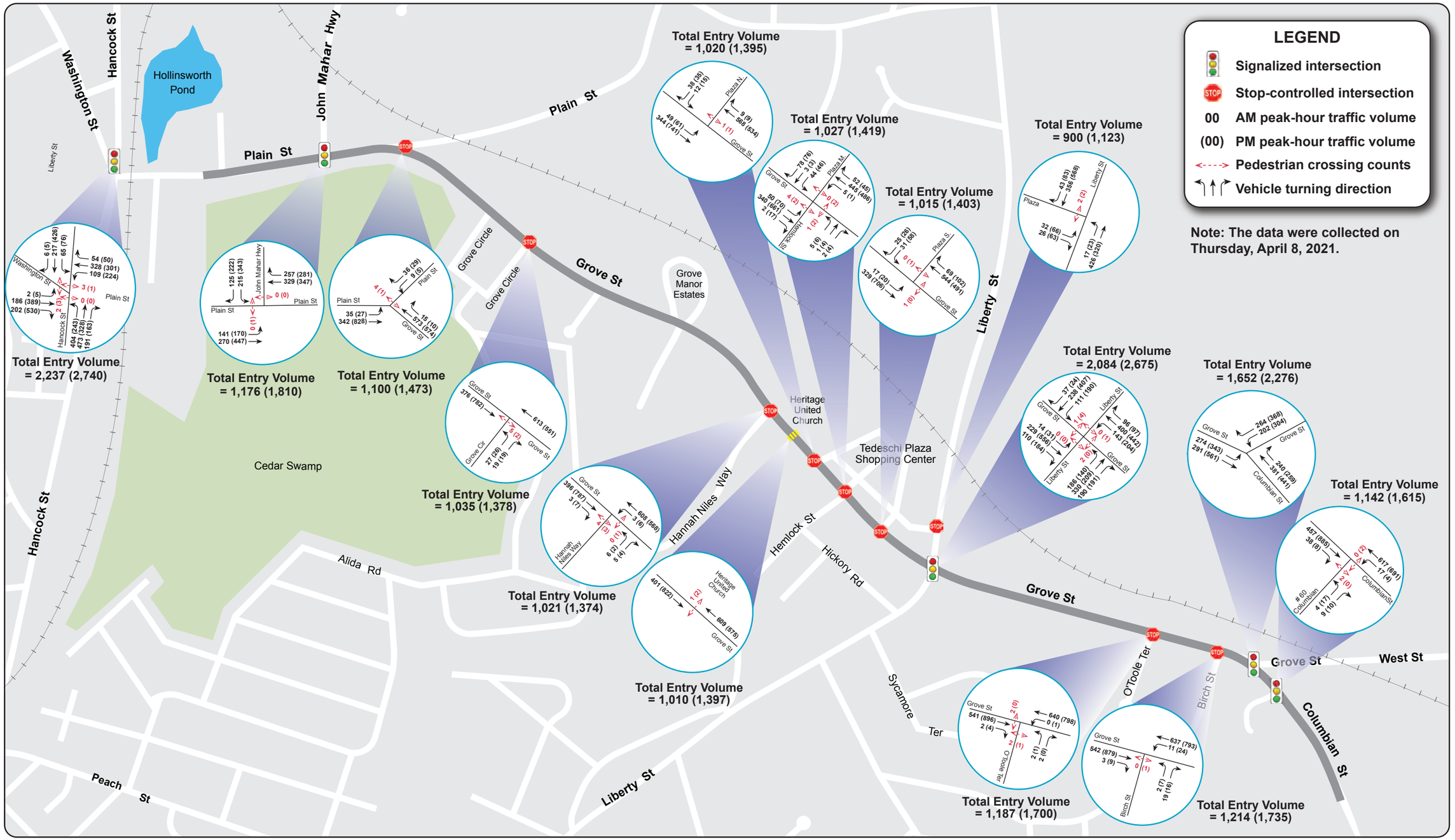


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Figure 5
2021 Observed Weekday AM/PM Peak-Hour Intersection Traffic and Pedestrian Volumes
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

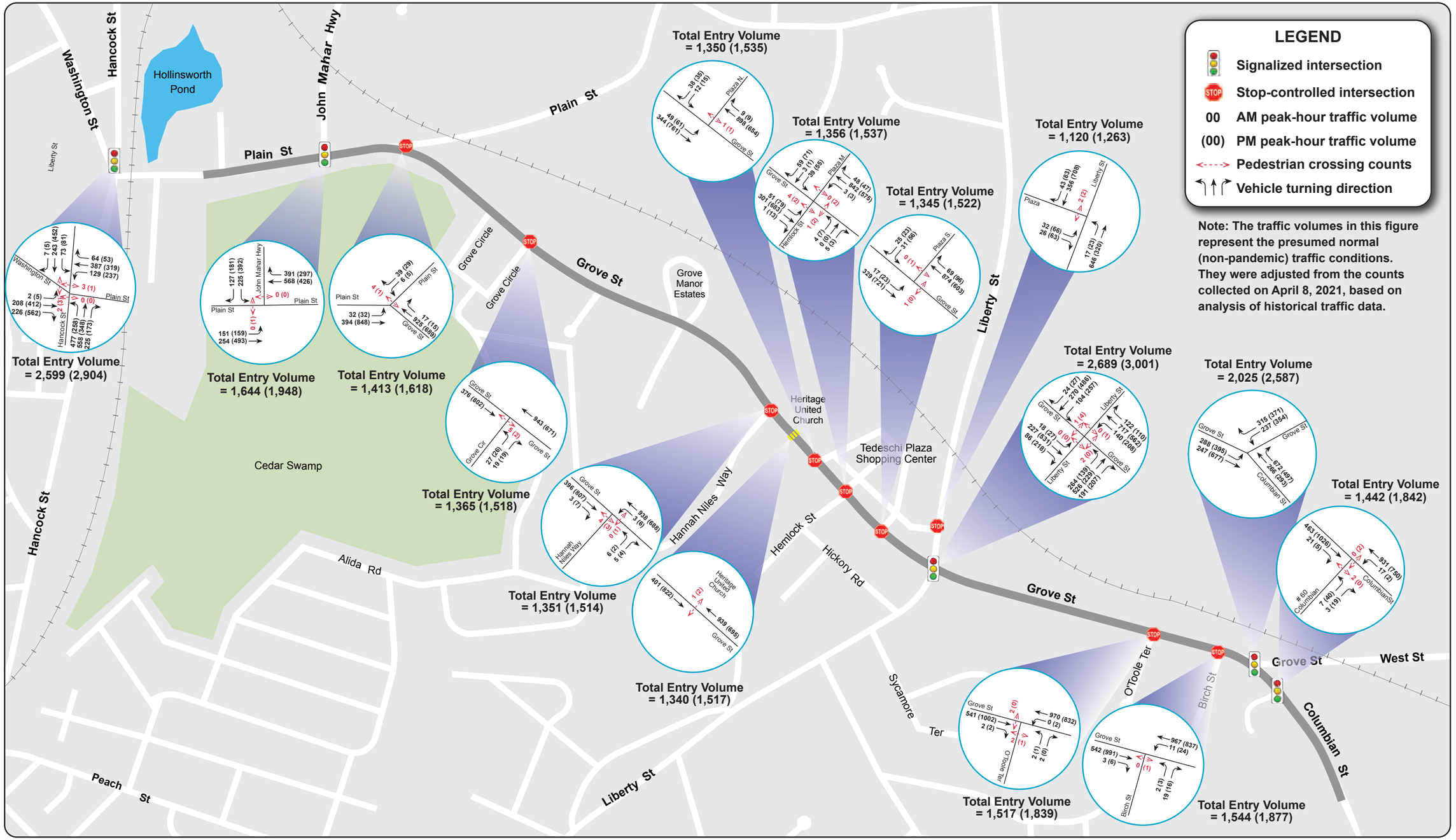

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Figure 6
2021 Estimated Weekday AM/PM Peak-Hour Intersection Traffic and Pedestrian Volumes
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

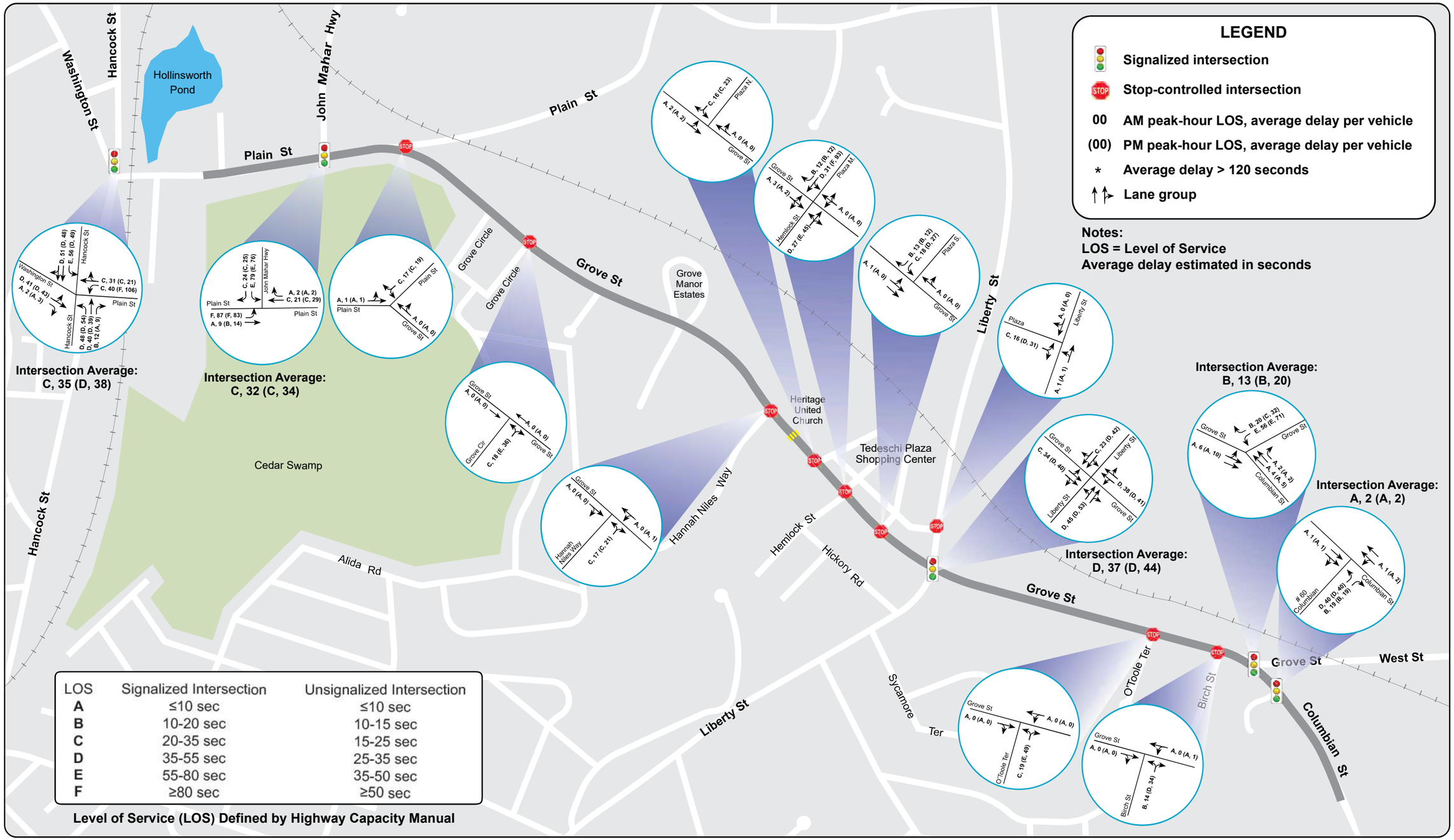

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Figure 7
2021 Weekday AM/PM Peak-Hour Intersection Capacity Analyses: Observed Traffic Conditions
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

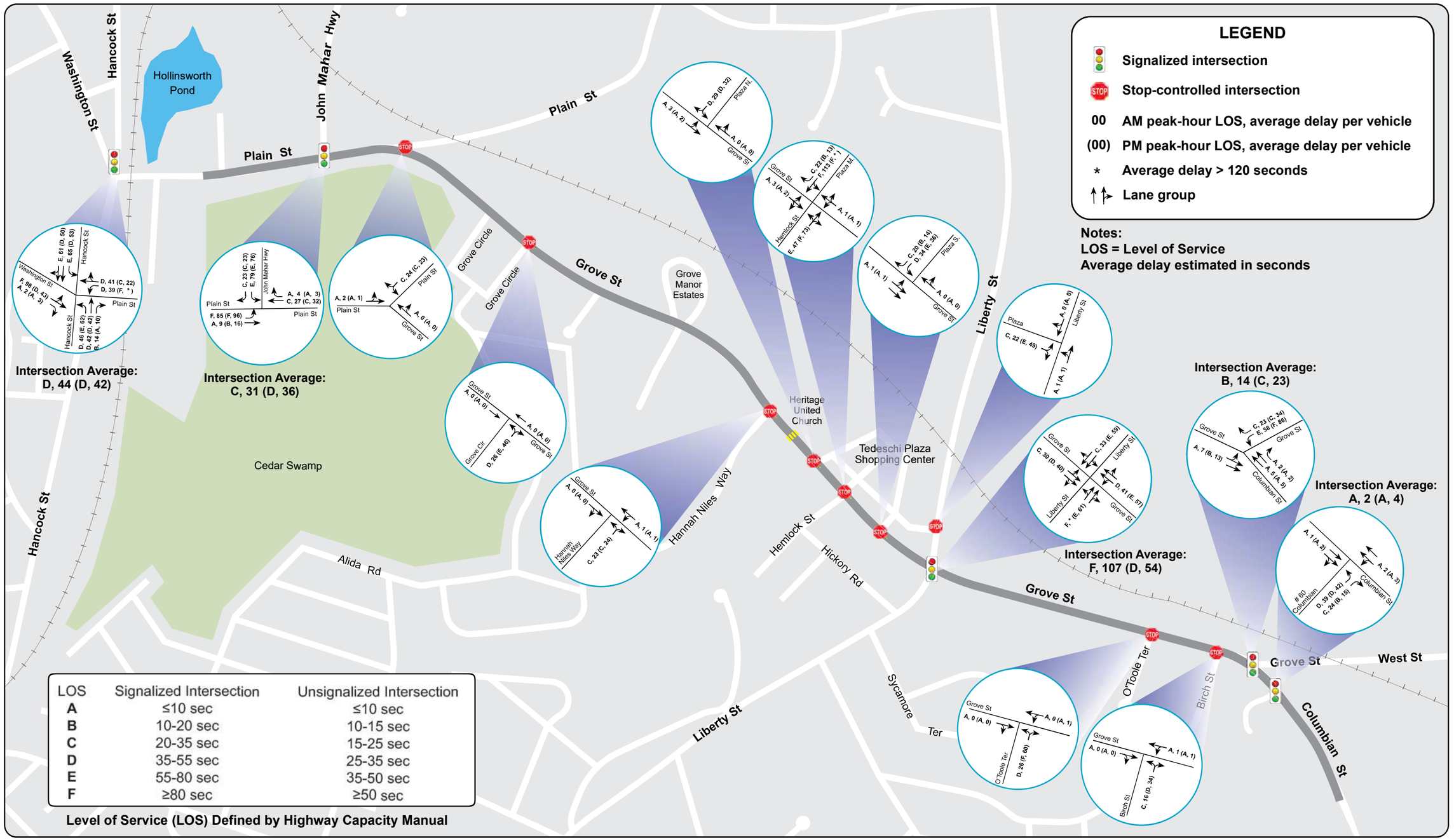

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Figure 8
2021 Weekday AM/PM Peak-Hour Intersection Capacity Analyses: Estimated Traffic Conditions
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

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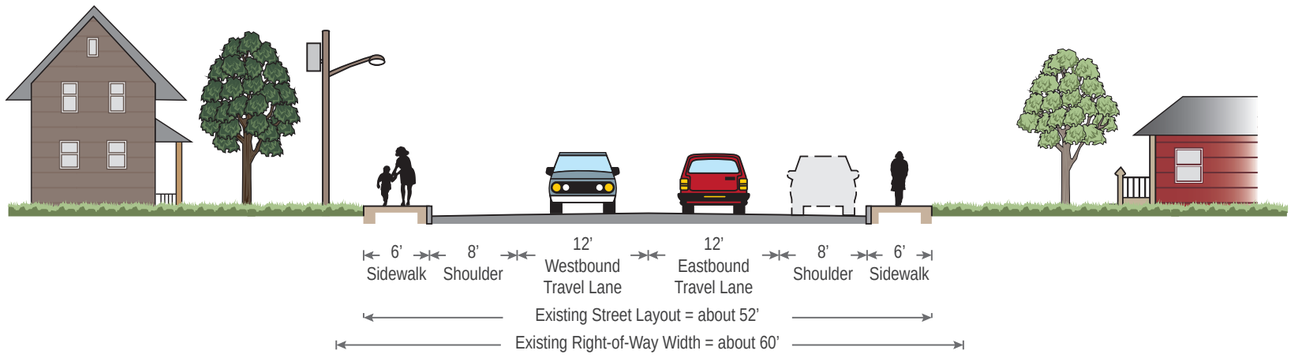
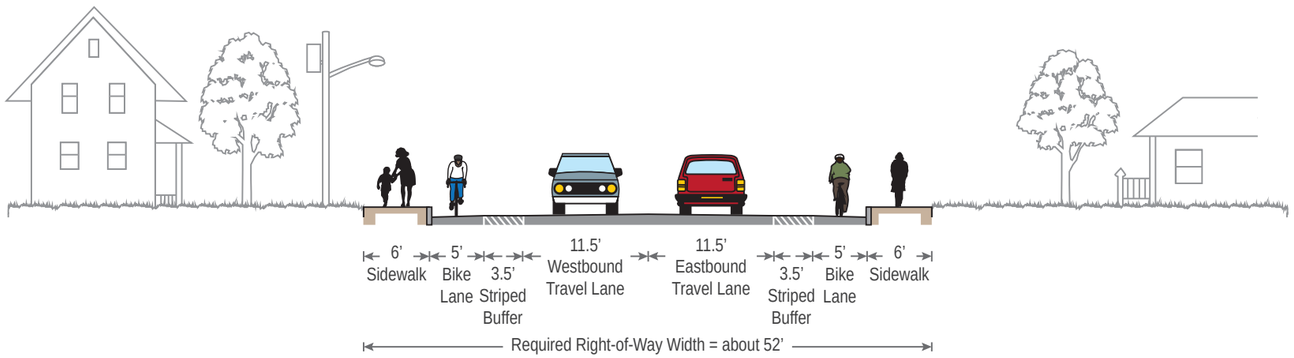
Figure 9
Speed Regulations and Estimated 85th Percentile Speeds
Grove Street Corridor in Braintree

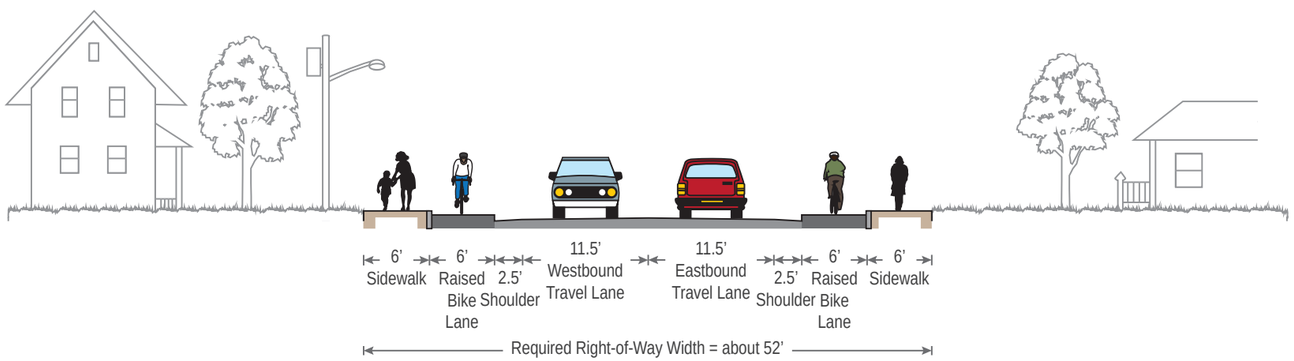
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



Existing Roadway Cross Section



Potential Improvement Alternative 1



Potential Improvement Alternative 2

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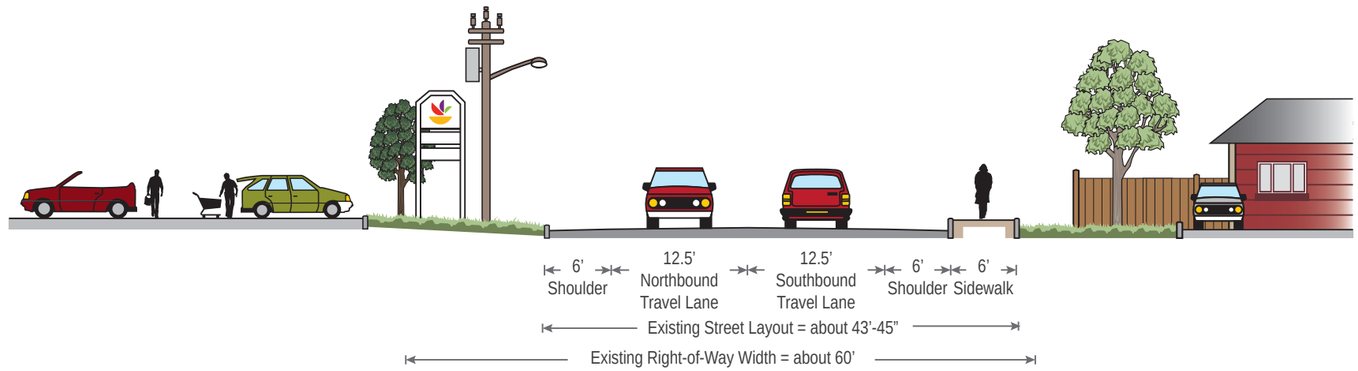
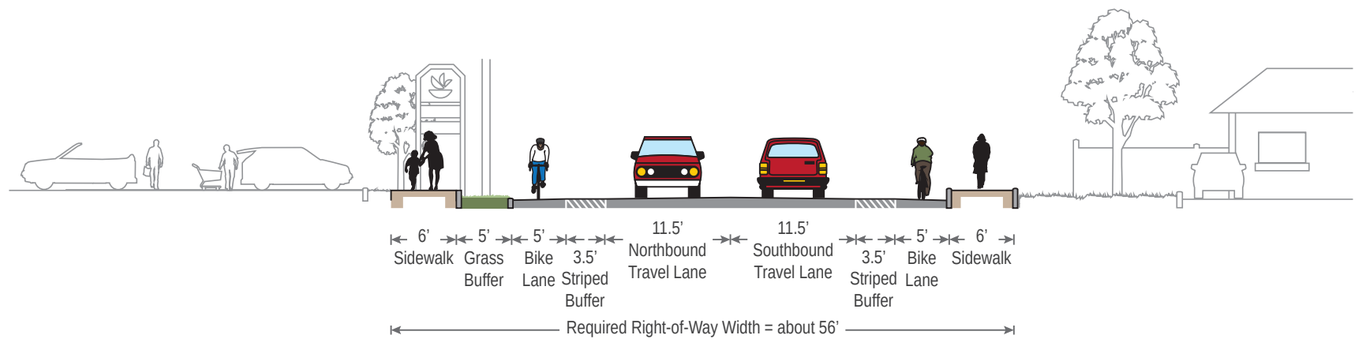
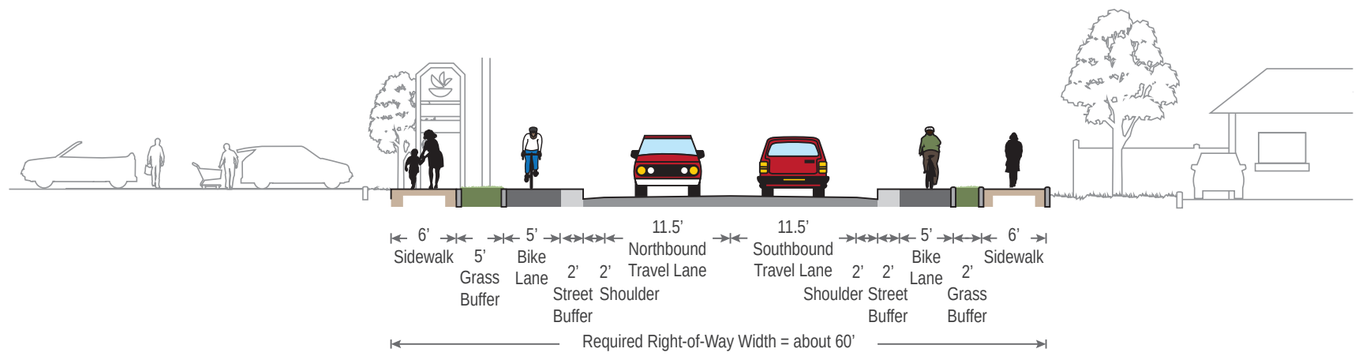
Figure 10
Existing Roadway Cross Section and Potential Reconfigurations: Plain Street between Hancock Street and Grove Street
Grove Street Corridor in Braintree



Existing Roadway Cross Section



Potential Improvement Alternative 1



Potential Improvement Alternative 2

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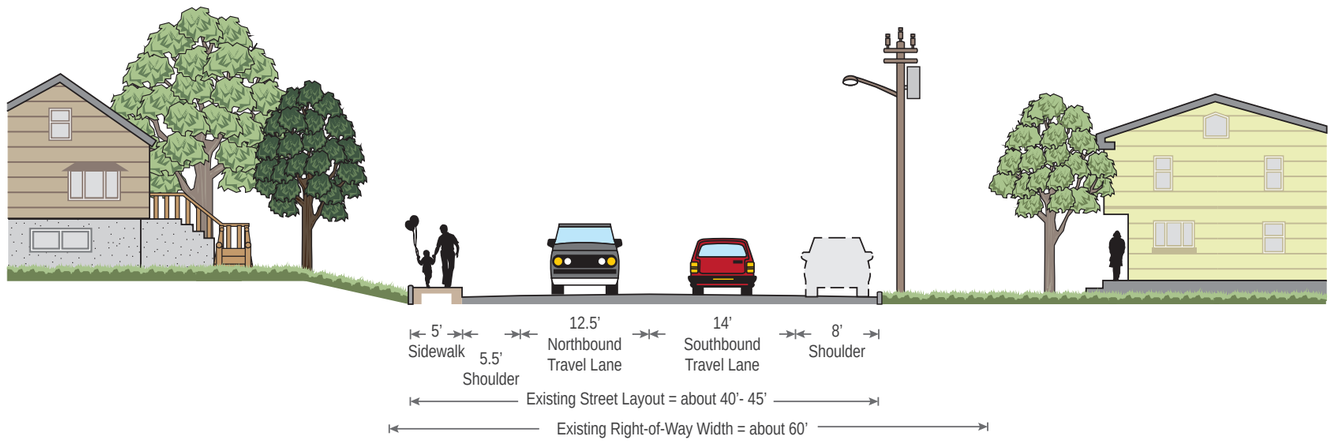
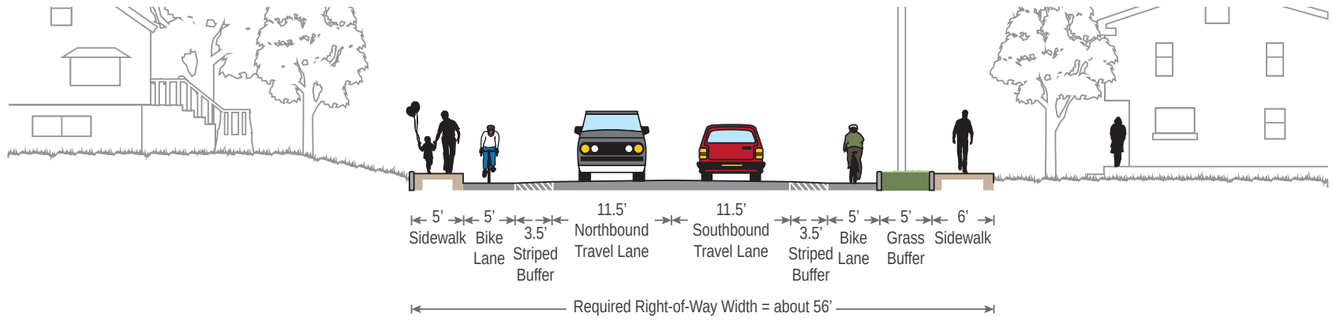
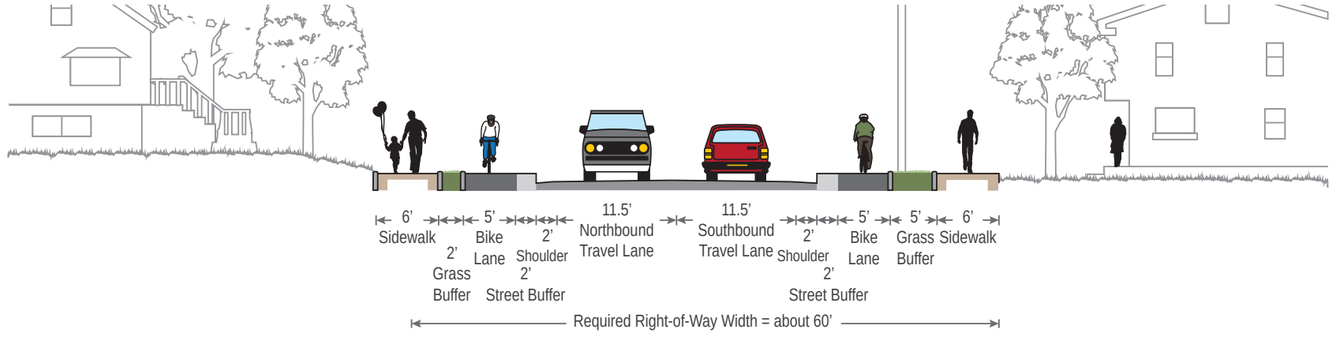
Figure 11
Existing Roadway Cross Section and Potential Reconfigurations: Grove Street between Plain Street and Liberty Street
Grove Street Corridor in Braintree



Existing Roadway Cross Section



Potential Improvement Alternative 1



Potential Improvement Alternative 2

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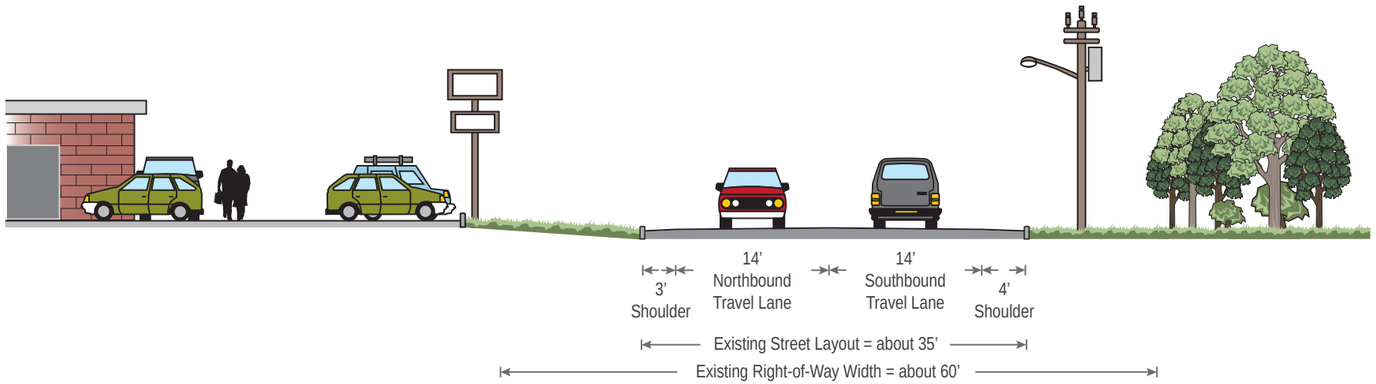
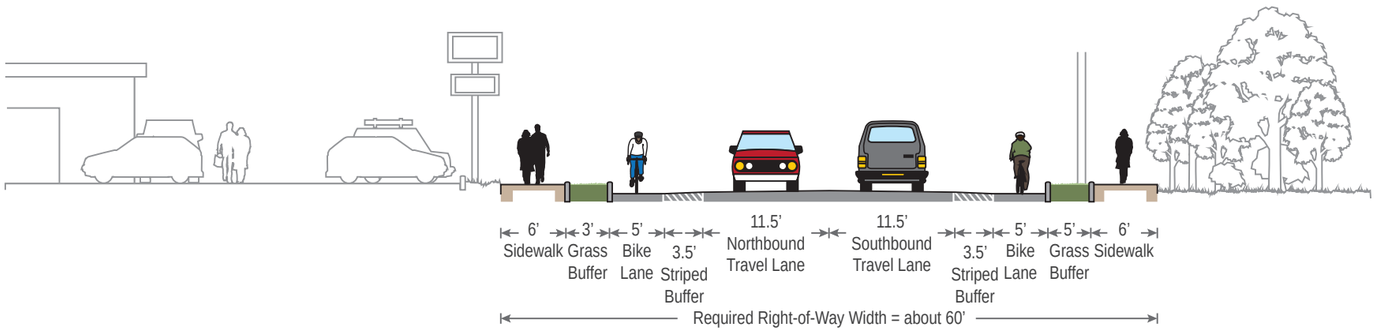
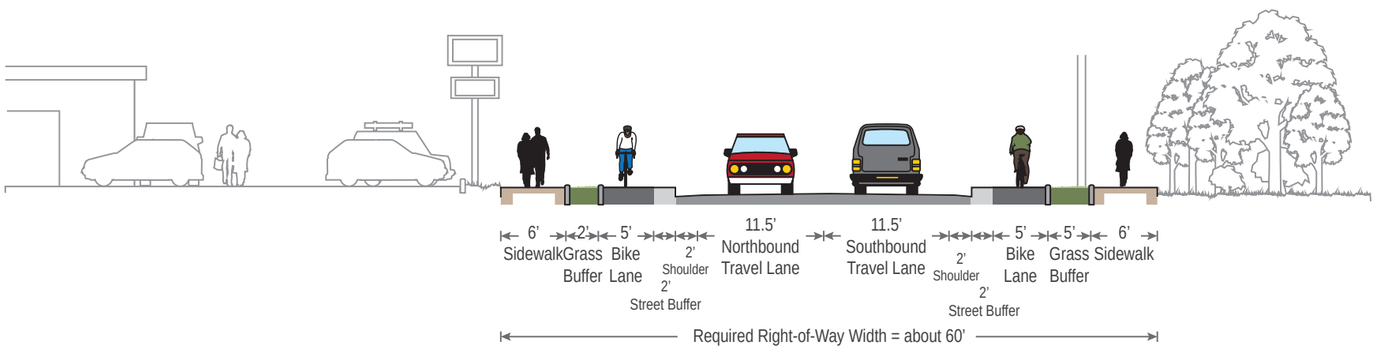
Figure 12
Existing Roadway Cross Section and Potential Reconfigurations: Grove Street between Liberty Street and Columbian Street
Grove Street Corridor in Braintree



Existing Roadway Cross Section



Potential Improvement Alternative 1



Potential Improvement Alternative 2

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Figure 13
Existing Roadway Cross Section and Potential Reconfigurations: Columbian Street between Grove Street and Weymouth Town Line
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

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Figure 14
Proposed Improvements Conceptual Plan: Plain Street between Hancock Street and Grove Street
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

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Figure 15
Proposed Improvements Conceptual Plan: Grove Street between Plain Street and Liberty Street (Section 1)
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

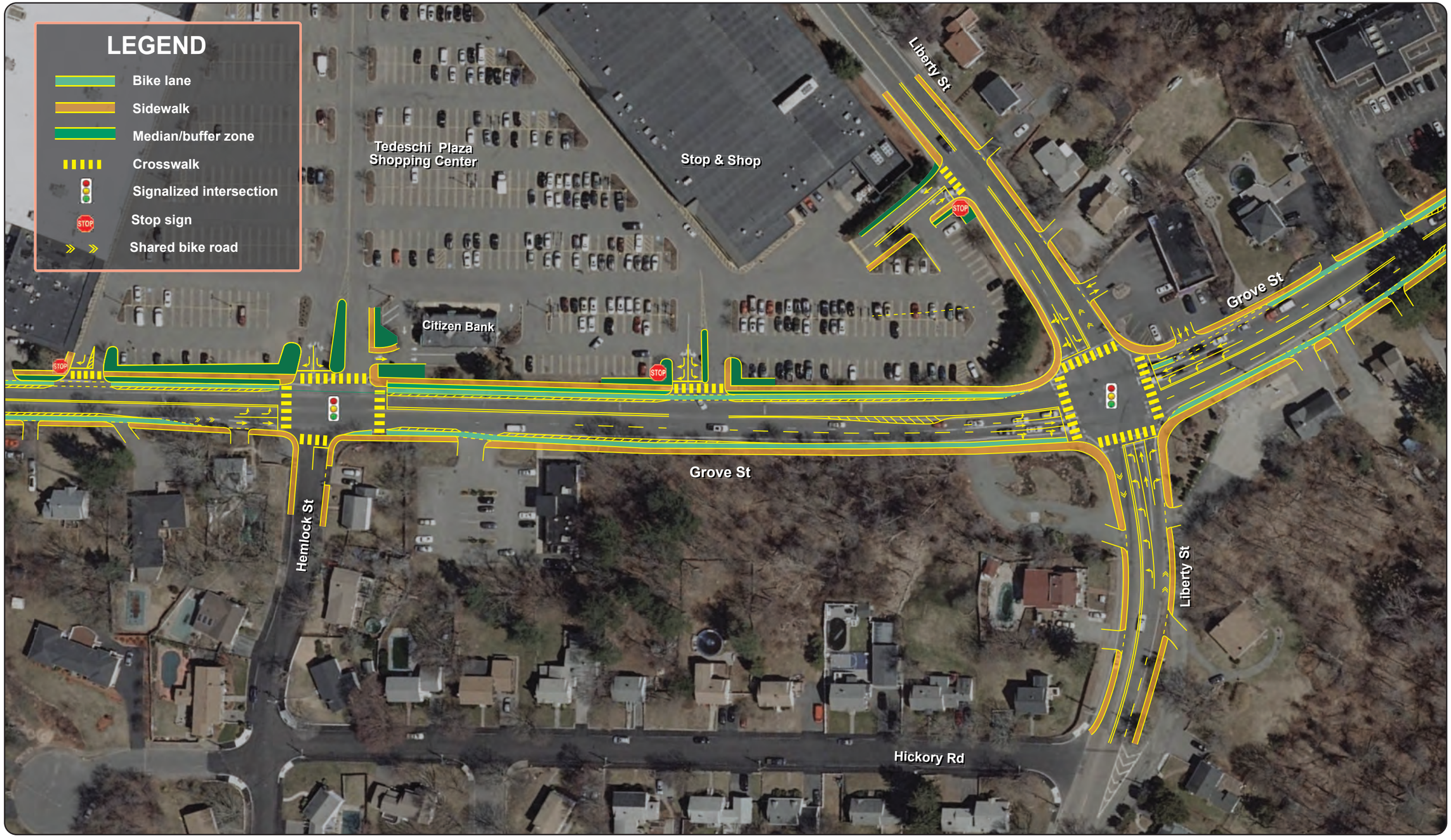

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Figure 16
Proposed Improvements Conceptual Plan: Grove Street between Plain Street and Liberty Street (Section 2)
Grove Street corridor in Braintree

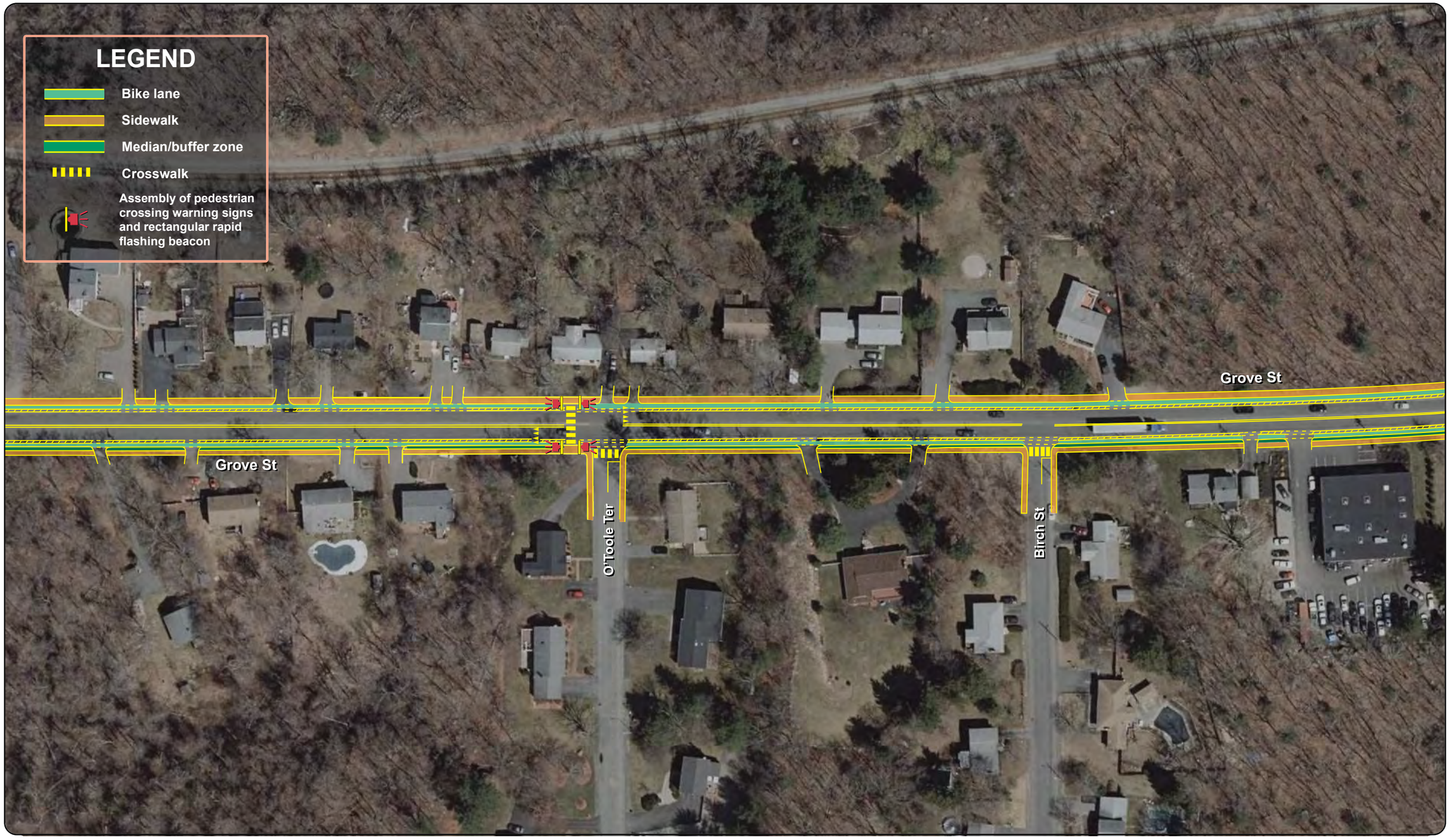

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Figure 17
Proposed Improvements Conceptual Plan: Grove Street between Liberty Street and Columbian Street
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

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Figure 18
Proposed Improvements Conceptual Plan: Columbian Street between Grove Street and Weymouth Town Line
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

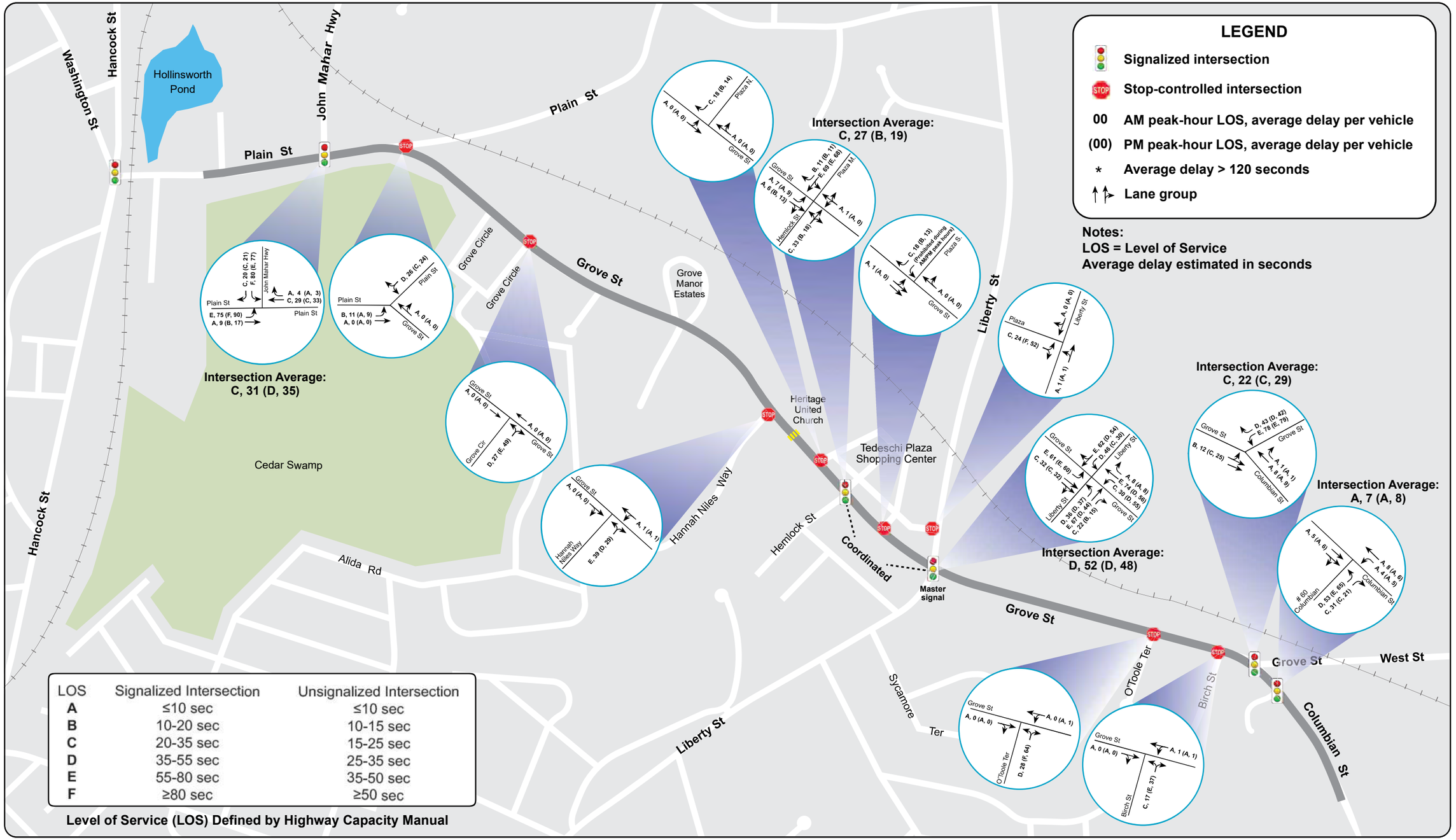

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Figure 19
2030 Weekday AM/PM Peak-Hour Intersection Capacity Analyses: Projected Traffic Conditions with Proposed Improvements
Grove Street Corridor in Braintree

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Appendices

A. Study Advisory Members

B. Summary of Corridor User Survey Results and Comments

C. Additional Comments on Corridor Issues and Concerns

D. Corridor Crash Data (2015–19) Summary

E. Corridor Crash Rate Worksheets

F. Intersection Crash Rate Worksheets

G. Collision Diagrams and Crash Look-Up Tables

H. Automatic Traffic Recorder Counts, April 7–13, 2021

I. Turning Movement Counts, April 8 and 10, 2021

J. Turning Movement Counts, Grove Street at Liberty Street, March 21, 2019

K. Intersection Capacity Analyses: Weekday AM/PM Peak Hour, 2021 Observed Traffic Condition

L. Intersection Capacity Analyses: Weekday AM/PM Peak Hour, 2021 Estimated Traffic Condition

M. Intersection Capacity Analyses: Weekday AM/PM Peak Hour, Signal Retiming Scenarios under 2021 Estimated Traffic Conditions

N. Intersection Capacity Analyses: Weekday AM/PM Peak Hour, 2030 Projected Traffic conditions with Proposed Improvements

O. MassDOT Project Development Process

APPENDIX A

Study Advisory Members

Study Advisory Members

FFY 2021 Subregional Priority Roadway Study: Grove Street Corridor in Braintree

Name	Affiliation	Email
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Makaela Niles	MassDOT Office of Transportation Planning	makaela.niles@state.ma.us
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APPENDIX B

Summary of Corridor User Survey Results and Comments

Summary of Grove Street Corridor Survey Results by Question and Answer

A\Q	1. How do you typically use the corridor? (Check all that apply)	155 Total Responses	
1	*Driving*	154	99.4%
2	*Walking*	41	26.5%
3	*Biking*	19	12.3%
4	*Use a mobility device (a wheelchair, for example)*	2	1.3%
5	*Other (please specify)*	3	1.9%
	I live off of Grove Street. It's horrible and very dangerous.		
	I woud walk or bike, but that is not possible as it is.		
	I live on Grove St.		

A\Q	2. Please indicate the purpose of your usual trips in the corridor. (Check all that apply)	155 Total Responses	
1	*Work*	45	29.0%
2	*Shopping (including trips for pharmacy, banking, and other services)*	146	94.2%
3	*Dining*	59	38.1%
4	*Social / recreation*	78	50.3%
5	*School / daycare*	19	12.3%
6	*Walking, jogging, or other health improvement activities*	46	29.7%
7	*Other (please specify)*	26	16.8%
	Cut through travel		
	Live of of Grove Street		
	Veterinarian		
	I live near Grove and Liberty - so I access this corridor for everything I do.		
	Visit residents at Grove Manor & Alliance Nursing Home		
	On way to Dr. appointment/ hospital		
	Home		
	Medical appointments		
	Medical appointments in Weymouth		
	Healthcare		
	We love off grove street		
	doctor appointments		
	Live on grove st		

Home
Reside nearby
Meeting friends
I live in a neighborhood off of Grove Street
Walking to the subway
Vet visits for pets
we would walk there but can't
Home
live on north portion of grove street
travel through to destination in neighboring town
I live on Grove St.
visit family that live on Grove St
DMV

A\Q	3. Please indicate the destination of your usual trips in the corridor. (Check all that apply)	155 Total Responses	
1	*The Tedeschi Plaza Shopping Area (see the corridor map)*	127	81.9%
2	*Grove Street north of the shopping area*	75	48.4%
3	*Grove Street/Columbian Street south of the shopping area*	87	56.1%
4	*North of Grove Street*	62	40.0%
5	*South of Columbian Street*	62	40.0%
6	*Other (please specify)*	21	13.6%

using corridor to travel between Weymouth and Holbrook
Access Liberty Street
East of the corridor to shop in Weymouth
Liberty School
South Weymouth - Rte 18 etc.
Monatiquot River

Driving twice daily from Hancock Street to Liberty to pick up my daughter at the Liberty School
On the way to Colombian Square and Rockland
Home, school
A friends home and as a cut through to my mothers home off of peach street.
South Braintree Square

Hannah Niles way
Derby Street and WholeFoods
Braintree Highlands
To go to Weymouth and Abington
To get home
MBTA
South Weymouth Whole Foods plaza
Intersection of Grove and Liberty to go to my home off Liberty.
visit family that live on Grove St
getting lost

A\Q	4. While driving in the corridor, what problems do you encounter? (Check all that apply)	152	Total Responses
1	*Long wait at intersections with signals*	65	42.8%
2	*High volume of traffic (congestion)*	105	69.1%
3	*Safety concerns, such as crashes and aggressive drivers*	74	48.7%
4	*Difficulty turning into and out of side streets*	79	52.0%
5	*Difficulty turning into and out of stores and restaurants*	87	57.2%
6	*Poor sight distance*	29	19.1%
7	*Poor street lighting*	23	15.1%
8	*Other (please specify)*	26	17.1%

Speeding
People driving too fast
long wait times (or no opportunity) to get out of side streets and parkinglots in on tho the main road.
Horrible sidewalk conditions for wheelchair
No sidewalk - causes -pedestrians to walk on side of street
Bad pedestrian safety sidewalks etc. People in roads

I have had many experiences with aggressive drivers. I normally drive 35mph on this stretch of road because there are two signs (40mph and 35mph) I err on the side of being conservative. I have had drivers tailgate me while honking there horn at me (with two kids and a dog in my car) for the entire route from Liberty Street to Hancock Street. At that intersection the aggressive driver opened his window and raised his fist to me. This has happened more then once, different drivers (except the raising fist dude, he was exceptional).

Speed of drivers

Speeding and tailgating

We can't take a left out of our street. The cars speed by. The speed limit jumps as it heads toward the residential portions of Grove Street. We've seen many almost accidents by cars rushing by or passing on right while people try to turn into a facility or residential neighborhoodz

Lack of bike lanes

Never had a problem

People often use grove as a 2 lane street when it is not - major accidents waiting to happen esp turning into shopping plaza t

People drive too fast, needs driving lanes to be narrower, needs sidewalk set back from curb needs speed monitoring/ticketing speeders

Speeding... can't get out of my driveway

Cars not stopping at crosswalks for pedestrians

Speeding vehicles

Speed limit too high in some places

no sidewalks. Sometimes the road narrowing (2 lanes to 1) can get dicey.

Speeding is huge issue.

No sidewalks on east side of Grove St. Sidewalks on west side are decrepid. Almost no crosswalks between Tedeschi Plaza and Plain St

Other drivers speeding

Narrow bike lane

The sewer/draining system is not good , it get flooded

difficulty turning into and out of driveway

None

A\Q	**5. While walking or bicycling along the corridor, what particular problems do you regularly encounter? (Check all that apply)**	**103**	**Total Responses**
1	*Lack of sidewalks*	66	64.1%
2	*Lack of midblock crossings or difficulty crossing Grove Street/Columbian Street*	48	46.6%
3	*Lack of bike lanes or useable shoulders*	45	43.7%
4	*Lack of accessible curb/wheelchair ramps*	18	17.5%
5	*Sidewalks too narrow or in poor condition*	51	49.5%
6	*High volume of traffic*	67	65.1%
7	*High speed of vehicles*	69	67.0%

8	*Insufficient pedestrian crossing times at intersections with signals*	42	40.8%
9	*Poor street lighting*	15	14.6%
10	*Drivers with poor attention to people who walk or bike*	49	47.6%
11	*Personal safety concerns*	32	31.1%
12	*Poor connectivity to places you need to go (residence, work, school, or recreational area)*	20	19.4%
13	*Other (please specify)*	10	9.7%

N/A

I don't walk or bike in that area

I never walk this area.

No sidewalks is a big problem

Ideally my daughter should be able to bike to her elementary school and middle school. I believe it is a healthy habit and would bring her joy. With the current state of this road the only time she bikes on it is with me and even that is scary.

None

Don't walk

Again people drive way too fast and try to pass others in the right (I have nearly been hit by cars multiple times)

North grove street (by plain st) is very unsafe for walking. Too much traffic going way to fast and lack of sidewalks on one side and a sidewalk that is too close to traffic on the other side. Also there is a lot of large truck traffic that again goes too fast though a residential area

N/A

A\Q	**6. Please indicate any problems that keep you from walking or bicycling in the corridor. (Check all that apply)**	**111**	**Total Responses**
1	*Lack of sidewalks*	59.5%	66
2	*Lack of midblock crossings or difficulty crossing Grove Street/Columbian Street*	37.8%	42
3	*Lack of bike lanes or useable shoulders*	42.3%	47
4	*Lack of accessible curb/wheelchair ramps*	11.7%	13
5	*Sidewalks too narrow or in poor condition*	42.3%	47
6	*High volume of traffic*	66.7%	74
7	*High speed of vehicles*	66.7%	74
8	*Insufficient pedestrian crossing times at intersections with signals*	27.9%	31
9	*Poor street lighting*	11.7%	13

10	*Drivers with poor attention to people who walk or bike*	50.5%	56
11	*Personal safety concerns*	36.9%	41
12	*Poor connectivity to places you need to go (residence, work, school, or recreational area)*	15.3%	17
13	*Other (please specify)*	7.2%	8

N/A

I drive from too far away to bike or walk

None

Too far to walk

Don’t need to walk in this area

The high speed is major safety concern near Gove st/plain st intersection

n/a

N/A

A\Q	**7. Please indicate any improvements that you would like to see implemented in the corridor. (Check all that apply)**	**147**	**Total Responses**
1	*Increase safety for all road users (reduce crashes)*	92	62.6%
2	*Accommodate people walking*	89	60.5%
3	*Improve pedestrian crossings in the corridor*	81	55.1%
4	*Accommodate biking*	56	38.1%
5	*Reduce traffic congestion*	89	60.5%
6	*Add left-turn lanes and improve access to adjacent commercial developments*	83	56.5%
7	*Improve shuttle and local bus service in the corridor*	27	18.4%
8	*Other (please specify)*	13	8.8%

Add more lights at shopping areas

adding sidewalks

Connect the proposed Monatiquot River Trail to other sections of Trail and to the Ivory Street Corridor.

Fewer construction projects

Bike lane

Please DO NOT widen the roadway

improve aquatic connectivity under the road Culverts are in bad shape, and spring peepers are dying off

reduced speed and actual enforcement. Reduce large truck traffic

Traffic/Pedestrian light at Grove Circle. Lower speed limit to town level 25MPH AND ENFORCE IT.

Increased police presence for speeding and allowing pedestrians to cross in crosswalks.

lower speed limits

Make sidewalk more withder.

Better/more signage

A\Q 8. Where do you live? **153 Total Responses**

1	*Within one mile of the study corridor*	97	63.4%
2	*Other location in Braintree*	45	29.4%
3	*Other town or city (please indicate the five-digit zip code of your residence)*	11	7.2%

02189

02186

02190

02188

02061

02368

I live on Hannah Niles Way right off of Grove.

02188

Mike and a half from Grove St

02066

02188

02190

Hingham

A\Q 9. Please use the space below to describe specific problem locations and improvements that you would like to see implemented in the corridor

56 Total Responses

Speeding, no cycle tracks provided, need multi-use path along RR ROWs

This route runs somewhat parallel to RT 3, so its easy to use for cut through travel and connect to points to the west in Braintree and Holbrook. Consequently there is speeding along this route. Reducing auto lanes in this area will result in the deterioration of Tedeschi plaza. There are several other shopping centers in the Braintree/Weymouth area that will benefit by making Tedeschi inconvenient.

If the sidewalk are bad for walkers, then they should be re-surfaced. People need to slow down...that's the main problem.
Motorists drive too fast, and have no respect for pedestrians. Grove street sidewalks are in bad condition. It is scary when walking on a Grove Street sidewalk and a car or truck speeds by. Please add more separation between motorists and pedestrians. Also Pearl and Ivory streets are just as bad if not worse for pedestrians!

Classic Massachusetts setup where at traffic lights road is two lanes neither lane is designating only for turns and then ten feet on far side of intersection it's back to one lane feeding road rage. Also all the signals on the route are ridiculous. At plain and mahar the sensors largely don't work or you sit at train crossing for two mins and then just get to plain for red light, another two mins. Liberty st the sensors have hair trigger resulting in excessive wait times on primary route of grove st. Two lights nearest Weymouth are few hundred feet apart but not coordinated. Road width varies widely across entire study corridor so cars are all over the place exacerbating blind spots. And as well understood sidewalks are non existent near Weymouth. 2021. Massachusetts should be better than this.

Install a light signal at Columbian St and Forest St

Bus service is a considerable need. Also, sidewalks.

We need WIDE sidewalks in the entire area on both sides of the street. We need a way to reduce traffic in this area as this is a popular cut-through route to/from Weymouth and Hingham and primary access point to Liberty street to get to Holbrook and Randolph. VERY BUSY area! It's like living ON the meridian of route 3 south. Please help!
Traffics is always heavy there. I travel Grove/Columbian multiple times daily to get my kids to and from school. The back-ups in the morning on a regular day are unbelievable.

1. Back ups at all traffic lights; 2. No sidewalks (e.g. Mahar Highway intersection and Liberty Streer) -- 3.Add dedicated tr\urning lanes at Grove and Liberty 4. Railroad crossing at Plain \ Hancock 5. difficult to make left turn from stores; side streets. 6 lengthy rush hour backups

I think the study should take into consideration the new trail that will be under construction at the Armstrong Dam Removal - Monatiquot River Restoration site off of Plain Street by the Commuter Rail Tracks. It would be great if there could be connections to the neighborhoods and the Ivory Street Corridor with the trail as it is built out over time. There is currently an unpaved nature trail downstream of the proposed trail.

There has been an increase in aggressive drivers. It is unsafe and needs to be stopped. There are many cars that have very loud engines that are very disruptive. This is a quality of life issue that needs to be improved - car manufacturers should be held responsible for the noise levels of their cars. This might even be an EPA issue - are these cars high polluters?

Difficulty getting in and out of side streets when high volume of traffic.

Enforcement of traffic laws
It can be very difficult to take a left out of the Tedeschi Center due to high traffic volume and high speeds. Also difficult to take a left out of Grove Manor due to high speeds.

Although I don't live in Braintree now, I grew up off of Grove St and have experienced all aspects of road use (including walking, biking, and driving) in that area throughout my life. I continue to use the Grove St Corridor regularly to commute to and from work and visit family. I've never thought of this area as being any worse for traveling than other parts of Braintree, but I have always felt Braintree in general has a lot of traffic problems. It's unique location at the convergence of 2 major highways makes the whole Town a bit of a choke point for people passing through. More specifically in regards to the Grove St area, the northbound lanes at the Liberty St light often backs up to Columbian St. A second lane leading up to the light, and some adjustments to the light sequence could help that traffic flow through better (though it does also back up quite far from the Mahar Hwy light as well). As someone who lives near RT 53 in Norwell, I've had recent experience with the addition of a center turn lane... I think one of those could be helpful along the Tedeschi Plaza. As far as walking / cycling, I don't see many walkers these days. I used to walk those streets as a kid but would never allow my kids to walk them now, it's too dangerous. I also do not believe street cycling should be allowed in areas of this level of congestion. Ultimately, I think this corridor tends to be a main route between RT 37 and RT's 18 / 53. There aren't many better options to get from one of those areas to the other, like RT 139 is as you get further south. I'd like to see this corridor developed into a numbered state Route like 139, but like I said the overall traffic situation in Braintree is more concerning than the Grove St corridor alone. Thanks for your time.

time lights at intersections re: daily traffic flows

Drivers speed down Grove Street. We have a middle school and elementary school within walking distance. Kids are always walking to Dunkin Donuts and Papa Ginos after school or on half days. There should be a flashing light to warn drivers of pedestrians crossing. Taking a left out of our street is next to impossible. Drivers do NOT slow down. They DONT let us take a left out of our street even when the traffic is bumper to bumper at the Grove/Liberty lights. Our neighborhood has voiced concern for years. Someone is going to get hurt or killed. The sped limits increases as it passes out little neighborhood. There is also Alliance Healthcare and Grove Manor off this street. Many residents, mostly seniors, or trying to walk or drive to the shopping areas. It's too dangerous. Why does the speed increase? Why aren't there signs warning drivers to slow down??? Flashing yellow? Or a sign that displays what speed you're traveling? Something needs to be done about this area.

Being able to take left turn out of Hannah Niles Way

Would love to see Protected bike lanes

Turning left from Liberty on to Grove is aweful. Cars travel the entire length of Liberty way to fast!

Less congestion and more police presence for speed

My friend loves on the curve right by the power station and it is so scary to pull in, and pull out. They have an easement, but people go so fast it's still not safe. I wish there were sensors to stop traffic when residents and guests need to get onto the street.

I do not have a problem with the corridor

Fewer high-density occupancy construction projects

The grove at / liberty street light is a major traffic backup at ALL times of day. For walking and biking, the grove street corridor from stop and shop up to John Maher highway is a nightmare for walkers and bikers - cars pass each other often on the right and drive right along the sidewalk which leads to problems for walkers and bikers. There should be a proper bike lane here for bikers only. Also we live off grove street and it is very difficult to exit our neighborhood (from Hemlock street)

Narrower roadway for vehicular travel

I live on Grove St. At times it's nearly impossible to get out of my driveway going in either direction. The speed of traffic on the road is ridiculous. I live right at corner of Grove St and the turn into grove Circle. There are no crosswalks near that intersection. Only 1 side of street has sidewalk.

It is very difficult to take a left hand turn out of Hannah Niles Way or any of the streets that are on that side

Very difficult pulling out of Grove Circle onto Grove Street. Not enough safe crosswalks for walkers and bikes.

Right at the intersection of Liberty and Grove St. the road should be widened with two lanes at or right before allen dental. Many people cross the double yellow i have caught many almost near accidents on my dash camera. Some times people will cross the double yellow a little before allen dental too

People need to stop cutting thru hemlock or hickory to bypass light at Grove and liberty. They speed thru and we have many young kids in the neighborhood.....we have complained about this for 10 + years.

Crossing light at cross walks. Cars do allow pedestrians to cross or allow cars to exit from side streets. Cars also pass when school bus lights are flashing.

Rush hour traffic is very congested. Since those roads are used as cut throughs in addition to traffic to the businesses, that would not be a good location for additional housing.

right turn only lane when coming north on liberty st to turn right onto Grove

My family lives just around the corner from this corridor. Our experience is that Drivers are too fast and too aggressive. Pedestrians and cyclists, as well as turning vehicles, would benefit from slowing the traffic and having better infrastructure for walking and biking.

Left turn arrow at intersection Sidewalks Lower speed limit - its very hard getting out of Grove Circle onto Grove Street

People to stop cutting through hemlock and hickory at top speedsters

I just did that with your servay

Because of where I live, I need to turn off Birch Street to get onto Grove Street, and it is an absolute nightmare and sometimes takes up to 10 minutes to get on Grove street. Grove street also desperately needs a sidewalk on the side of Car Craft going up and down the street. I would love to walk down it, but it is far too dangerous at the moment. I couldn't even cross the street to walk on the other side of the street if I wanted to.

Lower the speed limit and lengthen the red lights to discourage Boston to Weymouth commuting

Traffic light at Grove St/Liberty St needs to have left-turn light on all 4 directions!

The culvert right at the town line and the 2 or 3 culverts under the dirt road under the high tension wires are in rough shape. When they dumped the new gravel on the dirt road under the high tension wires they blocked the ends: they are now fords.

Too much traffic the at travels at too high of speed for a residential road. Lack of sidewalks on the one side and very poor sidewalks that are too close to traffic

The north section of grove street (by plain st.) needs a lot of improvement. Decent sidewalks on both sides with an occasional crossing would be a start. The high speed of traffic in this area is my biggest concern, very unsafe for those who walk/bike along street. I would like to see some actual enforcement of the reduced speed limit in this area. A reduction in heavy truck traffic would also be beneficial as they also speed though this area.

Traveling from Hancock on Grove there's no accommodation for a left turn onto Liberty and visibility is poor. There should be sidewalks on both sides of the street. On Grove between Liberty and Columbia there are no sidewalks either. The intersection of Columbia and Grove is terrible especially if you're using Grove St from Weymouth to turn right onto Grove. You have to wait until traffic turning left onto Columbia is gone before being able to turn right onto Grove. Braintree Market at the corner of Grove and Liberty is difficult to get in and out of especially if you're turning onto Grove from the parking lot.

I have lived on Grove Street for 11 years. Both of my children were born here and have never allowed to play in front of our home due to dangerous drivers. Crossing Grove St on foot, to access the Alida Road neighborhood is terrifying. This is now a heavy residential area, but the traffic is still treated like a state highway it was 40 years ago. The state MUST designate this as a residential street and apply the driving laws befitting that designation. We need sidewalks on both sides of the street. We need bike lanes on both sides. We need wheelchair ramps and crosswalks at all intersections. Residents from surrounding towns need to be discouraged from using Grove Street as a "shortcut" from using Routes 3, 18 or 37.

many accidents at the Grove/Liberty St intersection, could use left turn lanes or light cycle just one direction at a time (similar to Union/Ivory

I don't have the answers, but in my opinion the corridor has many problems; congestion/volume, speed, obeying traffic laws, lack of usable crosswalks, etc. The corridor is used a major cut through by surrounding communities between the Route 18/Route 3 corridor and Route 93/128. Many ambulances use it as a cut through to go to South Shore Hospital. Large numbers of garbage trucks from all communities use it as a cut through to Braintree's Covanta transfer station. The crosswalks that are there are useless, drivers do not stop for pedestrians in the crosswalk unless it has a warning light. The state increased the speed limit to 40mph, it needs to be reduced.

Sidewalks. Both sides.

An MBTA bus route along Liberty and Grove to Braintree station and South Braintree Square.

#1 - Aggressive Driving #2 - Speed limits are too high

Speed limits to be enforced. Intersection at Grove & Liberty to add a traffic light arrow to take a left onto liberty st. because of the freight train of traffic coming from Weymouth.

DO NOT ADD A BIKE LANE, THIS IMPEDES TRAFFIC

The tree is overhanging on the Grove St, need to cut.. Need to widened sidewalk , clean draining and sewer basin.

APPENDIX C

Additional Comments on Corridor Issues and Concerns

April 12, 2022

Chen-Yuan Wang, Chief Transportation Planner
Central Transportation Planning Staff
Boston Region Metropolitan Planning Organization
10 Park Plaza, Suite 2150
Boston, MA 02116

Re: Grove Street Corridor Study, Braintree

Dear Mr. Wang,

I recently heard of the Grove Street Corridor Study being performed by Central Transportation Planning Staff (CTPS) and appreciate our conversation regarding the project last week. As a lifelong resident of Braintree who lives in a neighborhood directly off of Grove Street, I have a particular interest in any improvements being proposed along the corridor. As a licensed Professional Traffic Engineer who performs similar studies and designs for municipalities throughout the Commonwealth, I fully understand the competing interests of motorists, pedestrians and bicyclists and very much hope any future project focuses on a well-balanced design that looks out for the welfare and safety of our community over efficiency for the endless demand of commuters cutting through our town from other regions.

I commend those involved in promoting safe and comfortable Complete Streets improvements along the Grove Street corridor. Not only do existing pedestrian accommodations not comply with ADA, sidewalks are extremely tight and almost unpassable in places. The excessive roadway width promotes fast travel speeds and, given the cut-through commuter element, poor driver behavior makes unsignalized pedestrian crossing unsafe, motorist access from side streets near impossible during peak periods, and bicycle travel uncomfortable. As a result, I have very real concerns whenever my children want to walk from our home to nearby schools (Liberty School and South Middle School), Papa Gino's and/or Dunkin' Donuts, popular destinations with school children in the area. As it currently exists, I certainly would never allow my children to get anywhere near Grove Street with their bicycles.

The Grove Street at Liberty Street intersection is of particular concern given the unique role it plays. The intersection services a significant amount of cut-through traffic from neighboring towns and beyond seeking to avoid congested highways during peak commuter periods, approaching via the southern Liberty Street and eastern Grove Street approaches. In fact, I know people who travel through the Grove Street at Liberty Street intersection from as far as Middleborough to avoid highway traffic in order to reach Quincy or the Expressway.

Given the amount of cut-through demand from different regions, my fear in increasing the intersection's capacity with additional lanes is the direct result it will likely have on promoting increased cut-through traffic at the intersection and funneling more traffic along Grove Street. (For instance, in reference to the commuters who cut through this intersection from Middleborough, the delay they experienced at this intersection is the only reason they would occasionally seek going a different route.) Eliminating the

delay and queues could very well influence the volumes experienced at this intersection and impact other intersections downstream. Without these increases in traffic, it is currently already difficult for side street motorists to navigate left turns onto Grove Street, waiting excessively for an appropriate gap in traffic that frequently results in driver frustration and the unsafe condition of accepting a less than adequate gap, darting in front of other vehicles. I see it frequently.

Before advancing with a project that adds even more lanes at the Grove Street at Liberty Street intersection to completely "fix" delay and queue length deficiencies (at least until more cut-through traffic funnels through the intersection), I respectfully request that consideration be made for the welfare of our community by minimizing and limiting such increases in capacity to an appropriate degree to avoid promoting more cut-through traffic and to ensure the congestion that plagues this roadway and the town is not exasperated. I also suggest that the traffic analysis performed as the basis for design be based on unadjusted post-COVID volumes given changes in traffic patterns resulting from the "new normal" of many working from home and the desire to avoid over-designing the intersection.

Thank you for your efforts towards improving the Grove Street corridor and for taking my concerns and those of our community into consideration during future studies and design. This project has the potential to be truly transformative and have a positive impact on so many. I look forward to the opportunity of reviewing the studies and analyses prepared by CTPS and in the future.

Sincerely,

James D. Fitzgerald, P.E., LEED AP

101 Hannah Niles Way
Braintree, MA 02184
617-653-6986

APPENDIX D

Corridor Crash Data (2015–19) Summary

Table 1
Crash Data Summary: Grove Street Corridor in Braintree
MassDOT Crash Data 2015–19

Statistics Period	2015	2016	2017	2018	2019	5-Year Total	Yearly Average
Total number of crashes	27	44	39	30	36	176	35.2
Severity: Property damage only	17	30	25	17	21	110	22.0
Severity: Non-fatal injury	9	14	14	13	14	64	12.8
Severity: Fatality	0	0	0	0	0	0	0.0
Severity: Not reported/unknown	1	0	0	0	1	2	0.4
Collision type: Single vehicle	5	2	4	2	3	16	3.2
Collision type: Rear-end	10	16	21	14	13	74	14.8
Collision type: Angle	9	19	9	14	18	69	13.8
Collision type: Head-on	2	1	1	0	1	5	1.0
Collision type: Sideswipe, same direction	0	4	1	0	0	5	1.0
Collision type: Sideswipe, opposite direction	1	2	3	0	1	7	1.4
Collision type: Not reported/unknown	0	0	0	0	0	0	0.0
Involved pedestrian(s)	1	0	0	0	1	2	0.4
Involved cyclist(s)	1	0	1	1	0	3	0.6
Occurred during weekday peak periods*	6	19	16	17	13	71	14.2
Wet or icy pavement conditions	7	10	11	5	9	42	8.4
Dark conditions (lit or unlit)	6	6	12	2	11	37	7.4

* Peak periods are defined as weekday 7:00–10:00 AM and 3:30–6:30 PM.

APPENDIX E

Corridor Crash Rate Worksheets

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/7–13/2021

DISTRICT : 6

~ SEGMENT DATA ~

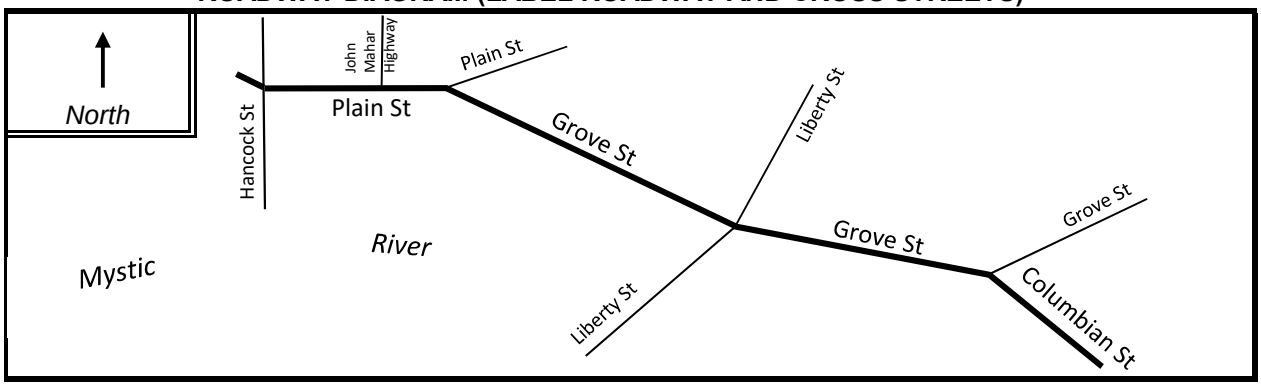
ROADWAY NAME: Grove Street Corridor

START POINT: Hancock Street (Route 37)

END POINT: Weymouth Town Line

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**2.00**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	15,200

TOTAL # OF CRASHES:	176	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**35.20**

CRASH RATE CALCULATION : **3.17**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : State Average for Urban Minor Arterial = 3.49 (7/1/2020)

Project Title & Date: Braintree Grove Street Corridor Study

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/7–13/2021

DISTRICT : 6

~ SEGMENT DATA ~

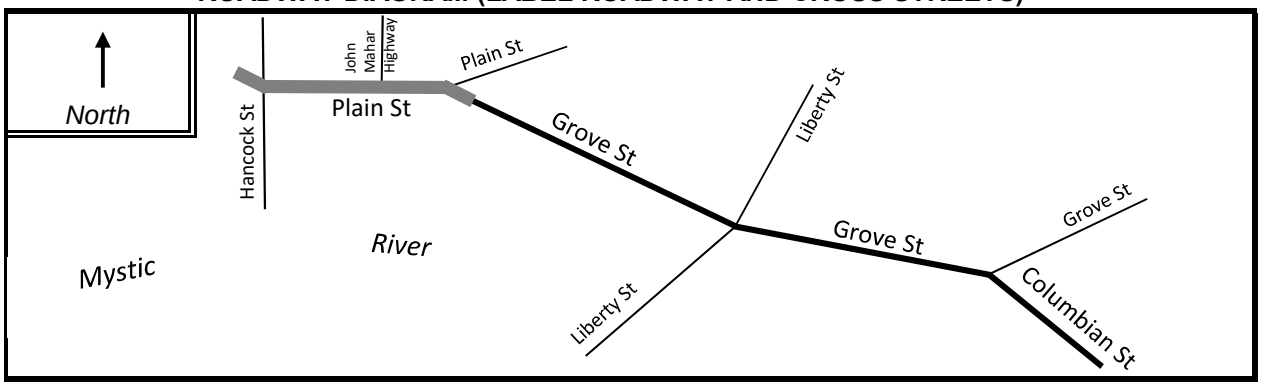
ROADWAY NAME: Plain Street

START POINT: Hancock Street (Route 37)

END POINT: Grove Street

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.38**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	15,300

TOTAL # OF CRASHES:	39	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**7.80**

CRASH RATE CALCULATION : **3.68**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : State Average for Urban Minor Arterial = 3.49 (7/1/2020)

Project Title & Date: Braintree Grove Street Corridor Study

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/7–13/2021

DISTRICT : 6

~ SEGMENT DATA ~

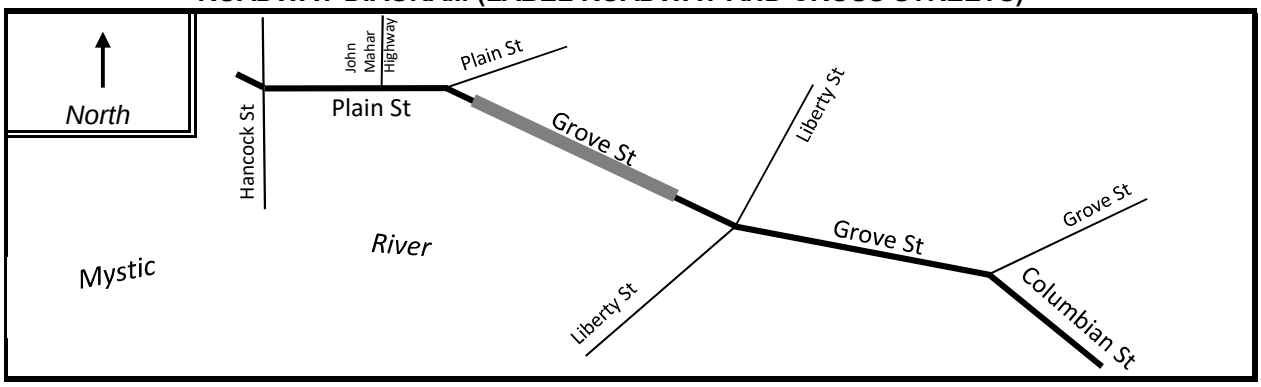
ROADWAY NAME: Grove Street

START POINT: South of Grove Street

END POINT: North of Tedeschi Plaza

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.57**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	14,000

TOTAL # OF CRASHES:	22	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**4.40**

CRASH RATE CALCULATION : **1.51**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : State Average for Urban Minor Arterial = 3.49 (7/1/2020)

Project Title & Date: Braintree Grove Street Corridor Study

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/7–13/2021

DISTRICT : 6

~ SEGMENT DATA ~

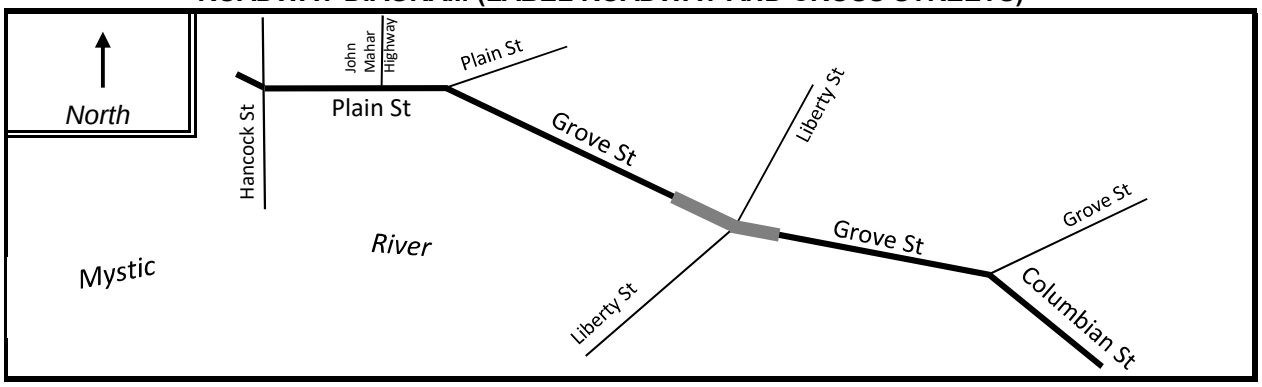
ROADWAY NAME: Grove Street

START POINT: Tedeschi Plaza

END POINT: South of Liberty Street

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.27**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	16,800

TOTAL # OF CRASHES:	49	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**9.80**

CRASH RATE CALCULATION : **5.92**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : State Average for Urban Minor Arterial = 3.49 (7/1/2020)

Project Title & Date: Braintree Grove Street Corridor Study

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/7–13/2021

DISTRICT : 6

~ SEGMENT DATA ~

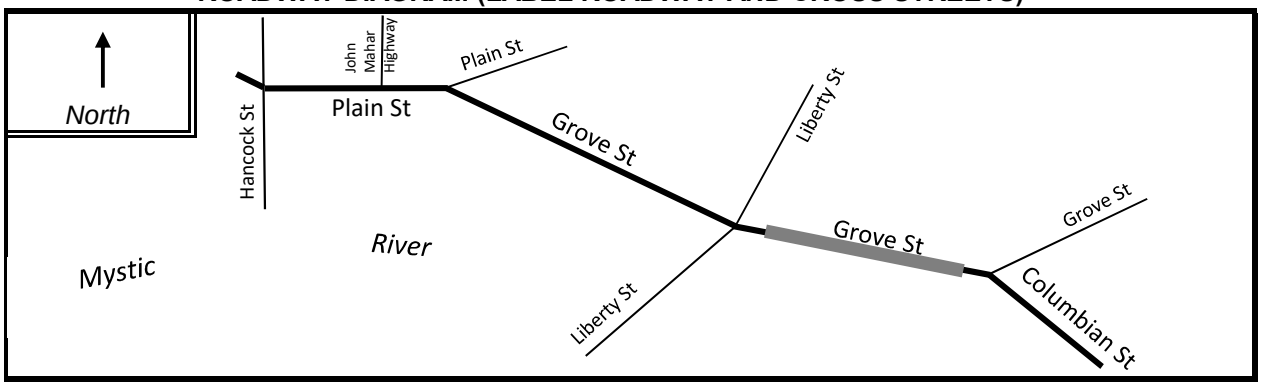
ROADWAY NAME: Grove Street

START POINT: South of Liberty Street

END POINT: North of Columbian Street

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.53**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	15,800

TOTAL # OF CRASHES:	27	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**5.40**

CRASH RATE CALCULATION : **1.77**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : State Average for Urban Minor Arterial = 3.49 (7/1/2020)

Project Title & Date: Braintree Grove Street Corridor Study

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/7–13/2021

DISTRICT : 6

~ SEGMENT DATA ~

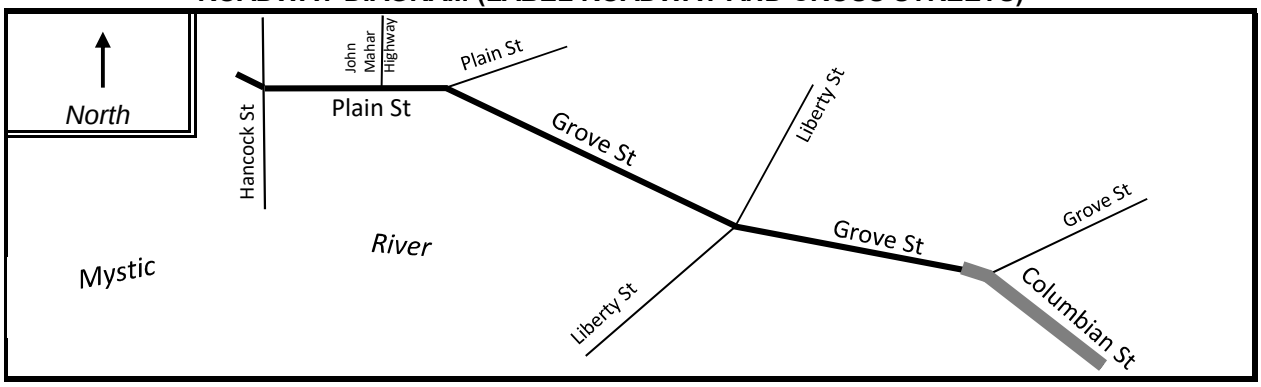
ROADWAY NAME: Colubian Street

START POINT: Grove Street

END POINT: Waymouth Town Line

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.28**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	15,000

TOTAL # OF CRASHES:	39	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**7.80**

CRASH RATE CALCULATION : **5.09**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments : State Average for Urban Minor Arterial = 3.49 (7/1/2020)

Project Title & Date: Braintree Grove Street Corridor Study

APPENDIX F

Intersection Crash Rate Worksheets

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

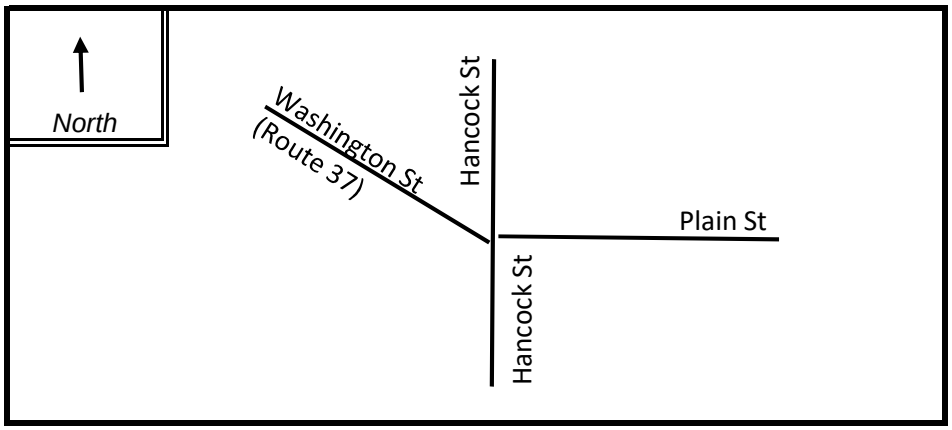
~ INTERSECTION DATA ~

MAJOR STREET : Plain Street

MINOR STREET(S) : Washington Street (Route 37)

Hancock St

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB	NB		
PEAK HOURLY VOLUMES (PM) :	979	610	537	778		**2,904**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **32,267**

TOTAL # OF CRASHES : 14 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **2.80**

CRASH RATE CALCULATION : **0.27** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Signalized Intersections = 0.71

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

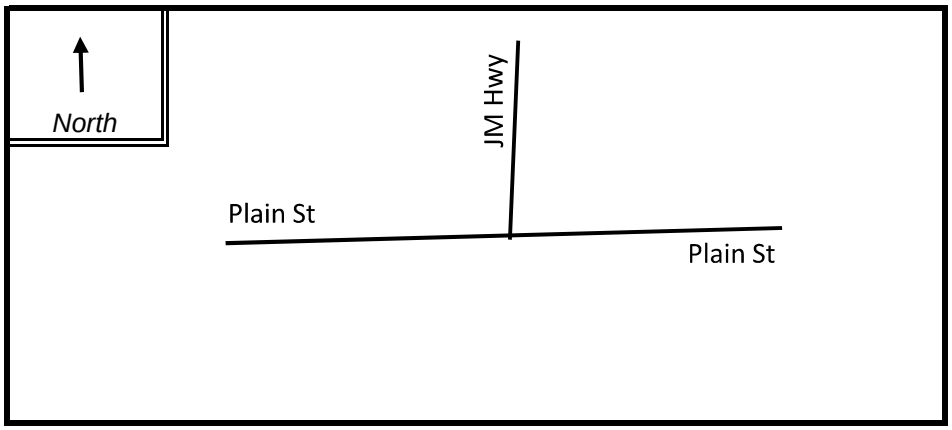
DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Plain Street

MINOR STREET(S) : John Mahar Highway

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB	NB		
PEAK HOURLY VOLUMES (PM) :	652	753	573	0		1,978

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **21,978**

TOTAL # OF CRASHES : 8

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **1.60**

CRASH RATE CALCULATION : **0.23**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments : 2018 Average Crash Rate for MassDOT District 6 Signalized Intersections = 0.71

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

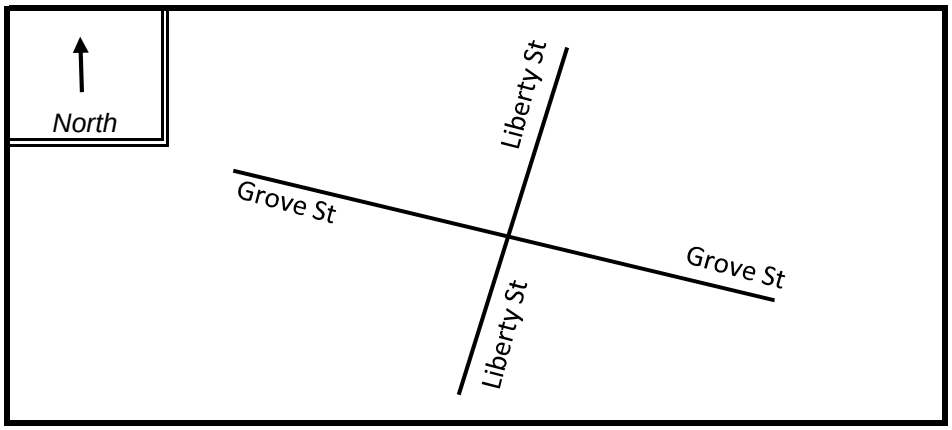
DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : Liberty Street

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB	NB		
PEAK HOURLY VOLUMES (PM) :	331	979	398	981		**2,689**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **29,878**

TOTAL # OF CRASHES : 25

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **5.00**

CRASH RATE CALCULATION : 0.53

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments : 2018 Average Crash Rate for MassDOT District 6 Signalized Intersections = 0.71

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

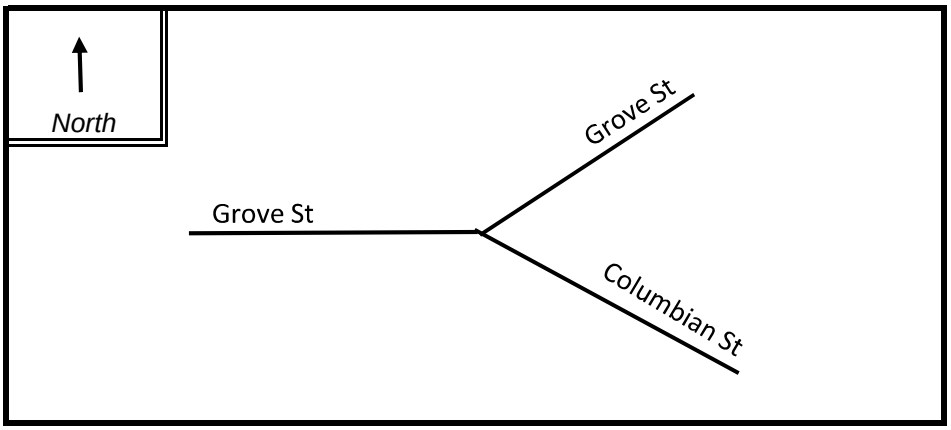
DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : Columbian St

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB	NB		
PEAK HOURLY VOLUMES (PM) :	0	725	1,072	790		**2,587**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **28,744**

TOTAL # OF CRASHES : 28 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **5.60**

CRASH RATE CALCULATION : **0.61** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Signalized Intersections = 0.71

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

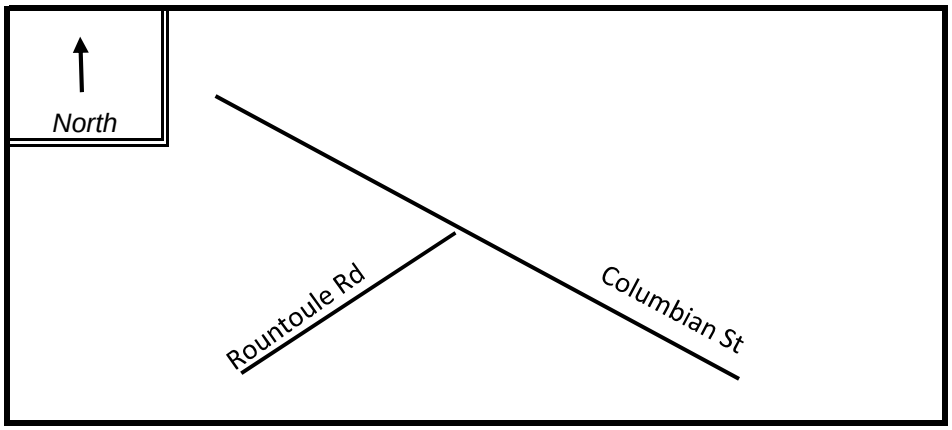
DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Columbian Street

MINOR STREET(S) : Driveway at #60 Columbian Street (Rantoule Road)

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB	NB		
PEAK HOURLY VOLUMES (PM) :	0	725	1,072	790		**2,587**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **28,744**

TOTAL # OF CRASHES : 4 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **0.80**

CRASH RATE CALCULATION : **0.09** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Signalized Intersections = 0.71

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

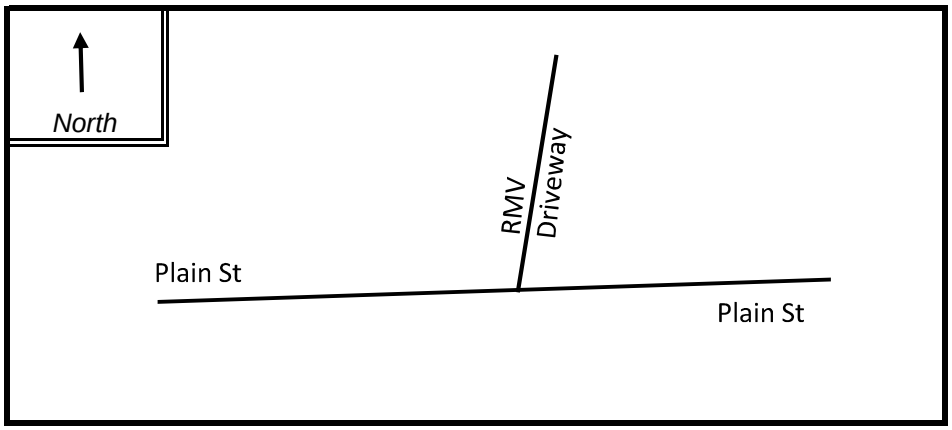
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Plain Street

MINOR STREET(S) : RMV Driveway

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (PM) :	450	650	70			**1,170**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **13,000**

TOTAL # OF CRASHES : 11 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **2.20**

CRASH RATE CALCULATION : **0.53** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

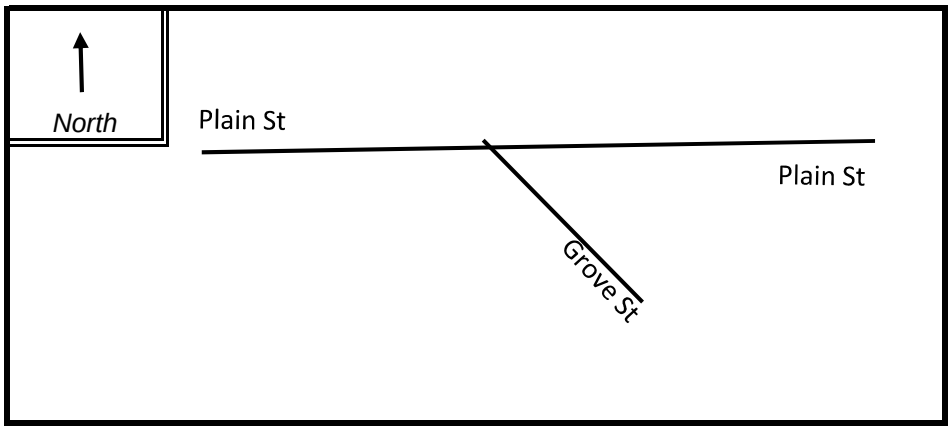
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Plain Street

MINOR STREET(S) : Grove Street

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	WB	SB	NB			
PEAK HOURLY VOLUMES (PM) :	34	880	704			**1,618**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **17,978**

TOTAL # OF CRASHES : 2

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **0.40**

CRASH RATE CALCULATION : **0.07**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

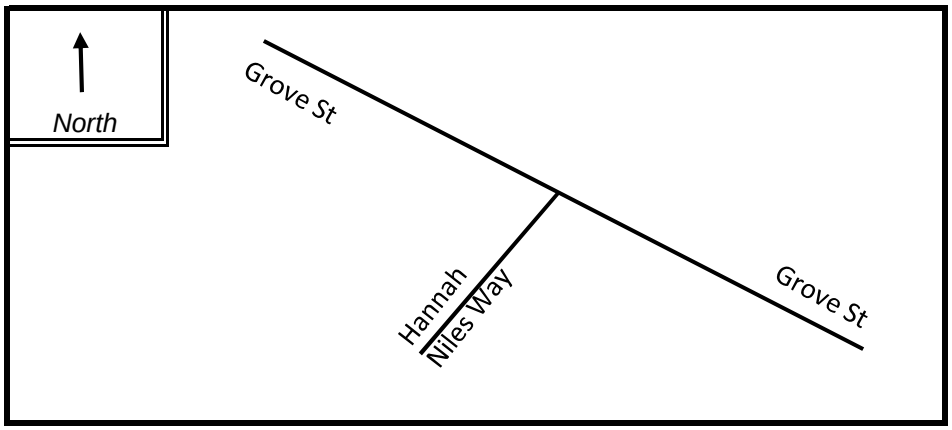
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : Hannah Niles Way

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	WB	SB	NB			
PEAK HOURLY VOLUMES (PM) :	6	814	694			**1,514**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **16,822**

TOTAL # OF CRASHES : 6 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **1.20**

CRASH RATE CALCULATION : **0.22** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

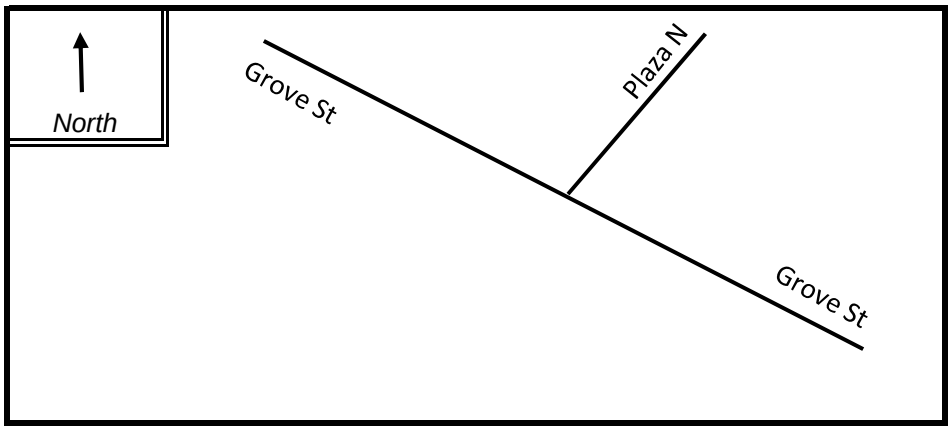
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : Plaza North

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	SWB	SEB	NWB			
PEAK HOURLY VOLUMES (PM) :	50	822	663			**1,535**

" K " FACTOR :	**0.090**	INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME :	**17,056**

TOTAL # OF CRASHES :	4	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**0.80**

CRASH RATE CALCULATION : **0.15**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

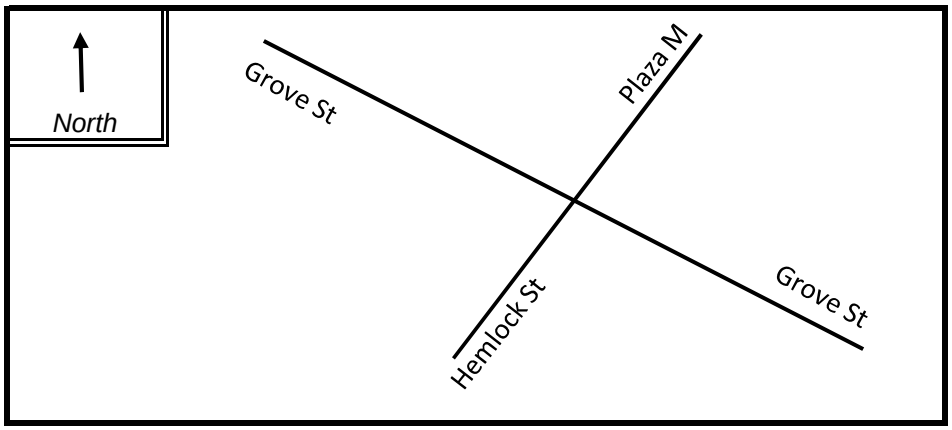
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : Hemlock St

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NWB	SWB	NEB	SEB		
PEAK HOURLY VOLUMES (PM) :	625	127	10	775		**1,537**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **17,078**

TOTAL # OF CRASHES : 6 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **1.20**

CRASH RATE CALCULATION : **0.22** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

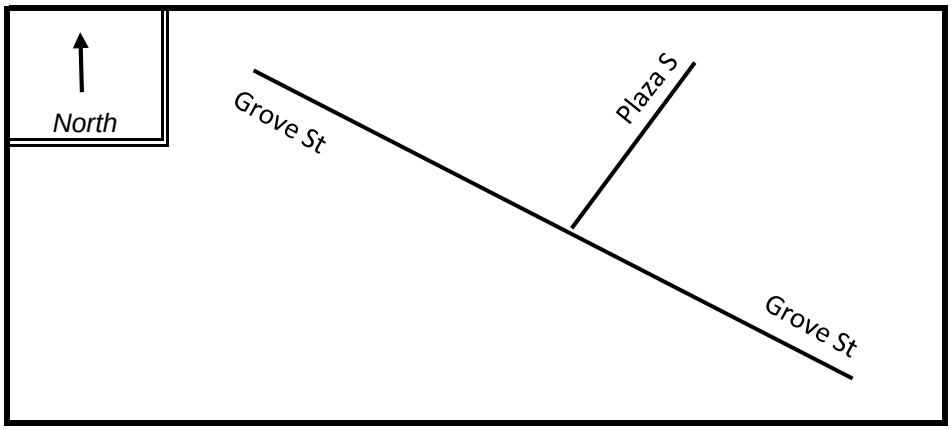
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : Plaza South

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NWB	SWB	SEB			
PEAK HOURLY VOLUMES (PM) :	744	79	699			**1,522**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **16,911**

TOTAL # OF CRASHES : 8 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **1.60**

CRASH RATE CALCULATION : **0.30** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

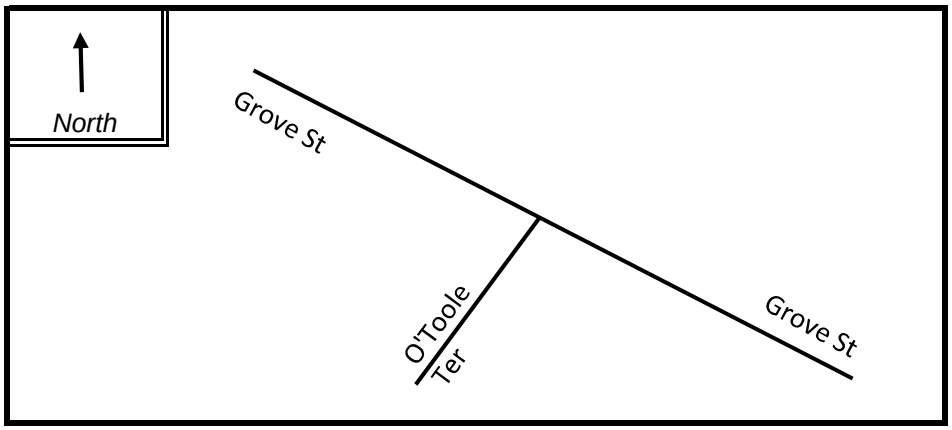
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : O'Toole Terrace

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NWB	SWB	SEB			
PEAK HOURLY VOLUMES (PM) :	834	1	1,004			**1,839**

" K " FACTOR :	**0.090**	INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME :	**20,433**

TOTAL # OF CRASHES :	6	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**1.20**

CRASH RATE CALCULATION : **0.18** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Braintree COUNT DATE : 4/8/2021 (adjusted)

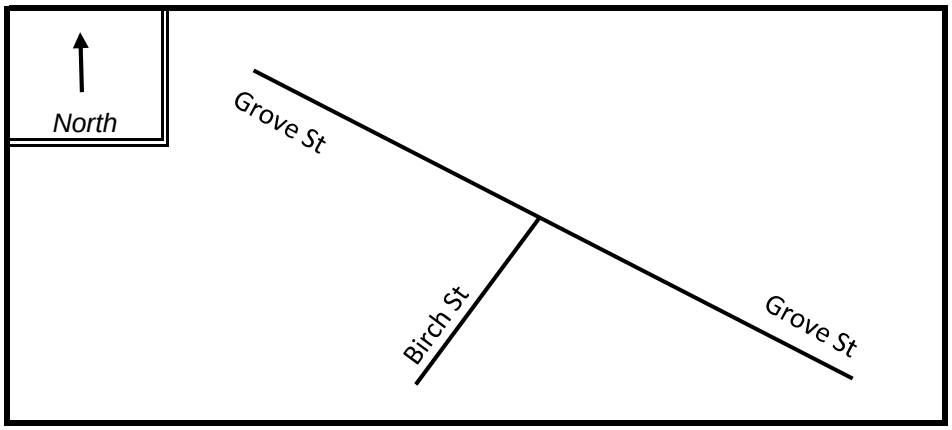
DISTRICT : 6 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Grove Street

MINOR STREET(S) : Birch Street

INTERSECTION DIAGRAM



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NWB	SWB	SEB			
PEAK HOURLY VOLUMES (PM) :	861	19	997			**1,877**

" K " FACTOR :	**0.090**	INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME :	**20,856**

TOTAL # OF CRASHES :	9	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**1.80**

CRASH RATE CALCULATION : **0.27** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2018 Average Crash Rate for MassDOT District 6 Unsignalized Intersections = 0.52

Project Title & Date: Grove Street Corridor Study in Braintree

APPENDIX G

Collision Diagrams and Crash Look-Up Tables

SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle
- Pedestrian
- Parked Vehicle
- Fixed Object
- Bicycle
- Animal

TYPES OF CRASH

- Head On
- Angle
- Rear End
- Sideswipe
- Out of Control

CRASH INDEX AND SEVERITY

#, (#), (#)

- # Property Damage Only Crash Index Number
- (#) Injury Crash Index Number
- (#) Fatal Crash Index Number

BOSTON REGION MPO

North

Figure 1
Collision Diagram: Plain Street at Hancock St and Route 37 (Washington Street)
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 1
Crash Data Lookup: Plain Street at Hancock Street
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior to Crash	Most Harmful Event	Driver Contributing Code
1	2016-06-14	Tue	10:55 AM	Off-peak	2	0	Property damage only	Sideswipe, same direction	Dry	Daylight	Clear / Cloudy	Travelling straight ahead / Parked	Motor vehicle in transport	Inattention / Distracted
2	2016-06-30	Thu	8:43 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Not Reported	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
3	2016-07-06	Wed	2:24 PM	Off-peak	2	0	Property damage only	Sideswipe, same direction	Dry	Daylight	Clear	Backing / Parked	Parked motor vehicle	Inattention
4	2016-07-13	Wed	2:07 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Entering traffic lane / Travelling straight ahead	Motor vehicle in transport	No improper driving
5	2016-09-06	Tue	3:13 PM	Off-peak	2	2	Non-fatal injury	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
6	2016-09-14	Wed	4:39 PM	Peak	3	1	Non-fatal injury	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped in traffic / Making U-turn / Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
7	2016-11-06	Sun	9:04 PM	Off-peak	1	0	Property damage only	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Utility pole	No improper driving
8	2016-12-01	Thu	8:16 AM	Peak	2	0	Property damage only	Angle	Wet	Daylight	Clear	Travelling straight ahead / Entering traffic lane	Motor vehicle in transport	No improper driving
9	2017-01-26	Thu	5:52 PM	Peak	2	0	Property damage only	Rear-end	Wet	Dark - lighted roadway	Cloudy / Rain	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
10	2017-03-05	Sun	2:33 PM	Off-peak	2	2	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead / Travelling straight ahead	Motor vehicle in transport	No improper driving
11	2017-03-20	Mon	10:34 PM	Off-peak	2	0	Property damage only	Rear-end	Sand, mud, dirt, oil, gravel	Dark - lighted roadway	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
12	2017-04-23	Sun	4:47 PM	Off-peak	2	0	Property damage only	Sideswipe, same direction	Dry	Daylight	Clear	Changing lanes / Travelling straight ahead	Motor vehicle in transport	Inattention
13	2017-05-09	Tue	6:09 AM	Off-peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Entering traffic lane	Motor vehicle in transport	No improper driving
14	2017-06-13	Tue	8:06 AM	Peak	1	0	Property damage only	Single vehicle crash	Dry	Daylight	Clear	Turning left	**Cyclist**	Visibility obstructed / Glare
15	2017-07-10	Mon	2:47 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
16	2017-07-13	Thu	10:22 AM	Off-peak	2	0	Property damage only	Angle	Wet	Daylight	Cloudy	Travelling straight ahead / Entering traffic lane	Motor vehicle in transport	No improper driving
17	2017-08-22	Tue	11:04 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
18	2017-11-22	Wed	6:21 PM	Peak	2	1	Non-fatal injury	Sideswipe, opposite direction	Wet	Dark - lighted roadway	Clear	Travelling straight ahead / Travelling straight ahead	Motor vehicle in transport	No improper driving
19	2018-05-29	Tue	6:00 PM	Peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Turning left / Turning left	Motor vehicle in transport	Followed too closely
20	2018-06-05	Tue	8:44 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Cloudy	Turning left / Travelling straight ahead	Motor vehicle in transport	Failed to yield right of way / No improper driving
21	2018-08-03	Fri	11:24 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
22	2019-01-26	Sat	10:41 PM	Off-peak	2	2	Non-fatal injury	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Travelling straight ahead	Motor vehicle in transport	No improper driving / Unknown
23	2019-06-18	Tue	3:09 PM	Off-peak	2	2	Non-fatal injury	Angle	Wet	Daylight	Rain	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving / Failed to yield right of way
24	2019-06-26	Wed	1:47 AM	Off-peak	2	Unknown	Not Reported	Rear-end	Wet	Dark - lighted roadway	Rain	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving / Unknown
25	2019-11-29	Fri	10:50 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	Unknown

SYMBOLS		TYPES OF CRASH		CRASH INDEX AND SEVERITY
Moving Vehicle	Parked Vehicle	Head On	Sideswipe	#, (#), (#)
Backing Vehicle	Fixed Object	Angle	Out of Control	# Property Damage Only Crash Index Number
Non-Involved Vehicle	Bicycle	Rear End		(#) Injury Crash Index Number
Pedestrian	Animal			(#) Fatal Crash Index Number

BOSTON REGION MPO

North

Figure 2
Collision Diagram: Plain Street at John Mahar Highway and Grove Street
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 2
Crash Data Lookup: Plain Street at John Mahar Highway and Grove Street
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior to Crash	Most Harmful Event	Driver Contributing Code
1	2015-01-17	Sat	3:14 AM	Off-peak	1	0	Property damage only	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Turning left	Unknown/other fixed object	Erratic or reckless operation / Failure to keep in proper lane or running off road
2	2015-08-24	Mon	12:06 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Cloudy	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
3	2015-12-17	Thu	9:16 PM	Off-peak	1	0	Property damage only	Single vehicle crash	Wet	Dark - lighted roadway	Rain	Not reported	Utility pole	Unknown
4	2016-03-01	Tue	5:01 PM	Peak	2	0	Property damage only	Head-on	Dry	Daylight	Clear	Travelling straight ahead	Motor vehicle in transport	Disregarded traffic signs, signals, road markings
5	2016-04-06	Wed	3:44 PM	Peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	Inattention
6	2016-10-14	Fri	8:53 PM	Off-peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
7	2017-01-19	Thu	4:50 PM	Peak	3	0	Property damage only	Rear-end	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	Followed too closely
8	2017-02-05	Sun	4:44 PM	Off-peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Turning left	Other movable object	No improper driving
9	2017-03-07	Tue	1:43 PM	Off-peak	3	0	Property damage only	Rear-end	Wet	Daylight	Cloudy	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
10	2017-06-22	Thu	3:08 PM	Off-peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Other movable object	No improper driving
11	2018-05-29	Tue	4:01 PM	Peak	3	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Not reported	No improper driving / Inattention
12	2018-07-07	Sat	9:35 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Disregarded traffic signs, signals, road markings
13	2018-12-17	Mon	3:30 PM	Peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Not reported / Slowing or stopped in traffic	Not reported	Not reported
14	2019-05-02	Thu	12:23 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped in traffic / Turning left	Motor vehicle in transport	No improper driving / Inattention

SYMBOLS				TYPES OF CRASH		CRASH INDEX AND SEVERITY
Moving Vehicle		Parked Vehicle		Head On	Sideswipe	# , (#) , (#)
Backing Vehicle		Fixed Object		Angle	Out of Control	# Property Damage Only Crash Index Number
Non-Involved Vehicle		Bicycle		Rear End		(#) Injury Crash Index Number
Pedestrian		Animal				(#) Fatal Crash Index Number

BOSTON REGION MPO

North

Figure 3
Collision Diagram: Grove Street Between Plain Street and Hannah Niles Way
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 3
Crash Data Lookup: Grove Street Between Plain Street and Hannah Niles Way
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior to Crash	Most Harmful Event	Driver Contributing Code
1	2016-02-08	Mon	4:02 PM	Peak	2	0	Property damage only	Sideswipe, same direction	Snow	Daylight	Blowing sand / Snow	Parked / Travelling straight ahead	Motor vehicle in transport	No improper driving
2	2016-03-20	Sun	12:57 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear / Cloudy	Parked / Turning left	Motor vehicle in transport	No improper driving
3	2016-06-20	Mon	4:58 AM	Off-peak	1	0	Property damage only	Single vehicle crash	Dry	Dawn	Clear	Travelling straight ahead	Unknown/other fixed object	No improper driving
4	2016-08-13	Sat	1:33 PM	Off-peak	2	0	Property damage only	Sideswipe, opposite direction	Dry	Daylight	Clear / Cloudy	Travelling straight ahead / Turning left	Motor vehicle in transport	Unknown
5	2017-01-20	Fri	11:49 PM	Off-peak	2	1	Non-fatal injury	Rear-end	Dry	Dark - lighted roadway	Clear	Turning right / Travelling straight ahead	Motor vehicle in transport	No improper driving
6	2017-05-18	Thu	6:19 PM	Peak	1	0	Property damage only	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead	Unknown	No improper driving
7	2017-09-23	Sat	5:48 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
8	2017-09-28	Thu	4:28 AM	Off-peak	1	1	Non-fatal injury	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Light pole or other post/support	Glare
9	2017-12-18	Mon	8:03 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Cloudy	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
10	2018-08-04	Sat	1:13 AM	Off-peak	1	4	Non-fatal injury	Single vehicle crash	Dry	Dark - lighted roadway	Cloudy	Travelling straight ahead	Bridge overhead structure	Erratic or reckless operation
11	2018-10-18	Thu	7:40 AM	Peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving / Inattention
12	2019-04-05	Fri	7:24 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Failed to yield right of way
13	2019-04-10	Wed	8:51 AM	Peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Slowing or stopped in traffic	Motor vehicle in transport	No improper driving / Inattention
14	2019-11-10	Sun	5:53 PM	Off-peak	2	1	Non-fatal injury	Rear-end	Dry	Dark - lighted roadway	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving / Followed too closely
15	2019-11-26	Tue	8:39 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Failed to yield right of way
16	2019-12-07	Sat	4:35 PM	Off-peak	2	2	Non-fatal injury	Head-on	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Travelling straight ahead	Motor vehicle in transport	No improper driving

SYMBOLS		TYPES OF CRASH		CRASH INDEX AND SEVERITY
Moving Vehicle	Parked Vehicle	Head On	Sideswipe	#, (#), (#)
Backing Vehicle	Fixed Object	Angle	Out of Control	# Property Damage Only Crash Index Number
Non-Involved Vehicle	Bicycle	Rear End		(#) Injury Crash Index Number
Pedestrian	Animal			(#) Fatal Crash Index Number

BOSTON REGION MPO

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Figure 4
Collision Diagram: Grove Street Between Hannah Niles Way and Liberty Street
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 4
Crash Data Lookup: Grove Street between Hannah Niles Way and Liberty Street
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior to Crash	Most Harmful Event	Driver Contributing Code
1	2015-09-18	Fri	9:24 AM	Peak	2	Unknown	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
2	2015-12-10	Thu	10:06 PM	Off-peak	2	4	Non-fatal injury	Angle	Dry	Dark - lighted roadway	Clear	Making U-turn / Travelling straight ahead	Motor vehicle in transport	Made an improper turn
3	2016-03-26	Sat	2:21 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
4	2016-04-17	Sun	8:53 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Parked	Motor vehicle in transport	Other improper action
5	2016-05-06	Fri	11:02 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Cloudy	Turning left / Travelling straight ahead	Motor vehicle in transport	Unknown
6	2016-05-11	Wed	2:45 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
7	2016-07-21	Thu	3:26 PM	Off-peak	3	3	Non-fatal injury	Rear-end	Not reported	Not reported	Not reported	Travelling straight ahead	Motor vehicle in transport	No improper driving
8	2016-11-15	Tue	6:42 PM	Off-peak	2	2	Non-fatal injury	Rear-end	Wet	Dark - lighted roadway	Rain / Cloudy	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	Unknown
9	2016-12-14	Wed	8:25 AM	Peak	2	0	Property damage only	Angle	Wet	Daylight	Not Reported	Backing / Travelling straight ahead	Motor vehicle in transport	Glare
10	2017-01-17	Tue	8:46 AM	Peak	3	0	Property damage only	Rear-end	Dry	Daylight	Clear / Cloudy	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	Followed too closely / Inattention
11	2017-05-26	Fri	4:33 PM	Peak	2	0	Property damage only	Rear-end	Wet	Daylight	Cloudy	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
12	2017-10-09	Mon	1:46 PM	Off-peak	2	0	Property damage only	Sideswipe, opposite direction	Wet	Daylight	Rain / Cloudy	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
13	2018-01-18	Thu	4:17 PM	Peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Clear	Travelling straight ahead	Motor vehicle in transport	Failure to keep in proper lane
14	2018-04-23	Mon	9:24 AM	Peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Clear	Travelling straight ahead	Motor vehicle in transport	No improper driving / Inattention
15	2018-07-22	Sun	9:14 AM	Off-peak	1	1	Non-fatal injury	Angle	Wet	Daylight	Rain	Travelling straight ahead	**Cyclist**	No improper driving
16	2018-07-28	Sat	12:24 PM	Off-peak	1	0	Property damage only	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead	Other movable object	No improper driving
17	2019-03-29	Fri	12:08 PM	Off-peak	2	Unknown	Non-fatal injury	Angle	Dry	Daylight	Cloudy	Entering traffic lane / Travelling straight ahead	Motor vehicle in transport	Visibility obstructed / Failed to yield right of way / No improper driving
18	2019-10-29	Tue	5:59 PM	Peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Entering traffic lane	Motor vehicle in transport	No improper driving

SYMBOLS				TYPES OF CRASH		CRASH INDEX AND SEVERITY
Moving Vehicle	Parked Vehicle	Head On	Sideswipe	# , (#) , (#)	
Backing Vehicle	Fixed Object	Angle	Out of Control	#	Property Damage Only Crash Index Number
Non-Involved Vehicle	Bicycle	Rear End		(#)	Injury Crash Index Number
Pedestrian	Animal			(#)	Fatal Crash Index Number

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Figure 5
Collision Diagram: Grove Street at Liberty Street
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 5
Crash Data Lookup: Grove Street at Liberty Street
MassDOT Crash Data 2015–2019

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior to Crash	Most Harmful Event (Collision with)	Driver Contributing Code
1	2015-03-30	Mon	3:09 PM	Off-peak	1	1	Non-fatal injury	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead	**Pedestrian**	Distracted
2	2015-06-20	Sat	3:14 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Motor vehicle in transport	Distracted
3	2015-08-25	Tue	11:23 AM	Off-peak	2	0	Property damage only	Head-on	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	Inattention / Failed to yield right of way
4	2015-10-09	Fri	5:56 PM	Peak	2	0	Property damage only	Angle	Wet	Dusk	Rain	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
5	2015-10-28	Wed	9:59 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Cloudy	Not reported / Turning left	Motor vehicle in transport	No improper driving
6	2015-11-18	Wed	9:33 AM	Peak	3	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Overtaking/passing	Motor vehicle in transport	No improper driving
7	2015-12-16	Wed	1:33 PM	Off-peak	2	Unknown	Not Reported	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	
8	2015-12-16	Wed	2:00 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	Failed to yield right of way
9	2015-12-27	Sun	5:44 PM	Off-peak	2	2	Non-fatal injury	Rear-end	Wet	Dark - lighted roadway	Rain / Cloudy	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	Not reported
10	2016-06-12	Sun	11:52 AM	Off-peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead / Travelling straight ahead	Motor vehicle in transport	No improper driving
11	2016-08-28	Sun	8:36 AM	Off-peak	2	0	Property damage only	Sideswipe, opposite direction	Dry	Daylight	Clear	Slowing or stopped in traffic / Turning left	Motor vehicle in transport	No improper driving
12	2016-10-03	Mon	8:55 PM	Off-peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
13	2016-10-09	Sun	1:04 PM	Off-peak	2	0	Property damage only	Angle	Wet	Daylight	Rain	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
14	2016-10-28	Fri	5:32 PM	Peak	3	1	Non-fatal injury	Angle	Wet	Dark - lighted roadway	Rain / Cloudy	Slowing or stopped in traffic / Entering traffic lane / Travelling straight ahead	Other	Failed to yield right of way
15	2016-11-01	Tue	3:41 PM	Peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Motor vehicle in transport	No improper driving
16	2017-01-21	Sat	11:18 AM	Off-peak	2	1	Non-fatal injury	Angle	Wet	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
17	2017-02-14	Tue	8:20 AM	Peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Turning right / Travelling straight ahead	Motor vehicle in transport	No improper driving
18	2017-09-07	Thu	7:25 PM	Off-peak	2	1	Non-fatal injury	Head-on	Dry	Dusk	Clear	Travelling straight ahead	Motor vehicle in transport	No improper driving
19	2017-09-24	Sun	2:05 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	Inattention
20	2017-12-22	Fri	5:14 PM	Peak	2	0	Property damage only	Rear-end	Wet	Dark - lighted roadway	Snow	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
21	2017-12-29	Fri	6:22 PM	Peak	2	1	Non-fatal injury	Rear-end	Dry	Dark - lighted roadway	Clear	Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
22	2018-01-11	Thu	10:29 AM	Off-peak	2	2	Non-fatal injury	Rear-end	Wet	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
23	2018-03-16	Fri	1:45 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	Not reported
24	2018-04-16	Mon	1:33 PM	Off-peak	2	0	Property damage only	Rear-end	Wet	Daylight	Rain	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving

Table 5
Crash Data Lookup: Grove Street at Liberty Street
MassDOT Crash Data 2015–2019

25	2018-04-27	Fri	12:10 PM	Off-peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped in traffic	Motor vehicle in transport	No improper driving / Followed too closely
26	2018-07-31	Tue	6:47 AM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear / Cloudy	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
27	2018-08-14	Tue	6:43 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Failed to yield right of way
28	2019-01-08	Tue	6:30 AM	Off-peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
29	2019-03-01	Fri	4:35 PM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	Failed to yield right of way
30	2019-03-26	Tue	12:04 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Failed to yield right of way
31	2019-04-22	Mon	5:05 PM	Peak	4	0	Property damage only	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Motor vehicle in transport	Visibility obstructed
32	2019-04-22	Mon	3:35 PM	Peak	2	0	Property damage only	Angle	Wet	Daylight	Rain / Cloudy	Turning left / Travelling straight ahead	Motor vehicle in transport	Not reported
33	2019-08-14	Wed	1:24 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
34	2019-08-27	Tue	12:54 PM	Off-peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
35	2019-10-30	Wed	3:27 PM	Off-peak	3	1	Non-fatal injury	Angle	Dry	Daylight	Rain / Cloudy	Travelling straight ahead / Turning left / Slowing or stopped in traffic	Motor vehicle in transport	No improper driving / Inattention
36	2019-11-01	Fri	8:39 AM	Peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Clear	Travelling straight ahead / Slowing or stopped in traffic	Tree	No improper driving / Unknown
37	2019-12-28	Sat	3:49 AM	Off-peak	2	0	Property damage only	Angle	Wet	Dark - lighted roadway	Cloudy	Travelling straight ahead	Motor vehicle in transport	Unknown

SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle
- Pedestrian
- Parked Vehicle
- Fixed Object
- Bicycle
- Animal

TYPES OF CRASH

- Head On
- Angle
- Rear End
- Sideswipe
- Out of Control

CRASH INDEX AND SEVERITY

#, (#), (#)

- # Property Damage Only Crash Index Number
- (#) Injury Crash Index Number
- (#) Fatal Crash Index Number

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Figure 6
Collision Diagram: Grove Street Between Liberty Street and Columbian Street
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 6
Crash Data Lookup: Grove Street between Liberty Street and Columbian Street
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior to Crash	Most Harmful Event	Driver Contributing Code
1	2015-02-07	Sat	10:20 PM	Off-peak	2	0	Property damage only	Angle	Ice	Dark - lighted roadway	Snow / Blowing sand, snow	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
2	2015-02-26	Thu	12:46 PM	Off-peak	2	0	Property damage only	Rear-end	Snow	Daylight	Snow	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
3	2015-03-13	Fri	00:02 AM	Off-peak	1	0	Property damage only	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Other	Failure to keep in proper lane or running off road / Other improper action
4	2015-07-01	Wed	4:09 PM	Peak	1	0	Property damage only	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead	**Cyclist**	No improper driving
5	2015-08-08	Sat	11:35 AM	Off-peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear / Other	Travelling straight ahead	Motor vehicle in transport	No improper driving
6	2016-01-15	Fri	4:24 PM	Peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Motor vehicle in transport	No improper driving
7	2016-01-26	Tue	7:07 AM	Peak	2	0	Property damage only	Rear-end	Wet	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	Other improper action
8	2016-05-13	Fri	2:53 PM	Off-peak	4	1	Non-fatal injury	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	Reckless or erratic operation
9	2016-06-26	Sun	3:48 AM	Off-peak	2	1	Non-fatal injury	Sideswipe, same direction	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Parked	Tree	Fatigued/asleep / Inattention
10	2016-08-29	Mon	3:54 PM	Peak	3	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
11	2016-09-01	Thu	9:01 AM	Peak	3	1	Non-fatal injury	Rear-end	Wet	Daylight	Cloudy / Rain	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
12	2016-10-02	Sun	5:48 PM	Off-peak	3	0	Property damage only	Rear-end	Wet	Daylight	Cloudy	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	Distracted
13	2017-01-24	Tue	8:20 AM	Peak	5	0	Property damage only	Rear-end	Wet	Daylight	Rain	Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
14	2017-06-02	Fri	11:24 AM	Off-peak	2	2	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
15	2017-09-13	Wed	3:24 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
16	2017-12-20	Wed	4:46 PM	Peak	3	0	Property damage only	Rear-end	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	Followed too closely
17	2018-05-08	Tue	3:23 PM	Off-peak	3	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving / Inattention
18	2018-06-18	Mon	8:53 AM	Peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
19	2018-06-19	Tue	7:38 AM	Peak	3	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
20	2018-09-25	Tue	7:09 AM	Peak	3	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
21	2018-11-07	Wed	6:57 AM	Off-peak	2	0	Property damage only	Rear-end	Wet	Daylight	Clear	Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
22	2018-11-27	Tue	6:30 PM	Peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	Inattention / No improper driving
23	2019-06-06	Thu	7:16 AM	Peak	3	0	Property damage only	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving / Other improper action
24	2019-10-16	Wed	7:50 AM	Peak	3	0	Property damage only	Rear-end	Dry	Daylight	Clear	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	No improper driving / Visibility obstructed

Table 6
Crash Data Lookup: Grove Street between Liberty Street and Columbian Street
MassDOT Crash Data 2015–19

25	2019-11-24	Sun	10:35 PM	Off-peak	1	1	Non-fatal injury	Single vehicle crash	Wet	Dark - lighted roadway	Clear	Travelling straight ahead	Utility pole	Failure to keep in proper lane or running off road / Fatigued/asleep
26	2019-12-19	Thu	4:55 PM	Peak	3	1	Non-fatal injury	Rear-end	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Motor vehicle in transport	No improper driving / Inattention
27	2019-12-20	Fri	2:28 PM	Off-peak	3	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	No improper driving / Inattention

SYMBOLS				TYPES OF CRASH		CRASH INDEX AND SEVERITY	
Moving Vehicle		Parked Vehicle		Head On		# , (#) , (#)	
Backing Vehicle		Fixed Object		Angle	Sideswipe	#	Property Damage Only Crash Index Number
Non-Involved Vehicle		Bicycle		Rear End	Out of Control	(#)	Injury Crash Index Number
Pedestrian		Animal				(#)	Fatal Crash Index Number

BOSTON REGION MPO

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Figure 7
Collision Diagram: Grove Street at Columbian Street
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 7
Crash Data Lookup: Grove Street at Columbian Street
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior Crash	Most Harmful Event	Driver Contributing Code
1	2015-03-14	Sat	3:37 PM	Off-peak	2	2	Non-fatal injury	Rear-end	Wet	Daylight	Cloudy / Rain	Travelling straight ahead	Motor vehicle in transport	Inattention
2	2015-07-09	Thu	11:01 AM	Off-peak	2	0	Property damage only	Sideswipe, opposite direction	Dry	Daylight	Cloudy / Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
3	2015-08-16	Sun	9:33 AM	Off-peak	2	2	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
4	2015-08-28	Fri	2:22 PM	Off-peak	2	Unknown	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Entering traffic lane	Motor vehicle in transport	Inattention
5	2015-10-12	Mon	7:58 AM	Peak	3	0	Property damage only	Angle	Dry	Daylight	Clear	Turning left / Travelling straight ahead / Slowing or stopped in traffic	Motor vehicle in transport	Glare / Failed to yield right of way
6	2015-11-15	Sun	3:07 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
7	2015-11-22	Sun	12:42 PM	Off-peak	2	Unknown	Non-fatal injury	Head-on	Wet	Daylight	Cloudy / Rain	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
8	2016-02-24	Wed	7:33 AM	Peak	2	0	Property damage only	Rear-end	Wet	Dawn	Cloudy / Rain	Travelling straight ahead	Motor vehicle in transport	Followed too closely / Inattention
9	2016-04-24	Sun	3:10 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
10	2016-05-17	Tue	3:59 PM	Peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Clear	Entering traffic lane / Travelling straight ahead	Motor vehicle in transport	Failed to yield right of way
11	2016-06-01	Wed	7:11 AM	Peak	3	Unknown	Non-fatal injury	Angle	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	Failed to yield right of way
12	2016-08-20	Sat	6:51 PM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
13	2016-11-01	Tue	8:45 AM	Peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Clear	Turning left / Not reported	Motor vehicle in transport	No improper driving
14	2017-01-09	Mon	7:07 AM	Peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
15	2017-01-09	Mon	4:55 PM	Peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Not reported	Motor vehicle in transport	No improper driving
16	2017-01-18	Wed	11:18 PM	Off-peak	1	0	Property damage only	Single vehicle crash	Wet	Dark - lighted roadway	Cloudy / Rain	Turning right	Utility pole	Inattention
17	2017-05-22	Mon	1:11 PM	Off-peak	2	1	Non-fatal injury	Sideswipe, opposite direction	Wet	Daylight	Cloudy / Rain	Travelling straight ahead / Turning left	Motor vehicle in transport	Unknown
18	2017-05-31	Wed	10:43 AM	Off-peak	2	0	Property damage only	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Motor vehicle in transport	No improper driving
19	2017-07-05	Wed	3:30 PM	Peak	2	3	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving
20	2018-01-16	Tue	8:47 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving / Failed to yield right of way / Inattention
21	2018-01-31	Wed	7:29 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Glare

Table 7
Crash Data Lookup: Grove Street at Columbian Street
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior Crash	Most Harmful Event	Driver Contributing Code
22	2018-02-07	Wed	7:58 AM	Peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Cloudy	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
23	2018-03-23	Fri	4:38 PM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
24	2018-04-27	Fri	5:07 PM	Peak	2	0	Property damage only	Angle	Wet	Daylight	Rain	Entering traffic lane / Travelling straight ahead	Motor vehicle in transport	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc
25	2018-08-09	Thu	4:58 PM	Peak	3	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic / Travelling straight ahead	Motor vehicle in transport	No improper driving / Followed too closely
26	2019-04-09	Tue	8:50 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Cloudy	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
27	2019-05-08	Wed	7:00 AM	Peak	2	1	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Motor vehicle in transport	No improper driving / Inattention
28	2019-09-29	Sun	3:05 PM	Off-peak	2	0	Property damage only	Angle	Dry	Daylight	Clear	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Failed to yield right of way
29	2019-11-18	Mon	11:53 AM	Off-peak	2	0	Property damage only	Angle	Wet	Daylight	Rain	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Failed to yield right of way
30	2019-11-21	Thu	6:56 AM	Off-peak	1	0	Property damage only	Single vehicle crash	Ice	Daylight	Clear	Travelling straight ahead	Other	Driving too fast for conditions
31	2019-11-21	Thu	1:43 PM	Off-peak	2	2	Non-fatal injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Other movable object	No improper driving / Fatigued/asleep / Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc
32	2019-12-07	Sat	6:07 PM	Off-peak	2	0	Property damage only	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead / Turning left	Other movable object	No improper driving / Failed to yield right of way
33	2019-12-14	Sat	4:36 PM	Off-peak	2	0	Property damage only	Sideswipe, opposite direction	Wet	Dark - lighted roadway	Rain	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving / Failed to yield right of way

SYMBOLS		TYPES OF CRASH		CRASH INDEX AND SEVERITY
Moving Vehicle	Parked Vehicle	Head On	Sideswipe	#, (#), (#)
Backing Vehicle	Fixed Object	Angle	Out of Control	# Property Damage Only Crash Index Number
Non-Involved Vehicle	Bicycle	Rear End		(#) Injury Crash Index Number
Pedestrian	Animal			(#) Fatal Crash Index Number

BOSTON REGION MPO

North

Figure 8
Collision Diagram: Columbian Street Between Grove Street and Weymouth Border
Braintree Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table 8
Crash Data Lookup: Columbian Street between Grove Street and Weymouth Border
MassDOT Crash Data 2015–19

Index	Crash Date	Day	Time	Peak Hour	# Veh	# Injured	Crash Severity	Manner of Collision	Road Surface Conditions	Ambient Light Conditions	Weather Conditions	Vehicle Actions Prior Crash	Most Harmful Event	Driver Contributing Code
1	2015-12-01	Tue	3:54 PM	Peak	2	0	Property damage only	Angle	Wet	Dusk	Rain	Travelling straight ahead	Motor vehicle in transport	No improper driving
2	2016-02-16	Tue	8:57 AM	Peak	2	1	Non-fatal injury	Angle	Wet	Daylight	Cloudy	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
3	2016-07-19	Tue	2:03 PM	Off-peak	2	1	Non-fatal injury	Angle	Dry	Daylight	Clear	Travelling straight ahead / Entering traffic lane	Motor vehicle in transport	No improper driving
4	2016-07-27	Wed	8:33 AM	Peak	2	0	Property damage only	Angle	Dry	Daylight	Clear / Cloudy	Travelling straight ahead / Turning left	Motor vehicle in transport	No improper driving
5	2017-09-11	Mon	1:45 PM	Off-peak	2	2	Non-fatal injury	Rear-end	Dry	Daylight	Clear / Cloudy	Turning left / Travelling straight ahead	Motor vehicle in transport	No improper driving
6	2019-03-09	Sat	11:14 AM	Off-peak	1	1	Non-fatal injury	Single vehicle crash	Dry	Daylight	Clear	Turning right	**Pedestrian**	No improper driving

APPENDIX H

Automatic Traffic Recorder Counts
April 7–13, 2021

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 1 EB

Station #: 210020000125
Site ID: 000000000103
Location: Grove Street EB, at Grove Circle
Direction: ROAD TOTAL

File: D0406002.prn
City: Braintree
County: speed

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	11	14	28	26	29	22	42	44	28	194
02:00	16	16	8	17	18	15	32	14	17	121
03:00	13	14	6	7	11	10	13	6	10	70
04:00	6	8	7	6	8	7	13	8	8	56
05:00	25	19	13	15	19	18	17	8	17	116
06:00	64	69	65	57	64	64	32	21	53	372
07:00	172	181	169	175	178	175	89	71	148	1035
08:00	339	344	318	350	324	335	202	142	288	2019
09:00	418	392	382	384	504	416	274	190	363	2544
10:00	357	393	370	377	453	390	394	251	371	2595
11:00	398	376	418	437	447	415	460	364	414	2900
12:00	467	437	462	450	510	465	620	424	481	3370
13:00	523	549	504	495	570	528	659	547	550	3847
14:00	504	516	539	516	618	539	581	494	538	3768
15:00	670	687	733	671	665	685	575	501	643	4502
16:00	705	714	721	663	827	726	561	490	669	4681
17:00	725	702	716	727	664	707	521	413	638	4468
18:00	717	731	745	757	760	742	471	380	652	4561
19:00	477	554	568	562	583	549	415	304	495	3463
20:00	385	401	412	456	423	415	370	228	382	2675
21:00	233	264	283	283	306	274	261	156	255	1786
22:00	130	160	149	160	195	159	173	88	151	1055
23:00	84	82	72	121	125	97	116	60	94	660
24:00	29	44	43	44	90	50	87	43	54	380
TOTALS	7468	7667	7731	7756	8391	7803	6978	5247	7319	51238
% AVG WKDY	95.7	98.3	99.1	99.4	107.5		89.4	67.2		
% AVG WEEK	102.0	104.8	105.6	106.0	114.6		95.3	71.7		
AM Times	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks	467	437	462	450	510	465	620	424	481	
PM Times	17:00	18:00	18:00	18:00	16:00	18:00	13:00	13:00	16:00	
PM Peaks	725	731	745	757	827	742	659	547	669	

U4

EB 7803
WB 8343
COMB AWD 16146
FAC .92
COMB ADT 14,8900

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 1 WB

Station #: 210020000112
Site ID: 000000000104
Location: Grove Street WB, at Grove Circle
Direction: ROAD TOTAL

File: D0406004.prn
City: Braintree
County: speed

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	13	9	13	11	14	12	32	44	19	136
02:00	11	6	8	9	8	8	17	15	11	74
03:00	10	7	9	5	15	9	16	8	10	70
04:00	21	23	18	21	21	21	24	10	20	138
05:00	68	77	91	81	80	79	23	11	62	431
06:00	185	202	195	208	195	197	71	39	156	1095
07:00	355	598	332	397	347	406	129	79	320	2237
08:00	543	614	515	552	510	547	235	139	444	3108
09:00	510	578	594	556	536	555	398	241	488	3413
10:00	551	558	563	602	541	563	531	347	528	3693
11:00	546	535	562	532	529	541	542	470	531	3716
12:00	505	503	592	505	563	534	606	523	542	3797
13:00	532	534	571	493	611	548	650	598	570	3989
14:00	569	522	593	500	613	559	676	550	575	4023
15:00	584	565	708	560	645	612	531	492	584	4085
16:00	611	571	689	626	659	631	540	469	595	4165
17:00	557	549	583	558	635	576	539	392	545	3813
18:00	529	617	558	573	615	578	464	362	531	3718
19:00	429	461	454	438	472	451	399	299	422	2952
20:00	349	370	366	376	424	377	340	230	351	2455
21:00	231	232	233	269	249	243	210	146	224	1570
22:00	112	147	136	142	160	139	143	71	130	911
23:00	87	88	73	96	128	94	112	48	90	632
24:00	55	64	53	74	67	63	79	41	62	433
TOTALS	7963	8430	8509	8184	8637	8343	7307	5624	7810	54654
% AVG WKDY	95.4	101.0	102.0	98.1	103.5		87.6	67.4		
% AVG WEEK	102.0	107.9	109.0	104.8	110.6		93.6	72.0		
AM Times	10:00	08:00	09:00	10:00	12:00	10:00	12:00	12:00	12:00	
AM Peaks	551	614	594	602	563	563	606	523	542	
PM Times	16:00	18:00	15:00	16:00	16:00	16:00	14:00	13:00	16:00	
PM Peaks	611	617	708	626	659	631	676	598	595	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA.2 EB

Station #: 210020000018
Site ID: 000000000203
Location: Grove St.EB,btwn.Hannah Niles Wy/Hemlock
Direction: ROAD TOTAL

File: D0406006.prn
City: Braintree
County: speed

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	12	14	27	25	28	21	44	42	27	192
02:00	16	18	10	17	20	16	33	15	18	129
03:00	16	13	6	8	11	11	17	7	11	78
04:00	5	5	5	5	6	5	12	8	7	46
05:00	19	15	12	11	15	14	19	6	14	97
06:00	69	67	72	56	59	65	27	20	53	370
07:00	152	172	149	166	176	163	74	62	136	951
08:00	330	317	312	334	306	320	208	151	280	1958
09:00	413	392	380	391	509	417	269	177	362	2531
10:00	347	385	366	379	444	384	383	247	364	2551
11:00	392	366	418	436	431	409	463	366	410	2872
12:00	460	451	450	447	525	467	611	421	481	3365
13:00	518	549	529	490	585	534	669	543	555	3883
14:00	510	500	538	518	607	535	614	505	542	3792
15:00	652	681	743	663	686	685	577	491	642	4493
16:00	704	754	719	688	862	745	572	498	685	4797
17:00	756	733	727	763	693	734	501	415	655	4588
18:00	704	751	755	798	767	755	465	384	661	4624
19:00	491	579	589	566	591	563	411	310	505	3537
20:00	391	404	416	445	414	414	377	221	381	2668
21:00	240	275	283	290	313	280	265	164	261	1830
22:00	134	162	154	159	190	160	167	89	151	1055
23:00	82	77	73	117	128	95	110	55	92	642
24:00	33	51	44	54	92	55	96	45	59	415
TOTALS	7446	7731	7777	7826	8458	7847	6984	5242	7352	51464
% AVG WKDY	94.9	98.5	99.1	99.7	107.8		89.0	66.8		
% AVG WEEK	101.3	105.2	105.8	106.4	115.0		95.0	71.3		
AM Times	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks	460	451	450	447	525	467	611	421	481	
PM Times	17:00	16:00	18:00	18:00	16:00	18:00	13:00	13:00	16:00	
PM Peaks	756	754	755	798	862	755	669	543	685	

U4

EB 7847
WB 7949
COMB AWD 15796
FAC .92
COMB ADT 14,500

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

Station #: 210020000057
Site ID: 000000000204
Location: Grove St.WB,btwn.Hannah Niles Wy/Hemlock
Direction: ROAD TOTAL

STA.2 WB

File: D0406008.prn
City: Braintree
County: speed

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	12	9	13	9	14	11	27	34	17	118
02:00	10	5	7	9	8	8	17	12	10	68
03:00	9	7	9	4	12	8	11	9	9	61
04:00	19	17	17	19	17	18	21	7	17	117
05:00	62	70	85	78	75	74	21	12	58	403
06:00	183	199	193	198	185	192	62	36	151	1056
07:00	353	574	330	384	334	395	129	85	313	2189
08:00	523	574	491	525	494	521	213	130	421	2950
09:00	495	556	574	533	513	534	382	224	468	3277
10:00	529	525	539	589	497	536	497	338	502	3514
11:00	524	503	528	523	512	518	517	451	508	3558
12:00	480	481	582	481	517	508	573	500	516	3614
13:00	513	508	551	483	575	526	615	574	546	3819
14:00	531	478	582	478	570	528	642	529	544	3810
15:00	554	504	707	535	624	585	507	495	561	3926
16:00	589	552	660	580	627	602	496	439	563	3943
17:00	539	508	569	527	583	545	487	394	515	3607
18:00	490	559	533	537	569	538	437	345	496	3470
19:00	398	453	430	418	452	430	380	295	404	2826
20:00	338	350	351	353	393	357	328	232	335	2345
21:00	228	228	220	255	250	236	207	138	218	1526
22:00	107	142	130	132	152	133	133	69	124	865
23:00	88	89	69	96	119	92	105	50	88	616
24:00	51	54	42	63	62	54	70	32	53	374
TOTALS	7625	7945	8212	7809	8154	7949	6877	5430	7437	52052
% AVG WKDY	95.9	99.9	103.3	98.2	102.6		86.5	68.3		
% AVG WEEK	102.5	106.8	110.4	105.0	109.6		92.5	73.0		
AM Times	10:00	07:00	12:00	10:00	12:00	10:00	12:00	12:00	12:00	
AM Peaks	529	574	582	589	517	536	573	500	516	
PM Times	16:00	18:00	15:00	16:00	16:00	16:00	14:00	13:00	16:00	
PM Peaks	589	559	707	580	627	602	642	574	563	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 3 EB

Station #: 210020000046
Site ID: 000000000303
Location: Grove St.EB,btwn.Liberty St.& Otoole Ter
Direction: ROAD TOTAL

File: D0406010.prn
City: Braintree
County: speed

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	13	13	18	28	32	21	43	41	27	188
02:00	15	13	12	20	16	15	34	15	18	125
03:00	10	9	7	10	12	10	11	8	10	67
04:00	4	7	8	10	9	8	12	8	8	58
05:00	30	35	28	19	31	29	18	11	25	172
06:00	95	97	92	80	85	90	39	35	75	523
07:00	218	252	240	245	263	244	112	90	203	1420
08:00	455	469	453	480	472	466	240	147	388	2716
09:00	509	514	503	512	650	538	348	242	468	3278
10:00	448	473	455	453	563	478	503	353	464	3248
11:00	419	472	461	492	509	471	540	415	473	3308
12:00	512	503	534	526	582	531	686	513	551	3856
13:00	605	619	604	573	646	609	752	601	629	4400
14:00	585	573	584	626	675	609	706	586	619	4335
15:00	698	706	863	705	814	757	671	570	718	5027
16:00	845	893	850	860	1050	900	610	548	808	5656
17:00	806	857	880	883	839	853	567	454	755	5286
18:00	763	828	829	885	944	850	518	403	739	5170
19:00	574	661	629	693	630	637	442	329	565	3958
20:00	385	428	474	464	470	444	383	235	406	2839
21:00	266	286	295	320	334	300	267	177	278	1945
22:00	134	158	168	176	204	168	169	81	156	1090
23:00	92	97	80	120	123	102	116	49	97	677
24:00	29	37	39	45	87	47	84	33	51	354
TOTALS	8510	9000	9106	9225	10040	9177	7871	5944	8531	59696
% AVG WKDY	92.7	98.1	99.2	100.5	109.4		85.8	64.8		
% AVG WEEK	99.8	105.5	106.7	108.1	117.7		92.3	69.7		
AM Times	12:00	09:00	12:00	12:00	09:00	09:00	12:00	12:00	12:00	
AM Peaks	512	514	534	526	650	538	686	513	551	
PM Times	16:00	16:00	17:00	18:00	16:00	16:00	13:00	13:00	16:00	
PM Peaks	845	893	880	885	1050	900	752	601	808	

4

EB 9177
WB 9691
COMB AWD 18868
FAC .92
COMB ADT 17,400

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

Station #: 210020000148 STA. 3 WB
Site ID: 000000000304
Location: Grove St.WB,btwn.Liberty St.& Otoole Ter
Direction: ROAD TOTAL

File: D0406012.prn
City: Braintree
County: speed

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	13	13	24	19	21	18	46	49	26	185
02:00	13	11	9	10	11	11	27	19	14	100
03:00	10	19	18	14	21	16	14	12	15	108
04:00	9	18	17	18	17	16	19	7	15	105
05:00	78	79	81	74	80	78	25	11	61	428
06:00	162	195	187	189	172	181	54	32	142	991
07:00	357	624	328	389	319	403	131	70	317	2218
08:00	546	652	537	565	506	561	280	160	464	3246
09:00	573	611	647	635	639	621	401	261	538	3767
10:00	593	589	679	711	620	638	574	390	594	4156
11:00	587	542	682	608	593	602	627	510	593	4149
12:00	604	611	719	571	618	625	656	577	622	4356
13:00	621	651	681	622	714	658	717	633	663	4639
14:00	616	599	727	553	707	640	750	647	657	4599
15:00	638	643	899	638	797	723	642	564	689	4821
16:00	709	754	848	773	792	775	663	551	727	5090
17:00	715	713	766	735	833	752	667	449	697	4878
18:00	655	775	673	711	775	718	523	373	641	4485
19:00	541	559	596	589	566	570	470	359	526	3680
20:00	389	431	447	430	495	438	392	274	408	2858
21:00	266	322	282	334	316	304	257	152	276	1929
22:00	135	158	204	190	184	174	172	96	163	1139
23:00	93	77	96	100	130	99	137	77	101	710
24:00	61	74	59	77	81	70	102	42	71	496
TOTALS	8984	9720	10206	9555	10007	9691	8346	6315	9020	63133
% AVG WKDY	92.7	100.3	105.3	98.6	103.3		86.1	65.2		
% AVG WEEK	99.6	107.8	113.1	105.9	110.9		92.5	70.0		
AM Times	12:00	08:00	12:00	10:00	09:00	10:00	12:00	12:00	12:00	
AM Peaks	604	652	719	711	639	638	656	577	622	
PM Times	17:00	18:00	15:00	16:00	17:00	16:00	14:00	14:00	16:00	
PM Peaks	715	775	899	773	833	775	750	647	727	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 4 EB

Station #: 210020000113
Site ID: 000000000403
Location: Plain St. EB, West of John Mahar Highway
Direction: ROAD TOTAL

File: D0406013.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	17	12	12	28	25	19	39	34	24	167
02:00	12	13	8	12	13	12	26	14	14	98
03:00	9	17	9	11	16	12	12	10	12	84
04:00	14	12	9	8	15	12	19	6	12	83
05:00	45	55	44	46	44	47	17	10	37	261
06:00	139	130	146	125	122	132	49	29	106	740
07:00	221	239	246	234	220	232	109	79	193	1348
08:00	367	421	353	413	375	386	200	144	325	2273
09:00	419	409	432	430	440	426	286	199	374	2615
10:00	372	337	384	393	403	378	371	245	358	2505
11:00	378	390	394	417	419	400	442	347	398	2787
12:00	410	389	413	435	477	425	587	367	440	3078
13:00	426	446	451	463	544	466	587	471	484	3388
14:00	429	439	424	481	560	467	541	441	474	3315
15:00	566	603	593	579	617	592	501	418	554	3877
16:00	573	673	617	555	681	620	490	376	566	3965
17:00	590	580	620	611	587	598	427	319	533	3734
18:00	539	613	632	617	658	612	433	279	539	3771
19:00	358	419	450	478	483	438	361	255	401	2804
20:00	287	328	331	356	355	331	303	187	307	2147
21:00	152	180	188	214	236	194	214	117	186	1301
22:00	129	122	105	134	156	129	140	83	124	869
23:00	71	77	64	93	91	79	98	53	78	547
24:00	31	37	31	30	81	42	61	26	42	297
TOTALS	6554	6941	6956	7163	7618	7049	6313	4509	6581	46054
% AVG WKDY	93.0	98.5	98.7	101.6	108.1		89.6	64.0		
% AVG WEEK	99.6	105.5	105.7	108.8	115.8		95.9	68.5		
AM Times	09:00	08:00	09:00	12:00	12:00	09:00	12:00	12:00	12:00	
AM Peaks	419	421	432	435	477	426	587	367	440	
PM Times	17:00	16:00	18:00	18:00	16:00	16:00	13:00	13:00	16:00	
PM Peaks	590	673	632	617	681	620	587	471	566	

US

EB 7049
WB 7267
COMB AWD 14316
FAC .92 (.99)
COMB ADT 13,000

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 4 WB

Station #: 210020000114
Site ID: 000000000404
Location: Plain St. WB, West of John Mahar Highway
Direction: ROAD TOTAL

File: D0406014.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	25	20	20	23	25	23	53	49	31	215
02:00	15	14	15	19	16	16	22	29	19	130
03:00	8	9	7	8	14	9	16	15	11	77
04:00	7	17	13	13	13	13	16	9	13	88
05:00	28	38	40	48	37	38	23	8	32	222
06:00	100	110	113	102	99	105	40	26	84	590
07:00	261	483	230	274	251	300	97	60	237	1656
08:00	415	486	435	453	411	440	197	138	362	2535
09:00	413	454	473	511	444	459	309	220	403	2824
10:00	422	404	466	535	409	447	409	274	417	2919
11:00	424	386	509	460	448	445	460	344	433	3031
12:00	427	421	532	447	452	456	461	428	453	3168
13:00	449	458	544	502	512	493	541	470	497	3476
14:00	495	427	558	476	556	502	573	397	497	3482
15:00	526	578	682	529	578	579	466	425	541	3784
16:00	525	547	640	571	586	574	496	398	538	3763
17:00	521	519	565	518	577	540	465	345	501	3510
18:00	508	510	558	532	519	525	402	330	480	3359
19:00	355	445	440	412	449	420	365	295	394	2761
20:00	308	344	351	354	350	341	332	234	325	2273
21:00	218	219	239	271	251	240	219	145	223	1562
22:00	119	145	119	136	141	132	160	81	129	901
23:00	79	97	79	90	115	92	124	53	91	637
24:00	52	85	74	65	112	78	98	48	76	534
TOTALS	6700	7216	7702	7349	7365	7267	6344	4821	6787	47497
% AVG WKDY	92.2	99.3	106.0	101.1	101.3		87.3	66.3		
% AVG WEEK	98.7	106.3	113.5	108.3	108.5		93.5	71.0		
AM Times	12:00	08:00	12:00	10:00	12:00	09:00	12:00	12:00	12:00	
AM Peaks	427	486	532	535	452	459	461	428	453	
PM Times	15:00	15:00	15:00	16:00	16:00	15:00	14:00	13:00	15:00	
PM Peaks	526	578	682	571	586	579	573	470	541	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 5 NB

Station #: 210020000086
Site ID: 000000000501
Location: John Mahar Highway NB, N.of Plain St.
Direction: ROAD TOTAL

File: D0406015.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	16	12	11	26	14	16	23	33	19	135
02:00	6	5	6	9	12	8	17	13	10	68
03:00	16	13	9	10	10	12	7	6	10	71
04:00	26	15	15	15	13	17	21	8	16	113
05:00	70	80	81	77	88	79	20	9	61	425
06:00	212	228	225	213	194	214	58	35	166	1165
07:00	325	309	327	315	308	317	132	86	257	1802
08:00	459	488	414	430	405	439	186	117	357	2499
09:00	426	468	446	445	442	445	334	183	392	2744
10:00	423	403	419	392	438	415	418	307	400	2800
11:00	426	476	418	454	479	451	499	428	454	3180
12:00	428	428	436	437	489	444	572	460	464	3250
13:00	458	460	439	447	528	466	562	498	485	3392
14:00	469	468	453	464	577	486	520	484	491	3435
15:00	427	520	519	452	533	490	463	434	478	3348
16:00	457	480	508	487	529	492	429	402	470	3292
17:00	427	436	467	428	482	448	448	335	432	3023
18:00	405	473	413	418	511	444	409	316	421	2945
19:00	330	406	398	373	397	381	377	275	365	2556
20:00	267	295	325	333	347	313	289	158	288	2014
21:00	176	198	190	196	234	199	176	114	183	1284
22:00	130	131	116	119	144	128	107	91	120	838
23:00	74	76	70	84	105	82	96	49	79	554
24:00	34	34	35	40	34	35	57	24	37	258
TOTALS	6487	6902	6740	6664	7313	6821	6220	4865	6455	45191
% AVG WKDY	95.1	101.2	98.8	97.7	107.2		91.2	71.3		
% AVG WEEK	100.5	106.9	104.4	103.2	113.3		96.4	75.4		
AM Times	08:00	08:00	09:00	11:00	12:00	11:00	12:00	12:00	12:00	
AM Peaks	459	488	446	454	489	451	572	460	464	
PM Times	14:00	15:00	15:00	16:00	14:00	16:00	13:00	13:00	14:00	
PM Peaks	469	520	519	487	577	492	562	498	491	

US

NB 6821
SB 6807
COMB AWD 13628
FAC .92 (.99)
COMB ADT 12,400

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 5 SB

Station #: 210020000158
Site ID: 000000000502
Location: John Mahar Highway SB, N.of Plain St.
Direction: ROAD TOTAL

File: D0406016.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	25	21	35	29	29	28	55	57	36	251
02:00	15	18	12	22	25	18	32	34	23	158
03:00	15	12	7	11	14	12	15	10	12	84
04:00	9	3	5	5	5	5	13	13	8	53
05:00	21	21	17	17	20	19	19	6	17	121
06:00	58	73	71	56	60	64	19	16	50	353
07:00	160	139	138	114	159	142	63	63	119	836
08:00	243	217	213	231	242	229	163	112	203	1421
09:00	351	341	300	331	423	349	246	163	308	2155
10:00	305	314	317	322	382	328	328	202	310	2170
11:00	335	312	357	370	404	356	430	306	359	2514
12:00	427	433	430	397	447	427	457	411	429	3002
13:00	505	506	488	511	506	503	506	472	499	3494
14:00	497	489	532	500	576	519	532	411	505	3537
15:00	535	603	621	582	593	587	490	475	557	3899
16:00	549	591	591	569	681	596	455	443	554	3879
17:00	593	590	581	565	549	576	475	418	539	3771
18:00	592	584	627	599	581	597	430	372	541	3785
19:00	418	513	506	462	511	482	388	340	448	3138
20:00	343	370	372	402	384	374	361	218	350	2450
21:00	239	266	302	291	298	279	275	158	261	1829
22:00	121	166	137	147	183	151	180	97	147	1031
23:00	81	82	93	99	128	97	122	64	96	669
24:00	42	72	72	56	101	69	105	52	71	500
TOTALS	6479	6736	6824	6688	7301	6807	6159	4913	6442	45100
% AVG WKDY	95.2	99.0	100.2	98.3	107.3		90.5	72.2		
% AVG WEEK	100.6	104.6	105.9	103.8	113.3		95.6	76.3		
AM Times	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks	427	433	430	397	447	427	457	411	429	
PM Times	17:00	15:00	18:00	18:00	16:00	18:00	14:00	15:00	15:00	
PM Peaks	593	603	627	599	681	597	532	475	557	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

Station #: 210020000053
Site ID: 000000000603
Location: Plain St. EB, East of Grove St.
Direction: ROAD TOTAL

STA. 6 EB

File: D0406017.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	2	3	2	4	1	2	7	5	3	24
02:00	0	0	0	0	1	0	2	1	1	4
03:00	0	0	1	1	0	0	2	1	1	5
04:00	0	0	0	0	0	0	0	2	0	2
05:00	0	2	1	2	0	1	0	1	1	6
06:00	2	2	2	2	3	2	4	1	2	16
07:00	10	15	12	11	9	11	5	11	10	73
08:00	26	45	39	37	41	38	21	18	32	227
09:00	46	44	36	44	44	43	39	24	40	277
10:00	25	24	36	34	46	33	48	34	35	247
11:00	33	22	38	58	40	38	62	57	44	310
12:00	31	27	58	46	59	44	78	53	50	352
13:00	37	44	56	51	53	48	48	67	51	356
14:00	39	48	47	48	51	47	75	58	52	366
15:00	59	37	54	58	52	52	71	45	54	376
16:00	45	49	50	43	56	49	50	33	47	326
17:00	37	52	40	50	47	45	35	32	42	293
18:00	47	47	52	33	41	44	39	32	42	291
19:00	41	29	54	45	43	42	28	24	38	264
20:00	27	28	30	32	40	31	27	18	29	202
21:00	17	17	14	23	19	18	32	6	18	128
22:00	5	7	9	6	11	8	7	8	8	53
23:00	3	3	1	5	10	4	9	6	5	37
24:00	2	5	2	5	9	5	2	2	4	27
TOTALS	534	550	634	638	676	605	691	539	609	4262
% AVG WKDY	88.3	90.9	104.8	105.5	111.7		114.2	89.1		
% AVG WEEK	87.7	90.3	104.1	104.8	111.0		113.5	88.5		
AM Times	09:00	08:00	12:00	11:00	12:00	12:00	12:00	11:00	12:00	
AM Peaks	46	45	58	58	59	44	78	57	50	
PM Times	15:00	17:00	13:00	15:00	16:00	15:00	14:00	13:00	15:00	
PM Peaks	59	52	56	58	56	52	75	67	54	

U4

EB 605
WB 437
COMB AWD 1042
FAC .92 (.99)
COMB ADT 950

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

Station #: 210020000045
Site ID: 000000000604
Location: Plain St. WB, East of Grove St.
Direction: ROAD TOTAL

STA 6 WB

File: D0406018.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	3	3	3	5	1	3	6	3	3	24
02:00	0	0	0	1	1	0	2	1	1	5
03:00	0	1	0	0	0	0	1	2	1	4
04:00	0	1	1	0	0	0	0	1	0	3
05:00	0	2	2	2	1	1	2	0	1	9
06:00	2	2	2	6	5	3	4	2	3	23
07:00	11	20	10	13	15	14	6	5	11	80
08:00	30	35	49	35	35	37	19	14	31	217
09:00	28	34	28	30	36	31	39	26	32	221
10:00	29	25	22	32	22	26	37	39	29	206
11:00	31	21	32	43	43	34	53	40	38	263
12:00	25	24	37	29	51	33	55	50	39	271
13:00	23	30	39	35	39	33	48	53	38	267
14:00	24	29	47	45	35	36	66	31	40	277
15:00	25	28	30	24	38	29	53	36	33	234
16:00	40	18	50	35	34	35	28	20	32	225
17:00	27	21	31	29	38	29	22	15	26	183
18:00	19	27	34	34	29	29	21	13	25	177
19:00	24	20	30	32	23	26	23	18	24	170
20:00	8	20	22	19	12	16	21	11	16	113
21:00	11	16	11	9	17	13	13	8	12	85
22:00	4	3	3	7	9	5	13	2	6	41
23:00	2	1	3	3	3	2	7	2	3	21
24:00	0	3	0	0	5	2	6	2	2	16
TOTALS	366	384	486	468	492	437	545	394	446	3135
% AVG WKDY	83.8	87.9	111.2	107.1	112.6		124.7	90.2		
% AVG WEEK	82.1	86.1	109.0	104.9	110.3		122.2	88.3		
AM Times	11:00	08:00	08:00	11:00	12:00	08:00	12:00	12:00	12:00	
AM Peaks	31	35	49	43	51	37	55	50	39	
PM Times	16:00	13:00	16:00	14:00	13:00	14:00	14:00	13:00	14:00	
PM Peaks	40	30	50	45	39	36	66	53	40	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

Station #: 210020000119 STA. 7 NB
Site ID: 000000000701
Location: Liberty St.NB,N.of Tedeschi Plaza drivew
Direction: ROAD TOTAL

File: D0406019.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	13	8	12	7	10	10	21	25	14	96
02:00	5	2	3	7	7	5	17	19	9	60
03:00	3	5	5	4	10	5	8	8	6	43
04:00	6	6	4	4	7	5	2	10	6	39
05:00	25	31	30	26	31	29	17	8	24	168
06:00	111	97	100	100	90	100	35	19	79	552
07:00	256	271	237	229	220	243	100	54	195	1367
08:00	389	452	378	398	390	401	148	95	321	2250
09:00	429	388	416	429	413	415	223	171	353	2469
10:00	254	281	272	298	326	286	258	204	270	1893
11:00	262	250	282	270	270	267	335	260	276	1929
12:00	279	265	284	266	314	282	371	311	299	2090
13:00	289	280	275	269	327	288	381	362	312	2183
14:00	298	282	304	292	378	311	405	351	330	2310
15:00	350	379	440	343	409	384	370	300	370	2591
16:00	385	420	402	402	421	406	311	309	379	2650
17:00	317	367	384	363	381	362	363	256	347	2431
18:00	346	371	375	383	411	377	289	247	346	2422
19:00	278	296	309	337	356	315	271	243	299	2090
20:00	221	234	221	284	267	245	228	156	230	1611
21:00	166	169	153	179	181	170	183	128	166	1159
22:00	89	100	117	136	124	113	121	66	108	753
23:00	58	56	58	67	94	67	105	53	70	491
24:00	20	32	29	46	54	36	69	18	38	268
TOTALS	4849	5042	5090	5139	5491	5122	4631	3673	4847	33915
% AVG WKDY	94.7	98.4	99.4	100.3	107.2		90.4	71.7		
% AVG WEEK	100.0	104.0	105.0	106.0	113.3		95.5	75.8		
AM Times	09:00	08:00	09:00	09:00	09:00	09:00	12:00	12:00	09:00	
AM Peaks	429	452	416	429	413	415	371	311	353	
PM Times	16:00	16:00	15:00	16:00	16:00	16:00	14:00	13:00	16:00	
PM Peaks	385	420	440	402	421	406	405	362	379	

44

NB 5122
SB 4942
COMB AWD 10064
FAC .92 (.99)
COMB ADT 9,200

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 75B

Station #: 210020000056
Site ID: 000000000702
Location: Liberty St.SB,N.of Tedeschi Plaza drivew
Direction: ROAD TOTAL

File: D0406020.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	15	13	9	24	22	17	29	31	20	143
02:00	4	2	10	10	8	7	30	28	13	92
03:00	2	3	2	8	9	5	10	9	6	43
04:00	3	3	1	5	2	3	5	13	5	32
05:00	13	20	15	10	14	14	8	13	13	93
06:00	40	47	49	38	44	44	21	13	36	252
07:00	108	110	93	110	114	107	61	43	91	639
08:00	297	294	296	278	293	292	145	109	245	1712
09:00	311	315	319	331	339	323	189	112	274	1916
10:00	219	215	195	204	215	210	253	225	218	1526
11:00	233	250	241	219	249	238	272	249	245	1713
12:00	253	256	264	264	267	261	313	354	282	1971
13:00	283	260	254	265	309	274	387	322	297	2080
14:00	253	254	312	307	317	289	376	366	312	2185
15:00	477	390	515	433	464	456	315	293	412	2887
16:00	491	496	486	470	560	501	297	322	446	3122
17:00	466	432	520	516	530	493	311	244	431	3019
18:00	438	465	480	506	478	473	272	242	412	2881
19:00	278	312	310	384	373	331	222	211	299	2090
20:00	241	229	250	247	261	246	223	145	228	1596
21:00	156	170	153	173	164	163	188	109	159	1113
22:00	88	99	71	92	122	94	113	59	92	644
23:00	51	56	63	67	85	64	93	29	63	444
24:00	34	32	32	32	57	37	53	32	39	272
TOTALS	4754	4723	4940	4993	5296	4942	4186	3573	4638	32465
% AVG WKDY	96.2	95.6	100.0	101.0	107.2		84.7	72.3		
% AVG WEEK	102.5	101.8	106.5	107.7	114.2		90.3	77.0		
AM Times	09:00	09:00	09:00	09:00	09:00	09:00	12:00	12:00	12:00	
AM Peaks	311	315	319	331	339	323	313	354	282	
PM Times	16:00	16:00	17:00	17:00	16:00	16:00	13:00	14:00	16:00	
PM Peaks	491	496	520	516	560	501	387	366	446	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 8 NB

Station #: 210020000162
Site ID: 000000000801
Location: Liberty St.NB,btwn.Forest St/Sycamore Rd
Direction: ROAD TOTAL

File: D0406021.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	14	12	12	12	16	13	27	26	17	119
02:00	9	7	4	12	5	7	13	20	10	70
03:00	8	4	7	9	10	8	10	9	8	57
04:00	19	15	15	18	16	17	8	12	15	103
05:00	45	56	61	55	60	55	24	10	44	311
06:00	205	201	200	197	186	198	71	56	159	1116
07:00	380	380	366	374	385	377	162	119	309	2166
08:00	634	674	627	657	632	645	276	167	524	3667
09:00	591	605	623	633	626	616	402	262	535	3742
10:00	385	384	373	401	421	393	418	375	394	2757
11:00	331	362	363	369	420	369	518	364	390	2727
12:00	383	343	428	382	463	400	580	462	434	3041
13:00	363	378	389	402	430	392	508	478	421	2948
14:00	399	366	377	404	497	409	557	441	434	3041
15:00	557	561	579	578	594	574	463	405	534	3737
16:00	526	517	554	563	605	553	430	370	509	3565
17:00	424	512	515	502	526	496	488	314	469	3281
18:00	425	500	480	554	558	503	351	297	452	3165
19:00	315	343	373	391	421	369	341	262	349	2446
20:00	218	285	258	287	327	275	256	198	261	1829
21:00	182	181	152	210	207	186	201	146	183	1279
22:00	89	93	99	123	145	110	137	52	105	738
23:00	65	74	59	77	116	78	118	53	80	562
24:00	25	31	32	45	66	40	76	29	43	304
TOTALS	6592	6884	6946	7255	7732	7083	6435	4927	6679	46771
% AVG WKDY	93.1	97.2	98.1	102.4	109.2		90.9	69.6		
% AVG WEEK	98.7	103.1	104.0	108.6	115.8		96.3	73.8		
AM Times	08:00	08:00	08:00	08:00	08:00	08:00	12:00	12:00	09:00	
AM Peaks	634	674	627	657	632	645	580	462	535	
PM Times	15:00	15:00	15:00	15:00	16:00	15:00	14:00	13:00	15:00	
PM Peaks	557	561	579	578	605	574	557	478	534	

U4

NB 7083
SB 7331
COMB AWD 14414
FAC .92 (.99)
COMB ADT 13,100

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 858

Station #: 210020000117
Site ID: 000000000802
Location: Liberty St.SB,btwn.Forest St/Sycamore Rd
Direction: ROAD TOTAL

File: D0406022.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	15	23	24	38	29	26	50	53	33	232
02:00	8	14	9	11	12	11	42	34	19	130
03:00	9	14	11	21	14	14	15	14	14	98
04:00	9	10	8	12	10	10	9	15	10	73
05:00	18	19	13	13	18	16	16	10	15	107
06:00	46	54	46	44	44	47	30	15	40	279
07:00	134	165	132	132	155	144	71	40	118	829
08:00	405	424	376	412	351	394	158	137	323	2263
09:00	442	402	429	432	411	423	243	151	359	2510
10:00	293	301	340	338	345	323	358	267	320	2242
11:00	322	284	356	345	358	333	467	367	357	2499
12:00	374	354	415	380	419	388	545	464	422	2951
13:00	408	397	408	434	484	426	559	467	451	3157
14:00	397	398	484	406	466	430	518	484	450	3153
15:00	665	658	679	703	689	679	544	424	623	4362
16:00	650	740	714	709	754	713	502	447	645	4516
17:00	694	688	685	789	780	727	541	403	654	4580
18:00	623	701	679	750	763	703	428	373	617	4317
19:00	439	502	494	540	533	502	382	327	460	3217
20:00	368	395	396	370	414	389	353	236	362	2532
21:00	266	315	253	301	289	285	284	162	267	1870
22:00	130	150	172	161	213	165	193	96	159	1115
23:00	91	82	105	107	142	105	150	62	106	739
24:00	63	70	69	80	108	78	106	65	80	561
TOTALS	6869	7160	7297	7528	7801	7331	6564	5113	6904	48332
% AVG WKDY	93.7	97.7	99.5	102.7	106.4		89.5	69.7		
% AVG WEEK	99.5	103.7	105.7	109.0	113.0		95.1	74.1		
AM Times	09:00	08:00	09:00	09:00	12:00	09:00	12:00	12:00	12:00	
AM Peaks	442	424	429	432	419	423	545	464	422	
PM Times	17:00	16:00	16:00	17:00	17:00	17:00	13:00	14:00	17:00	
PM Peaks	694	740	714	789	780	727	559	484	654	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 9 EB

Station #: 210020000129
Site ID: 000000000903
Location: Grove St. EB, East of Columbian St.
Direction: ROAD TOTAL

File: D0406023.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	16	18	15	29	21	20	32	39	24	170
02:00	8	9	8	16	12	11	27	18	14	98
03:00	9	7	5	8	9	8	14	6	8	58
04:00	7	9	8	13	13	10	13	7	10	70
05:00	38	36	38	29	28	34	17	11	28	197
06:00	102	108	114	99	91	103	35	26	82	575
07:00	215	216	205	217	210	213	92	59	173	1214
08:00	436	478	500	473	462	470	232	118	386	2699
09:00	456	470	469	431	479	461	299	211	402	2815
10:00	376	367	391	412	415	392	458	272	384	2691
11:00	359	364	386	375	388	374	441	304	374	2617
12:00	384	409	392	394	479	412	474	384	417	2916
13:00	438	432	433	437	482	444	500	357	440	3079
14:00	396	384	399	432	443	411	476	362	413	2892
15:00	462	497	570	542	567	528	445	369	493	3452
16:00	549	565	595	573	632	583	461	376	536	3751
17:00	517	609	582	580	558	569	372	325	506	3543
18:00	525	609	566	603	597	580	367	288	508	3555
19:00	414	477	478	478	464	462	324	241	411	2876
20:00	258	328	324	330	322	312	247	179	284	1988
21:00	198	217	226	229	213	217	185	118	198	1386
22:00	103	114	119	127	137	120	133	70	115	803
23:00	54	72	57	96	95	75	98	34	72	506
24:00	24	43	31	46	78	44	69	35	47	326
TOTALS	6344	6838	6911	6969	7195	6853	5811	4209	6325	44277
% AVG WKDY	92.6	99.8	100.8	101.7	105.0		84.8	61.4		
% AVG WEEK	100.3	108.1	109.3	110.2	113.8		91.9	66.5		
AM Times	09:00	08:00	08:00	08:00	09:00	08:00	12:00	12:00	12:00	
AM Peaks	456	478	500	473	479	470	474	384	417	
PM Times	16:00	17:00	16:00	18:00	16:00	16:00	13:00	16:00	16:00	
PM Peaks	549	609	595	603	632	583	500	376	536	

U4

EB 6853

WB 7521

COMB AWD 14374

FAC .92 (.99)

COMB ADT 13,100

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

Station #: 210020000073 STA 9 WB
Site ID: 000000000904
Location: Grove St. WB, East of Columbian St.
Direction: ROAD TOTAL

File: D0406024.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	13	20	12	26	27	20	39	38	25	175
02:00	13	17	14	17	13	15	26	24	18	124
03:00	10	25	20	18	17	18	14	13	17	117
04:00	12	13	11	17	21	15	18	13	15	105
05:00	47	42	43	28	44	41	27	8	34	239
06:00	96	100	99	92	78	93	33	15	73	513
07:00	212	416	212	230	219	258	100	49	205	1438
08:00	396	475	418	415	411	423	204	125	349	2444
09:00	458	494	497	476	481	481	330	204	420	2940
10:00	480	464	476	469	450	468	471	328	448	3138
11:00	454	381	487	428	455	441	512	383	443	3100
12:00	451	434	502	414	495	459	538	422	465	3256
13:00	475	472	490	449	519	481	526	447	483	3378
14:00	494	449	501	441	481	473	585	473	489	3424
15:00	527	538	615	503	643	565	543	389	537	3758
16:00	626	623	760	652	699	672	460	405	604	4225
17:00	642	703	669	663	758	687	454	336	604	4225
18:00	562	639	581	612	633	605	418	295	534	3740
19:00	419	458	494	451	409	446	333	278	406	2842
20:00	344	354	337	388	371	359	277	191	323	2262
21:00	215	258	226	238	221	232	194	128	211	1480
22:00	113	142	143	134	148	136	130	83	128	893
23:00	68	67	74	97	98	81	105	55	81	564
24:00	46	55	39	57	63	52	71	31	52	362
TOTALS	7173	7639	7720	7315	7754	7521	6408	4733	6964	48742
% AVG WKDY	95.4	101.6	102.6	97.3	103.1		85.2	62.9		
% AVG WEEK	103.0	109.7	110.9	105.0	111.3		92.0	68.0		
AM Times	10:00	09:00	12:00	09:00	12:00	09:00	12:00	12:00	12:00	
AM Peaks	480	494	502	476	495	481	538	422	465	
PM Times	17:00	17:00	16:00	17:00	17:00	17:00	14:00	14:00	16:00	
PM Peaks	642	703	760	663	758	687	585	473	604	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA, 10 NB

Station #: 210020000051
Site ID: 000000001001
Location: Columbian St. NB, North of Weymouth TL
Direction: ROAD TOTAL

File: D0406025.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	10	17	23	16	18	17	27	41	22	152
02:00	11	7	5	6	9	8	18	14	10	70
03:00	5	2	6	6	11	6	13	7	7	50
04:00	5	12	11	9	13	10	11	4	9	65
05:00	60	65	68	66	62	64	13	10	49	344
06:00	150	165	180	166	143	161	49	27	126	880
07:00	354	434	334	372	308	360	126	85	288	2013
08:00	584	646	606	614	540	598	287	155	490	3432
09:00	535	552	581	565	613	569	357	250	493	3453
10:00	495	492	593	575	535	538	525	341	508	3556
11:00	483	467	564	524	502	508	561	427	504	3528
12:00	508	496	531	485	547	513	580	511	523	3658
13:00	525	514	555	522	590	541	699	502	558	3907
14:00	488	514	607	471	616	539	629	521	549	3846
15:00	520	545	810	577	667	624	565	483	595	4167
16:00	559	599	679	640	650	625	595	464	598	4186
17:00	578	587	645	637	647	619	551	391	577	4036
18:00	519	617	572	593	601	580	442	325	524	3669
19:00	397	440	464	485	495	456	417	267	424	2965
20:00	268	313	343	323	376	325	345	236	315	2204
21:00	203	230	227	272	253	237	229	120	219	1534
22:00	100	110	148	133	150	128	141	83	124	865
23:00	61	71	63	70	115	76	115	51	78	546
24:00	42	50	38	51	72	51	73	39	52	365
TOTALS	7460	7945	8653	8178	8533	8153	7368	5354	7642	53491
% AVG WKDY	91.5	97.4	106.1	100.3	104.7		90.4	65.7		
% AVG WEEK	97.6	104.0	113.2	107.0	111.7		96.4	70.1		
AM Times	08:00	08:00	08:00	08:00	09:00	08:00	12:00	12:00	12:00	
AM Peaks	584	646	606	614	613	598	580	511	523	
PM Times	17:00	18:00	15:00	16:00	15:00	16:00	13:00	14:00	16:00	
PM Peaks	578	617	810	640	667	625	699	521	598	

U4

NB 8153
SB 8631
COMB AWD 16784
FAC .92 (.99)
COMB ADT 15,300

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

Station #: 210020000116
Site ID: 000000001002
Location: Columbian St. SB, North of Weymouth TL
Direction: ROAD TOTAL

STA. 105 B

File: D0406026.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	14	18	23	28	34	23	40	44	29	201
02:00	15	15	14	18	22	17	27	18	18	129
03:00	3	18	14	10	13	12	11	5	11	74
04:00	3	5	5	6	12	6	8	9	7	48
05:00	20	24	18	9	18	18	14	7	16	110
06:00	57	53	57	51	49	53	27	16	44	310
07:00	179	215	218	218	227	211	88	69	173	1214
08:00	352	381	381	393	387	379	182	123	314	2199
09:00	442	446	447	448	618	480	330	208	420	2939
10:00	416	445	435	404	528	446	456	346	433	3030
11:00	427	405	475	482	500	458	623	406	474	3318
12:00	498	455	501	497	573	505	742	481	535	3747
13:00	539	564	599	505	603	562	821	572	600	4203
14:00	585	547	570	580	658	588	761	540	606	4241
15:00	641	703	785	646	800	715	707	517	686	4799
16:00	805	875	908	824	1063	895	631	484	799	5590
17:00	797	862	881	904	907	870	581	423	765	5355
18:00	701	789	830	843	883	809	542	353	706	4941
19:00	496	589	597	648	610	588	432	292	523	3664
20:00	389	403	418	439	437	417	369	215	381	2670
21:00	242	262	266	295	289	271	253	149	251	1756
22:00	134	167	166	164	193	165	157	88	153	1069
23:00	83	85	78	94	118	92	100	56	88	614
24:00	35	45	41	40	92	51	73	33	51	359
TOTALS	7873	8371	8727	8546	9634	8631	7975	5454	8083	56580
% AVG WKDY	91.2	97.0	101.1	99.0	111.6		92.4	63.2		
% AVG WEEK	97.4	103.6	108.0	105.7	119.2		98.7	67.5		
AM Times	12:00	12:00	12:00	12:00	09:00	12:00	12:00	12:00	12:00	
AM Peaks	498	455	501	497	618	505	742	481	535	
PM Times	16:00	16:00	16:00	17:00	16:00	16:00	13:00	13:00	16:00	
PM Peaks	805	875	908	904	1063	895	821	572	799	

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 11 NB

Station #: 210020000132
Site ID: 000000001101
Location: Washington St. NB, South of Peach St.
Direction: ROAD TOTAL

File: D0406027.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	45	49	56	67	54	54	110	100	69	481
02:00	26	32	31	43	34	33	56	55	40	277
03:00	18	29	21	28	27	25	22	33	25	178
04:00	21	17	17	15	25	19	33	25	22	153
05:00	28	45	38	40	37	38	23	12	32	223
06:00	101	143	117	100	91	110	50	40	92	642
07:00	272	329	262	249	260	274	116	91	226	1579
08:00	447	463	473	466	510	472	252	171	397	2782
09:00	474	504	499	534	530	508	348	237	447	3126
10:00	442	410	435	500	492	456	519	366	452	3164
11:00	503	521	515	558	536	527	652	449	533	3734
12:00	571	691	625	547	577	602	709	649	624	4369
13:00	659	648	693	696	721	683	873	677	710	4967
14:00	656	640	753	662	783	699	811	695	714	5000
15:00	880	875	1031	934	1031	950	806	664	889	6221
16:00	1049	1030	1080	1069	1080	1062	767	682	965	6757
17:00	1075	1079	1065	1113	1157	1098	797	596	983	6882
18:00	970	1019	1020	998	1051	1012	680	625	909	6363
19:00	651	754	764	843	844	771	689	538	726	5083
20:00	572	666	690	676	706	662	632	371	616	4313
21:00	369	468	441	489	518	457	454	269	430	3008
22:00	293	282	298	323	414	322	343	190	306	2143
23:00	165	173	185	172	244	188	245	150	191	1334
24:00	119	140	135	145	232	154	176	97	149	1044
TOTALS	10406	11007	11244	11267	11954	11176	10163	7782	10547	73823
% AVG WKDY	93.1	98.5	100.6	100.8	107.0		90.9	69.6		
% AVG WEEK	98.7	104.4	106.6	106.8	113.3		96.4	73.8		
AM Times	12:00	12:00	12:00	11:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks	571	691	625	558	577	602	709	649	624	
PM Times	17:00	17:00	16:00	17:00	17:00	17:00	13:00	14:00	17:00	
PM Peaks	1075	1079	1080	1113	1157	1098	873	695	983	

U3

NB 11176
SB 11113
COMB AWD 22289
FAC .94 (.98)
COMB ADT 20,500

Mass Highway Department

WEEKLY SUMMARY FOR ALL LANES
Starting: 4/7/2021

STA. 11 58

Station #: 210020000142
Site ID: 000000001102
Location: Washington St. SB, South of Peach St.
Direction: ROAD TOTAL

File: D0406028.prn
City: Braintree
County: volume

TIME	MON 12	TUE 13	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00	25	27	28	39	30	30	53	67	38	269
02:00	19	13	17	15	12	15	40	39	22	155
03:00	24	22	18	27	27	24	28	27	25	173
04:00	57	57	64	67	65	62	46	27	55	383
05:00	204	214	203	221	209	210	65	37	165	1153
06:00	542	550	548	525	505	534	165	102	420	2937
07:00	775	806	754	769	750	771	312	186	622	4352
08:00	955	1005	939	1045	968	982	428	256	799	5596
09:00	787	895	837	874	840	847	574	345	736	5152
10:00	547	603	615	694	712	634	698	493	623	4362
11:00	615	583	658	757	717	666	752	630	673	4712
12:00	628	598	620	644	730	644	747	707	668	4674
13:00	565	576	731	711	693	655	768	722	681	4766
14:00	625	615	646	680	784	670	814	732	699	4896
15:00	697	683	726	723	813	728	643	638	703	4923
16:00	646	686	659	719	723	687	683	563	668	4679
17:00	631	665	689	683	706	675	686	526	655	4586
18:00	578	613	648	705	713	651	605	458	617	4320
19:00	489	517	517	557	604	537	530	387	514	3601
20:00	329	429	424	444	467	419	465	291	407	2849
21:00	241	279	253	269	357	280	309	191	271	1899
22:00	180	181	171	180	241	191	231	151	191	1335
23:00	118	141	158	131	188	147	173	103	145	1012
24:00	46	39	38	51	97	54	119	48	63	438
TOTALS	10323	10797	10961	11530	11951	11113	9934	7726	10460	73222
% AVG WKDY	92.9	97.2	98.6	103.8	107.5		89.4	69.5		
% AVG WEEK	98.7	103.2	104.8	110.2	114.3		95.0	73.9		
AM Times	08:00	08:00	08:00	08:00	08:00	08:00	11:00	12:00	08:00	
AM Peaks	955	1005	939	1045	968	982	752	707	799	
PM Times	15:00	16:00	13:00	15:00	15:00	15:00	14:00	14:00	15:00	
PM Peaks	697	686	731	723	813	728	814	732	703	

APPENDIX I

Turning Movement Counts
April 8 and 10, 2021

217835 (1) - TMC

Thu Apr 8, 2021
Full Length (10 AM-2 PM, 7 AM-11 AM, 2 PM-6 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818570, Location: 42.196174, -71.005175

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Hancock Street (Route 37)						Hancock Street (Route 37)						Plain Street						Plain Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	396	449	183	0	**1028**	0	58	204	4	0	**266**	0	1	179	188	0	**368**	0	98	289	57	0	**444**	0	**2106**
8:00AM	346	393	209	0	**948**	0	67	252	9	0	**328**	4	3	187	176	0	**366**	11	146	301	47	0	**494**	0	**2136**
9:00AM	259	283	153	0	**695**	1	68	245	11	0	**324**	0	2	192	163	0	**357**	0	131	360	66	0	**557**	0	**1933**
10:00AM	280	325	191	0	**796**	0	70	234	5	0	**309**	2	2	203	203	0	**408**	0	147	276	73	0	**496**	1	**2009**
2:00PM	237	329	203	0	**769**	0	106	355	3	0	**464**	0	3	285	416	0	**704**	0	224	268	53	0	**545**	0	**2482**
3:00PM	265	323	178	0	**766**	0	77	383	5	0	**465**	1	2	326	449	0	**777**	2	230	311	52	0	**593**	0	**2601**
4:00PM	234	330	149	0	**713**	0	86	415	7	0	**508**	0	4	369	524	0	**897**	2	209	289	50	0	**548**	0	**2666**
5:00PM	238	322	187	0	**747**	2	80	451	2	0	**533**	0	2	359	477	0	**838**	3	211	299	44	0	**554**	2	**2672**
2021-04-10 10:00AM	256	377	188	0	**821**	0	66	269	5	0	**340**	0	1	203	252	0	**456**	1	152	236	65	0	**453**	3	**2070**
11:00AM	302	334	211	0	**847**	1	99	323	11	0	**433**	5	8	279	354	0	**641**	1	160	244	65	0	**469**	2	**2390**
12:00PM	294	348	210	0	**852**	3	99	339	10	0	**448**	4	5	281	393	0	**679**	0	206	268	66	0	**540**	4	**2519**
1:00PM	324	370	198	0	**892**	1	76	359	8	0	**443**	0	1	281	346	0	**628**	0	199	285	58	0	**542**	0	**2505**
Total	3431	4183	2260	0	**9874**	8	952	3829	80	0	**4861**	16	34	3144	3941	0	**7119**	20	2113	3426	696	0	**6235**	12	**28089**
% Approach	34.7%	42.4%	22.9%	0%	**-**	-	19.6%	78.8%	1.6%	0%	**-**	-	0.5%	44.2%	55.4%	0%	**-**	-	33.9%	54.9%	11.2%	0%	**-**	-	**-**
% Total	12.2%	14.9%	8.0%	0%	**35.2%**	-	3.4%	13.6%	0.3%	0%	**17.3%**	-	0.1%	11.2%	14.0%	0%	**25.3%**	-	7.5%	12.2%	2.5%	0%	**22.2%**	-	-
Motorcycles	9	14	11	0	**34**	-	3	14	0	0	**17**	-	0	12	20	0	**32**	-	5	8	1	0	**14**	-	97
% Motorcycles	0.3%	0.3%	0.5%	0%	**0.3%**	-	0.3%	0.4%	0%	0%	**0.3%**	-	0%	0.4%	0.5%	0%	**0.4%**	-	0.2%	0.2%	0.1%	0%	**0.2%**	-	0.3%
Lights	3329	4086	2210	0	**9625**	-	932	3707	76	0	**4715**	-	33	3030	3832	0	**6895**	-	2056	3296	682	0	**6034**	-	27269
% Lights	97.0%	97.7%	97.8%	0%	**97.5%**	-	97.9%	96.8%	95.0%	0%	**97.0%**	-	97.1%	96.4%	97.2%	0%	**96.9%**	-	97.3%	96.2%	98.0%	0%	**96.8%**	-	97.1%
Single-Unit Trucks	57	48	28	0	**133**	-	13	67	2	0	**82**	-	1	74	56	0	**131**	-	42	84	10	0	**136**	-	482
% Single-Unit Trucks	1.7%	1.1%	1.2%	0%	**1.3%**	-	1.4%	1.7%	2.5%	0%	**1.7%**	-	2.9%	2.4%	1.4%	0%	**1.8%**	-	2.0%	2.5%	1.4%	0%	**2.2%**	-	1.7%
Articulated Trucks	15	7	9	0	**31**	-	2	13	1	0	**16**	-	0	15	7	0	**22**	-	9	22	2	0	**33**	-	102
% Articulated Trucks	0.4%	0.2%	0.4%	0%	**0.3%**	-	0.2%	0.3%	1.3%	0%	**0.3%**	-	0%	0.5%	0.2%	0%	**0.3%**	-	0.4%	0.6%	0.3%	0%	**0.5%**	-	0.4%
Buses	20	28	0	0	**48**	-	2	26	0	0	**28**	-	0	13	24	0	**37**	-	1	15	1	0	**17**	-	130
% Buses	0.6%	0.7%	0%	0%	**0.5%**	-	0.2%	0.7%	0%	0%	**0.6%**	-	0%	0.4%	0.6%	0%	**0.5%**	-	0%	0.4%	0.1%	0%	**0.3%**	-	0.5%
Bicycles on Road	1	0	2	0	**3**	-	0	2	1	0	**3**	-	0	0	2	0	**2**	-	0	1	0	0	**1**	-	9
% Bicycles on Road	0%	0%	0.1%	0%	**0%**	-	0%	0.1%	1.3%	0%	**0.1%**	-	0%	0%	0.1%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	6	-	-	-	-	-	16	-	-	-	-	-	18	-	-	-	-	-	8	
% Pedestrians	-	-	-	-	-	75.0%	-	-	-	-	-	100%	-	-	-	-	-	90.0%	-	-	-	-	-	66.7%	-
Bicycles on Crosswalk	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	4	
% Bicycles on Crosswalk	-	-	-	-	-	25.0%	-	-	-	-	-	0%	-	-	-	-	-	10.0%	-	-	-	-	-	33.3%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (1) - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:15AM - 8:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818570, Location: 42.196174, -71.005175

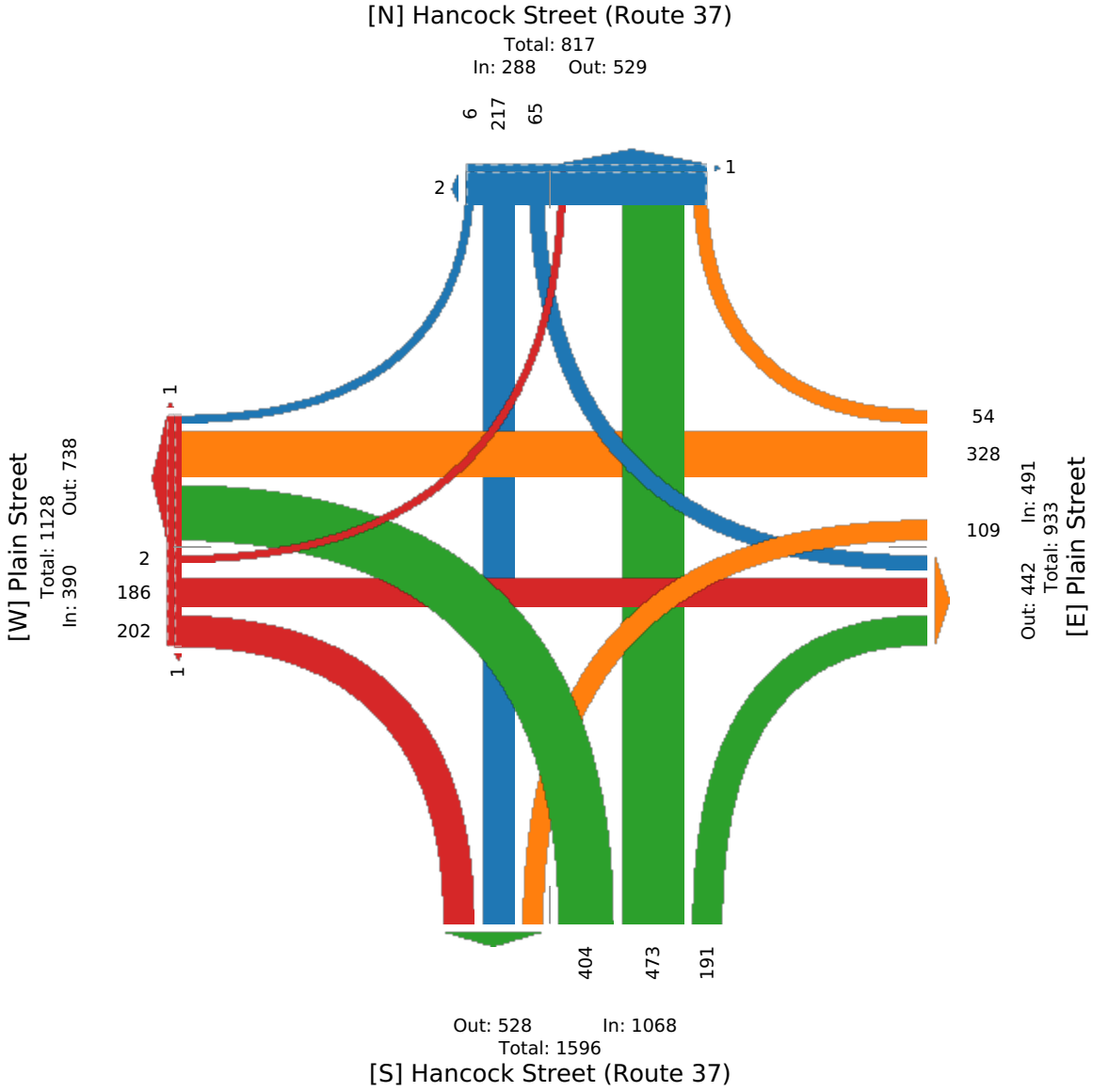
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Hancock Street (Route 37)						Hancock Street (Route 37)						Plain Street						Plain Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-04-08 7:15AM	117	132	51	0	**300**	0	12	42	2	0	**56**	0	0	54	42	0	**96**	0	24	110	17	0	**151**	0	**603**
7:30AM	96	119	42	0	**257**	0	16	56	0	0	**72**	0	0	57	66	0	**123**	0	19	57	11	0	**87**	0	**539**
7:45AM	99	113	51	0	**263**	0	20	63	1	0	**84**	0	1	35	58	0	**94**	0	31	69	16	0	**116**	0	**557**
8:00AM	92	109	47	0	**248**	0	17	56	3	0	**76**	3	1	40	36	0	**77**	2	35	92	10	0	**137**	0	**538**
Total	404	473	191	0	**1068**	0	65	217	6	0	**288**	3	2	186	202	0	**390**	2	109	328	54	0	**491**	0	**2237**
% Approach	37.8%	44.3%	17.9%	0%	**-**	-	22.6%	75.3%	2.1%	0%	**-**	-	0.5%	47.7%	51.8%	0%	**-**	-	22.2%	66.8%	11.0%	0%	**-**	-	-
% Total	18.1%	21.1%	8.5%	0%	**47.7%**	-	2.9%	9.7%	0.3%	0%	**12.9%**	-	0.1%	8.3%	9.0%	0%	**17.4%**	-	4.9%	14.7%	2.4%	0%	**21.9%**	-	-
PHF	0.863	0.896	0.936	-	**0.890**	-	0.813	0.861	0.500	-	**0.857**	-	0.500	0.816	0.765	-	**0.793**	-	0.779	0.745	0.794	-	**0.813**	-	0.927
Motorcycles	0	1	1	0	**2**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	3
% Motorcycles	0%	0.2%	0.5%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0.5%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	389	461	185	0	**1035**	-	64	204	5	0	**273**	-	2	172	191	0	**365**	-	101	311	53	0	**465**	-	2138
% Lights	96.3%	97.5%	96.9%	0%	**96.9%**	-	98.5%	94.0%	83.3%	0%	**94.8%**	-	100%	92.5%	94.6%	0%	**93.6%**	-	92.7%	94.8%	98.1%	0%	**94.7%**	-	95.6%
Single-Unit Trucks	7	6	3	0	**16**	-	1	7	0	0	**8**	-	0	10	4	0	**14**	-	7	12	1	0	**20**	-	58
% Single-Unit Trucks	1.7%	1.3%	1.6%	0%	**1.5%**	-	1.5%	3.2%	0%	0%	**2.8%**	-	0%	5.4%	2.0%	0%	**3.6%**	-	6.4%	3.7%	1.9%	0%	**4.1%**	-	2.6%
Articulated Trucks	1	1	2	0	**4**	-	0	2	1	0	**3**	-	0	1	2	0	**3**	-	1	4	0	0	**5**	-	15
% Articulated Trucks	0.2%	0.2%	1.0%	0%	**0.4%**	-	0%	0.9%	16.7%	0%	**1.0%**	-	0%	0.5%	1.0%	0%	**0.8%**	-	0.9%	1.2%	0%	0%	**1.0%**	-	0.7%
Buses	7	4	0	0	**11**	-	0	4	0	0	**4**	-	0	2	5	0	**7**	-	0	1	0	0	**1**	-	23
% Buses	1.7%	0.8%	0%	0%	**1.0%**	-	0%	1.8%	0%	0%	**1.4%**	-	0%	1.1%	2.5%	0%	**1.8%**	-	0%	0.3%	0%	0%	**0.2%**	-	1.0%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	2	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (1) - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:15AM - 8:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818570, Location: 42.196174, -71.005175

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (1) - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818570, Location: 42.196174, -71.005175

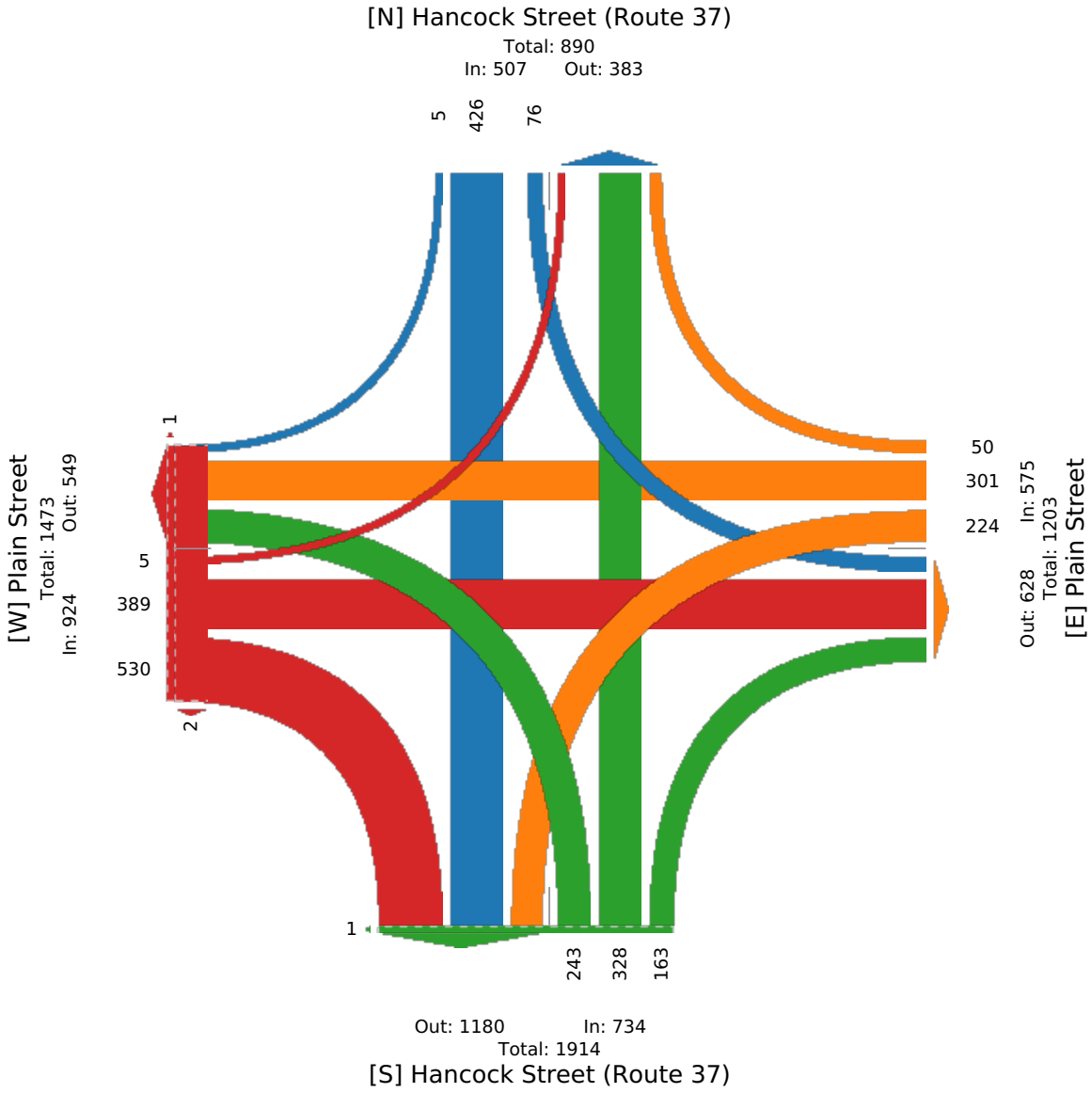
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Hancock Street (Route 37)						Hancock Street (Route 37)						Plain Street						Plain Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2021-04-08 4:30PM	56	92	36	0	**184**	0	19	98	2	0	**119**	0	2	97	142	0	**241**	0	57	64	11	0	**132**	0	**676**
4:45PM	63	75	35	0	**173**	0	19	103	1	0	**123**	0	2	101	137	0	**240**	0	57	74	11	0	**142**	0	**678**
5:00PM	64	65	51	0	**180**	0	24	120	1	0	**145**	0	0	92	114	0	**206**	1	61	82	14	0	**157**	0	**688**
5:15PM	60	96	41	0	**197**	1	14	105	1	0	**120**	0	1	99	137	0	**237**	2	49	81	14	0	**144**	0	**698**
Total	243	328	163	0	**734**	1	76	426	5	0	**507**	0	5	389	530	0	**924**	3	224	301	50	0	**575**	0	**2740**
% Approach	33.1%	44.7%	22.2%	0%	**-**	-	15.0%	84.0%	1.0%	0%	**-**	-	0.5%	42.1%	57.4%	0%	**-**	-	39.0%	52.3%	8.7%	0%	**-**	-	-
% Total	8.9%	12.0%	5.9%	0%	**26.8%**	-	2.8%	15.5%	0.2%	0%	**18.5%**	-	0.2%	14.2%	19.3%	0%	**33.7%**	-	8.2%	11.0%	1.8%	0%	**21.0%**	-	-
PHF	0.949	0.854	0.799	-	**0.931**	-	0.792	0.888	0.625	-	**0.874**	-	0.625	0.963	0.933	-	**0.959**	-	0.918	0.918	0.893	-	**0.916**	-	0.981
Motorcycles	1	0	0	0	**1**	-	0	0	0	0	**0**	-	0	0	2	0	**2**	-	1	0	0	0	**1**	-	4
% Motorcycles	0.4%	0%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.4%	0%	**0.2%**	-	0.4%	0%	0%	0%	**0.2%**	-	0.1%
Lights	237	325	163	0	**725**	-	76	419	5	0	**500**	-	5	384	524	0	**913**	-	221	295	49	0	**565**	-	2703
% Lights	97.5%	99.1%	100%	0%	**98.8%**	-	100%	98.4%	100%	0%	**98.6%**	-	100%	98.7%	98.9%	0%	**98.8%**	-	98.7%	98.0%	98.0%	0%	**98.3%**	-	98.6%
Single-Unit Trucks	4	2	0	0	**6**	-	0	4	0	0	**4**	-	0	4	4	0	**8**	-	1	4	0	0	**5**	-	23
% Single-Unit Trucks	1.6%	0.6%	0%	0%	**0.8%**	-	0%	0.9%	0%	0%	**0.8%**	-	0%	1.0%	0.8%	0%	**0.9%**	-	0.4%	1.3%	0%	0%	**0.9%**	-	0.8%
Articulated Trucks	1	0	0	0	**1**	-	0	1	0	0	**1**	-	0	1	0	0	**1**	-	1	2	1	0	**4**	-	7
% Articulated Trucks	0.4%	0%	0%	0%	**0.1%**	-	0%	0.2%	0%	0%	**0.2%**	-	0%	0.3%	0%	0%	**0.1%**	-	0.4%	0.7%	2.0%	0%	**0.7%**	-	0.3%
Buses	0	1	0	0	**1**	-	0	2	0	0	**2**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Buses	0%	0.3%	0%	0%	**0.1%**	-	0%	0.5%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	66.7%	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	33.3%	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (1) - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818570, Location: 42.196174, -71.005175

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (2) John Mahar Hwy @ Plain Street - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818572, Location: 42.196556, -70.999603

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	John Mahar Highway					Plain Street					Plain Street					
Direction	Southbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	123	90	0	**213**	0	163	238	0	**401**	0	343	261	0	**604**	0	**1218**
8:00AM	160	149	0	**309**	0	152	262	0	**414**	0	344	268	0	**612**	0	**1335**
9:00AM	157	124	1	**282**	0	132	252	0	**384**	0	397	248	0	**645**	0	**1311**
10:00AM	215	125	0	**340**	0	141	270	0	**411**	0	329	257	0	**586**	0	**1337**
2:00PM	341	205	1	**547**	2	176	412	0	**588**	1	319	265	0	**584**	0	**1719**
3:00PM	327	208	0	**535**	1	150	399	0	**549**	1	365	279	0	**644**	0	**1728**
4:00PM	352	186	0	**538**	0	140	475	0	**615**	1	321	246	0	**567**	0	**1720**
5:00PM	391	186	0	**577**	0	162	456	0	**618**	0	346	251	0	**597**	0	**1792**
2021-04-10 10:00AM	264	133	0	**397**	1	160	282	0	**442**	1	315	303	0	**618**	0	**1457**
11:00AM	298	150	0	**448**	0	180	411	0	**591**	3	314	349	0	**663**	0	**1702**
12:00PM	324	202	0	**526**	0	190	399	0	**589**	1	340	349	0	**689**	0	**1804**
1:00PM	323	183	1	**507**	1	159	380	0	**539**	0	392	351	0	**743**	0	**1789**
Total	3275	1941	3	**5219**	5	1905	4236	0	**6141**	8	4125	3427	0	**7552**	0	**18912**
% Approach	62.8%	37.2%	0.1%	**-**	-	31.0%	69.0%	0%	**-**	-	54.6%	45.4%	0%	**-**	-	**-**
% Total	17.3%	10.3%	0%	**27.6%**	-	10.1%	22.4%	0%	**32.5%**	-	21.8%	18.1%	0%	**39.9%**	-	**-**
Motorcycles	7	4	0	**11**	-	2	22	0	**24**	-	12	4	0	**16**	-	51
% Motorcycles	0.2%	0.2%	0%	**0.2%**	-	0.1%	0.5%	0%	**0.4%**	-	0.3%	0.1%	0%	**0.2%**	-	0.3%
Lights	3207	1890	3	**5100**	-	1852	4090	0	**5942**	-	3962	3354	0	**7316**	-	18358
% Lights	97.9%	97.4%	100%	**97.7%**	-	97.2%	96.6%	0%	**96.8%**	-	96.0%	97.9%	0%	**96.9%**	-	97.1%
Single-Unit Trucks	47	43	0	**90**	-	42	94	0	**136**	-	110	55	0	**165**	-	391
% Single-Unit Trucks	1.4%	2.2%	0%	**1.7%**	-	2.2%	2.2%	0%	**2.2%**	-	2.7%	1.6%	0%	**2.2%**	-	2.1%
Articulated Trucks	7	2	0	**9**	-	6	16	0	**22**	-	24	8	0	**32**	-	63
% Articulated Trucks	0.2%	0.1%	0%	**0.2%**	-	0.3%	0.4%	0%	**0.4%**	-	0.6%	0.2%	0%	**0.4%**	-	0.3%
Buses	6	2	0	**8**	-	2	13	0	**15**	-	16	5	0	**21**	-	44
% Buses	0.2%	0.1%	0%	**0.2%**	-	0.1%	0.3%	0%	**0.2%**	-	0.4%	0.1%	0%	**0.3%**	-	0.2%
Bicycles on Road	1	0	0	**1**	-	1	1	0	**2**	-	1	1	0	**2**	-	5
% Bicycles on Road	0%	0%	0%	**0%**	-	0.1%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	5	-	-	-	-	8	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	100%	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (2) John Mahar Hwy @ Plain Street - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 10AM - 11 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818572, Location: 42.196556, -70.999603

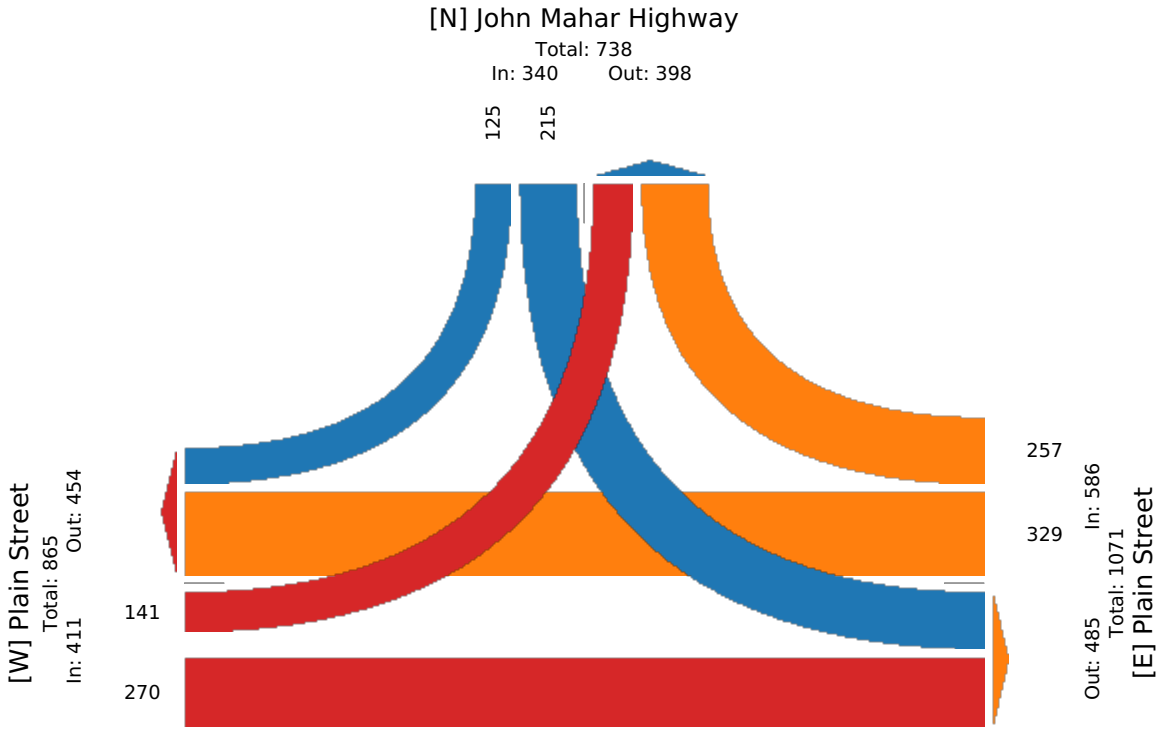
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	John Mahar Highway					Plain Street					Plain Street					
Direction	Southbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	**Int**
2021-04-08 10:00AM	47	31	0	**78**	0	37	69	0	**106**	0	76	66	0	**142**	0	**326**
10:15AM	61	25	0	**86**	0	34	56	0	**90**	0	86	69	0	**155**	0	**331**
10:30AM	58	23	0	**81**	0	31	66	0	**97**	0	80	60	0	**140**	0	**318**
10:45AM	49	46	0	**95**	0	39	79	0	**118**	0	87	62	0	**149**	0	**362**
Total	215	125	0	**340**	0	141	270	0	**411**	0	329	257	0	**586**	0	**1337**
% Approach	63.2%	36.8%	0%	**-**	-	34.3%	65.7%	0%	**-**	-	56.1%	43.9%	0%	**-**	-	-
% Total	16.1%	9.3%	0%	**25.4%**	-	10.5%	20.2%	0%	**30.7%**	-	24.6%	19.2%	0%	**43.8%**	-	-
PHF	0.881	0.679	-	**0.895**	-	0.904	0.854	-	**0.871**	-	0.945	0.931	-	**0.945**	-	0.923
Motorcycles	0	0	0	**0**	-	0	2	0	**2**	-	0	0	0	**0**	-	2
% Motorcycles	0%	0%	0%	**0%**	-	0%	0.7%	0%	**0.5%**	-	0%	0%	0%	**0%**	-	0.1%
Lights	203	120	0	**323**	-	138	257	0	**395**	-	315	249	0	**564**	-	1282
% Lights	94.4%	96.0%	0%	**95.0%**	-	97.9%	95.2%	0%	**96.1%**	-	95.7%	96.9%	0%	**96.2%**	-	95.9%
Single-Unit Trucks	8	4	0	**12**	-	3	10	0	**13**	-	11	5	0	**16**	-	41
% Single-Unit Trucks	3.7%	3.2%	0%	**3.5%**	-	2.1%	3.7%	0%	**3.2%**	-	3.3%	1.9%	0%	**2.7%**	-	3.1%
Articulated Trucks	3	1	0	**4**	-	0	0	0	**0**	-	2	3	0	**5**	-	9
% Articulated Trucks	1.4%	0.8%	0%	**1.2%**	-	0%	0%	0%	**0%**	-	0.6%	1.2%	0%	**0.9%**	-	0.7%
Buses	1	0	0	**1**	-	0	1	0	**1**	-	1	0	0	**1**	-	3
% Buses	0.5%	0%	0%	**0.3%**	-	0%	0.4%	0%	**0.2%**	-	0.3%	0%	0%	**0.2%**	-	0.2%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (2) John Mahar Hwy @ Plain Street - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 10AM - 11 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818572, Location: 42.196556, -70.999603

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (2) John Mahar Hwy @ Plain Street - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 2:15PM - 3:15 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818572, Location: 42.196556, -70.999603

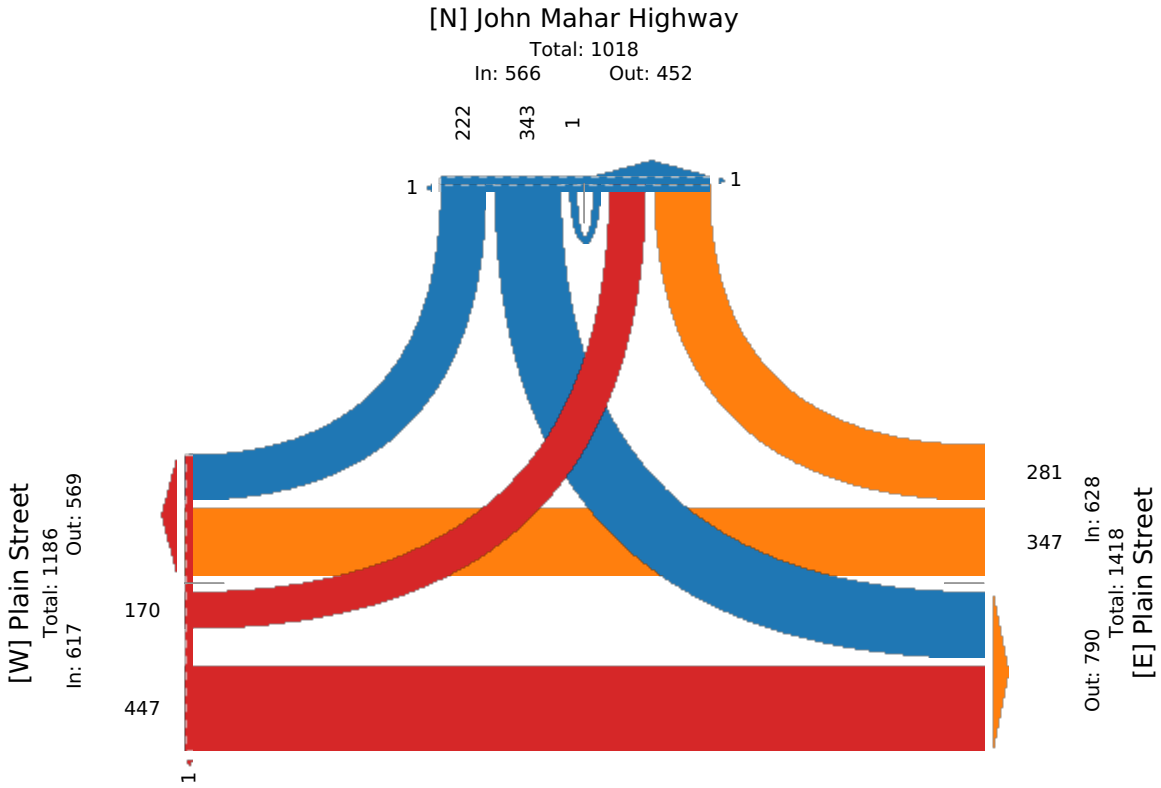
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	John Mahar Highway					Plain Street					Plain Street					
Direction	Southbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	**Int**
2021-04-08 2:15PM	93	50	0	**143**	2	34	113	0	**147**	0	80	74	0	**154**	0	**444**
2:30PM	84	58	0	**142**	0	35	125	0	**160**	1	74	63	0	**137**	0	**439**
2:45PM	84	58	1	**143**	0	58	110	0	**168**	0	83	66	0	**149**	0	**460**
3:00PM	82	56	0	**138**	0	43	99	0	**142**	0	110	78	0	**188**	0	**468**
Total	343	222	1	**566**	2	170	447	0	**617**	1	347	281	0	**628**	0	**1811**
% Approach	60.6%	39.2%	0.2%	**-**	-	27.6%	72.4%	0%	**-**	-	55.3%	44.7%	0%	**-**	-	**-**
% Total	18.9%	12.3%	0.1%	**31.3%**	-	9.4%	24.7%	0%	**34.1%**	-	19.2%	15.5%	0%	**34.7%**	-	**-**
PHF	0.922	0.957	0.250	**0.990**	-	0.733	0.894	-	**0.918**	-	0.789	0.901	-	**0.835**	-	0.967
Motorcycles	2	0	0	**2**	-	0	0	0	**0**	-	1	0	0	**1**	-	3
% Motorcycles	0.6%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.3%	0%	0%	**0.2%**	-	0.2%
Lights	335	216	1	**552**	-	164	432	0	**596**	-	330	274	0	**604**	-	1752
% Lights	97.7%	97.3%	100%	**97.5%**	-	96.5%	96.6%	0%	**96.6%**	-	95.1%	97.5%	0%	**96.2%**	-	96.7%
Single-Unit Trucks	4	5	0	**9**	-	5	10	0	**15**	-	10	5	0	**15**	-	39
% Single-Unit Trucks	1.2%	2.3%	0%	**1.6%**	-	2.9%	2.2%	0%	**2.4%**	-	2.9%	1.8%	0%	**2.4%**	-	2.2%
Articulated Trucks	0	0	0	**0**	-	1	0	0	**1**	-	2	2	0	**4**	-	5
% Articulated Trucks	0%	0%	0%	**0%**	-	0.6%	0%	0%	**0.2%**	-	0.6%	0.7%	0%	**0.6%**	-	0.3%
Buses	2	1	0	**3**	-	0	5	0	**5**	-	4	0	0	**4**	-	12
% Buses	0.6%	0.5%	0%	**0.5%**	-	0%	1.1%	0%	**0.8%**	-	1.2%	0%	0%	**0.6%**	-	0.7%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	2	-	-	-	-	1	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	100%	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (2) John Mahar Hwy @ Plain Street - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 2:15PM - 3:15 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818572, Location: 42.196556, -70.999603

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (3) Grove Street @ Plain Street - TMC

Thu Apr 8, 2021
Full Length (10 AM-2 PM, 7 AM-11 AM, 2 PM-6 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818573, Location: 42.196517, -70.998599

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Plain Street					Plain Street					
Direction	Northbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	575	7	0	**582**	0	30	333	0	**363**	0	8	27	0	**35**	2	**980**
8:00AM	584	9	0	**593**	0	37	382	0	**419**	0	6	27	0	**33**	0	**1045**
9:00AM	608	9	0	**617**	0	26	380	0	**406**	0	5	32	0	**37**	2	**1060**
10:00AM	549	15	0	**564**	0	44	438	0	**482**	1	7	37	0	**44**	2	**1090**
2:00PM	553	18	0	**571**	0	43	692	0	**735**	0	4	25	0	**29**	4	**1335**
3:00PM	612	18	0	**630**	0	29	701	0	**730**	0	11	30	0	**41**	0	**1401**
4:00PM	560	14	0	**574**	0	38	794	0	**832**	1	3	28	0	**31**	0	**1437**
5:00PM	571	12	0	**583**	0	23	807	0	**830**	0	6	28	0	**34**	3	**1447**
2021-04-10 10:00AM	573	18	0	**591**	0	44	498	0	**542**	1	8	48	0	**56**	4	**1189**
11:00AM	616	26	0	**642**	0	56	648	0	**704**	0	12	45	0	**57**	1	**1403**
12:00PM	649	16	0	**665**	2	32	694	0	**726**	0	11	40	0	**51**	0	**1442**
1:00PM	680	22	0	**702**	0	53	647	0	**700**	0	14	52	0	**66**	0	**1468**
Total	7130	184	0	**7314**	2	455	7014	0	**7469**	3	95	419	0	**514**	18	**15297**
% Approach	97.5%	2.5%	0%	**-**	-	6.1%	93.9%	0%	**-**	-	18.5%	81.5%	0%	**-**	-	-
% Total	46.6%	1.2%	0%	**47.8%**	-	3.0%	45.9%	0%	**48.8%**	-	0.6%	2.7%	0%	**3.4%**	-	-
Motorcycles	16	1	0	**17**	-	1	27	0	**28**	-	0	0	0	**0**	-	45
% Motorcycles	0.2%	0.5%	0%	**0.2%**	-	0.2%	0.4%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.3%
Lights	6919	181	0	**7100**	-	435	6827	0	**7262**	-	92	401	0	**493**	-	14855
% Lights	97.0%	98.4%	0%	**97.1%**	-	95.6%	97.3%	0%	**97.2%**	-	96.8%	95.7%	0%	**95.9%**	-	97.1%
Single-Unit Trucks	142	2	0	**144**	-	15	120	0	**135**	-	1	16	0	**17**	-	296
% Single-Unit Trucks	2.0%	1.1%	0%	**2.0%**	-	3.3%	1.7%	0%	**1.8%**	-	1.1%	3.8%	0%	**3.3%**	-	1.9%
Articulated Trucks	32	0	0	**32**	-	3	20	0	**23**	-	0	0	0	**0**	-	55
% Articulated Trucks	0.4%	0%	0%	**0.4%**	-	0.7%	0.3%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	19	0	0	**19**	-	1	16	0	**17**	-	2	2	0	**4**	-	40
% Buses	0.3%	0%	0%	**0.3%**	-	0.2%	0.2%	0%	**0.2%**	-	2.1%	0.5%	0%	**0.8%**	-	0.3%
Bicycles on Road	2	0	0	**2**	-	0	4	0	**4**	-	0	0	0	**0**	-	6
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0.1%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	2	-	-	-	-	2	-	-	-	-	18	
% Pedestrians	-	-	-	-	100%	-	-	-	-	66.7%	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	33.3%	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (3) Grove Street @ Plain Street - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:45AM - 10:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818573, Location: 42.196517, -70.998599

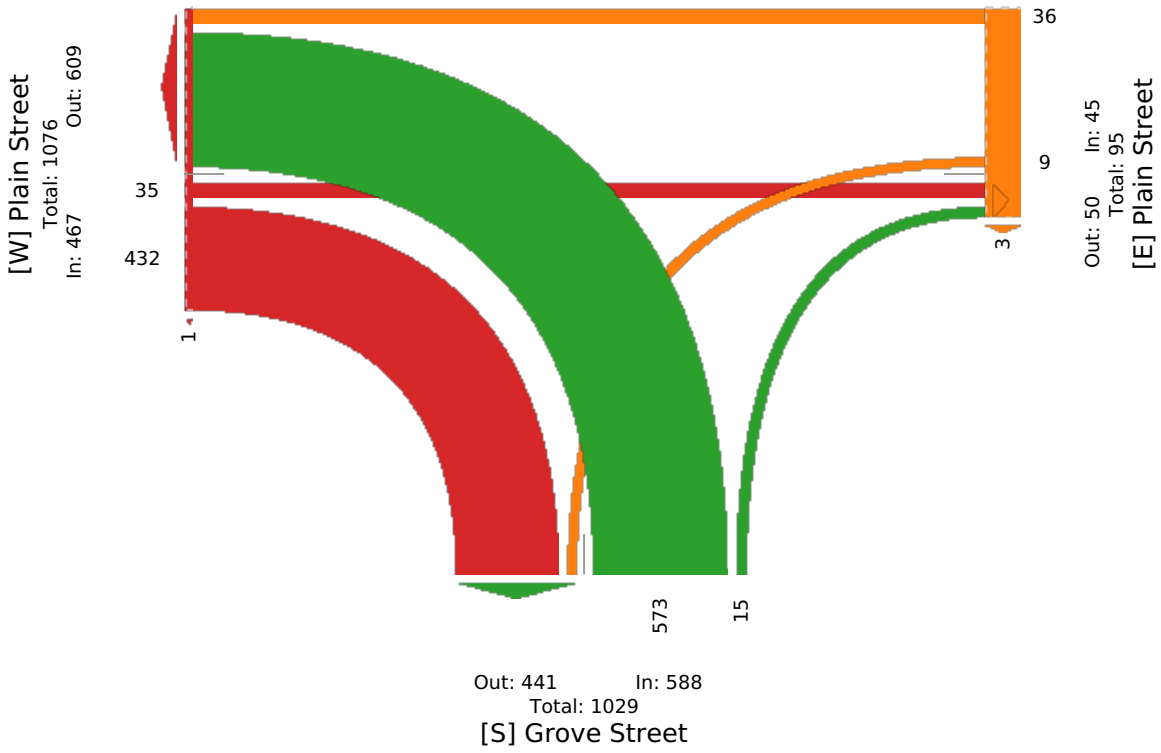
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Plain Street					Plain Street					
Direction	Northbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	**Int**
2021-04-08 9:45AM	155	4	0	**159**	0	5	105	0	**110**	0	4	10	0	**14**	1	**283**
10:00AM	134	4	0	**138**	0	10	106	0	**116**	0	2	8	0	**10**	2	**264**
10:15AM	149	3	0	**152**	0	8	107	0	**115**	0	1	9	0	**10**	0	**277**
10:30AM	135	4	0	**139**	0	12	114	0	**126**	1	2	9	0	**11**	0	**276**
Total	573	15	0	**588**	0	35	432	0	**467**	1	9	36	0	**45**	3	**1100**
% Approach	97.4%	2.6%	0%	**-**	-	7.5%	92.5%	0%	**-**	-	20.0%	80.0%	0%	**-**	-	-
% Total	52.1%	1.4%	0%	**53.5%**	-	3.2%	39.3%	0%	**42.5%**	-	0.8%	3.3%	0%	**4.1%**	-	-
PHF	0.924	0.938	-	**0.925**	-	0.729	0.947	-	**0.927**	-	0.563	0.900	-	**0.804**	-	0.972
Motorcycles	1	0	0	**1**	-	0	3	0	**3**	-	0	0	0	**0**	-	4
% Motorcycles	0.2%	0%	0%	**0.2%**	-	0%	0.7%	0%	**0.6%**	-	0%	0%	0%	**0%**	-	0.4%
Lights	551	15	0	**566**	-	33	406	0	**439**	-	9	35	0	**44**	-	1049
% Lights	96.2%	100%	0%	**96.3%**	-	94.3%	94.0%	0%	**94.0%**	-	100%	97.2%	0%	**97.8%**	-	95.4%
Single-Unit Trucks	16	0	0	**16**	-	2	18	0	**20**	-	0	1	0	**1**	-	37
% Single-Unit Trucks	2.8%	0%	0%	**2.7%**	-	5.7%	4.2%	0%	**4.3%**	-	0%	2.8%	0%	**2.2%**	-	3.4%
Articulated Trucks	5	0	0	**5**	-	0	4	0	**4**	-	0	0	0	**0**	-	9
% Articulated Trucks	0.9%	0%	0%	**0.9%**	-	0%	0.9%	0%	**0.9%**	-	0%	0%	0%	**0%**	-	0.8%
Buses	0	0	0	**0**	-	0	1	0	**1**	-	0	0	0	**0**	-	1
% Buses	0%	0%	0%	**0%**	-	0%	0.2%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	1	-	-	-	-	3	
% Pedestrians	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (3) Grove Street @ Plain Street - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:45AM - 10:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818573, Location: 42.196517, -70.998599

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (3) Grove Street @ Plain Street - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818573, Location: 42.196517, -70.998599

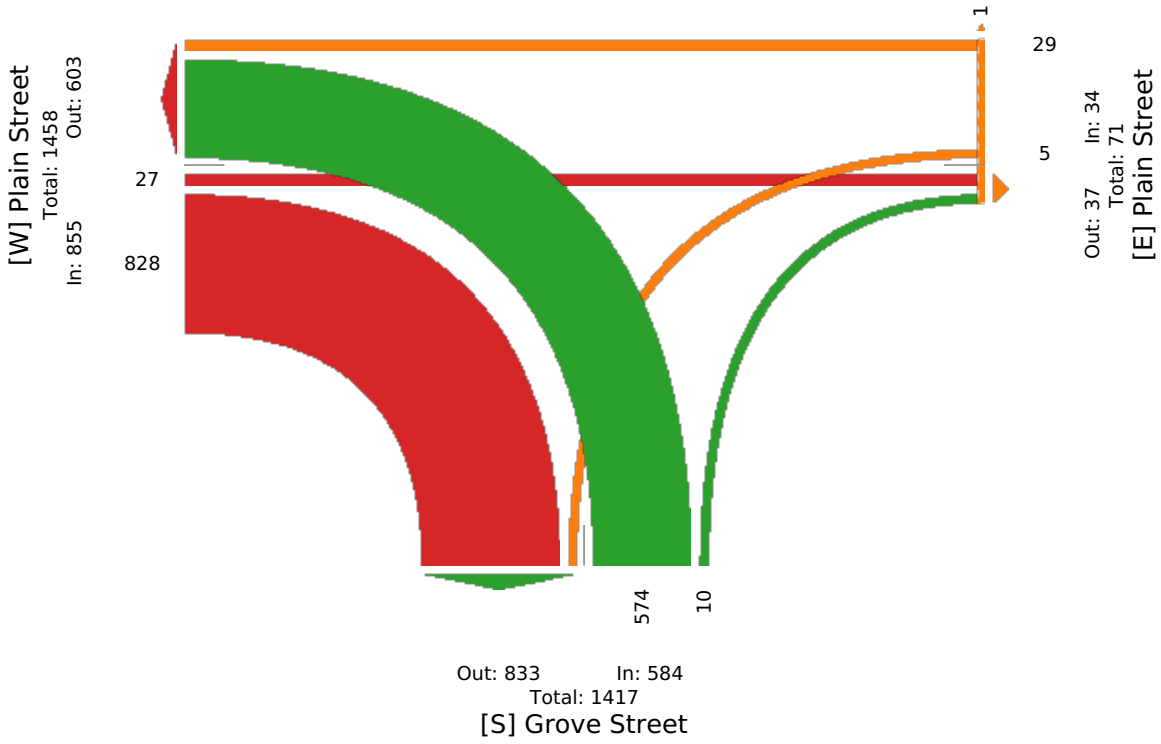
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Plain Street					Plain Street					
Direction	Northbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	**Int**
2021-04-08 4:45PM	134	2	0	**136**	0	11	211	0	**222**	0	1	8	0	**9**	0	**367**
5:00PM	144	3	0	**147**	0	5	190	0	**195**	0	0	10	0	**10**	0	**352**
5:15PM	157	3	0	**160**	0	5	224	0	**229**	0	1	7	0	**8**	1	**397**
5:30PM	139	2	0	**141**	0	6	203	0	**209**	0	3	4	0	**7**	0	**357**
Total	574	10	0	**584**	0	27	828	0	**855**	0	5	29	0	**34**	1	**1473**
% Approach	98.3%	1.7%	0%	**-**	-	3.2%	96.8%	0%	**-**	-	14.7%	85.3%	0%	**-**	-	-
% Total	39.0%	0.7%	0%	**39.6%**	-	1.8%	56.2%	0%	**58.0%**	-	0.3%	2.0%	0%	**2.3%**	-	-
PHF	0.914	0.833	-	**0.913**	-	0.614	0.924	-	**0.933**	-	0.417	0.725	-	**0.850**	-	0.928
Motorcycles	2	0	0	**2**	-	0	1	0	**1**	-	0	0	0	**0**	-	3
% Motorcycles	0.3%	0%	0%	**0.3%**	-	0%	0.1%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.2%
Lights	566	10	0	**576**	-	27	819	0	**846**	-	5	28	0	**33**	-	1455
% Lights	98.6%	100%	0%	**98.6%**	-	100%	98.9%	0%	**98.9%**	-	100%	96.6%	0%	**97.1%**	-	98.8%
Single-Unit Trucks	4	0	0	**4**	-	0	6	0	**6**	-	0	1	0	**1**	-	11
% Single-Unit Trucks	0.7%	0%	0%	**0.7%**	-	0%	0.7%	0%	**0.7%**	-	0%	3.4%	0%	**2.9%**	-	0.7%
Articulated Trucks	2	0	0	**2**	-	0	2	0	**2**	-	0	0	0	**0**	-	4
% Articulated Trucks	0.3%	0%	0%	**0.3%**	-	0%	0.2%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.3%
Buses	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Buses	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (3) Grove Street @ Plain Street - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818573, Location: 42.196517, -70.998599

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (4) Grove Street @ Grove Circle (sout... - TMC

Thu Apr 8, 2021
Full Length (10 AM-2 PM, 7 AM-11 AM, 2 PM-6 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818574, Location: 42.194974, -70.996102

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Grove Circle (south)					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	0	547	0	**547**	0	330	0	1	**331**	0	49	15	1	**65**	3	**943**
8:00AM	0	558	0	**558**	0	369	0	0	**369**	0	46	24	0	**70**	1	**997**
9:00AM	0	602	0	**602**	0	362	0	0	**362**	0	26	18	0	**44**	5	**1008**
10:00AM	0	548	0	**548**	0	425	1	0	**426**	0	31	17	0	**48**	10	**1022**
2:00PM	0	560	0	**560**	0	663	0	0	**663**	0	39	19	0	**58**	3	**1281**
3:00PM	0	625	0	**625**	0	672	0	0	**672**	0	29	20	0	**49**	1	**1346**
4:00PM	0	567	0	**567**	0	758	0	0	**758**	0	29	16	0	**45**	4	**1370**
5:00PM	0	544	0	**544**	0	750	0	0	**750**	0	27	21	0	**48**	2	**1342**
2021-04-10 10:00AM	0	536	0	**536**	1	456	0	0	**456**	0	61	26	0	**87**	4	**1079**
11:00AM	0	609	0	**609**	0	614	0	0	**614**	0	55	28	0	**83**	11	**1306**
12:00PM	0	651	0	**651**	0	658	0	0	**658**	0	42	20	0	**62**	1	**1371**
1:00PM	0	675	0	**675**	0	606	0	0	**606**	0	50	19	0	**69**	1	**1350**
Total	0	7022	0	**7022**	1	6663	1	1	**6665**	0	484	243	1	**728**	46	**14415**
% Approach	0%	100%	0%	**-**	-	100.0%	0%	0%	**-**	-	66.5%	33.4%	0.1%	**-**	-	**-**
% Total	0%	48.7%	0%	**48.7%**	-	46.2%	0%	0%	**46.2%**	-	3.4%	1.7%	0%	**5.1%**	-	**-**
Motorcycles	0	13	0	**13**	-	26	0	0	**26**	-	1	0	0	**1**	-	40
% Motorcycles	0%	0.2%	0%	**0.2%**	-	0.4%	0%	0%	**0.4%**	-	0.2%	0%	0%	**0.1%**	-	0.3%
Lights	0	6819	0	**6819**	-	6478	0	1	**6479**	-	477	234	1	**712**	-	14010
% Lights	0%	97.1%	0%	**97.1%**	-	97.2%	0%	100%	**97.2%**	-	98.6%	96.3%	100%	**97.8%**	-	97.2%
Single-Unit Trucks	0	134	0	**134**	-	115	1	0	**116**	-	5	3	0	**8**	-	258
% Single-Unit Trucks	0%	1.9%	0%	**1.9%**	-	1.7%	100%	0%	**1.7%**	-	1.0%	1.2%	0%	**1.1%**	-	1.8%
Articulated Trucks	0	27	0	**27**	-	20	0	0	**20**	-	0	2	0	**2**	-	49
% Articulated Trucks	0%	0.4%	0%	**0.4%**	-	0.3%	0%	0%	**0.3%**	-	0%	0.8%	0%	**0.3%**	-	0.3%
Buses	0	23	0	**23**	-	19	0	0	**19**	-	1	4	0	**5**	-	47
% Buses	0%	0.3%	0%	**0.3%**	-	0.3%	0%	0%	**0.3%**	-	0.2%	1.6%	0%	**0.7%**	-	0.3%
Bicycles on Road	0	6	0	**6**	-	5	0	0	**5**	-	0	0	0	**0**	-	11
% Bicycles on Road	0%	0.1%	0%	**0.1%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	1	-	-	-	-	0	-	-	-	-	46	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (4) Grove Street @ Grove Circle (sout... - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818574, Location: 42.194974, -70.996102

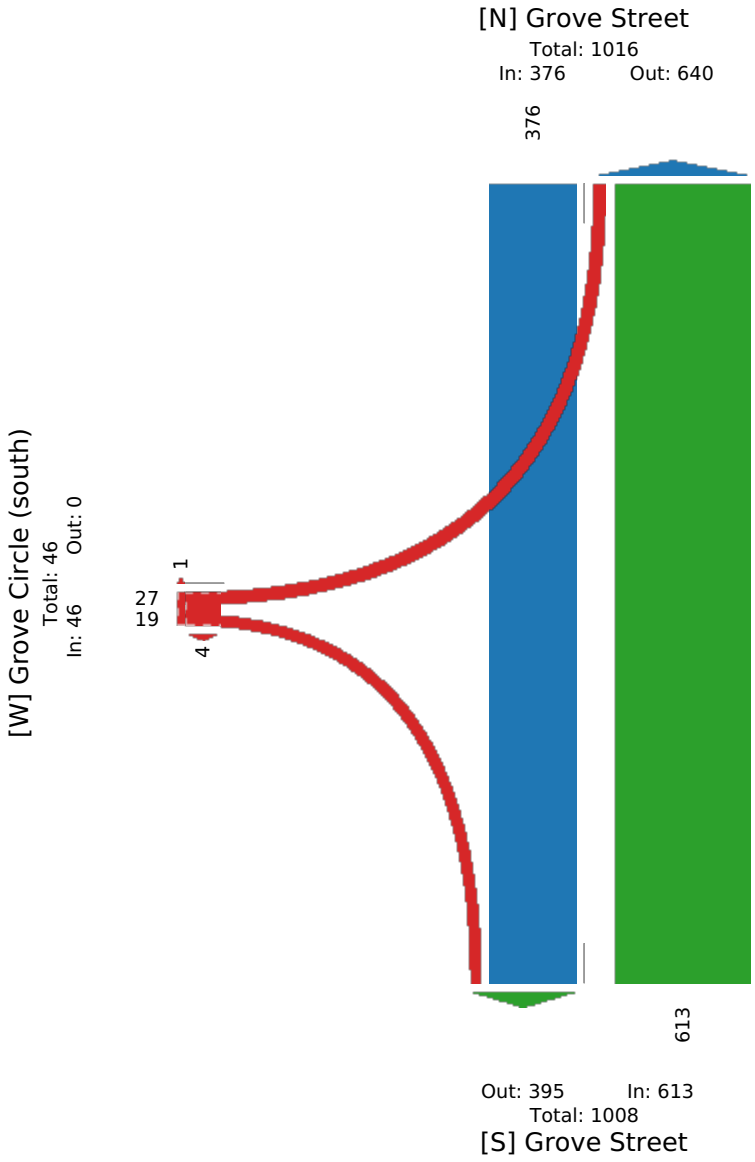
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Grove Circle (south)					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 9:15AM	0	146	0	**146**	0	88	0	0	**88**	0	6	5	0	**11**	0	**245**
9:30AM	0	162	0	**162**	0	88	0	0	**88**	0	7	5	0	**12**	2	**262**
9:45AM	0	154	0	**154**	0	99	0	0	**99**	0	7	3	0	**10**	1	**263**
10:00AM	0	151	0	**151**	0	101	0	0	**101**	0	7	6	0	**13**	2	**265**
Total	0	613	0	**613**	0	376	0	0	**376**	0	27	19	0	**46**	5	**1035**
% Approach	0%	100%	0%	**-**	-	100%	0%	0%	**-**	-	58.7%	41.3%	0%	**-**	-	-
% Total	0%	59.2%	0%	**59.2%**	-	36.3%	0%	0%	**36.3%**	-	2.6%	1.8%	0%	**4.4%**	-	-
PHF	-	0.946	-	**0.946**	-	0.931	-	-	**0.931**	-	0.964	0.792	-	**0.885**	-	0.976
Motorcycles	0	1	0	**1**	-	1	0	0	**1**	-	0	0	0	**0**	-	2
% Motorcycles	0%	0.2%	0%	**0.2%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.2%
Lights	0	584	0	**584**	-	359	0	0	**359**	-	27	18	0	**45**	-	988
% Lights	0%	95.3%	0%	**95.3%**	-	95.5%	0%	0%	**95.5%**	-	100%	94.7%	0%	**97.8%**	-	95.5%
Single-Unit Trucks	0	24	0	**24**	-	12	0	0	**12**	-	0	1	0	**1**	-	37
% Single-Unit Trucks	0%	3.9%	0%	**3.9%**	-	3.2%	0%	0%	**3.2%**	-	0%	5.3%	0%	**2.2%**	-	3.6%
Articulated Trucks	0	4	0	**4**	-	3	0	0	**3**	-	0	0	0	**0**	-	7
% Articulated Trucks	0%	0.7%	0%	**0.7%**	-	0.8%	0%	0%	**0.8%**	-	0%	0%	0%	**0%**	-	0.7%
Buses	0	0	0	**0**	-	1	0	0	**1**	-	0	0	0	**0**	-	1
% Buses	0%	0%	0%	**0%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	5	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (4) Grove Street @ Grove Circle (sout... - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818574, Location: 42.194974, -70.996102

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (4) Grove Street @ Grove Circle (sout... - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818574, Location: 42.194974, -70.996102

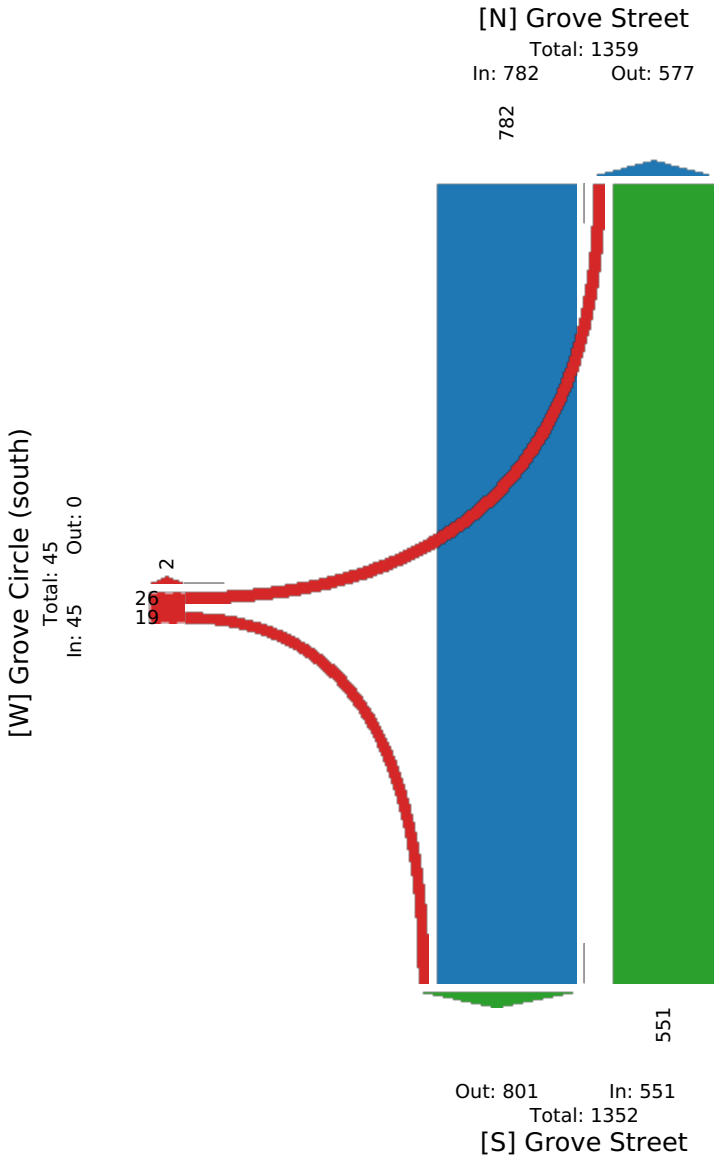
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Grove Circle (south)					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 4:45PM	0	128	0	**128**	0	204	0	0	**204**	0	4	5	0	**9**	0	**341**
5:00PM	0	147	0	**147**	0	178	0	0	**178**	0	2	4	0	**6**	0	**331**
5:15PM	0	144	0	**144**	0	216	0	0	**216**	0	9	2	0	**11**	1	**371**
5:30PM	0	132	0	**132**	0	184	0	0	**184**	0	11	8	0	**19**	1	**335**
Total	0	551	0	**551**	0	782	0	0	**782**	0	26	19	0	**45**	2	**1378**
% Approach	0%	100%	0%	**-**	-	100%	0%	0%	**-**	-	57.8%	42.2%	0%	**-**	-	-
% Total	0%	40.0%	0%	**40.0%**	-	56.7%	0%	0%	**56.7%**	-	1.9%	1.4%	0%	**3.3%**	-	-
PHF	-	0.937	-	**0.937**	-	0.905	-	-	**0.905**	-	0.591	0.594	-	**0.592**	-	0.929
Motorcycles	0	1	0	**1**	-	1	0	0	**1**	-	0	0	0	**0**	-	2
% Motorcycles	0%	0.2%	0%	**0.2%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Lights	0	545	0	**545**	-	772	0	0	**772**	-	25	19	0	**44**	-	1361
% Lights	0%	98.9%	0%	**98.9%**	-	98.7%	0%	0%	**98.7%**	-	96.2%	100%	0%	**97.8%**	-	98.8%
Single-Unit Trucks	0	3	0	**3**	-	6	0	0	**6**	-	1	0	0	**1**	-	10
% Single-Unit Trucks	0%	0.5%	0%	**0.5%**	-	0.8%	0%	0%	**0.8%**	-	3.8%	0%	0%	**2.2%**	-	0.7%
Articulated Trucks	0	2	0	**2**	-	2	0	0	**2**	-	0	0	0	**0**	-	4
% Articulated Trucks	0%	0.4%	0%	**0.4%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.3%
Buses	0	0	0	**0**	-	1	0	0	**1**	-	0	0	0	**0**	-	1
% Buses	0%	0%	0%	**0%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	2	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (4) Grove Street @ Grove Circle (sout... - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818574, Location: 42.194974, -70.996102

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (5) Grove Street @ Hannah Niles Way - TMC

Thu Apr 8, 2021
Full Length (10 AM-2 PM, 7 AM-11 AM, 2 PM-6 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818575, Location: 42.19278, -70.991506

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Hannah Niles Way					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	5	541	0	**546**	1	324	4	0	**328**	0	9	8	0	**17**	4	**891**
8:00AM	8	561	0	**569**	0	390	2	0	**392**	0	4	7	0	**11**	1	**972**
9:00AM	3	599	1	**603**	0	369	2	0	**371**	0	5	6	0	**11**	2	**985**
10:00AM	5	541	0	**546**	0	441	4	0	**445**	0	5	2	0	**7**	5	**998**
2:00PM	7	563	0	**570**	3	667	6	1	**674**	0	4	7	0	**11**	2	**1255**
3:00PM	5	611	0	**616**	3	694	5	0	**699**	0	2	5	0	**7**	3	**1322**
4:00PM	6	559	0	**565**	1	774	7	0	**781**	0	2	3	0	**5**	10	**1351**
5:00PM	2	556	0	**558**	1	785	6	0	**791**	0	2	4	0	**6**	5	**1355**
2021-04-10 10:00AM	1	541	0	**542**	0	469	6	0	**475**	0	8	2	0	**10**	3	**1027**
11:00AM	4	597	0	**601**	5	620	2	0	**622**	0	1	5	0	**6**	15	**1229**
12:00PM	2	641	0	**643**	1	677	5	0	**682**	0	3	5	0	**8**	3	**1333**
1:00PM	4	664	1	**669**	5	628	4	0	**632**	0	4	7	0	**11**	1	**1312**
Total	52	6974	2	**7028**	20	6838	53	1	**6892**	0	49	61	0	**110**	54	**14030**
% Approach	0.7%	99.2%	0%	**-**	-	99.2%	0.8%	0%	**-**	-	44.5%	55.5%	0%	**-**	-	**-**
% Total	0.4%	49.7%	0%	**50.1%**	-	48.7%	0.4%	0%	**49.1%**	-	0.3%	0.4%	0%	**0.8%**	-	**-**
Motorcycles	0	15	0	**15**	-	26	0	0	**26**	-	0	0	0	**0**	-	41
% Motorcycles	0%	0.2%	0%	**0.2%**	-	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.3%
Lights	51	6751	2	**6804**	-	6628	49	1	**6678**	-	47	58	0	**105**	-	13587
% Lights	98.1%	96.8%	100%	**96.8%**	-	96.9%	92.5%	100%	**96.9%**	-	95.9%	95.1%	0%	**95.5%**	-	96.8%
Single-Unit Trucks	1	144	0	**145**	-	135	3	0	**138**	-	1	3	0	**4**	-	287
% Single-Unit Trucks	1.9%	2.1%	0%	**2.1%**	-	2.0%	5.7%	0%	**2.0%**	-	2.0%	4.9%	0%	**3.6%**	-	2.0%
Articulated Trucks	0	37	0	**37**	-	23	0	0	**23**	-	0	0	0	**0**	-	60
% Articulated Trucks	0%	0.5%	0%	**0.5%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	0	21	0	**21**	-	22	0	0	**22**	-	0	0	0	**0**	-	43
% Buses	0%	0.3%	0%	**0.3%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.3%
Bicycles on Road	0	6	0	**6**	-	4	1	0	**5**	-	1	0	0	**1**	-	12
% Bicycles on Road	0%	0.1%	0%	**0.1%**	-	0.1%	1.9%	0%	**0.1%**	-	2.0%	0%	0%	**0.9%**	-	0.1%
Pedestrians	-	-	-	-	19	-	-	-	-	0	-	-	-	-	53	
% Pedestrians	-	-	-	-	95.0%	-	-	-	-	-	-	-	-	-	98.1%	-
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	0	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	5.0%	-	-	-	-	-	-	-	-	-	1.9%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (5) Grove Street @ Hannah Niles Way - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818575, Location: 42.19278, -70.991506

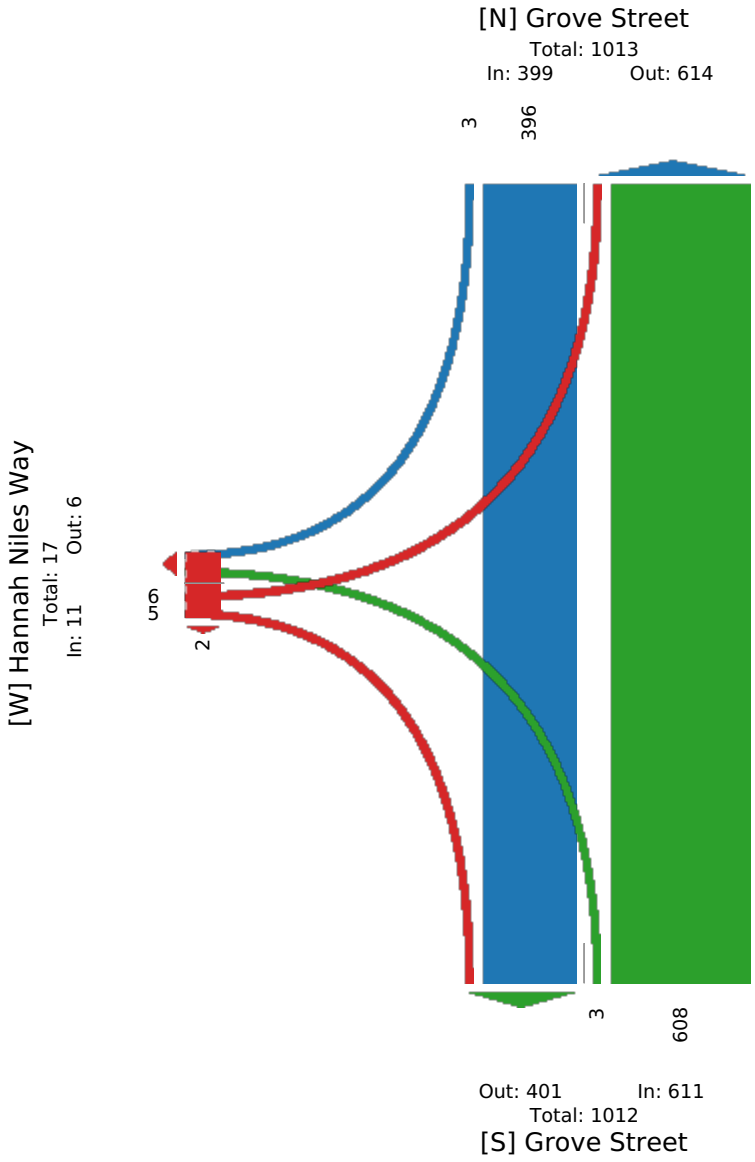
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Hannah Niles Way					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 9:15AM	1	144	0	**145**	0	91	1	0	**92**	0	2	1	0	**3**	0	**240**
9:30AM	0	156	0	**156**	0	98	0	0	**98**	0	2	0	0	**2**	0	**256**
9:45AM	1	159	0	**160**	0	96	1	0	**97**	0	0	3	0	**3**	2	**260**
10:00AM	1	149	0	**150**	0	111	1	0	**112**	0	2	1	0	**3**	0	**265**
Total	3	608	0	**611**	0	396	3	0	**399**	0	6	5	0	**11**	2	**1021**
% Approach	0.5%	99.5%	0%	**-**	-	99.2%	0.8%	0%	**-**	-	54.5%	45.5%	0%	**-**	-	-
% Total	0.3%	59.5%	0%	**59.8%**	-	38.8%	0.3%	0%	**39.1%**	-	0.6%	0.5%	0%	**1.1%**	-	-
PHF	0.750	0.956	-	**0.955**	-	0.892	0.750	-	**0.891**	-	0.750	0.417	-	**0.917**	-	0.963
Motorcycles	0	1	0	**1**	-	0	0	0	**0**	-	0	0	0	**0**	-	1
% Motorcycles	0%	0.2%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0.1%
Lights	3	575	0	**578**	-	378	2	0	**380**	-	6	4	0	**10**	-	968
% Lights	100%	94.6%	0%	**94.6%**	-	95.5%	66.7%	0%	**95.2%**	-	100%	80.0%	0%	**90.9%**	-	94.8%
Single-Unit Trucks	0	26	0	**26**	-	15	1	0	**16**	-	0	1	0	**1**	-	43
% Single-Unit Trucks	0%	4.3%	0%	**4.3%**	-	3.8%	33.3%	0%	**4.0%**	-	0%	20.0%	0%	**9.1%**	-	4.2%
Articulated Trucks	0	6	0	**6**	-	2	0	0	**2**	-	0	0	0	**0**	-	8
% Articulated Trucks	0%	1.0%	0%	**1.0%**	-	0.5%	0%	0%	**0.5%**	-	0%	0%	0%	**0%**	-	0.8%
Buses	0	0	0	**0**	-	1	0	0	**1**	-	0	0	0	**0**	-	1
% Buses	0%	0%	0%	**0%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	2	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (5) Grove Street @ Hannah Niles Way - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818575, Location: 42.19278, -70.991506

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (5) Grove Street @ Hannah Niles Way - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818575, Location: 42.19278, -70.991506

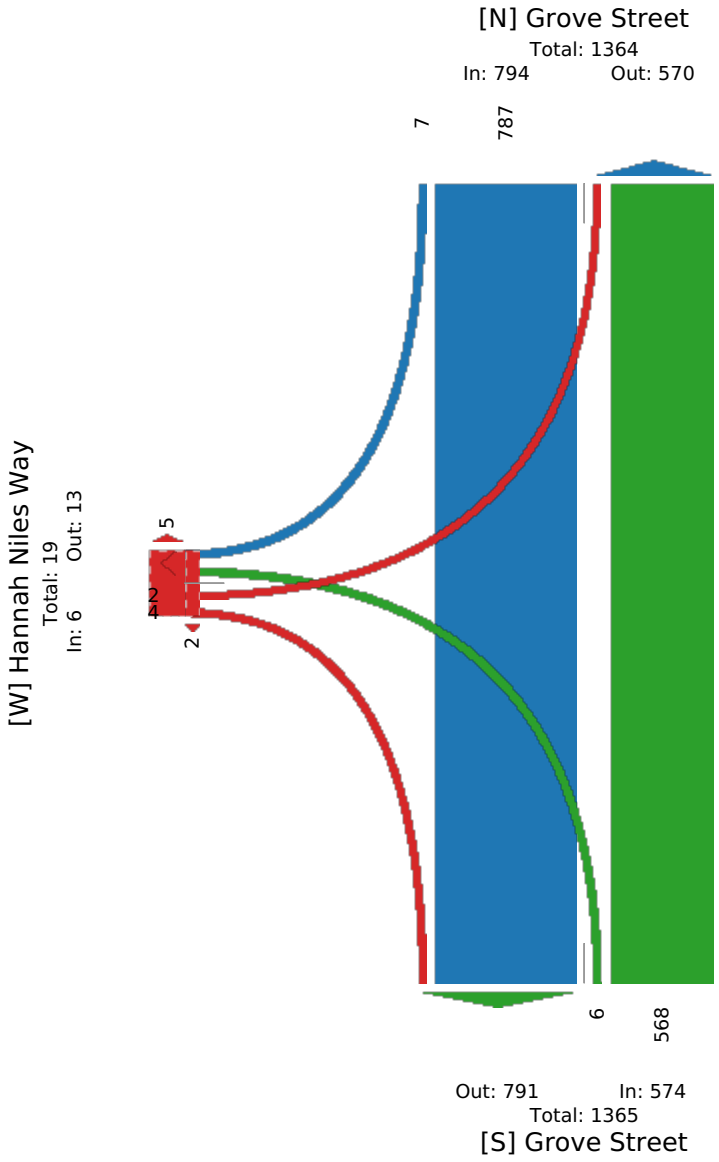
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Hannah Niles Way					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 4:30PM	0	151	0	**151**	0	175	3	0	**178**	0	2	1	0	**3**	5	**332**
4:45PM	4	119	0	**123**	0	203	2	0	**205**	0	0	2	0	**2**	0	**330**
5:00PM	2	145	0	**147**	0	193	1	0	**194**	0	0	1	0	**1**	1	**342**
5:15PM	0	153	0	**153**	0	216	1	0	**217**	0	0	0	0	**0**	1	**370**
Total	6	568	0	**574**	0	787	7	0	**794**	0	2	4	0	**6**	7	**1374**
% Approach	1.0%	99.0%	0%	**-**	-	99.1%	0.9%	0%	**-**	-	33.3%	66.7%	0%	**-**	-	-
% Total	0.4%	41.3%	0%	**41.8%**	-	57.3%	0.5%	0%	**57.8%**	-	0.1%	0.3%	0%	**0.4%**	-	-
PHF	0.375	0.928	-	**0.938**	-	0.911	0.583	-	**0.915**	-	0.250	0.500	-	**0.500**	-	0.928
Motorcycles	0	3	0	**3**	-	1	0	0	**1**	-	0	0	0	**0**	-	4
% Motorcycles	0%	0.5%	0%	**0.5%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.3%
Lights	6	558	0	**564**	-	779	7	0	**786**	-	2	4	0	**6**	-	1356
% Lights	100%	98.2%	0%	**98.3%**	-	99.0%	100%	0%	**99.0%**	-	100%	100%	0%	**100%**	-	98.7%
Single-Unit Trucks	0	4	0	**4**	-	5	0	0	**5**	-	0	0	0	**0**	-	9
% Single-Unit Trucks	0%	0.7%	0%	**0.7%**	-	0.6%	0%	0%	**0.6%**	-	0%	0%	0%	**0%**	-	0.7%
Articulated Trucks	0	3	0	**3**	-	1	0	0	**1**	-	0	0	0	**0**	-	4
% Articulated Trucks	0%	0.5%	0%	**0.5%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.3%
Buses	0	0	0	**0**	-	1	0	0	**1**	-	0	0	0	**0**	-	1
% Buses	0%	0%	0%	**0%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	7	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (5) Grove Street @ Hannah Niles Way - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818575, Location: 42.19278, -70.991506

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (6) Grove Street @ United Methodist C... - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818577, Location: 42.191533, -70.989714

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street				Grove Street				
Direction	Northbound				Southbound				
Time	T	U	**App**	Ped*	T	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	546	0	**546**	0	330	0	**330**	0	**876**
8:00AM	553	0	**553**	1	397	0	**397**	1	**950**
9:00AM	604	0	**604**	0	373	0	**373**	0	**977**
10:00AM	546	0	**546**	0	442	0	**442**	0	**988**
2:00PM	577	0	**577**	0	675	0	**675**	0	**1252**
3:00PM	617	0	**617**	0	706	0	**706**	4	**1323**
4:00PM	569	0	**569**	0	774	0	**774**	4	**1343**
5:00PM	555	0	**555**	0	797	1	**798**	2	**1353**
2021-04-10 10:00AM	541	0	**541**	0	470	0	**470**	1	**1011**
11:00AM	597	0	**597**	1	623	0	**623**	1	**1220**
12:00PM	642	0	**642**	0	688	0	**688**	0	**1330**
1:00PM	665	0	**665**	0	633	0	**633**	0	**1298**
Total	7012	0	**7012**	2	6908	1	**6909**	13	**13921**
% Approach	100%	0%	**-**	-	100.0%	0%	**-**	-	-
% Total	50.4%	0%	**50.4%**	-	49.6%	0%	**49.6%**	-	-
Motorcycles	16	0	**16**	-	28	0	**28**	-	44
% Motorcycles	0.2%	0%	**0.2%**	-	0.4%	0%	**0.4%**	-	0.3%
Lights	6799	0	**6799**	-	6706	1	**6707**	-	13506
% Lights	97.0%	0%	**97.0%**	-	97.1%	100%	**97.1%**	-	97.0%
Single-Unit Trucks	138	0	**138**	-	124	0	**124**	-	262
% Single-Unit Trucks	2.0%	0%	**2.0%**	-	1.8%	0%	**1.8%**	-	1.9%
Articulated Trucks	34	0	**34**	-	24	0	**24**	-	58
% Articulated Trucks	0.5%	0%	**0.5%**	-	0.3%	0%	**0.3%**	-	0.4%
Buses	20	0	**20**	-	20	0	**20**	-	40
% Buses	0.3%	0%	**0.3%**	-	0.3%	0%	**0.3%**	-	0.3%
Bicycles on Road	5	0	**5**	-	6	0	**6**	-	11
% Bicycles on Road	0.1%	0%	**0.1%**	-	0.1%	0%	**0.1%**	-	0.1%
Pedestrians	-	-	-	1	-	-	-	8	
% Pedestrians	-	-	-	50.0%	-	-	-	61.5%	-
Bicycles on Crosswalk	-	-	-	1	-	-	-	5	
% Bicycles on Crosswalk	-	-	-	50.0%	-	-	-	38.5%	-

*Pedestrians and Bicycles on Crosswalk. T: Thru, U: U-Turn

217835 (6) Grove Street @ United Methodist C... - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818577, Location: 42.191533, -70.989714

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street				Grove Street				
Direction	Northbound				Southbound				
Time	T	U	**App**	Ped*	T	U	**App**	Ped*	**Int**
2021-04-08 9:15AM	143	0	**143**	0	93	0	**93**	0	**236**
9:30AM	155	0	**155**	0	98	0	**98**	0	**253**
9:45AM	161	0	**161**	0	98	0	**98**	0	**259**
10:00AM	150	0	**150**	0	112	0	**112**	0	**262**
Total	609	0	**609**	0	401	0	**401**	0	**1010**
% Approach	100%	0%	**-**	-	100%	0%	**-**	-	-
% Total	60.3%	0%	**60.3%**	-	39.7%	0%	**39.7%**	-	-
PHF	0.946	-	**0.946**	-	0.895	-	**0.895**	-	0.964
Motorcycles	1	0	**1**	-	1	0	**1**	-	2
% Motorcycles	0.2%	0%	**0.2%**	-	0.2%	0%	**0.2%**	-	0.2%
Lights	578	0	**578**	-	383	0	**383**	-	961
% Lights	94.9%	0%	**94.9%**	-	95.5%	0%	**95.5%**	-	95.1%
Single-Unit Trucks	24	0	**24**	-	13	0	**13**	-	37
% Single-Unit Trucks	3.9%	0%	**3.9%**	-	3.2%	0%	**3.2%**	-	3.7%
Articulated Trucks	6	0	**6**	-	3	0	**3**	-	9
% Articulated Trucks	1.0%	0%	**1.0%**	-	0.7%	0%	**0.7%**	-	0.9%
Buses	0	0	**0**	-	1	0	**1**	-	1
% Buses	0%	0%	**0%**	-	0.2%	0%	**0.2%**	-	0.1%
Bicycles on Road	0	0	**0**	-	0	0	**0**	-	0
% Bicycles on Road	0%	0%	**0%**	-	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	0	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	0	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. T: Thru, U: U-Turn

217835 (6) Grove Street @ United Methodist C... - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818577, Location: 42.191533, -70.989714

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

217835 (6) Grove Street @ United Methodist C... - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818577, Location: 42.191533, -70.989714

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street				Grove Street				
Direction	Northbound				Southbound				
Time	T	U	**App**	Ped*	T	U	**App**	Ped*	**Int**
2021-04-08 4:30PM	151	0	**151**	0	179	0	**179**	1	**330**
4:45PM	125	0	**125**	0	207	0	**207**	0	**332**
5:00PM	147	0	**147**	0	196	0	**196**	1	**343**
5:15PM	152	0	**152**	0	220	0	**220**	0	**372**
Total	575	0	**575**	0	802	0	**802**	2	**1377**
% Approach	100%	0%	**-**	-	100%	0%	**-**	-	-
% Total	41.8%	0%	**41.8%**	-	58.2%	0%	**58.2%**	-	-
PHF	0.946	-	**0.946**	-	0.911	-	**0.911**	-	0.925
Motorcycles	3	0	**3**	-	1	0	**1**	-	4
% Motorcycles	0.5%	0%	**0.5%**	-	0.1%	0%	**0.1%**	-	0.3%
Lights	565	0	**565**	-	797	0	**797**	-	1362
% Lights	98.3%	0%	**98.3%**	-	99.4%	0%	**99.4%**	-	98.9%
Single-Unit Trucks	4	0	**4**	-	4	0	**4**	-	8
% Single-Unit Trucks	0.7%	0%	**0.7%**	-	0.5%	0%	**0.5%**	-	0.6%
Articulated Trucks	3	0	**3**	-	0	0	**0**	-	3
% Articulated Trucks	0.5%	0%	**0.5%**	-	0%	0%	**0%**	-	0.2%
Buses	0	0	**0**	-	0	0	**0**	-	0
% Buses	0%	0%	**0%**	-	0%	0%	**0%**	-	0%
Bicycles on Road	0	0	**0**	-	0	0	**0**	-	0
% Bicycles on Road	0%	0%	**0%**	-	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	0	-	-	-	2	
% Pedestrians	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	0	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. T: Thru, U: U-Turn

217835 (6) Grove Street @ United Methodist C... - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818577, Location: 42.191533, -70.989714

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

217835 (7) Grove Street @ Tedeschi Shipping ... - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818578, Location: 42.191004, -70.988938

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Tedeschi Plaza North Driveway					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	503	9	0	**512**	0	31	301	0	**332**	0	19	44	0	**63**	0	**907**
8:00AM	526	26	0	**552**	0	49	348	0	**397**	0	11	34	0	**45**	1	**994**
9:00AM	560	12	0	**572**	0	44	322	0	**366**	0	11	39	0	**50**	1	**988**
10:00AM	504	6	0	**510**	0	50	390	0	**440**	1	16	46	0	**62**	0	**1012**
2:00PM	515	9	0	**524**	0	54	605	0	**659**	0	16	50	0	**66**	0	**1249**
3:00PM	578	8	0	**586**	0	41	667	0	**708**	0	15	44	0	**59**	1	**1353**
4:00PM	533	12	0	**545**	0	50	726	0	**776**	0	16	34	0	**50**	1	**1371**
5:00PM	524	10	0	**534**	0	66	733	0	**799**	0	12	30	0	**42**	1	**1375**
2021-04-10 10:00AM	500	14	0	**514**	0	43	437	0	**480**	1	13	40	0	**53**	1	**1047**
11:00AM	553	13	0	**566**	0	35	578	0	**613**	0	13	52	0	**65**	0	**1244**
12:00PM	603	21	0	**624**	1	56	642	0	**698**	0	22	43	0	**65**	0	**1387**
1:00PM	625	13	0	**638**	0	48	577	0	**625**	0	12	40	0	**52**	0	**1315**
Total	6524	153	0	**6677**	1	567	6326	0	**6893**	2	176	496	0	**672**	6	**14242**
% Approach	97.7%	2.3%	0%	**-**	-	8.2%	91.8%	0%	**-**	-	26.2%	73.8%	0%	**-**	-	**-**
% Total	45.8%	1.1%	0%	**46.9%**	-	4.0%	44.4%	0%	**48.4%**	-	1.2%	3.5%	0%	**4.7%**	-	**-**
Motorcycles	16	0	0	**16**	-	0	25	0	**25**	-	1	1	0	**2**	-	43
% Motorcycles	0.2%	0%	0%	**0.2%**	-	0%	0.4%	0%	**0.4%**	-	0.6%	0.2%	0%	**0.3%**	-	0.3%
Lights	6324	151	0	**6475**	-	562	6133	0	**6695**	-	170	489	0	**659**	-	13829
% Lights	96.9%	98.7%	0%	**97.0%**	-	99.1%	96.9%	0%	**97.1%**	-	96.6%	98.6%	0%	**98.1%**	-	97.1%
Single-Unit Trucks	130	0	0	**130**	-	5	115	0	**120**	-	4	5	0	**9**	-	259
% Single-Unit Trucks	2.0%	0%	0%	**1.9%**	-	0.9%	1.8%	0%	**1.7%**	-	2.3%	1.0%	0%	**1.3%**	-	1.8%
Articulated Trucks	30	0	0	**30**	-	0	25	0	**25**	-	0	0	0	**0**	-	55
% Articulated Trucks	0.5%	0%	0%	**0.4%**	-	0%	0.4%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	19	0	0	**19**	-	0	21	0	**21**	-	0	1	0	**1**	-	41
% Buses	0.3%	0%	0%	**0.3%**	-	0%	0.3%	0%	**0.3%**	-	0%	0.2%	0%	**0.1%**	-	0.3%
Bicycles on Road	5	2	0	**7**	-	0	7	0	**7**	-	1	0	0	**1**	-	15
% Bicycles on Road	0.1%	1.3%	0%	**0.1%**	-	0%	0.1%	0%	**0.1%**	-	0.6%	0%	0%	**0.1%**	-	0.1%
Pedestrians	-	-	-	-	1	-	-	-	-	1	-	-	-	-	5	
% Pedestrians	-	-	-	-	100%	-	-	-	-	50.0%	-	-	-	-	83.3%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	1	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	50.0%	-	-	-	-	16.7%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (7) Grove Street @ Tedeschi Shipping ... - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818578, Location: 42.191004, -70.988938

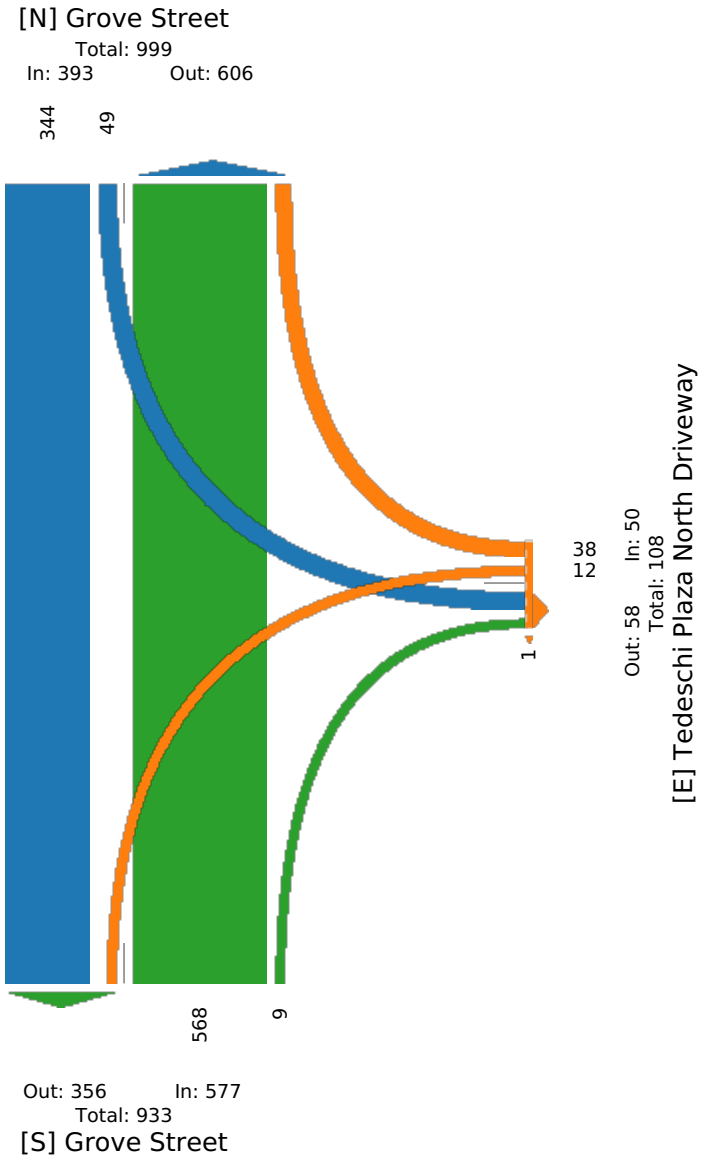
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Tedeschi Plaza North Driveway					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 9:15AM	137	1	0	**138**	0	13	78	0	**91**	0	4	7	0	**11**	0	**240**
9:30AM	146	3	0	**149**	0	12	83	0	**95**	0	2	9	0	**11**	0	**255**
9:45AM	143	3	0	**146**	0	11	83	0	**94**	0	2	12	0	**14**	1	**254**
10:00AM	142	2	0	**144**	0	13	100	0	**113**	0	4	10	0	**14**	0	**271**
Total	568	9	0	**577**	0	49	344	0	**393**	0	12	38	0	**50**	1	**1020**
% Approach	98.4%	1.6%	0%	**-**	-	12.5%	87.5%	0%	**-**	-	24.0%	76.0%	0%	**-**	-	**-**
% Total	55.7%	0.9%	0%	**56.6%**	-	4.8%	33.7%	0%	**38.5%**	-	1.2%	3.7%	0%	**4.9%**	-	**-**
PHF	0.973	0.750	-	**0.968**	-	0.942	0.860	-	**0.869**	-	0.750	0.792	-	**0.893**	-	0.941
Motorcycles	0	0	0	**0**	-	0	1	0	**1**	-	1	0	0	**1**	-	2
% Motorcycles	0%	0%	0%	**0%**	-	0%	0.3%	0%	**0.3%**	-	8.3%	0%	0%	**2.0%**	-	0.2%
Lights	542	9	0	**551**	-	47	330	0	**377**	-	10	37	0	**47**	-	975
% Lights	95.4%	100%	0%	**95.5%**	-	95.9%	95.9%	0%	**95.9%**	-	83.3%	97.4%	0%	**94.0%**	-	95.6%
Single-Unit Trucks	21	0	0	**21**	-	2	10	0	**12**	-	1	1	0	**2**	-	35
% Single-Unit Trucks	3.7%	0%	0%	**3.6%**	-	4.1%	2.9%	0%	**3.1%**	-	8.3%	2.6%	0%	**4.0%**	-	3.4%
Articulated Trucks	5	0	0	**5**	-	0	2	0	**2**	-	0	0	0	**0**	-	7
% Articulated Trucks	0.9%	0%	0%	**0.9%**	-	0%	0.6%	0%	**0.5%**	-	0%	0%	0%	**0%**	-	0.7%
Buses	0	0	0	**0**	-	0	1	0	**1**	-	0	0	0	**0**	-	1
% Buses	0%	0%	0%	**0%**	-	0%	0.3%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (7) Grove Street @ Tedeschi Shipping ... - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818578, Location: 42.191004, -70.988938

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (7) Grove Street @ Tedeschi Shipping ... - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818578, Location: 42.191004, -70.988938

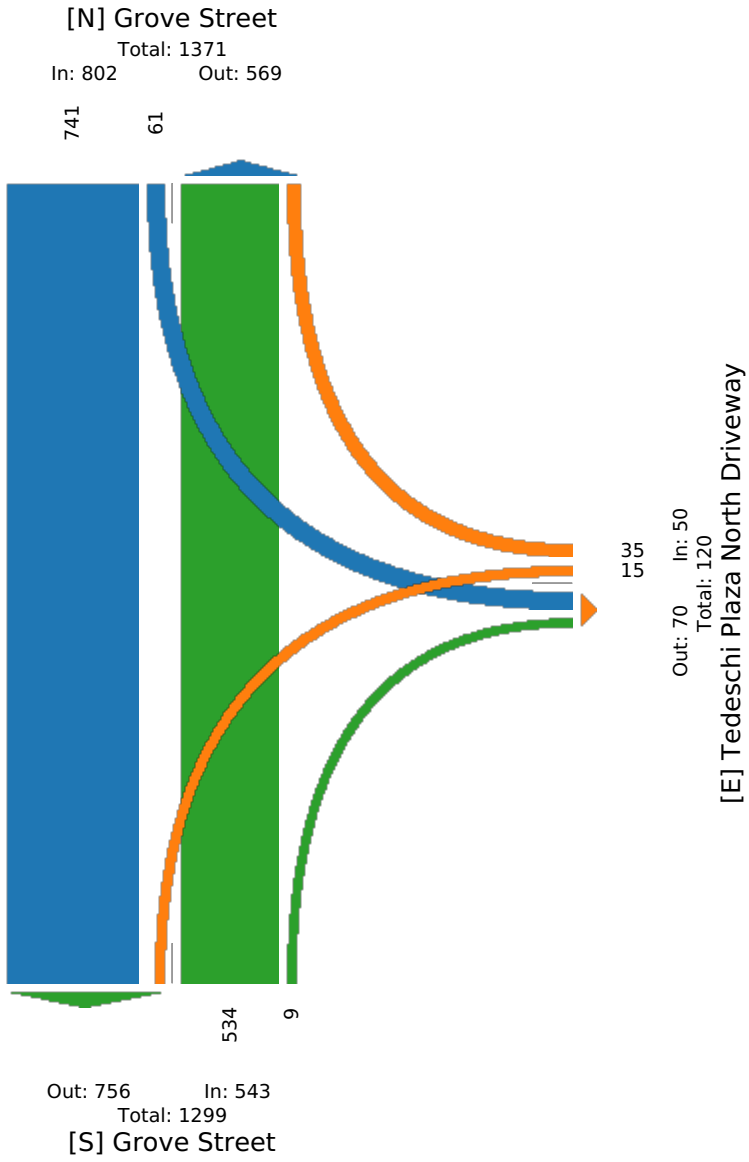
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Tedeschi Plaza North Driveway					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 4:30PM	138	3	0	**141**	0	8	170	0	**178**	0	4	9	0	**13**	0	**332**
4:45PM	118	3	0	**121**	0	17	189	0	**206**	0	6	7	0	**13**	0	**340**
5:00PM	140	2	0	**142**	0	15	184	0	**199**	0	2	9	0	**11**	0	**352**
5:15PM	138	1	0	**139**	0	21	198	0	**219**	0	3	10	0	**13**	0	**371**
Total	534	9	0	**543**	0	61	741	0	**802**	0	15	35	0	**50**	0	**1395**
% Approach	98.3%	1.7%	0%	**-**	-	7.6%	92.4%	0%	**-**	-	30.0%	70.0%	0%	**-**	-	-
% Total	38.3%	0.6%	0%	**38.9%**	-	4.4%	53.1%	0%	**57.5%**	-	1.1%	2.5%	0%	**3.6%**	-	-
PHF	0.954	0.750	-	**0.956**	-	0.726	0.936	-	**0.916**	-	0.625	0.875	-	**0.962**	-	0.940
Motorcycles	2	0	0	**2**	-	0	1	0	**1**	-	0	1	0	**1**	-	4
% Motorcycles	0.4%	0%	0%	**0.4%**	-	0%	0.1%	0%	**0.1%**	-	0%	2.9%	0%	**2.0%**	-	0.3%
Lights	525	9	0	**534**	-	61	734	0	**795**	-	15	34	0	**49**	-	1378
% Lights	98.3%	100%	0%	**98.3%**	-	100%	99.1%	0%	**99.1%**	-	100%	97.1%	0%	**98.0%**	-	98.8%
Single-Unit Trucks	5	0	0	**5**	-	0	5	0	**5**	-	0	0	0	**0**	-	10
% Single-Unit Trucks	0.9%	0%	0%	**0.9%**	-	0%	0.7%	0%	**0.6%**	-	0%	0%	0%	**0%**	-	0.7%
Articulated Trucks	2	0	0	**2**	-	0	1	0	**1**	-	0	0	0	**0**	-	3
% Articulated Trucks	0.4%	0%	0%	**0.4%**	-	0%	0.1%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.2%
Buses	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Buses	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (7) Grove Street @ Tedeschi Shipping ... - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:30PM - 5:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818578, Location: 42.191004, -70.988938

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (8) Grove Street @ Tedeschi Plaza Mid... - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818579, Location: 42.190544, -70.988318

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street						Grove Street						Hemlock Street						Tedeschi Plaza Main Driveway						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2021-04-08 7:00AM	3	484	39	0	**526**	0	21	292	3	0	**316**	0	11	0	6	0	**17**	3	25	2	20	0	**47**	1	**906**
8:00AM	0	513	49	0	**562**	1	31	318	8	0	**357**	0	6	0	3	0	**9**	1	35	2	35	0	**72**	0	**1000**
9:00AM	2	506	41	0	**549**	1	38	294	2	0	**334**	0	6	0	5	0	**11**	4	37	2	55	0	**94**	0	**988**
10:00AM	4	415	48	0	**467**	0	52	353	2	0	**407**	0	6	2	1	0	**9**	5	45	2	88	0	**135**	0	**1018**
2:00PM	2	469	45	0	**516**	0	59	562	13	0	**634**	0	6	2	2	0	**10**	4	59	3	49	0	**111**	0	**1271**
3:00PM	4	505	40	0	**549**	4	66	589	19	0	**674**	0	6	4	4	0	**14**	0	70	2	67	0	**139**	0	**1376**
4:00PM	2	457	43	0	**502**	0	65	670	11	0	**746**	0	7	3	3	0	**13**	3	46	3	81	0	**130**	0	**1391**
5:00PM	1	462	52	0	**515**	2	66	664	14	0	**744**	0	6	1	3	0	**10**	1	63	2	68	1	**134**	2	**1403**
2021-04-10 10:00AM	2	426	69	0	**497**	0	53	391	8	0	**452**	0	7	4	3	0	**14**	2	67	0	83	0	**150**	1	**1113**
11:00AM	6	461	58	0	**525**	0	57	524	10	0	**591**	0	7	2	4	0	**13**	8	72	5	93	0	**170**	0	**1299**
12:00PM	2	532	42	0	**576**	1	59	592	13	0	**664**	0	4	1	2	0	**7**	4	70	2	85	1	**158**	0	**1405**
1:00PM	4	549	30	0	**583**	0	76	506	9	0	**591**	1	6	1	4	0	**11**	0	57	5	87	0	**149**	0	**1334**
Total	32	5779	556	0	**6367**	9	643	5755	112	0	**6510**	1	78	20	40	0	**138**	35	646	30	811	2	**1489**	4	**14504**
% Approach	0.5%	90.8%	8.7%	0%	**-**	-	9.9%	88.4%	1.7%	0%	**-**	-	56.5%	14.5%	29.0%	0%	**-**	-	43.4%	2.0%	54.5%	0.1%	**-**	-	-
% Total	0.2%	39.8%	3.8%	0%	**43.9%**	-	4.4%	39.7%	0.8%	0%	**44.9%**	-	0.5%	0.1%	0.3%	0%	**1.0%**	-	4.5%	0.2%	5.6%	0%	**10.3%**	-	-
Motorcycles	1	15	1	0	**17**	-	0	28	0	0	**28**	-	0	0	0	0	**0**	-	0	0	1	0	**1**	-	46
% Motorcycles	3.1%	0.3%	0.2%	0%	**0.3%**	-	0%	0.5%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.1%	0%	**0.1%**	-	0.3%
Lights	30	5592	548	0	**6170**	-	637	5575	105	0	**6317**	-	75	18	39	0	**132**	-	640	29	804	2	**1475**	-	14094
% Lights	93.8%	96.8%	98.6%	0%	**96.9%**	-	99.1%	96.9%	93.8%	0%	**97.0%**	-	96.2%	90.0%	97.5%	0%	**95.7%**	-	99.1%	96.7%	99.1%	100%	**99.1%**	-	97.2%
Single-Unit Trucks	1	123	6	0	**130**	-	5	105	2	0	**112**	-	2	1	1	0	**4**	-	5	0	3	0	**8**	-	254
% Single-Unit Trucks	3.1%	2.1%	1.1%	0%	**2.0%**	-	0.8%	1.8%	1.8%	0%	**1.7%**	-	2.6%	5.0%	2.5%	0%	**2.9%**	-	0.8%	0%	0.4%	0%	**0.5%**	-	1.8%
Articulated Trucks	0	29	1	0	**30**	-	0	23	0	0	**23**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	53
% Articulated Trucks	0%	0.5%	0.2%	0%	**0.5%**	-	0%	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.4%
Buses	0	17	0	0	**17**	-	1	18	1	0	**20**	-	1	1	0	0	**2**	-	1	1	3	0	**5**	-	44
% Buses	0%	0.3%	0%	0%	**0.3%**	-	0.2%	0.3%	0.9%	0%	**0.3%**	-	1.3%	5.0%	0%	0%	**1.4%**	-	0.2%	3.3%	0.4%	0%	**0.3%**	-	0.3%
Bicycles on Road	0	3	0	0	**3**	-	0	6	4	0	**10**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	13
% Bicycles on Road	0%	0.1%	0%	0%	**0%**	-	0%	0.1%	3.6%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	9	-	-	-	-	-	1	-	-	-	-	-	34	-	-	-	-	-	4	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	97.1%	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	2.9%	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (8) Grove Street @ Tedeschi Plaza Mid... - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:45AM - 10:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818579, Location: 42.190544, -70.988318

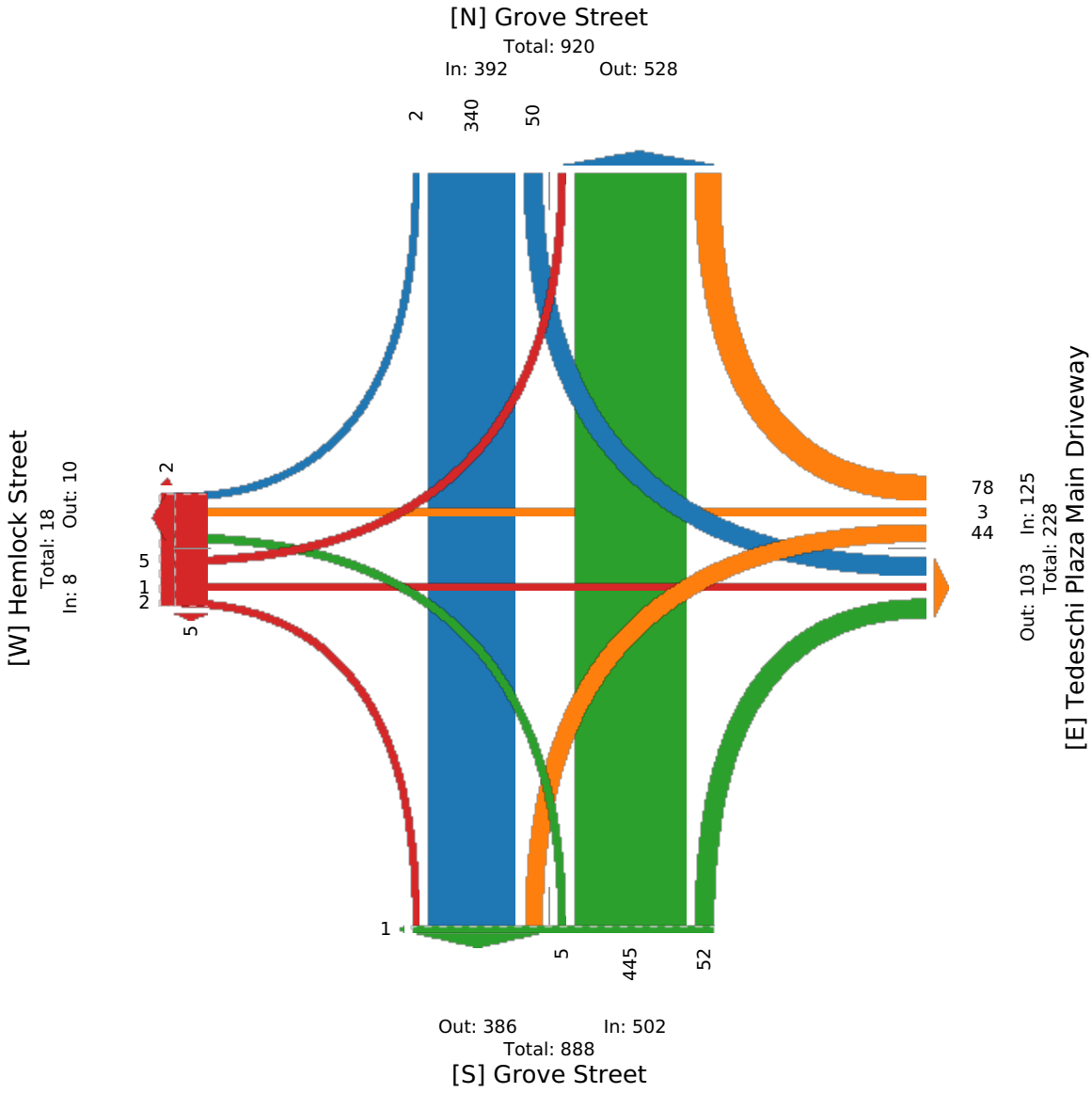
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street						Grove Street						Hemlock Street						Tedeschi Plaza Main Driveway						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2021-04-08 9:45AM	2	128	9	0	**139**	1	8	81	0	0	**89**	0	1	0	1	0	**2**	3	9	1	17	0	**27**	0	**257**
10:00AM	1	128	16	0	**145**	0	18	82	0	0	**100**	0	1	0	0	0	**1**	0	15	1	16	0	**32**	0	**278**
10:15AM	1	86	13	0	**100**	0	7	92	0	0	**99**	0	1	0	0	0	**1**	3	12	0	24	0	**36**	0	**236**
10:30AM	1	103	14	0	**118**	0	17	85	2	0	**104**	0	2	1	1	0	**4**	1	8	1	21	0	**30**	0	**256**
Total	5	445	52	0	**502**	1	50	340	2	0	**392**	0	5	1	2	0	**8**	7	44	3	78	0	**125**	0	**1027**
% Approach	1.0%	88.6%	10.4%	0%	**-**	-	12.8%	86.7%	0.5%	0%	**-**	-	62.5%	12.5%	25.0%	0%	**-**	-	35.2%	2.4%	62.4%	0%	**-**	-	-
% Total	0.5%	43.3%	5.1%	0%	**48.9%**	-	4.9%	33.1%	0.2%	0%	**38.2%**	-	0.5%	0.1%	0.2%	0%	**0.8%**	-	4.3%	0.3%	7.6%	0%	**12.2%**	-	-
PHF	0.625	0.869	0.813	-	**0.866**	-	0.694	0.924	0.250	-	**0.942**	-	0.625	0.250	0.500	-	**0.500**	-	0.733	0.750	0.813	-	**0.868**	-	0.924
Motorcycles	0	0	0	0	**0**	-	0	3	0	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0.9%	0%	0%	**0.8%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Lights	5	427	51	0	**483**	-	50	320	2	0	**372**	-	5	1	2	0	**8**	-	42	3	78	0	**123**	-	986
% Lights	100%	96.0%	98.1%	0%	**96.2%**	-	100%	94.1%	100%	0%	**94.9%**	-	100%	100%	100%	0%	**100%**	-	95.5%	100%	100%	0%	**98.4%**	-	96.0%
Single-Unit Trucks	0	15	1	0	**16**	-	0	13	0	0	**13**	-	0	0	0	0	**0**	-	2	0	0	0	**2**	-	31
% Single-Unit Trucks	0%	3.4%	1.9%	0%	**3.2%**	-	0%	3.8%	0%	0%	**3.3%**	-	0%	0%	0%	0%	**0%**	-	4.5%	0%	0%	0%	**1.6%**	-	3.0%
Articulated Trucks	0	3	0	0	**3**	-	0	3	0	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	6
% Articulated Trucks	0%	0.7%	0%	0%	**0.6%**	-	0%	0.9%	0%	0%	**0.8%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.6%
Buses	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Buses	0%	0%	0%	0%	**0%**	-	0%	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	7	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (8) Grove Street @ Tedeschi Plaza Mid... - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:45AM - 10:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818579, Location: 42.190544, -70.988318

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (8) Grove Street @ Tedeschi Plaza Mid... - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:45PM - 4:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818579, Location: 42.190544, -70.988318

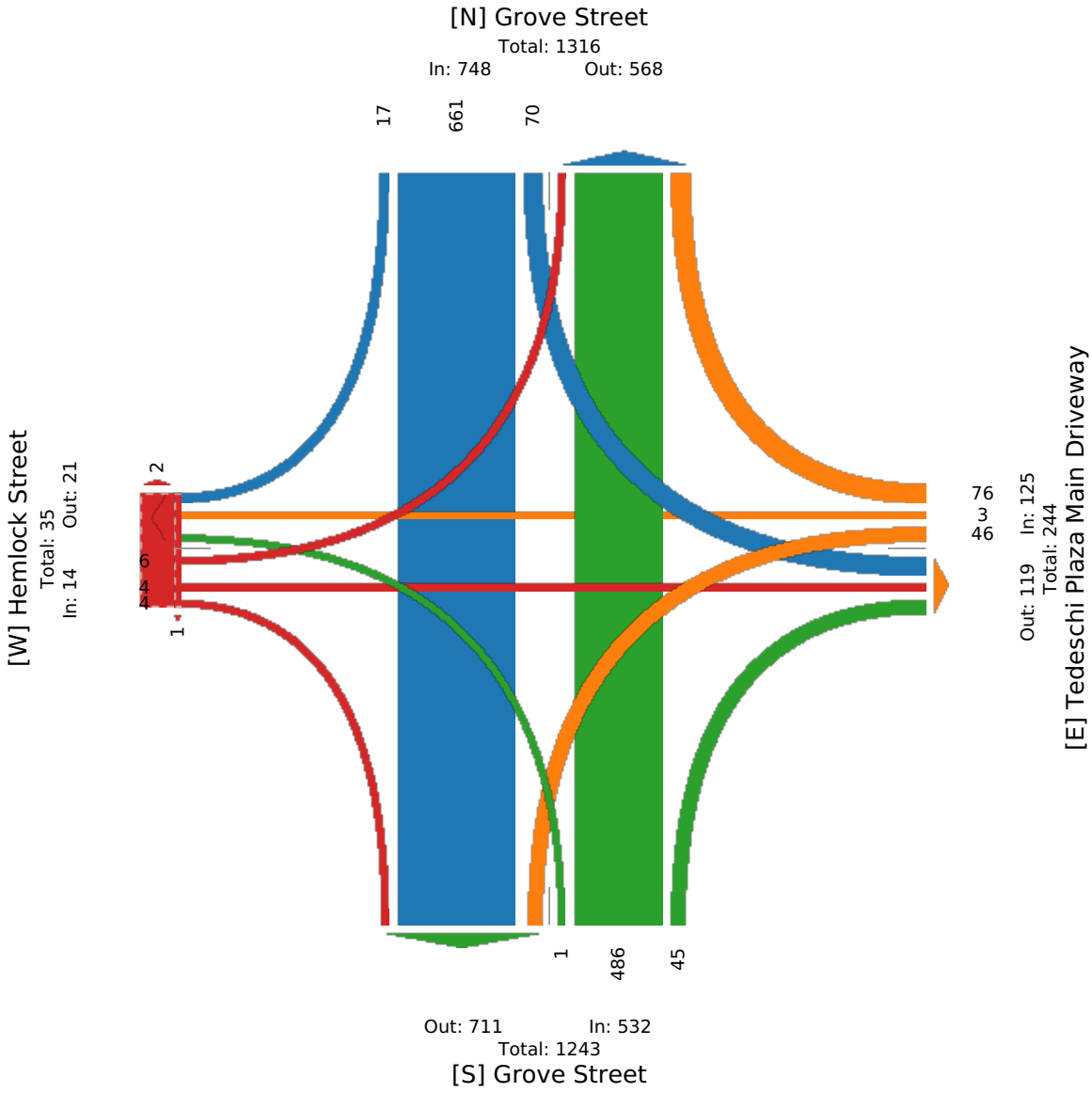
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street						Grove Street						Hemlock Street						Tedeschi Plaza Main Driveway						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2021-04-08 3:45PM	1	126	13	0	**140**	0	21	166	9	0	**196**	0	2	1	1	0	**4**	0	15	0	14	0	**29**	0	**369**
4:00PM	0	117	7	0	**124**	0	21	173	4	0	**198**	0	1	2	0	0	**3**	0	7	0	20	0	**27**	0	**352**
4:15PM	0	124	16	0	**140**	0	15	166	2	0	**183**	0	0	1	2	0	**3**	2	10	3	21	0	**34**	0	**360**
4:30PM	0	119	9	0	**128**	0	13	156	2	0	**171**	0	3	0	1	0	**4**	1	14	0	21	0	**35**	0	**338**
Total	1	486	45	0	**532**	0	70	661	17	0	**748**	0	6	4	4	0	**14**	3	46	3	76	0	**125**	0	**1419**
% Approach	0.2%	91.4%	8.5%	0%	**-**	-	9.4%	88.4%	2.3%	0%	**-**	-	42.9%	28.6%	28.6%	0%	**-**	-	36.8%	2.4%	60.8%	0%	**-**	-	-
% Total	0.1%	34.2%	3.2%	0%	**37.5%**	-	4.9%	46.6%	1.2%	0%	**52.7%**	-	0.4%	0.3%	0.3%	0%	**1.0%**	-	3.2%	0.2%	5.4%	0%	**8.8%**	-	-
PHF	0.250	0.964	0.703	-	**0.950**	-	0.833	0.954	0.536	-	**0.941**	-	0.500	0.500	0.500	-	**0.875**	-	0.767	0.250	0.905	-	**0.893**	-	0.967
Motorcycles	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	1	477	45	0	**523**	-	70	647	15	0	**732**	-	6	4	4	0	**14**	-	45	3	75	0	**123**	-	1392
% Lights	100%	98.1%	100%	0%	**98.3%**	-	100%	97.9%	88.2%	0%	**97.9%**	-	100%	100%	100%	0%	**100%**	-	97.8%	100%	98.7%	0%	**98.4%**	-	98.1%
Single-Unit Trucks	0	5	0	0	**5**	-	0	11	0	0	**11**	-	0	0	0	0	**0**	-	1	0	0	0	**1**	-	17
% Single-Unit Trucks	0%	1.0%	0%	0%	**0.9%**	-	0%	1.7%	0%	0%	**1.5%**	-	0%	0%	0%	0%	**0%**	-	2.2%	0%	0%	0%	**0.8%**	-	1.2%
Articulated Trucks	0	2	0	0	**2**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Articulated Trucks	0%	0.4%	0%	0%	**0.4%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Buses	0	2	0	0	**2**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	1	0	**1**	-	3
% Buses	0%	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	1.3%	0%	**0.8%**	-	0.2%
Bicycles on Road	0	0	0	0	**0**	-	0	1	2	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0.2%	11.8%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (8) Grove Street @ Tedeschi Plaza Mid... - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:45PM - 4:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818579, Location: 42.190544, -70.988318

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (9) Grove Street @ Tedeschi Plaza Sou... - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818581, Location: 42.189847, -70.987314

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Tedeschi Plaza South Driveway					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	514	28	0	**542**	0	9	315	0	**324**	0	13	4	0	**17**	1	**883**
8:00AM	552	53	0	**605**	1	19	341	0	**360**	0	21	9	0	**30**	1	**995**
9:00AM	537	79	0	**616**	1	17	318	0	**335**	0	27	23	0	**50**	0	**1001**
10:00AM	455	71	0	**526**	0	12	380	0	**392**	0	39	13	0	**52**	0	**970**
2:00PM	502	100	0	**602**	0	13	618	0	**631**	0	53	21	0	**74**	0	**1307**
3:00PM	521	88	0	**609**	0	24	635	0	**659**	0	53	26	0	**79**	0	**1347**
4:00PM	495	83	0	**578**	0	19	711	0	**730**	0	50	13	0	**63**	0	**1371**
5:00PM	491	102	0	**593**	0	20	706	0	**726**	0	58	26	0	**84**	0	**1403**
2021-04-10 10:00AM	483	108	0	**591**	0	10	454	0	**464**	0	44	20	0	**64**	2	**1119**
11:00AM	511	115	0	**626**	0	22	580	0	**602**	0	37	26	0	**63**	0	**1291**
12:00PM	562	102	0	**664**	0	21	639	0	**660**	0	54	15	0	**69**	0	**1393**
1:00PM	570	95	0	**665**	0	21	550	0	**571**	0	56	23	0	**79**	1	**1315**
Total	6193	1024	0	**7217**	2	207	6247	0	**6454**	0	505	219	0	**724**	5	**14395**
% Approach	85.8%	14.2%	0%	**-**	-	3.2%	96.8%	0%	**-**	-	69.8%	30.2%	0%	**-**	-	**-**
% Total	43.0%	7.1%	0%	**50.1%**	-	1.4%	43.4%	0%	**44.8%**	-	3.5%	1.5%	0%	**5.0%**	-	**-**
Motorcycles	17	2	0	**19**	-	0	26	0	**26**	-	1	0	0	**1**	-	46
% Motorcycles	0.3%	0.2%	0%	**0.3%**	-	0%	0.4%	0%	**0.4%**	-	0.2%	0%	0%	**0.1%**	-	0.3%
Lights	5998	1018	0	**7016**	-	204	6071	0	**6275**	-	498	218	0	**716**	-	14007
% Lights	96.9%	99.4%	0%	**97.2%**	-	98.6%	97.2%	0%	**97.2%**	-	98.6%	99.5%	0%	**98.9%**	-	97.3%
Single-Unit Trucks	126	2	0	**128**	-	3	107	0	**110**	-	5	1	0	**6**	-	244
% Single-Unit Trucks	2.0%	0.2%	0%	**1.8%**	-	1.4%	1.7%	0%	**1.7%**	-	1.0%	0.5%	0%	**0.8%**	-	1.7%
Articulated Trucks	31	1	0	**32**	-	0	20	0	**20**	-	0	0	0	**0**	-	52
% Articulated Trucks	0.5%	0.1%	0%	**0.4%**	-	0%	0.3%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	17	1	0	**18**	-	0	19	0	**19**	-	1	0	0	**1**	-	38
% Buses	0.3%	0.1%	0%	**0.2%**	-	0%	0.3%	0%	**0.3%**	-	0.2%	0%	0%	**0.1%**	-	0.3%
Bicycles on Road	4	0	0	**4**	-	0	4	0	**4**	-	0	0	0	**0**	-	8
% Bicycles on Road	0.1%	0%	0%	**0.1%**	-	0%	0.1%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	2	-	-	-	-	0	-	-	-	-	4	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	80.0%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	20.0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (9) Grove Street @ Tedeschi Plaza Sou... - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818581, Location: 42.189847, -70.987314

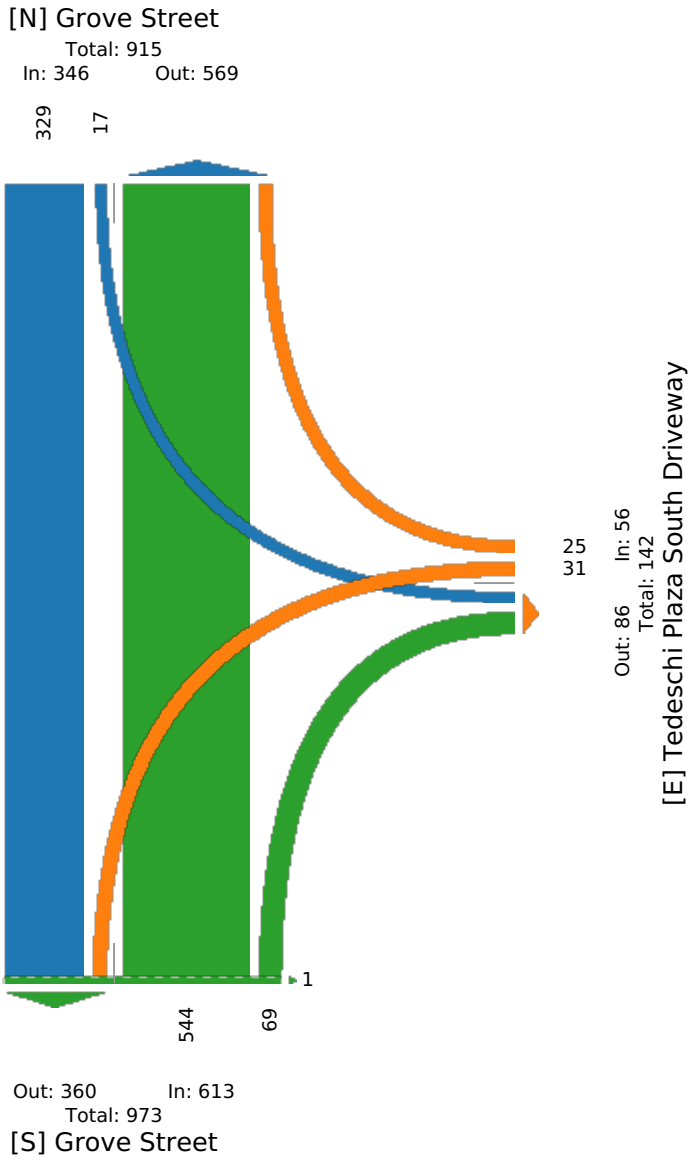
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Tedeschi Plaza South Driveway					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 9:15AM	133	24	0	**157**	0	6	75	0	**81**	0	5	7	0	**12**	0	**250**
9:30AM	136	12	0	**148**	0	2	74	0	**76**	0	8	7	0	**15**	0	**239**
9:45AM	138	20	0	**158**	1	6	84	0	**90**	0	9	7	0	**16**	0	**264**
10:00AM	137	13	0	**150**	0	3	96	0	**99**	0	9	4	0	**13**	0	**262**
Total	544	69	0	**613**	1	17	329	0	**346**	0	31	25	0	**56**	0	**1015**
% Approach	88.7%	11.3%	0%	**-**	-	4.9%	95.1%	0%	**-**	-	55.4%	44.6%	0%	**-**	-	-
% Total	53.6%	6.8%	0%	**60.4%**	-	1.7%	32.4%	0%	**34.1%**	-	3.1%	2.5%	0%	**5.5%**	-	-
PHF	0.986	0.719	-	**0.970**	-	0.708	0.857	-	**0.874**	-	0.861	0.893	-	**0.875**	-	0.961
Motorcycles	0	0	0	**0**	-	0	2	0	**2**	-	0	0	0	**0**	-	2
% Motorcycles	0%	0%	0%	**0%**	-	0%	0.6%	0%	**0.6%**	-	0%	0%	0%	**0%**	-	0.2%
Lights	517	69	0	**586**	-	17	314	0	**331**	-	30	25	0	**55**	-	972
% Lights	95.0%	100%	0%	**95.6%**	-	100%	95.4%	0%	**95.7%**	-	96.8%	100%	0%	**98.2%**	-	95.8%
Single-Unit Trucks	23	0	0	**23**	-	0	11	0	**11**	-	1	0	0	**1**	-	35
% Single-Unit Trucks	4.2%	0%	0%	**3.8%**	-	0%	3.3%	0%	**3.2%**	-	3.2%	0%	0%	**1.8%**	-	3.4%
Articulated Trucks	4	0	0	**4**	-	0	1	0	**1**	-	0	0	0	**0**	-	5
% Articulated Trucks	0.7%	0%	0%	**0.7%**	-	0%	0.3%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.5%
Buses	0	0	0	**0**	-	0	1	0	**1**	-	0	0	0	**0**	-	1
% Buses	0%	0%	0%	**0%**	-	0%	0.3%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	1	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (9) Grove Street @ Tedeschi Plaza Sou... - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 9:15AM - 10:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818581, Location: 42.189847, -70.987314

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (9) Grove Street @ Tedeschi Plaza Sou... - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 5PM - 6 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818581, Location: 42.189847, -70.987314

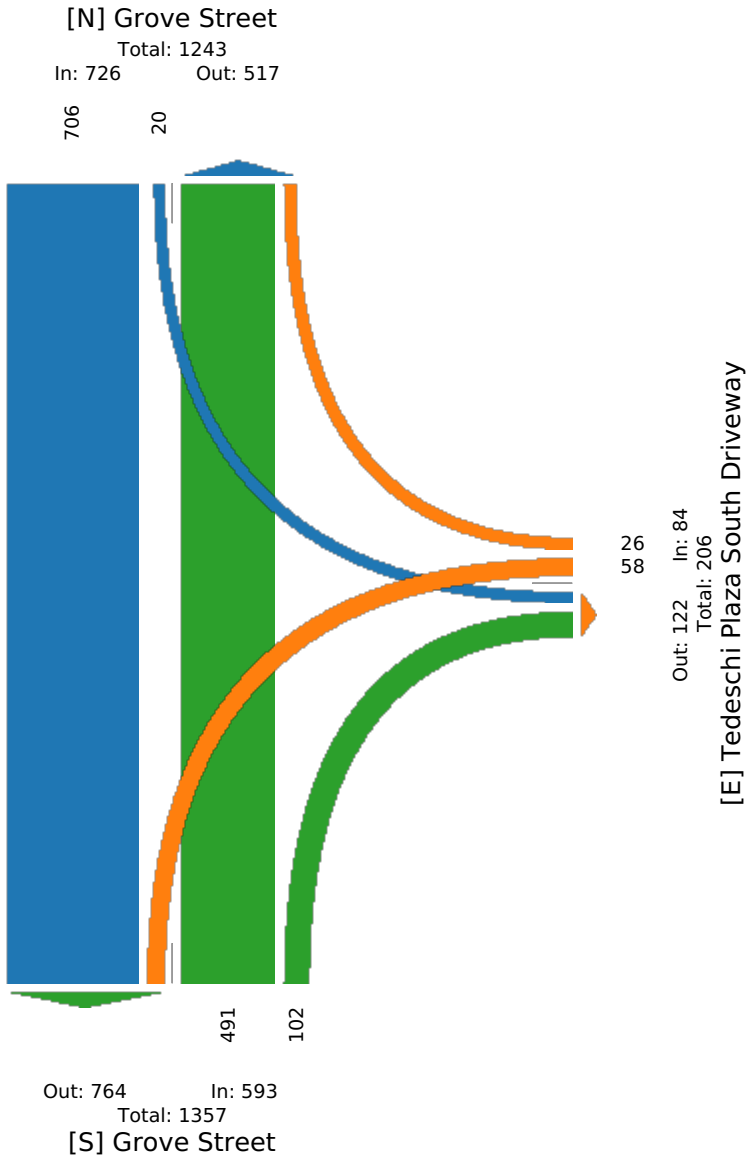
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Tedeschi Plaza South Driveway					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 5:00PM	134	22	0	**156**	0	2	187	0	**189**	0	15	4	0	**19**	0	**364**
5:15PM	113	31	0	**144**	0	7	177	0	**184**	0	11	8	0	**19**	0	**347**
5:30PM	126	21	0	**147**	0	4	165	0	**169**	0	19	7	0	**26**	0	**342**
5:45PM	118	28	0	**146**	0	7	177	0	**184**	0	13	7	0	**20**	0	**350**
Total	491	102	0	**593**	0	20	706	0	**726**	0	58	26	0	**84**	0	**1403**
% Approach	82.8%	17.2%	0%	**-**	-	2.8%	97.2%	0%	**-**	-	69.0%	31.0%	0%	**-**	-	**-**
% Total	35.0%	7.3%	0%	**42.3%**	-	1.4%	50.3%	0%	**51.7%**	-	4.1%	1.9%	0%	**6.0%**	-	**-**
PHF	0.916	0.823	-	**0.950**	-	0.714	0.944	-	**0.960**	-	0.763	0.813	-	**0.808**	-	0.964
Motorcycles	0	0	0	**0**	-	0	1	0	**1**	-	0	0	0	**0**	-	1
% Motorcycles	0%	0%	0%	**0%**	-	0%	0.1%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Lights	486	102	0	**588**	-	20	696	0	**716**	-	58	26	0	**84**	-	1388
% Lights	99.0%	100%	0%	**99.2%**	-	100%	98.6%	0%	**98.6%**	-	100%	100%	0%	**100%**	-	98.9%
Single-Unit Trucks	4	0	0	**4**	-	0	7	0	**7**	-	0	0	0	**0**	-	11
% Single-Unit Trucks	0.8%	0%	0%	**0.7%**	-	0%	1.0%	0%	**1.0%**	-	0%	0%	0%	**0%**	-	0.8%
Articulated Trucks	1	0	0	**1**	-	0	2	0	**2**	-	0	0	0	**0**	-	3
% Articulated Trucks	0.2%	0%	0%	**0.2%**	-	0%	0.3%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.2%
Buses	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Buses	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (9) Grove Street @ Tedeschi Plaza Sou... - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 5PM - 6 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818581, Location: 42.189847, -70.987314

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (10) Grove Street @ Liberty Street - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818582, Location: 42.189116, -70.986145

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street						Grove Street						Liberty Street						Liberty Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	L	T	R	U	App	Ped*	Int
2021-04-08 7:00AM	132	333	84	0	**549**	0	15	216	93	0	**324**	0	182	281	177	0	**640**	0	76	169	30	0	**275**	0	**1788**
8:00AM	128	400	85	0	**613**	1	13	240	102	0	**355**	1	171	312	180	0	**663**	1	104	194	34	0	**332**	1	**1963**
9:00AM	129	485	92	0	**706**	2	13	265	68	0	**346**	1	117	171	111	0	**399**	0	82	126	24	0	**232**	0	**1683**
10:00AM	109	393	85	0	**587**	0	20	296	97	0	**413**	0	106	137	123	0	**366**	0	96	143	20	0	**259**	0	**1625**
2:00PM	162	408	63	0	**633**	1	29	427	212	0	**668**	4	166	225	165	0	**556**	1	147	307	26	0	**480**	1	**2337**
3:00PM	189	446	119	0	**754**	1	31	485	160	0	**676**	1	142	218	206	0	**566**	0	178	353	23	0	**554**	0	**2550**
4:00PM	209	424	98	0	**731**	1	30	547	188	0	**765**	5	123	187	191	0	**501**	0	165	393	29	0	**587**	1	**2584**
5:00PM	201	443	97	0	**741**	0	29	550	187	0	**766**	4	157	219	181	0	**557**	0	194	362	21	0	**577**	0	**2641**
2021-04-10 10:00AM	154	377	102	0	**633**	0	19	331	130	0	**480**	0	191	182	145	0	**518**	0	107	167	24	0	**298**	1	**1929**
11:00AM	165	397	87	0	**649**	0	30	432	159	0	**621**	1	190	215	184	0	**589**	1	122	212	35	0	**369**	0	**2228**
12:00PM	151	452	113	0	**716**	0	27	492	182	0	**701**	2	170	189	169	0	**528**	0	152	230	41	0	**423**	0	**2368**
1:00PM	161	464	113	0	**738**	0	28	413	152	0	**593**	2	178	219	165	0	**562**	0	160	215	23	0	**398**	1	**2291**
Total	1890	5022	1138	0	**8050**	6	284	4694	1730	0	**6708**	21	1893	2555	1997	0	**6445**	3	1583	2871	330	0	**4784**	5	**25987**
% Approach	23.5%	62.4%	14.1%	0%	**-**	-	4.2%	70.0%	25.8%	0%	**-**	-	29.4%	39.6%	31.0%	0%	**-**	-	33.1%	60.0%	6.9%	0%	**-**	-	**-**
% Total	7.3%	19.3%	4.4%	0%	**31.0%**	-	1.1%	18.1%	6.7%	0%	**25.8%**	-	7.3%	9.8%	7.7%	0%	**24.8%**	-	6.1%	11.0%	1.3%	0%	**18.4%**	-	**-**
Motorcycles	2	15	0	0	**17**	-	1	22	7	0	**30**	-	3	10	5	0	**18**	-	5	8	0	0	**13**	-	78
% Motorcycles	0.1%	0.3%	0%	0%	**0.2%**	-	0.4%	0.5%	0.4%	0%	**0.4%**	-	0.2%	0.4%	0.3%	0%	**0.3%**	-	0.3%	0.3%	0%	0%	**0.3%**	-	0.3%
Lights	1835	4860	1119	0	**7814**	-	276	4547	1697	0	**6520**	-	1870	2484	1957	0	**6311**	-	1554	2800	319	0	**4673**	-	25318
% Lights	97.1%	96.8%	98.3%	0%	**97.1%**	-	97.2%	96.9%	98.1%	0%	**97.2%**	-	98.8%	97.2%	98.0%	0%	**97.9%**	-	98.2%	97.5%	96.7%	0%	**97.7%**	-	97.4%
Single-Unit Trucks	38	105	16	0	**159**	-	4	98	14	0	**116**	-	15	33	29	0	**77**	-	20	32	4	0	**56**	-	408
% Single-Unit Trucks	2.0%	2.1%	1.4%	0%	**2.0%**	-	1.4%	2.1%	0.8%	0%	**1.7%**	-	0.8%	1.3%	1.5%	0%	**1.2%**	-	1.3%	1.1%	1.2%	0%	**1.2%**	-	1.6%
Articulated Trucks	9	28	2	0	**39**	-	0	17	3	0	**20**	-	3	3	2	0	**8**	-	3	9	1	0	**13**	-	80
% Articulated Trucks	0.5%	0.6%	0.2%	0%	**0.5%**	-	0%	0.4%	0.2%	0%	**0.3%**	-	0.2%	0.1%	0.1%	0%	**0.1%**	-	0.2%	0.3%	0.3%	0%	**0.3%**	-	0.3%
Buses	6	10	1	0	**17**	-	3	10	8	0	**21**	-	2	22	4	0	**28**	-	1	21	6	0	**28**	-	94
% Buses	0.3%	0.2%	0.1%	0%	**0.2%**	-	1.1%	0.2%	0.5%	0%	**0.3%**	-	0.1%	0.9%	0.2%	0%	**0.4%**	-	0.1%	0.7%	1.8%	0%	**0.6%**	-	0.4%
Bicycles on Road	0	4	0	0	**4**	-	0	0	1	0	**1**	-	0	3	0	0	**3**	-	0	1	0	0	**1**	-	9
% Bicycles on Road	0%	0.1%	0%	0%	**0%**	-	0%	0%	0.1%	0%	**0%**	-	0%	0.1%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	6	-	-	-	-	-	18	-	-	-	-	-	3	-	-	-	-	-	3	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	85.7%	-	-	-	-	-	100%	-	-	-	-	-	60.0%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	-	-	-	-	-	2	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	14.3%	-	-	-	-	-	0%	-	-	-	-	-	40.0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (10) Grove Street @ Liberty Street - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:45AM - 8:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818582, Location: 42.189116, -70.986145

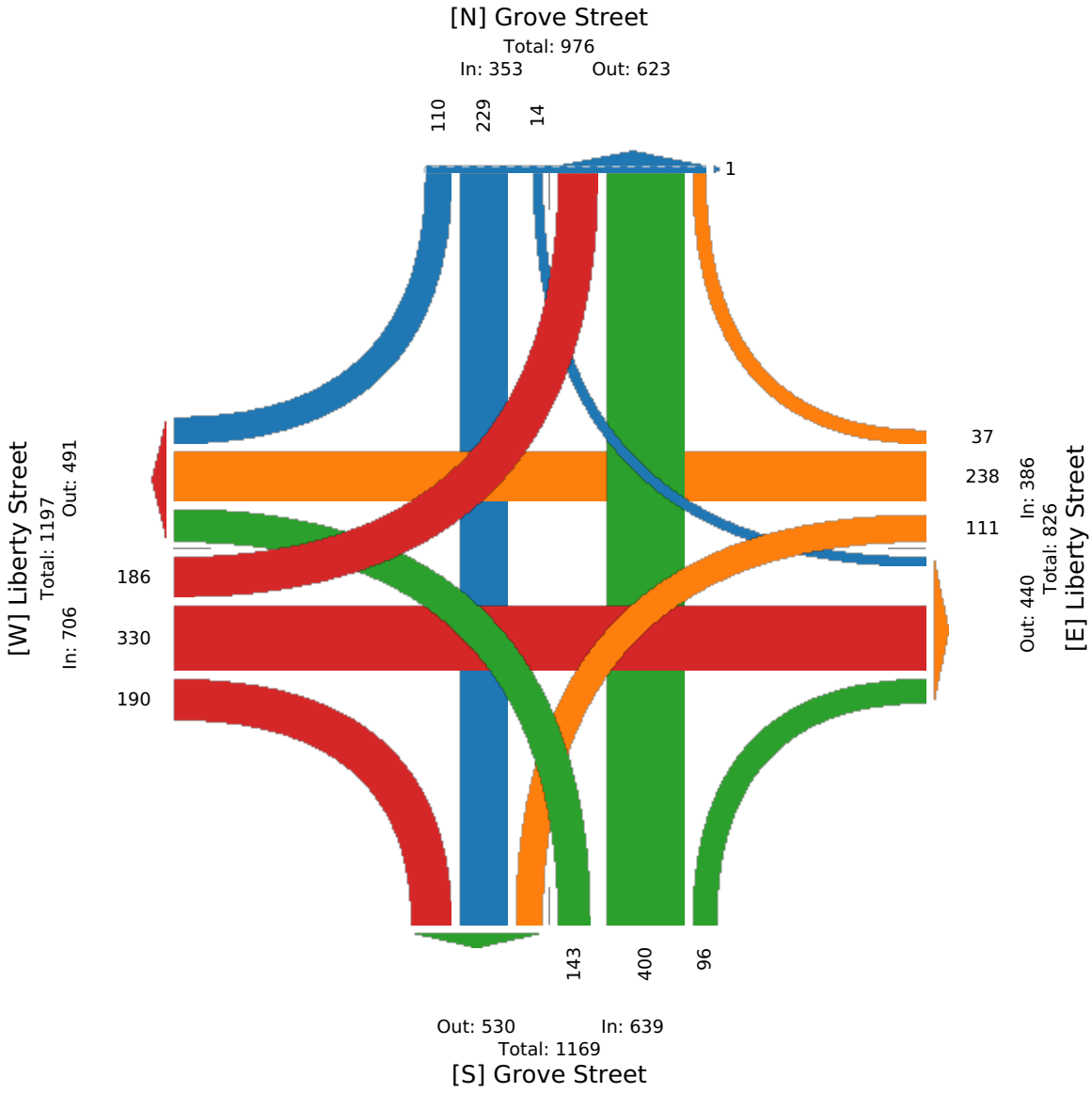
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street						Grove Street						Liberty Street						Liberty Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-04-08 7:45AM	42	96	27	0	**165**	0	6	59	29	0	**94**	0	52	73	53	0	**178**	0	27	81	7	0	**115**	0	**552**
8:00AM	35	116	22	0	**173**	0	2	60	26	0	**88**	0	44	90	49	0	**183**	0	33	36	6	0	**75**	0	**519**
8:15AM	37	94	26	0	**157**	0	5	58	26	0	**89**	0	34	77	43	0	**154**	0	26	73	17	0	**116**	0	**516**
8:30AM	29	94	21	0	**144**	0	1	52	29	0	**82**	1	56	90	45	0	**191**	0	25	48	7	0	**80**	0	**497**
Total	143	400	96	0	**639**	0	14	229	110	0	**353**	1	186	330	190	0	**706**	0	111	238	37	0	**386**	0	**2084**
% Approach	22.4%	62.6%	15.0%	0%	**-**	-	4.0%	64.9%	31.2%	0%	**-**	-	26.3%	46.7%	26.9%	0%	**-**	-	28.8%	61.7%	9.6%	0%	**-**	-	-
% Total	6.9%	19.2%	4.6%	0%	**30.7%**	-	0.7%	11.0%	5.3%	0%	**16.9%**	-	8.9%	15.8%	9.1%	0%	**33.9%**	-	5.3%	11.4%	1.8%	0%	**18.5%**	-	-
PHF	0.851	0.862	0.889	-	**0.923**	-	0.583	0.954	0.948	-	**0.939**	-	0.830	0.914	0.896	-	**0.923**	-	0.841	0.735	0.544	-	**0.832**	-	0.945
Motorcycles	0	1	0	0	**1**	-	0	1	0	0	**1**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	3
% Motorcycles	0%	0.3%	0%	0%	**0.2%**	-	0%	0.4%	0%	0%	**0.3%**	-	0%	0.3%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	137	381	94	0	**612**	-	14	220	106	0	**340**	-	182	319	186	0	**687**	-	108	231	34	0	**373**	-	2012
% Lights	95.8%	95.3%	97.9%	0%	**95.8%**	-	100%	96.1%	96.4%	0%	**96.3%**	-	97.8%	96.7%	97.9%	0%	**97.3%**	-	97.3%	97.1%	91.9%	0%	**96.6%**	-	96.5%
Single-Unit Trucks	5	13	2	0	**20**	-	0	8	1	0	**9**	-	2	2	3	0	**7**	-	3	2	1	0	**6**	-	42
% Single-Unit Trucks	3.5%	3.3%	2.1%	0%	**3.1%**	-	0%	3.5%	0.9%	0%	**2.5%**	-	1.1%	0.6%	1.6%	0%	**1.0%**	-	2.7%	0.8%	2.7%	0%	**1.6%**	-	2.0%
Articulated Trucks	0	3	0	0	**3**	-	0	0	0	0	**0**	-	1	0	1	0	**2**	-	0	2	0	0	**2**	-	7
% Articulated Trucks	0%	0.8%	0%	0%	**0.5%**	-	0%	0%	0%	0%	**0%**	-	0.5%	0%	0.5%	0%	**0.3%**	-	0%	0.8%	0%	0%	**0.5%**	-	0.3%
Buses	1	2	0	0	**3**	-	0	0	3	0	**3**	-	1	7	0	0	**8**	-	0	3	2	0	**5**	-	19
% Buses	0.7%	0.5%	0%	0%	**0.5%**	-	0%	0%	2.7%	0%	**0.8%**	-	0.5%	2.1%	0%	0%	**1.1%**	-	0%	1.3%	5.4%	0%	**1.3%**	-	0.9%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.3%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (10) Grove Street @ Liberty Street - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:45AM - 8:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818582, Location: 42.189116, -70.986145

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (10) Grove Street @ Liberty Street - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818582, Location: 42.189116, -70.986145

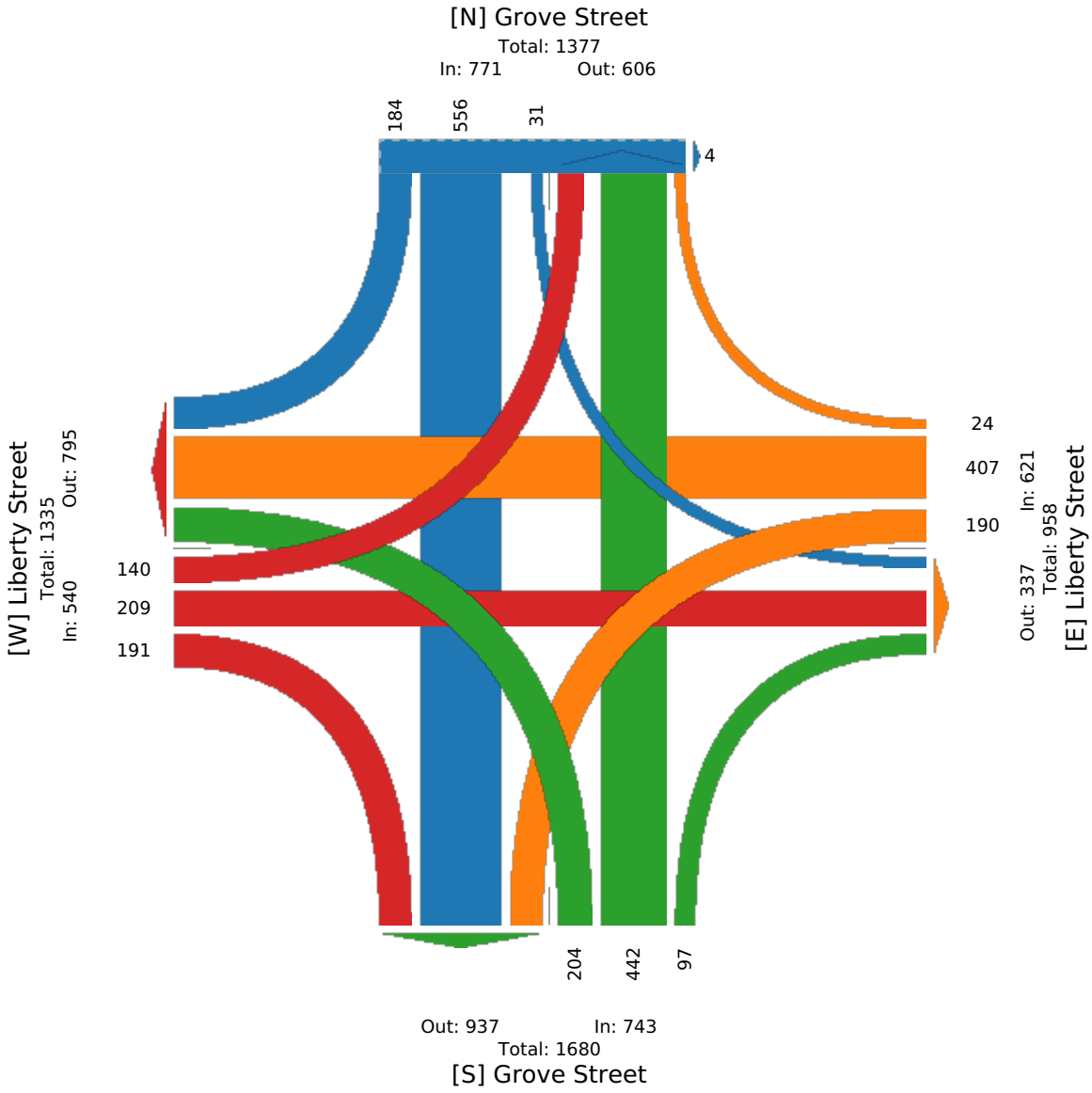
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street						Grove Street						Liberty Street						Liberty Street						
Direction	Northbound						Southbound						Eastbound						Westbound						
Time	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	L	T	R	U	**App**	Ped*	**Int**
2021-04-08 4:45PM	43	98	25	0	**166**	0	8	142	42	0	**192**	0	24	45	51	0	**120**	0	35	112	9	0	**156**	0	**634**
5:00PM	57	120	28	0	**205**	0	11	142	51	0	**204**	2	34	57	54	0	**145**	0	61	95	7	0	**163**	0	**717**
5:15PM	48	106	22	0	**176**	0	5	137	53	0	**195**	2	45	58	46	0	**149**	0	53	104	5	0	**162**	0	**682**
5:30PM	56	118	22	0	**196**	0	7	135	38	0	**180**	0	37	49	40	0	**126**	0	41	96	3	0	**140**	0	**642**
Total	204	442	97	0	**743**	0	31	556	184	0	**771**	4	140	209	191	0	**540**	0	190	407	24	0	**621**	0	**2675**
% Approach	27.5%	59.5%	13.1%	0%	**-**	-	4.0%	72.1%	23.9%	0%	**-**	-	25.9%	38.7%	35.4%	0%	**-**	-	30.6%	65.5%	3.9%	0%	**-**	-	-
% Total	7.6%	16.5%	3.6%	0%	**27.8%**	-	1.2%	20.8%	6.9%	0%	**28.8%**	-	5.2%	7.8%	7.1%	0%	**20.2%**	-	7.1%	15.2%	0.9%	0%	**23.2%**	-	-
PHF	0.895	0.921	0.866	-	**0.906**	-	0.705	0.979	0.868	-	**0.945**	-	0.778	0.897	0.884	-	**0.904**	-	0.779	0.908	0.667	-	**0.952**	-	0.934
Motorcycles	0	3	0	0	**3**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	1	0	0	0	**1**	-	5
% Motorcycles	0%	0.7%	0%	0%	**0.4%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0.5%	0%	0%	0%	**0.2%**	-	0.2%
Lights	194	434	97	0	**725**	-	31	547	183	0	**761**	-	140	207	190	0	**537**	-	186	404	23	0	**613**	-	2636
% Lights	95.1%	98.2%	100%	0%	**97.6%**	-	100%	98.4%	99.5%	0%	**98.7%**	-	100%	99.0%	99.5%	0%	**99.4%**	-	97.9%	99.3%	95.8%	0%	**98.7%**	-	98.5%
Single-Unit Trucks	7	3	0	0	**10**	-	0	6	1	0	**7**	-	0	1	1	0	**2**	-	1	3	1	0	**5**	-	24
% Single-Unit Trucks	3.4%	0.7%	0%	0%	**1.3%**	-	0%	1.1%	0.5%	0%	**0.9%**	-	0%	0.5%	0.5%	0%	**0.4%**	-	0.5%	0.7%	4.2%	0%	**0.8%**	-	0.9%
Articulated Trucks	2	2	0	0	**4**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	2	0	0	0	**2**	-	7
% Articulated Trucks	1.0%	0.5%	0%	0%	**0.5%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	1.1%	0%	0%	0%	**0.3%**	-	0.3%
Buses	1	0	0	0	**1**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	2
% Buses	0.5%	0%	0%	0%	**0.1%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.5%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (10) Grove Street @ Liberty Street - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818582, Location: 42.189116, -70.986145

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (11) Liberty Street @ Tedeschi Plaza ... - TMC

Thu Apr 8, 2021
Full Length (10 AM-2 PM, 7 AM-11 AM, 2 PM-6 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818583, Location: 42.189834, -70.985985

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Tedeschi Plaza Driveway					Liberty Street					Liberty Street					
Direction	Southbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	20	22	0	**42**	2	12	374	0	**386**	0	255	40	0	**295**	1	**723**
8:00AM	33	26	0	**59**	0	20	397	0	**417**	0	303	40	0	**343**	0	**819**
9:00AM	35	43	0	**78**	0	26	260	0	**286**	0	194	38	0	**232**	0	**596**
10:00AM	40	49	0	**89**	3	24	229	0	**253**	1	209	50	0	**259**	0	**601**
2:00PM	46	56	0	**102**	0	30	298	0	**328**	0	438	56	0	**494**	0	**924**
3:00PM	56	72	0	**128**	0	30	347	0	**377**	0	487	77	0	**564**	0	**1069**
4:00PM	61	62	0	**123**	3	21	300	0	**321**	0	528	76	0	**604**	0	**1048**
5:00PM	66	65	0	**131**	0	24	326	0	**350**	0	526	79	0	**605**	0	**1086**
2021-04-10 10:00AM	45	45	0	**90**	5	25	282	0	**307**	2	263	55	0	**318**	0	**715**
11:00AM	57	70	0	**127**	0	24	321	0	**345**	3	302	75	0	**377**	0	**849**
12:00PM	63	66	0	**129**	2	22	321	0	**343**	0	361	88	0	**449**	0	**921**
1:00PM	55	71	0	**126**	0	25	351	0	**376**	1	337	76	0	**413**	0	**915**
Total	577	647	0	**1224**	15	283	3806	0	**4089**	7	4203	750	0	**4953**	1	**10266**
% Approach	47.1%	52.9%	0%	**-**	-	6.9%	93.1%	0%	**-**	-	84.9%	15.1%	0%	**-**	-	**-**
% Total	5.6%	6.3%	0%	**11.9%**	-	2.8%	37.1%	0%	**39.8%**	-	40.9%	7.3%	0%	**48.2%**	-	-
Motorcycles	0	0	0	**0**	-	0	13	0	**13**	-	13	2	0	**15**	-	28
% Motorcycles	0%	0%	0%	**0%**	-	0%	0.3%	0%	**0.3%**	-	0.3%	0.3%	0%	**0.3%**	-	0.3%
Lights	573	646	0	**1219**	-	279	3706	0	**3985**	-	4089	744	0	**4833**	-	10037
% Lights	99.3%	99.8%	0%	**99.6%**	-	98.6%	97.4%	0%	**97.5%**	-	97.3%	99.2%	0%	**97.6%**	-	97.8%
Single-Unit Trucks	4	1	0	**5**	-	2	58	0	**60**	-	59	2	0	**61**	-	126
% Single-Unit Trucks	0.7%	0.2%	0%	**0.4%**	-	0.7%	1.5%	0%	**1.5%**	-	1.4%	0.3%	0%	**1.2%**	-	1.2%
Articulated Trucks	0	0	0	**0**	-	0	5	0	**5**	-	12	0	0	**12**	-	17
% Articulated Trucks	0%	0%	0%	**0%**	-	0%	0.1%	0%	**0.1%**	-	0.3%	0%	0%	**0.2%**	-	0.2%
Buses	0	0	0	**0**	-	2	22	0	**24**	-	28	1	0	**29**	-	53
% Buses	0%	0%	0%	**0%**	-	0.7%	0.6%	0%	**0.6%**	-	0.7%	0.1%	0%	**0.6%**	-	0.5%
Bicycles on Road	0	0	0	**0**	-	0	2	0	**2**	-	2	1	0	**3**	-	5
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0.1%	0%	**0%**	-	0%	0.1%	0%	**0.1%**	-	0%
Pedestrians	-	-	-	-	13	-	-	-	-	7	-	-	-	-	0	
% Pedestrians	-	-	-	-	86.7%	-	-	-	-	100%	-	-	-	-	0%	-
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	0	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	13.3%	-	-	-	-	0%	-	-	-	-	100%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (11) Liberty Street @ Tedeschi Plaza ... - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:45AM - 8:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818583, Location: 42.189834, -70.985985

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Tedeschi Plaza Driveway					Liberty Street					Liberty Street					
Direction	Southbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	**Int**
2021-04-08 7:45AM	9	5	0	**14**	0	2	104	0	**106**	0	106	12	0	**118**	1	**238**
8:00AM	6	8	0	**14**	0	4	109	0	**113**	0	66	10	0	**76**	0	**203**
8:15AM	6	8	0	**14**	0	8	104	0	**112**	0	108	8	0	**116**	0	**242**
8:30AM	11	5	0	**16**	0	3	109	0	**112**	0	76	13	0	**89**	0	**217**
Total	32	26	0	**58**	0	17	426	0	**443**	0	356	43	0	**399**	1	**900**
% Approach	55.2%	44.8%	0%	**-**	-	3.8%	96.2%	0%	**-**	-	89.2%	10.8%	0%	**-**	-	-
% Total	3.6%	2.9%	0%	**6.4%**	-	1.9%	47.3%	0%	**49.2%**	-	39.6%	4.8%	0%	**44.3%**	-	-
PHF	0.727	0.813	-	**0.906**	-	0.531	0.977	-	**0.980**	-	0.824	0.808	-	**0.850**	-	0.929
Motorcycles	0	0	0	**0**	-	0	1	0	**1**	-	0	0	0	**0**	-	1
% Motorcycles	0%	0%	0%	**0%**	-	0%	0.2%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.1%
Lights	32	25	0	**57**	-	16	414	0	**430**	-	346	41	0	**387**	-	874
% Lights	100%	96.2%	0%	**98.3%**	-	94.1%	97.2%	0%	**97.1%**	-	97.2%	95.3%	0%	**97.0%**	-	97.1%
Single-Unit Trucks	0	1	0	**1**	-	1	4	0	**5**	-	5	0	0	**5**	-	11
% Single-Unit Trucks	0%	3.8%	0%	**1.7%**	-	5.9%	0.9%	0%	**1.1%**	-	1.4%	0%	0%	**1.3%**	-	1.2%
Articulated Trucks	0	0	0	**0**	-	0	0	0	**0**	-	1	0	0	**1**	-	1
% Articulated Trucks	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0.3%	0%	0%	**0.3%**	-	0.1%
Buses	0	0	0	**0**	-	0	7	0	**7**	-	4	1	0	**5**	-	12
% Buses	0%	0%	0%	**0%**	-	0%	1.6%	0%	**1.6%**	-	1.1%	2.3%	0%	**1.3%**	-	1.3%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	1	0	**1**	-	1
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	2.3%	0%	**0.3%**	-	0.1%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (11) Liberty Street @ Tedeschi Plaza ... - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:45AM - 8:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818583, Location: 42.189834, -70.985985

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
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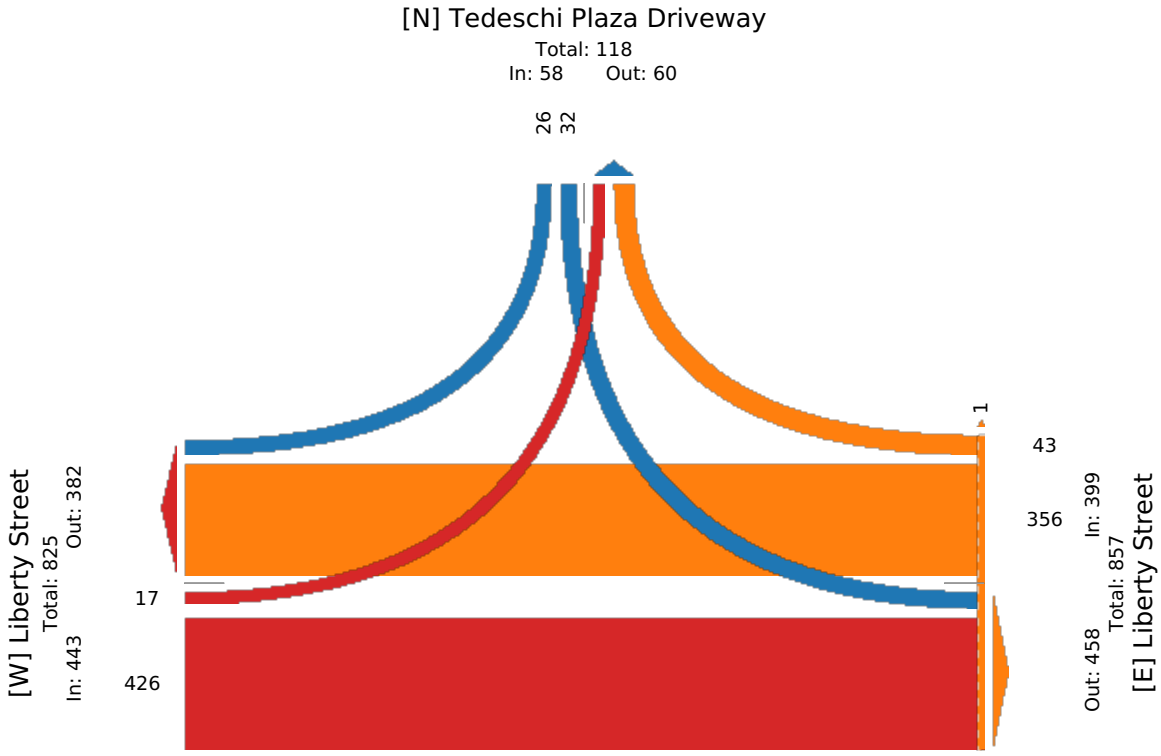

217835 (11) Liberty Street @ Tedeschi Plaza ... - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818583, Location: 42.189834, -70.985985

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Tedeschi Plaza Driveway					Liberty Street					Liberty Street					
Direction	Southbound					Eastbound					Westbound					
Time	L	R	U	**App**	Ped*	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	**Int**
2021-04-08 4:45PM	22	16	0	**38**	2	5	77	0	**82**	0	139	20	0	**159**	0	**279**
5:00PM	7	14	0	**21**	0	9	85	0	**94**	0	157	20	0	**177**	0	**292**
5:15PM	15	13	0	**28**	0	5	82	0	**87**	0	151	23	0	**174**	0	**289**
5:30PM	22	20	0	**42**	0	4	76	0	**80**	0	121	20	0	**141**	0	**263**
Total	66	63	0	**129**	2	23	320	0	**343**	0	568	83	0	**651**	0	**1123**
% Approach	51.2%	48.8%	0%	**-**	-	6.7%	93.3%	0%	**-**	-	87.3%	12.7%	0%	**-**	-	**-**
% Total	5.9%	5.6%	0%	**11.5%**	-	2.0%	28.5%	0%	**30.5%**	-	50.6%	7.4%	0%	**58.0%**	-	**-**
PHF	0.750	0.788	-	**0.768**	-	0.639	0.938	-	**0.910**	-	0.904	0.902	-	**0.919**	-	0.961
Motorcycles	0	0	0	**0**	-	0	2	0	**2**	-	1	1	0	**2**	-	4
% Motorcycles	0%	0%	0%	**0%**	-	0%	0.6%	0%	**0.6%**	-	0.2%	1.2%	0%	**0.3%**	-	0.4%
Lights	66	63	0	**129**	-	23	315	0	**338**	-	560	82	0	**642**	-	1109
% Lights	100%	100%	0%	**100%**	-	100%	98.4%	0%	**98.5%**	-	98.6%	98.8%	0%	**98.6%**	-	98.8%
Single-Unit Trucks	0	0	0	**0**	-	0	2	0	**2**	-	5	0	0	**5**	-	7
% Single-Unit Trucks	0%	0%	0%	**0%**	-	0%	0.6%	0%	**0.6%**	-	0.9%	0%	0%	**0.8%**	-	0.6%
Articulated Trucks	0	0	0	**0**	-	0	0	0	**0**	-	2	0	0	**2**	-	2
% Articulated Trucks	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0.4%	0%	0%	**0.3%**	-	0.2%
Buses	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Buses	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Bicycles on Road	0	0	0	**0**	-	0	1	0	**1**	-	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0.3%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	2	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (11) Liberty Street @ Tedeschi Plaza ... - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 4:45PM - 5:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818583, Location: 42.189834, -70.985985

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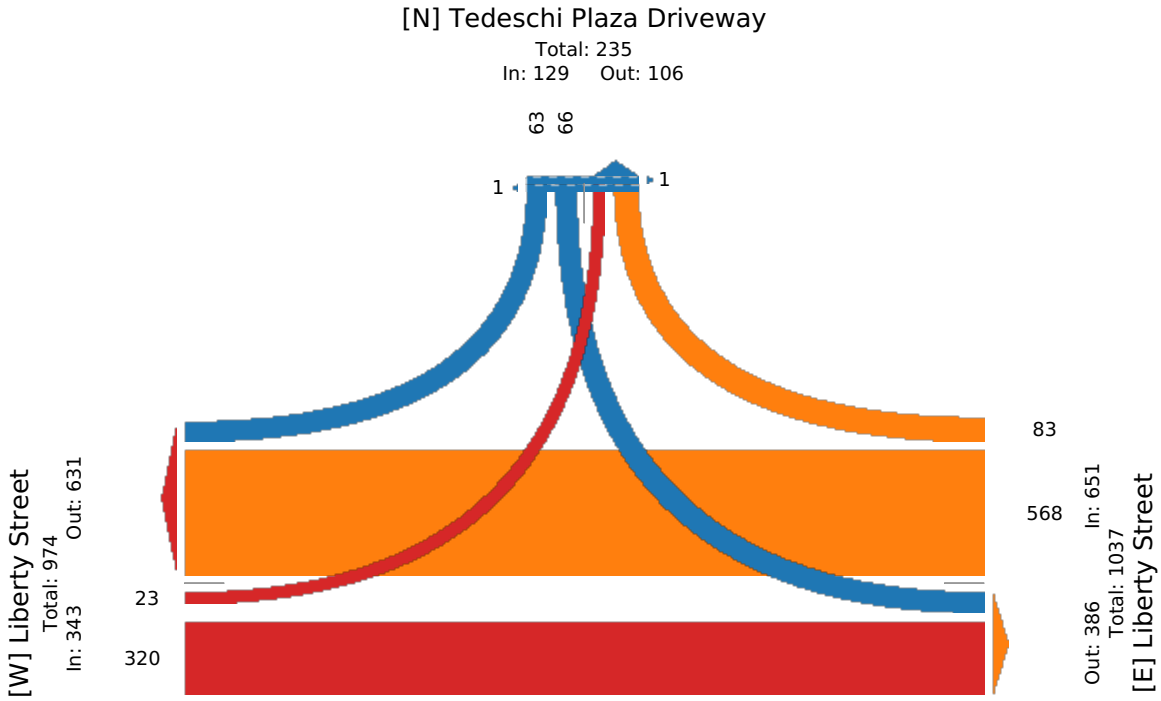


217849 (12) Grove Street @ O'Toole Terrace - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818584, Location: 42.187952, -70.981183

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					O'Toole Terrace					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	0	567	0	**567**	0	469	1	0	**470**	0	0	0	0	**0**	1	**1037**
8:00AM	0	608	0	**608**	0	512	3	0	**515**	0	2	2	0	**4**	0	**1127**
9:00AM	0	679	0	**679**	0	459	2	0	**461**	2	3	1	0	**4**	2	**1144**
10:00AM	3	594	0	**597**	1	509	0	0	**509**	0	0	0	0	**0**	0	**1106**
2:00PM	2	620	0	**622**	0	732	1	0	**733**	0	2	2	0	**4**	0	**1359**
3:00PM	1	773	0	**774**	0	873	3	0	**876**	0	1	1	0	**2**	0	**1652**
4:00PM	2	728	0	**730**	0	903	3	0	**906**	0	1	0	0	**1**	0	**1637**
5:00PM	1	699	0	**700**	0	928	2	0	**930**	0	3	0	0	**3**	1	**1633**
2021-04-10 10:00AM	1	613	0	**614**	0	587	1	0	**588**	2	0	3	0	**3**	0	**1205**
11:00AM	2	657	0	**659**	0	736	1	0	**737**	2	0	4	0	**4**	0	**1400**
12:00PM	2	717	0	**719**	0	815	1	0	**816**	0	0	0	0	**0**	0	**1535**
1:00PM	0	736	0	**736**	0	742	3	0	**745**	0	1	2	0	**3**	1	**1484**
Total	14	7991	0	**8005**	1	8265	21	0	**8286**	6	13	15	0	**28**	5	**16319**
% Approach	0.2%	99.8%	0%	**-**	-	99.7%	0.3%	0%	**-**	-	46.4%	53.6%	0%	**-**	-	**-**
% Total	0.1%	49.0%	0%	**49.1%**	-	50.6%	0.1%	0%	**50.8%**	-	0.1%	0.1%	0%	**0.2%**	-	**-**
Motorcycles	0	17	0	**17**	-	29	0	0	**29**	-	0	0	0	**0**	-	46
% Motorcycles	0%	0.2%	0%	**0.2%**	-	0.4%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.3%
Lights	13	7748	0	**7761**	-	8041	21	0	**8062**	-	13	14	0	**27**	-	15850
% Lights	92.9%	97.0%	0%	**97.0%**	-	97.3%	100%	0%	**97.3%**	-	100%	93.3%	0%	**96.4%**	-	97.1%
Single-Unit Trucks	1	166	0	**167**	-	155	0	0	**155**	-	0	1	0	**1**	-	323
% Single-Unit Trucks	7.1%	2.1%	0%	**2.1%**	-	1.9%	0%	0%	**1.9%**	-	0%	6.7%	0%	**3.6%**	-	2.0%
Articulated Trucks	0	40	0	**40**	-	22	0	0	**22**	-	0	0	0	**0**	-	62
% Articulated Trucks	0%	0.5%	0%	**0.5%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	0	15	0	**15**	-	15	0	0	**15**	-	0	0	0	**0**	-	30
% Buses	0%	0.2%	0%	**0.2%**	-	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.2%
Bicycles on Road	0	5	0	**5**	-	3	0	0	**3**	-	0	0	0	**0**	-	8
% Bicycles on Road	0%	0.1%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	1	-	-	-	-	6	-	-	-	-	5	
% Pedestrians	-	-	-	-	100%	-	-	-	-	100%	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217849 (12) Grove Street @ O'Toole Terrace - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818584, Location: 42.187952, -70.981183

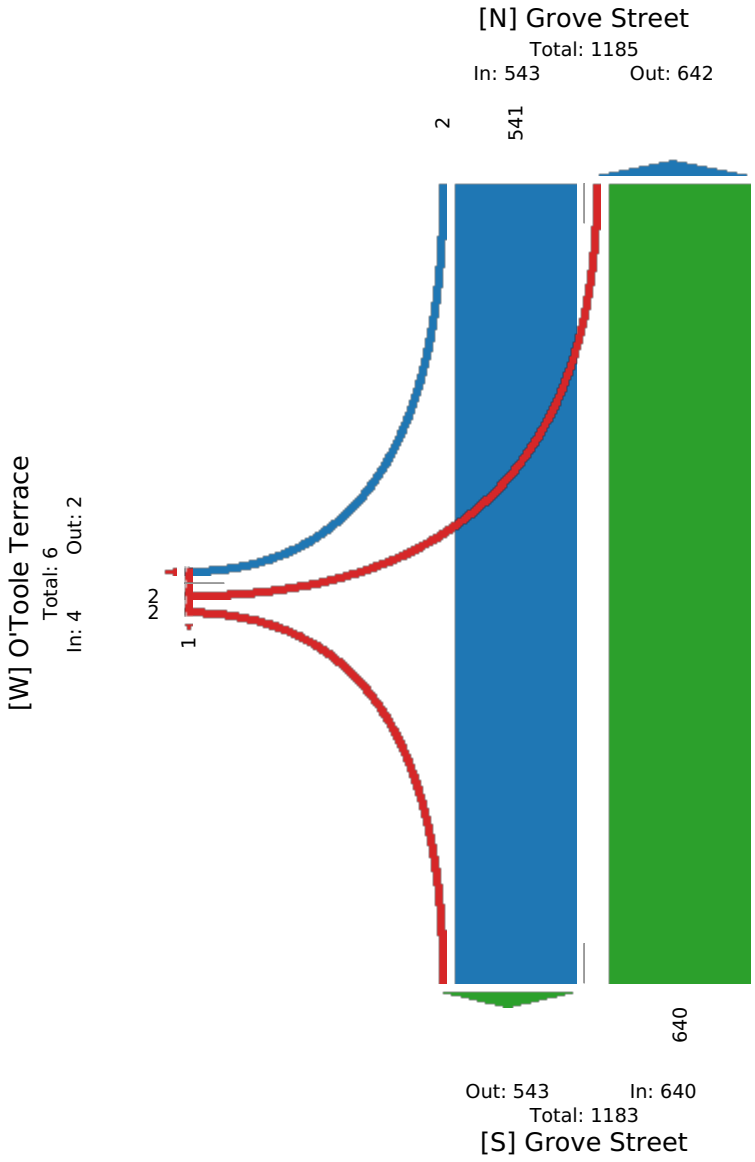
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					O'Toole Terrace					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:30AM	0	148	0	**148**	0	139	1	0	**140**	0	0	0	0	**0**	0	**288**
7:45AM	0	181	0	**181**	0	135	0	0	**135**	0	0	0	0	**0**	1	**316**
8:00AM	0	162	0	**162**	0	141	0	0	**141**	0	1	1	0	**2**	0	**305**
8:15AM	0	149	0	**149**	0	126	1	0	**127**	0	1	1	0	**2**	0	**278**
Total	0	640	0	**640**	0	541	2	0	**543**	0	2	2	0	**4**	1	**1187**
% Approach	0%	100%	0%	**-**	-	99.6%	0.4%	0%	**-**	-	50.0%	50.0%	0%	**-**	-	-
% Total	0%	53.9%	0%	**53.9%**	-	45.6%	0.2%	0%	**45.7%**	-	0.2%	0.2%	0%	**0.3%**	-	-
PHF	-	0.884	-	**0.884**	-	0.959	0.500	-	**0.963**	-	0.500	0.500	-	**0.500**	-	0.939
Motorcycles	0	0	0	**0**	-	2	0	0	**2**	-	0	0	0	**0**	-	2
% Motorcycles	0%	0%	0%	**0%**	-	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.2%
Lights	0	615	0	**615**	-	515	2	0	**517**	-	2	2	0	**4**	-	1136
% Lights	0%	96.1%	0%	**96.1%**	-	95.2%	100%	0%	**95.2%**	-	100%	100%	0%	**100%**	-	95.7%
Single-Unit Trucks	0	17	0	**17**	-	19	0	0	**19**	-	0	0	0	**0**	-	36
% Single-Unit Trucks	0%	2.7%	0%	**2.7%**	-	3.5%	0%	0%	**3.5%**	-	0%	0%	0%	**0%**	-	3.0%
Articulated Trucks	0	4	0	**4**	-	3	0	0	**3**	-	0	0	0	**0**	-	7
% Articulated Trucks	0%	0.6%	0%	**0.6%**	-	0.6%	0%	0%	**0.6%**	-	0%	0%	0%	**0%**	-	0.6%
Buses	0	4	0	**4**	-	2	0	0	**2**	-	0	0	0	**0**	-	6
% Buses	0%	0.6%	0%	**0.6%**	-	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.5%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217849 (12) Grove Street @ O'Toole Terrace - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818584, Location: 42.187952, -70.981183

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217849 (12) Grove Street @ O'Toole Terrace - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:30PM - 4:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818584, Location: 42.187952, -70.981183

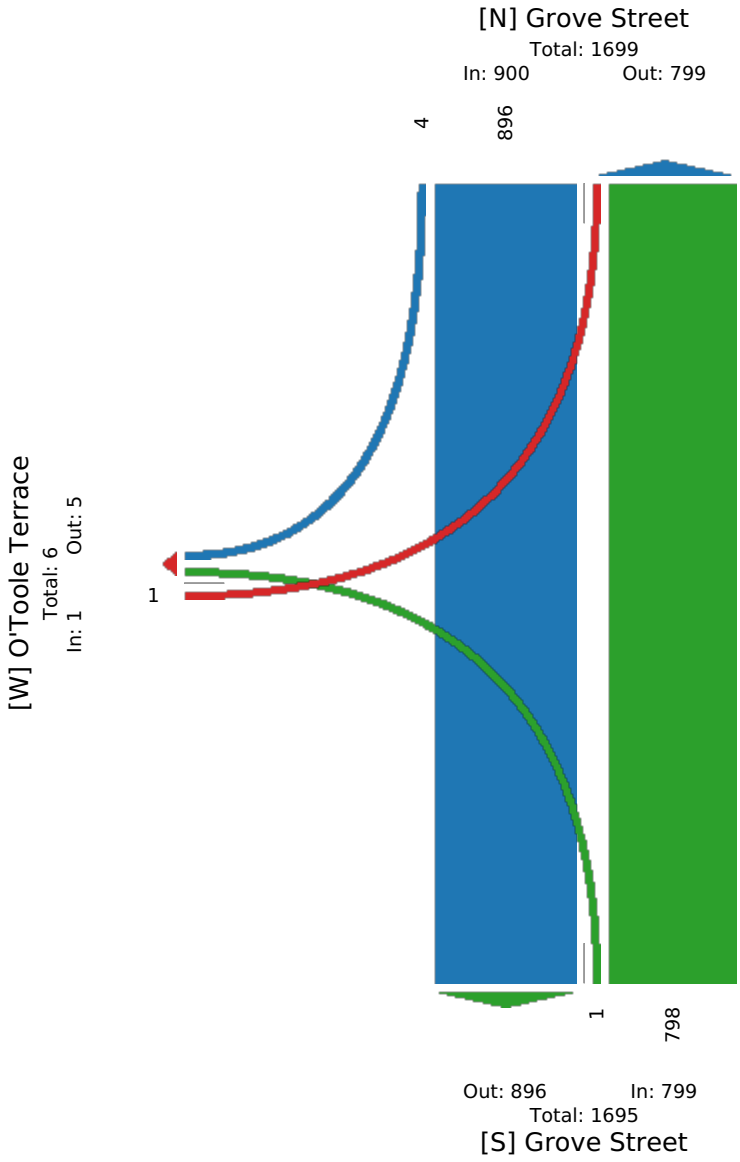
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					O'Toole Terrace					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 3:30PM	0	212	0	**212**	0	214	2	0	**216**	0	0	0	0	**0**	0	**428**
3:45PM	0	201	0	**201**	0	231	0	0	**231**	0	0	0	0	**0**	0	**432**
4:00PM	0	188	0	**188**	0	243	1	0	**244**	0	1	0	0	**1**	0	**433**
4:15PM	1	197	0	**198**	0	208	1	0	**209**	0	0	0	0	**0**	0	**407**
Total	1	798	0	**799**	0	896	4	0	**900**	0	1	0	0	**1**	0	**1700**
% Approach	0.1%	99.9%	0%	**-**	-	99.6%	0.4%	0%	**-**	-	100%	0%	0%	**-**	-	-
% Total	0.1%	46.9%	0%	**47.0%**	-	52.7%	0.2%	0%	**52.9%**	-	0.1%	0%	0%	**0.1%**	-	-
PHF	0.250	0.940	-	**0.941**	-	0.925	0.500	-	**0.925**	-	0.250	-	-	**0.250**	-	0.983
Motorcycles	0	0	0	**0**	-	3	0	0	**3**	-	0	0	0	**0**	-	3
% Motorcycles	0%	0%	0%	**0%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.2%
Lights	1	780	0	**781**	-	874	4	0	**878**	-	1	0	0	**1**	-	1660
% Lights	100%	97.7%	0%	**97.7%**	-	97.5%	100%	0%	**97.6%**	-	100%	0%	0%	**100%**	-	97.6%
Single-Unit Trucks	0	10	0	**10**	-	15	0	0	**15**	-	0	0	0	**0**	-	25
% Single-Unit Trucks	0%	1.3%	0%	**1.3%**	-	1.7%	0%	0%	**1.7%**	-	0%	0%	0%	**0%**	-	1.5%
Articulated Trucks	0	5	0	**5**	-	2	0	0	**2**	-	0	0	0	**0**	-	7
% Articulated Trucks	0%	0.6%	0%	**0.6%**	-	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	0	2	0	**2**	-	1	0	0	**1**	-	0	0	0	**0**	-	3
% Buses	0%	0.3%	0%	**0.3%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.2%
Bicycles on Road	0	1	0	**1**	-	1	0	0	**1**	-	0	0	0	**0**	-	2
% Bicycles on Road	0%	0.1%	0%	**0.1%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217849 (12) Grove Street @ O'Toole Terrace - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:30PM - 4:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818584, Location: 42.187952, -70.981183

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (13) Grove Street @ Birch Street - TMC

Thu Apr 8, 2021
Full Length (10 AM-2 PM, 7 AM-11 AM, 2 PM-6 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818585, Location: 42.187517, -70.979693

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Birch Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	4	561	0	**565**	0	462	4	0	**466**	1	6	15	0	**21**	1	**1052**
8:00AM	12	606	0	**618**	0	513	1	0	**514**	0	2	16	0	**18**	0	**1150**
9:00AM	13	675	0	**688**	0	457	4	0	**461**	0	2	15	0	**17**	0	**1166**
10:00AM	15	594	0	**609**	0	509	4	0	**513**	0	2	12	1	**15**	0	**1137**
2:00PM	13	619	0	**632**	0	723	7	0	**730**	0	2	10	0	**12**	0	**1374**
3:00PM	22	769	0	**791**	0	868	7	0	**875**	0	7	21	0	**28**	0	**1694**
4:00PM	27	722	0	**749**	0	884	5	0	**889**	0	6	15	0	**21**	0	**1659**
5:00PM	20	704	0	**724**	0	913	7	0	**920**	0	1	17	0	**18**	1	**1662**
2021-04-10 10:00AM	18	609	0	**627**	0	583	4	0	**587**	0	3	32	0	**35**	0	**1249**
11:00AM	20	650	0	**670**	0	733	4	0	**737**	0	4	17	0	**21**	0	**1428**
12:00PM	21	716	0	**737**	0	810	1	0	**811**	0	2	26	0	**28**	0	**1576**
1:00PM	18	731	0	**749**	0	734	7	1	**742**	0	4	13	0	**17**	0	**1508**
Total	203	7956	0	**8159**	0	8189	55	1	**8245**	1	41	209	1	**251**	2	**16655**
% Approach	2.5%	97.5%	0%	**-**	-	99.3%	0.7%	0%	**-**	-	16.3%	83.3%	0.4%	**-**	-	**-**
% Total	1.2%	47.8%	0%	**49.0%**	-	49.2%	0.3%	0%	**49.5%**	-	0.2%	1.3%	0%	**1.5%**	-	**-**
Motorcycles	0	20	0	**20**	-	31	0	0	**31**	-	0	0	0	**0**	-	51
% Motorcycles	0%	0.3%	0%	**0.2%**	-	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.3%
Lights	200	7712	0	**7912**	-	7976	51	1	**8028**	-	40	203	1	**244**	-	16184
% Lights	98.5%	96.9%	0%	**97.0%**	-	97.4%	92.7%	100%	**97.4%**	-	97.6%	97.1%	100%	**97.2%**	-	97.2%
Single-Unit Trucks	2	166	0	**168**	-	150	2	0	**152**	-	1	3	0	**4**	-	324
% Single-Unit Trucks	1.0%	2.1%	0%	**2.1%**	-	1.8%	3.6%	0%	**1.8%**	-	2.4%	1.4%	0%	**1.6%**	-	1.9%
Articulated Trucks	0	40	0	**40**	-	19	0	0	**19**	-	0	0	0	**0**	-	59
% Articulated Trucks	0%	0.5%	0%	**0.5%**	-	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	0	13	0	**13**	-	12	2	0	**14**	-	0	1	0	**1**	-	28
% Buses	0%	0.2%	0%	**0.2%**	-	0.1%	3.6%	0%	**0.2%**	-	0%	0.5%	0%	**0.4%**	-	0.2%
Bicycles on Road	1	5	0	**6**	-	1	0	0	**1**	-	0	2	0	**2**	-	9
% Bicycles on Road	0.5%	0.1%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0%	1.0%	0%	**0.8%**	-	0.1%
Pedestrians	-	-	-	-	0	-	-	-	-	1	-	-	-	-	2	
% Pedestrians	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (13) Grove Street @ Birch Street - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818585, Location: 42.187517, -70.979693

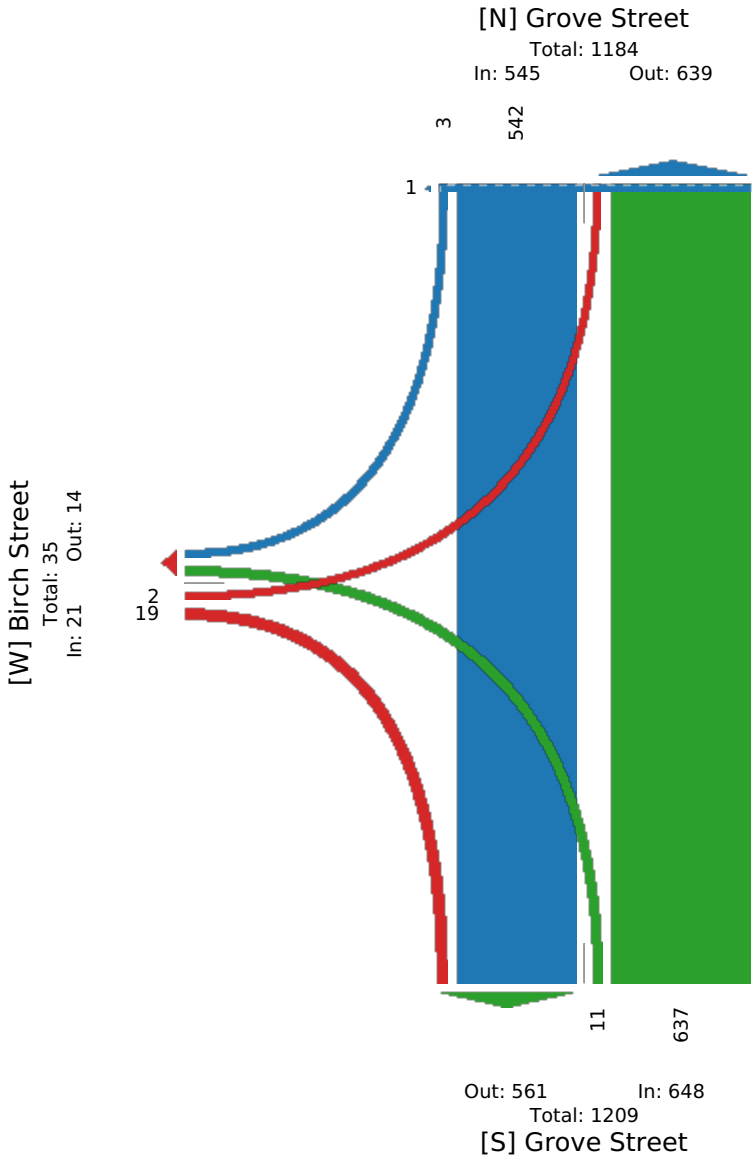
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Birch Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:30AM	0	149	0	**149**	0	137	3	0	**140**	0	0	4	0	**4**	0	**293**
7:45AM	3	179	0	**182**	0	134	0	0	**134**	1	1	4	0	**5**	0	**321**
8:00AM	2	162	0	**164**	0	141	0	0	**141**	0	0	6	0	**6**	0	**311**
8:15AM	6	147	0	**153**	0	130	0	0	**130**	0	1	5	0	**6**	0	**289**
Total	11	637	0	**648**	0	542	3	0	**545**	1	2	19	0	**21**	0	**1214**
% Approach	1.7%	98.3%	0%	**-**	-	99.4%	0.6%	0%	**-**	-	9.5%	90.5%	0%	**-**	-	-
% Total	0.9%	52.5%	0%	**53.4%**	-	44.6%	0.2%	0%	**44.9%**	-	0.2%	1.6%	0%	**1.7%**	-	-
PHF	0.458	0.890	-	**0.890**	-	0.961	0.250	-	**0.966**	-	0.500	0.792	-	**0.875**	-	0.945
Motorcycles	0	0	0	**0**	-	2	0	0	**2**	-	0	0	0	**0**	-	2
% Motorcycles	0%	0%	0%	**0%**	-	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.2%
Lights	11	612	0	**623**	-	518	3	0	**521**	-	2	18	0	**20**	-	1164
% Lights	100%	96.1%	0%	**96.1%**	-	95.6%	100%	0%	**95.6%**	-	100%	94.7%	0%	**95.2%**	-	95.9%
Single-Unit Trucks	0	19	0	**19**	-	17	0	0	**17**	-	0	0	0	**0**	-	36
% Single-Unit Trucks	0%	3.0%	0%	**2.9%**	-	3.1%	0%	0%	**3.1%**	-	0%	0%	0%	**0%**	-	3.0%
Articulated Trucks	0	3	0	**3**	-	3	0	0	**3**	-	0	0	0	**0**	-	6
% Articulated Trucks	0%	0.5%	0%	**0.5%**	-	0.6%	0%	0%	**0.6%**	-	0%	0%	0%	**0%**	-	0.5%
Buses	0	3	0	**3**	-	2	0	0	**2**	-	0	1	0	**1**	-	6
% Buses	0%	0.5%	0%	**0.5%**	-	0.4%	0%	0%	**0.4%**	-	0%	5.3%	0%	**4.8%**	-	0.5%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (13) Grove Street @ Birch Street - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818585, Location: 42.187517, -70.979693

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (13) Grove Street @ Birch Street - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:30PM - 4:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818585, Location: 42.187517, -70.979693

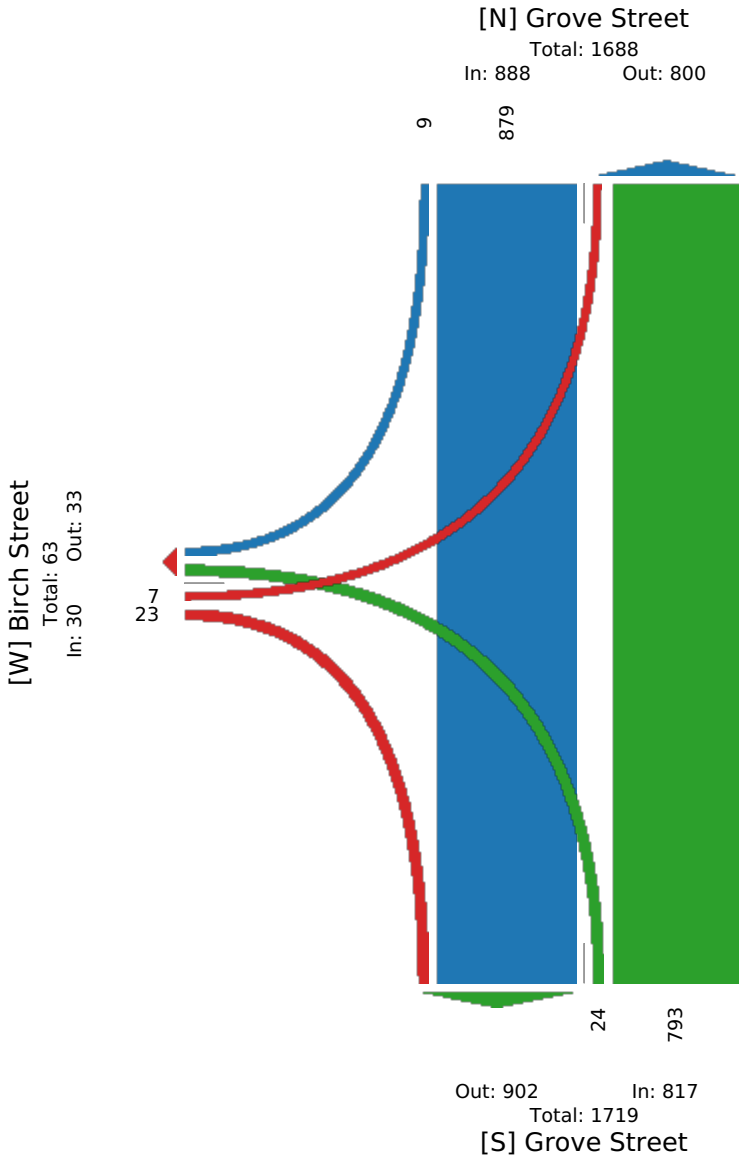
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Grove Street					Grove Street					Birch Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 3:30PM	6	215	0	**221**	0	212	3	0	**215**	0	2	4	0	**6**	0	**442**
3:45PM	5	197	0	**202**	0	226	1	0	**227**	0	2	10	0	**12**	0	**441**
4:00PM	3	188	0	**191**	0	239	5	0	**244**	0	0	4	0	**4**	0	**439**
4:15PM	10	193	0	**203**	0	202	0	0	**202**	0	3	5	0	**8**	0	**413**
Total	24	793	0	**817**	0	879	9	0	**888**	0	7	23	0	**30**	0	**1735**
% Approach	2.9%	97.1%	0%	**-**	-	99.0%	1.0%	0%	**-**	-	23.3%	76.7%	0%	**-**	-	-
% Total	1.4%	45.7%	0%	**47.1%**	-	50.7%	0.5%	0%	**51.2%**	-	0.4%	1.3%	0%	**1.7%**	-	-
PHF	0.600	0.922	-	**0.924**	-	0.922	0.450	-	**0.913**	-	0.583	0.575	-	**0.625**	-	0.981
Motorcycles	0	2	0	**2**	-	3	0	0	**3**	-	0	0	0	**0**	-	5
% Motorcycles	0%	0.3%	0%	**0.2%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.3%
Lights	24	773	0	**797**	-	859	9	0	**868**	-	7	23	0	**30**	-	1695
% Lights	100%	97.5%	0%	**97.6%**	-	97.7%	100%	0%	**97.7%**	-	100%	100%	0%	**100%**	-	97.7%
Single-Unit Trucks	0	10	0	**10**	-	14	0	0	**14**	-	0	0	0	**0**	-	24
% Single-Unit Trucks	0%	1.3%	0%	**1.2%**	-	1.6%	0%	0%	**1.6%**	-	0%	0%	0%	**0%**	-	1.4%
Articulated Trucks	0	6	0	**6**	-	1	0	0	**1**	-	0	0	0	**0**	-	7
% Articulated Trucks	0%	0.8%	0%	**0.7%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.4%
Buses	0	2	0	**2**	-	1	0	0	**1**	-	0	0	0	**0**	-	3
% Buses	0%	0.3%	0%	**0.2%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.2%
Bicycles on Road	0	0	0	**0**	-	1	0	0	**1**	-	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	**0%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (13) Grove Street @ Birch Street - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:30PM - 4:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818585, Location: 42.187517, -70.979693

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (14) Grove Street @ Birch Street - TMC

Thu Apr 8, 2021
Full Length (7 AM-11 AM, 2 PM-6 PM, 10 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818586, Location: 42.186663, -70.976334

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Columbian Street					Grove Street					Grove Street					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	339	227	0	**566**	0	234	248	0	**482**	0	182	225	0	**407**	0	**1455**
8:00AM	344	197	0	**541**	0	232	286	0	**518**	0	194	274	0	**468**	0	**1527**
9:00AM	396	190	0	**586**	0	214	269	0	**483**	0	183	286	0	**469**	0	**1538**
10:00AM	341	174	0	**515**	0	200	320	1	**521**	0	160	271	0	**431**	0	**1467**
2:00PM	353	235	0	**588**	0	302	437	1	**740**	0	222	280	0	**502**	0	**1830**
3:00PM	436	236	0	**672**	0	338	541	0	**879**	0	276	352	0	**628**	0	**2179**
4:00PM	412	254	0	**666**	0	335	571	0	**906**	0	305	338	0	**643**	0	**2215**
5:00PM	378	246	0	**624**	0	352	577	0	**929**	0	256	352	0	**608**	0	**2161**
2021-04-10 10:00AM	364	220	0	**584**	0	217	404	0	**621**	0	242	269	0	**511**	0	**1716**
11:00AM	363	231	0	**594**	0	246	506	0	**752**	0	226	314	0	**540**	0	**1886**
12:00PM	462	251	0	**713**	0	252	577	0	**829**	0	242	274	1	**517**	0	**2059**
1:00PM	419	224	0	**643**	0	254	498	0	**752**	0	267	328	0	**595**	0	**1990**
Total	4607	2685	0	**7292**	0	3176	5234	2	**8412**	0	2755	3563	1	**6319**	0	**22023**
% Approach	63.2%	36.8%	0%	**-**	-	37.8%	62.2%	0%	**-**	-	43.6%	56.4%	0%	**-**	-	**-**
% Total	20.9%	12.2%	0%	**33.1%**	-	14.4%	23.8%	0%	**38.2%**	-	12.5%	16.2%	0%	**28.7%**	-	**-**
Motorcycles	12	12	0	**24**	-	15	16	0	**31**	-	15	9	0	**24**	-	79
% Motorcycles	0.3%	0.4%	0%	**0.3%**	-	0.5%	0.3%	0%	**0.4%**	-	0.5%	0.3%	0%	**0.4%**	-	0.4%
Lights	4478	2620	0	**7098**	-	3078	5107	1	**8186**	-	2682	3449	1	**6132**	-	21416
% Lights	97.2%	97.6%	0%	**97.3%**	-	96.9%	97.6%	50.0%	**97.3%**	-	97.4%	96.8%	100%	**97.0%**	-	97.2%
Single-Unit Trucks	90	39	0	**129**	-	64	87	1	**152**	-	46	72	0	**118**	-	399
% Single-Unit Trucks	2.0%	1.5%	0%	**1.8%**	-	2.0%	1.7%	50.0%	**1.8%**	-	1.7%	2.0%	0%	**1.9%**	-	1.8%
Articulated Trucks	18	4	0	**22**	-	9	13	0	**22**	-	5	22	0	**27**	-	71
% Articulated Trucks	0.4%	0.1%	0%	**0.3%**	-	0.3%	0.2%	0%	**0.3%**	-	0.2%	0.6%	0%	**0.4%**	-	0.3%
Buses	6	8	0	**14**	-	9	6	0	**15**	-	7	9	0	**16**	-	45
% Buses	0.1%	0.3%	0%	**0.2%**	-	0.3%	0.1%	0%	**0.2%**	-	0.3%	0.3%	0%	**0.3%**	-	0.2%
Bicycles on Road	3	2	0	**5**	-	1	5	0	**6**	-	0	2	0	**2**	-	13
% Bicycles on Road	0.1%	0.1%	0%	**0.1%**	-	0%	0.1%	0%	**0.1%**	-	0%	0.1%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (14) Grove Street @ Birch Street - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818586, Location: 42.186663, -70.976334

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Columbian Street					Grove Street					Grove Street					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:30AM	95	58	0	**153**	0	76	68	0	**144**	0	38	56	0	**94**	0	**391**
7:45AM	110	77	0	**187**	0	73	65	0	**138**	0	57	69	0	**126**	0	**451**
8:00AM	105	56	0	**161**	0	66	75	0	**141**	0	55	58	0	**113**	0	**415**
8:15AM	71	49	0	**120**	0	59	83	0	**142**	0	52	81	0	**133**	0	**395**
Total	381	240	0	**621**	0	274	291	0	**565**	0	202	264	0	**466**	0	**1652**
% Approach	61.4%	38.6%	0%	**-**	-	48.5%	51.5%	0%	**-**	-	43.3%	56.7%	0%	**-**	-	-
% Total	23.1%	14.5%	0%	**37.6%**	-	16.6%	17.6%	0%	**34.2%**	-	12.2%	16.0%	0%	**28.2%**	-	-
PHF	0.866	0.779	-	**0.830**	-	0.901	0.877	-	**0.981**	-	0.886	0.815	-	**0.876**	-	0.916
Motorcycles	0	0	0	**0**	-	2	0	0	**2**	-	0	0	0	**0**	-	2
% Motorcycles	0%	0%	0%	**0%**	-	0.7%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.1%
Lights	370	231	0	**601**	-	264	276	0	**540**	-	198	250	0	**448**	-	1589
% Lights	97.1%	96.3%	0%	**96.8%**	-	96.4%	94.8%	0%	**95.6%**	-	98.0%	94.7%	0%	**96.1%**	-	96.2%
Single-Unit Trucks	8	8	0	**16**	-	6	12	0	**18**	-	3	10	0	**13**	-	47
% Single-Unit Trucks	2.1%	3.3%	0%	**2.6%**	-	2.2%	4.1%	0%	**3.2%**	-	1.5%	3.8%	0%	**2.8%**	-	2.8%
Articulated Trucks	1	1	0	**2**	-	1	1	0	**2**	-	0	3	0	**3**	-	7
% Articulated Trucks	0.3%	0.4%	0%	**0.3%**	-	0.4%	0.3%	0%	**0.4%**	-	0%	1.1%	0%	**0.6%**	-	0.4%
Buses	2	0	0	**2**	-	1	2	0	**3**	-	1	1	0	**2**	-	7
% Buses	0.5%	0%	0%	**0.3%**	-	0.4%	0.7%	0%	**0.5%**	-	0.5%	0.4%	0%	**0.4%**	-	0.4%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (14) Grove Street @ Birch Street - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818586, Location: 42.186663, -70.976334

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
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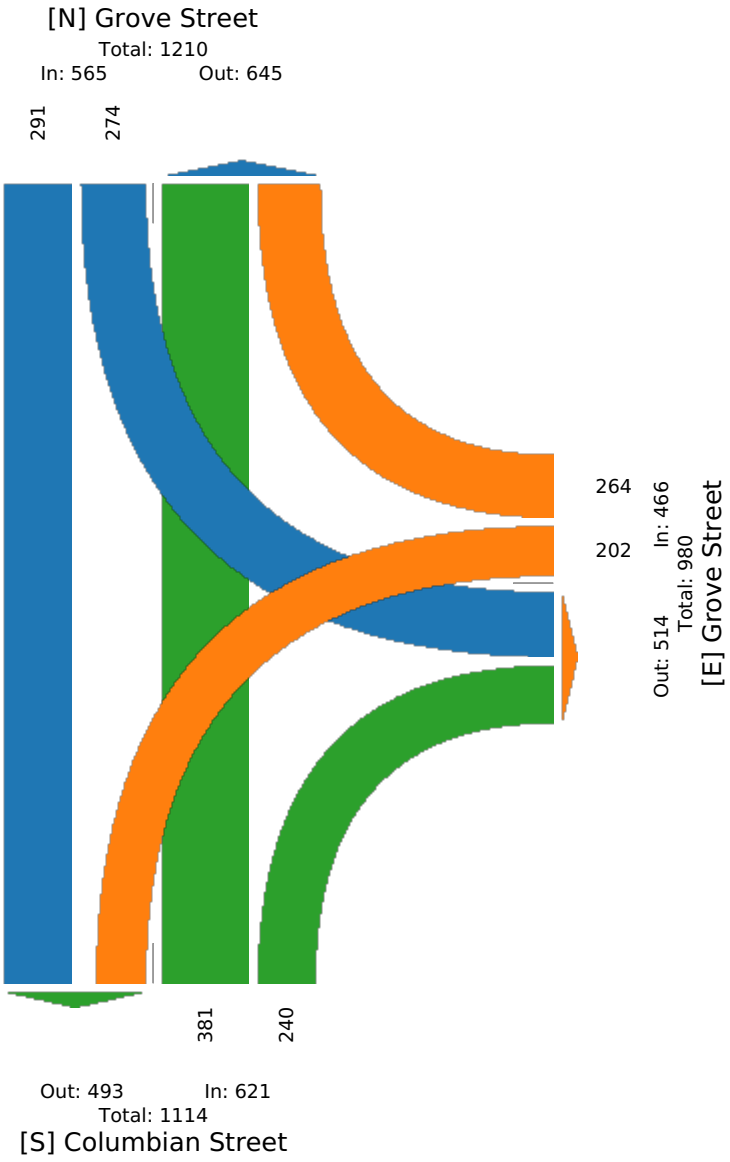


217835 (14) Grove Street @ Birch Street - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:30PM - 4:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818586, Location: 42.186663, -70.976334

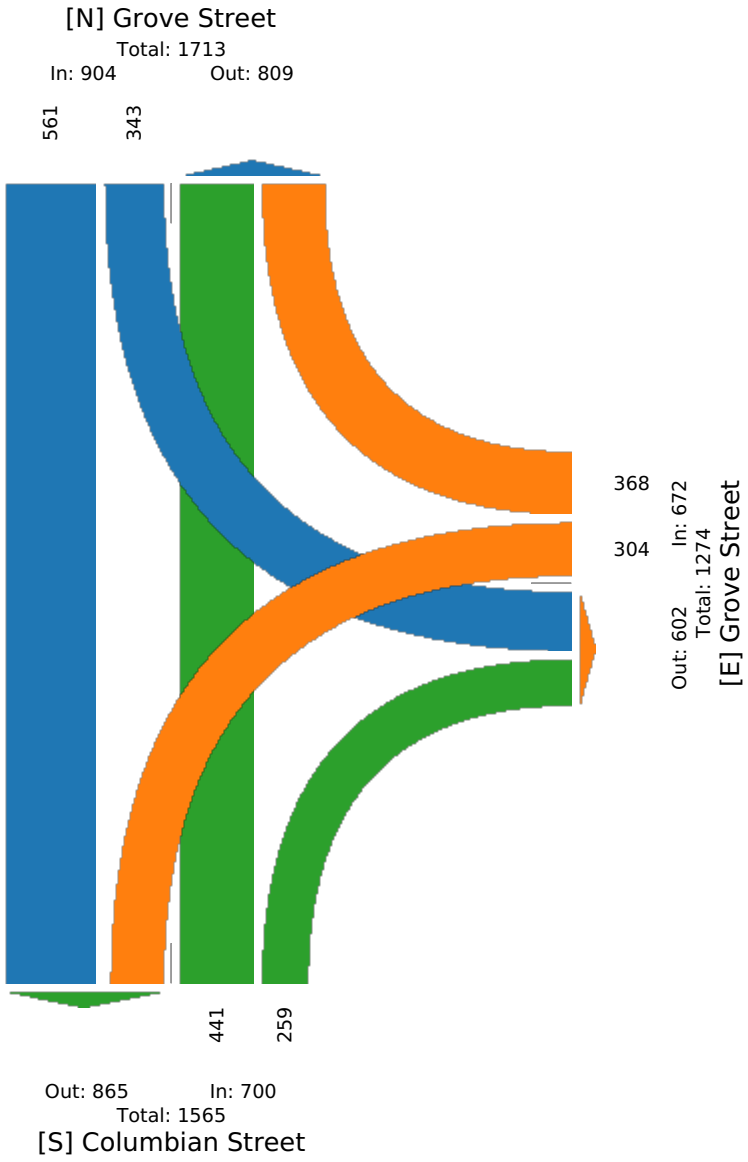
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Columbian Street					Grove Street					Grove Street					
Direction	Northbound					Southbound					Westbound					
Time	T	R	U	**App**	Ped*	L	T	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 3:30PM	114	59	0	**173**	0	82	125	0	**207**	0	73	99	0	**172**	0	**552**
3:45PM	110	65	0	**175**	0	101	135	0	**236**	0	70	91	0	**161**	0	**572**
4:00PM	97	69	0	**166**	0	89	159	0	**248**	0	82	99	0	**181**	0	**595**
4:15PM	120	66	0	**186**	0	71	142	0	**213**	0	79	79	0	**158**	0	**557**
Total	441	259	0	**700**	0	343	561	0	**904**	0	304	368	0	**672**	0	**2276**
% Approach	63.0%	37.0%	0%	**-**	-	37.9%	62.1%	0%	**-**	-	45.2%	54.8%	0%	**-**	-	-
% Total	19.4%	11.4%	0%	**30.8%**	-	15.1%	24.6%	0%	**39.7%**	-	13.4%	16.2%	0%	**29.5%**	-	-
PHF	0.919	0.938	-	**0.941**	-	0.849	0.886	-	**0.914**	-	0.927	0.929	-	**0.928**	-	0.957
Motorcycles	1	0	0	**1**	-	2	1	0	**3**	-	1	1	0	**2**	-	6
% Motorcycles	0.2%	0%	0%	**0.1%**	-	0.6%	0.2%	0%	**0.3%**	-	0.3%	0.3%	0%	**0.3%**	-	0.3%
Lights	430	254	0	**684**	-	333	546	0	**879**	-	296	363	0	**659**	-	2222
% Lights	97.5%	98.1%	0%	**97.7%**	-	97.1%	97.3%	0%	**97.2%**	-	97.4%	98.6%	0%	**98.1%**	-	97.6%
Single-Unit Trucks	5	2	0	**7**	-	7	11	0	**18**	-	3	2	0	**5**	-	30
% Single-Unit Trucks	1.1%	0.8%	0%	**1.0%**	-	2.0%	2.0%	0%	**2.0%**	-	1.0%	0.5%	0%	**0.7%**	-	1.3%
Articulated Trucks	4	0	0	**4**	-	0	2	0	**2**	-	1	1	0	**2**	-	8
% Articulated Trucks	0.9%	0%	0%	**0.6%**	-	0%	0.4%	0%	**0.2%**	-	0.3%	0.3%	0%	**0.3%**	-	0.4%
Buses	1	3	0	**4**	-	1	0	0	**1**	-	3	1	0	**4**	-	9
% Buses	0.2%	1.2%	0%	**0.6%**	-	0.3%	0%	0%	**0.1%**	-	1.0%	0.3%	0%	**0.6%**	-	0.4%
Bicycles on Road	0	0	0	**0**	-	0	1	0	**1**	-	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0.2%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (14) Grove Street @ Birch Street - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:30PM - 4:30 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818586, Location: 42.186663, -70.976334

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (15) Columbian Street @ #60 Columbian... - TMC

Thu Apr 8, 2021
Full Length (10 AM-2 PM, 7 AM-11 AM, 2 PM-6 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818587, Location: 42.185501, -70.975085

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Columbian Street					Columbian Street					Rantoule Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:00AM	18	571	0	**589**	1	406	21	0	**427**	0	3	8	0	**11**	0	**1027**
8:00AM	8	537	0	**545**	0	450	33	0	**483**	0	2	5	0	**7**	1	**1035**
9:00AM	4	582	0	**586**	0	418	32	0	**450**	0	2	7	0	**9**	2	**1045**
10:00AM	1	516	1	**518**	0	475	5	0	**480**	0	5	2	0	**7**	1	**1005**
2:00PM	2	583	0	**585**	0	653	8	0	**661**	0	9	5	0	**14**	0	**1260**
3:00PM	6	655	0	**661**	4	809	8	0	**817**	0	17	14	0	**31**	0	**1509**
4:00PM	6	659	0	**665**	2	873	6	0	**879**	0	19	14	0	**33**	0	**1577**
5:00PM	2	614	0	**616**	0	823	5	0	**828**	0	16	9	0	**25**	0	**1469**
2021-04-10 10:00AM	0	582	0	**582**	0	646	1	0	**647**	0	5	1	0	**6**	1	**1235**
11:00AM	3	594	0	**597**	0	735	4	0	**739**	0	1	3	0	**4**	2	**1340**
12:00PM	2	710	0	**712**	0	814	3	1	**818**	0	5	2	0	**7**	1	**1537**
1:00PM	1	639	0	**640**	0	758	6	0	**764**	0	6	0	0	**6**	0	**1410**
Total	53	7242	1	**7296**	7	7860	132	1	**7993**	0	90	70	0	**160**	8	**15449**
% Approach	0.7%	99.3%	0%	**-**	-	98.3%	1.7%	0%	**-**	-	56.3%	43.8%	0%	**-**	-	**-**
% Total	0.3%	46.9%	0%	**47.2%**	-	50.9%	0.9%	0%	**51.7%**	-	0.6%	0.5%	0%	**1.0%**	-	**-**
Motorcycles	0	27	0	**27**	-	30	0	0	**30**	-	0	0	0	**0**	-	57
% Motorcycles	0%	0.4%	0%	**0.4%**	-	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	**0%**	-	0.4%
Lights	51	7048	1	**7100**	-	7670	126	1	**7797**	-	86	69	0	**155**	-	15052
% Lights	96.2%	97.3%	100%	**97.3%**	-	97.6%	95.5%	100%	**97.5%**	-	95.6%	98.6%	0%	**96.9%**	-	97.4%
Single-Unit Trucks	1	126	0	**127**	-	124	5	0	**129**	-	4	1	0	**5**	-	261
% Single-Unit Trucks	1.9%	1.7%	0%	**1.7%**	-	1.6%	3.8%	0%	**1.6%**	-	4.4%	1.4%	0%	**3.1%**	-	1.7%
Articulated Trucks	0	21	0	**21**	-	20	0	0	**20**	-	0	0	0	**0**	-	41
% Articulated Trucks	0%	0.3%	0%	**0.3%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.3%
Buses	0	13	0	**13**	-	12	1	0	**13**	-	0	0	0	**0**	-	26
% Buses	0%	0.2%	0%	**0.2%**	-	0.2%	0.8%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.2%
Bicycles on Road	1	7	0	**8**	-	4	0	0	**4**	-	0	0	0	**0**	-	12
% Bicycles on Road	1.9%	0.1%	0%	**0.1%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	7	-	-	-	-	0	-	-	-	-	7	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	87.5%	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	12.5%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (15) Columbian Street @ #60 Columbian... - TMC

Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818587, Location: 42.185501, -70.975085

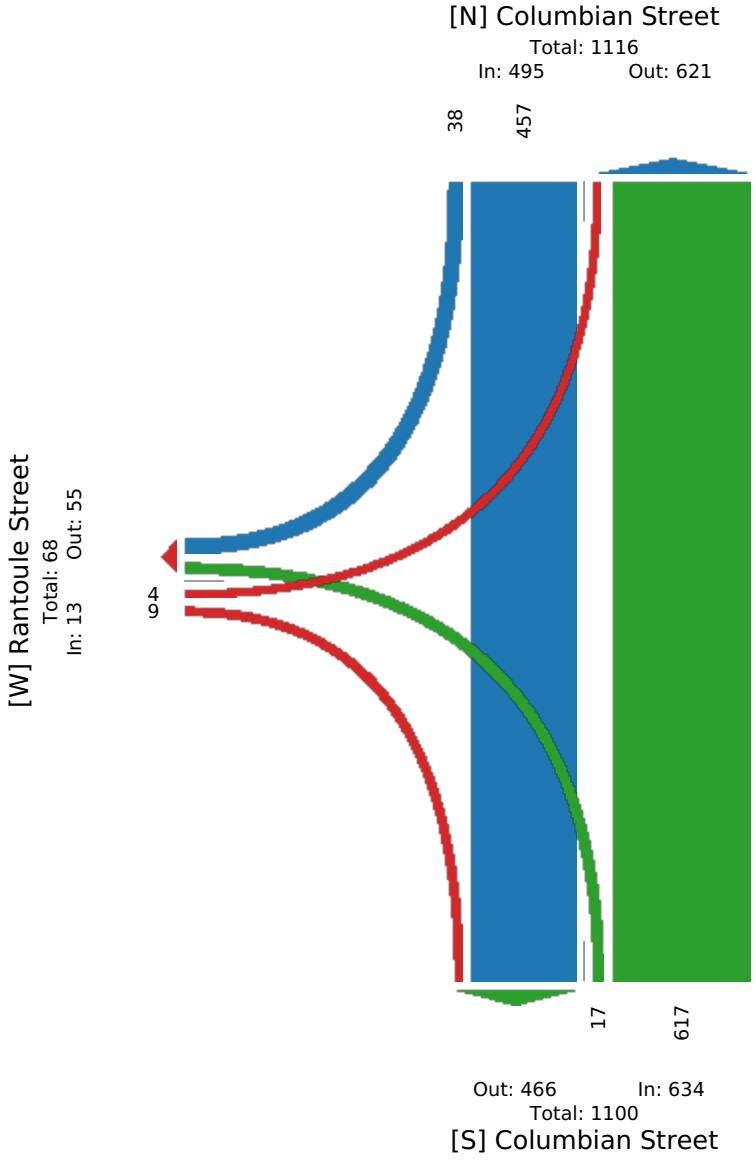
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Columbian Street					Columbian Street					Rantoule Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 7:30AM	6	152	0	**158**	0	104	2	0	**106**	0	1	2	0	**3**	0	**267**
7:45AM	6	188	0	**194**	0	111	9	0	**120**	0	2	4	0	**6**	0	**320**
8:00AM	3	158	0	**161**	0	115	15	0	**130**	0	0	3	0	**3**	0	**294**
8:15AM	2	119	0	**121**	0	127	12	0	**139**	0	1	0	0	**1**	0	**261**
Total	17	617	0	**634**	0	457	38	0	**495**	0	4	9	0	**13**	0	**1142**
% Approach	2.7%	97.3%	0%	**-**	-	92.3%	7.7%	0%	**-**	-	30.8%	69.2%	0%	**-**	-	-
% Total	1.5%	54.0%	0%	**55.5%**	-	40.0%	3.3%	0%	**43.3%**	-	0.4%	0.8%	0%	**1.1%**	-	-
PHF	0.708	0.820	-	**0.817**	-	0.900	0.633	-	**0.890**	-	0.500	0.563	-	**0.542**	-	0.892
Motorcycles	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Motorcycles	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Lights	17	597	0	**614**	-	439	37	0	**476**	-	3	9	0	**12**	-	1102
% Lights	100%	96.8%	0%	**96.8%**	-	96.1%	97.4%	0%	**96.2%**	-	75.0%	100%	0%	**92.3%**	-	96.5%
Single-Unit Trucks	0	17	0	**17**	-	14	1	0	**15**	-	1	0	0	**1**	-	33
% Single-Unit Trucks	0%	2.8%	0%	**2.7%**	-	3.1%	2.6%	0%	**3.0%**	-	25.0%	0%	0%	**7.7%**	-	2.9%
Articulated Trucks	0	2	0	**2**	-	1	0	0	**1**	-	0	0	0	**0**	-	3
% Articulated Trucks	0%	0.3%	0%	**0.3%**	-	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.3%
Buses	0	1	0	**1**	-	3	0	0	**3**	-	0	0	0	**0**	-	4
% Buses	0%	0.2%	0%	**0.2%**	-	0.7%	0%	0%	**0.6%**	-	0%	0%	0%	**0%**	-	0.4%
Bicycles on Road	0	0	0	**0**	-	0	0	0	**0**	-	0	0	0	**0**	-	0
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (15) Columbian Street @ #60 Columbian... - TMC
Thu Apr 8, 2021
AM Peak (Apr 08 2021 7:30AM - 8:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818587, Location: 42.185501, -70.975085

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



217835 (15) Columbian Street @ #60 Columbian... - TMC

Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:45PM - 4:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818587, Location: 42.185501, -70.975085

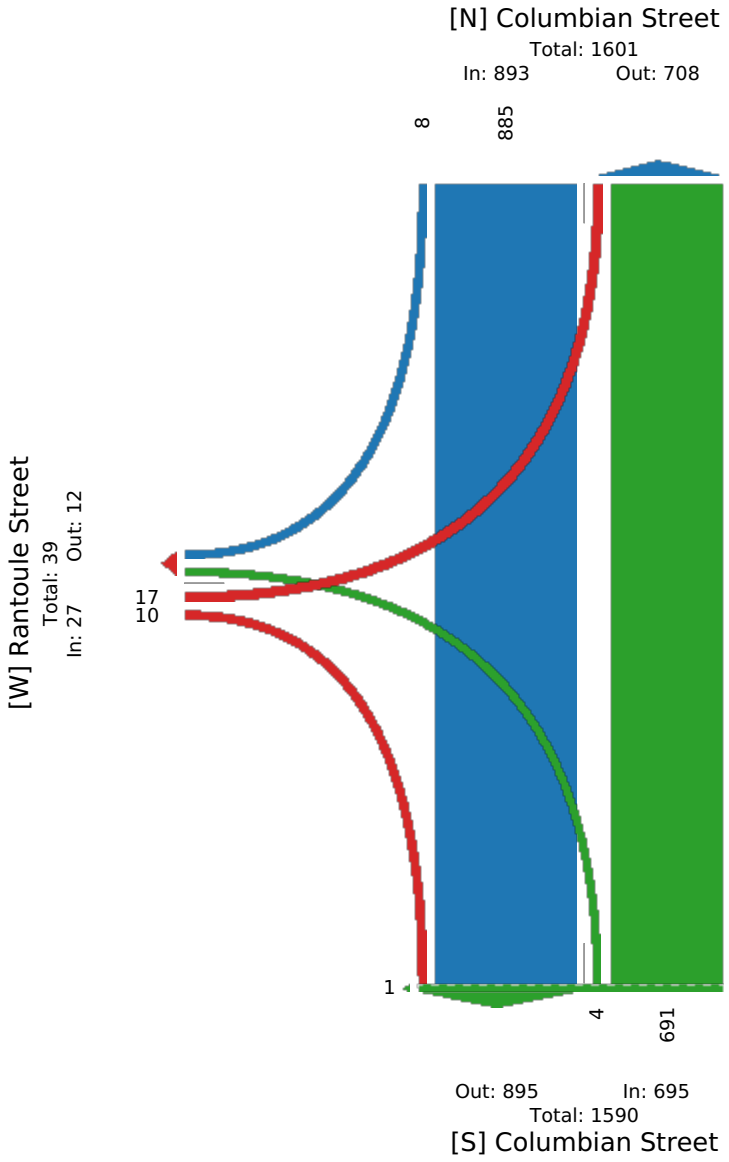
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Columbian Street					Columbian Street					Rantoule Street					
Direction	Northbound					Southbound					Eastbound					
Time	L	T	U	**App**	Ped*	T	R	U	**App**	Ped*	L	R	U	**App**	Ped*	**Int**
2021-04-08 3:45PM	0	168	0	**168**	0	204	2	0	**206**	0	4	0	0	**4**	0	**378**
4:00PM	1	163	0	**164**	0	240	2	0	**242**	0	8	2	0	**10**	0	**416**
4:15PM	1	186	0	**187**	1	225	1	0	**226**	0	3	4	0	**7**	0	**420**
4:30PM	2	174	0	**176**	0	216	3	0	**219**	0	2	4	0	**6**	0	**401**
Total	4	691	0	**695**	1	885	8	0	**893**	0	17	10	0	**27**	0	**1615**
% Approach	0.6%	99.4%	0%	**-**	-	99.1%	0.9%	0%	**-**	-	63.0%	37.0%	0%	**-**	-	-
% Total	0.2%	42.8%	0%	**43.0%**	-	54.8%	0.5%	0%	**55.3%**	-	1.1%	0.6%	0%	**1.7%**	-	-
PHF	0.500	0.929	-	**0.929**	-	0.925	0.667	-	**0.925**	-	0.531	0.625	-	**0.675**	-	0.961
Motorcycles	0	2	0	**2**	-	1	0	0	**1**	-	0	0	0	**0**	-	3
% Motorcycles	0%	0.3%	0%	**0.3%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.2%
Lights	4	678	0	**682**	-	874	8	0	**882**	-	16	10	0	**26**	-	1590
% Lights	100%	98.1%	0%	**98.1%**	-	98.8%	100%	0%	**98.8%**	-	94.1%	100%	0%	**96.3%**	-	98.5%
Single-Unit Trucks	0	7	0	**7**	-	4	0	0	**4**	-	1	0	0	**1**	-	12
% Single-Unit Trucks	0%	1.0%	0%	**1.0%**	-	0.5%	0%	0%	**0.4%**	-	5.9%	0%	0%	**3.7%**	-	0.7%
Articulated Trucks	0	3	0	**3**	-	2	0	0	**2**	-	0	0	0	**0**	-	5
% Articulated Trucks	0%	0.4%	0%	**0.4%**	-	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	**0%**	-	0.3%
Buses	0	1	0	**1**	-	3	0	0	**3**	-	0	0	0	**0**	-	4
% Buses	0%	0.1%	0%	**0.1%**	-	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	**0%**	-	0.2%
Bicycles on Road	0	0	0	**0**	-	1	0	0	**1**	-	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	**0%**	-	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	1	-	-	-	-	0	-	-	-	-	0	
% Pedestrians	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn

217835 (15) Columbian Street @ #60 Columbian... - TMC
Thu Apr 8, 2021
PM Peak (Apr 08 2021 3:45PM - 4:45 PM) - Overall Peak Hour
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 818587, Location: 42.185501, -70.975085

Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US



APPENDIX J

Turning Movement Counts
Grove Street at Liberty Street
March 21, 2019

Client:	Adriana Santiago
Project #:	352_062_VHB
BTD #:	Location 1
Location:	Braintree, MA
Street 1:	Liberty Street
Street 2:	Grove Street
Count Date:	3/21/2019
Day of Week:	Thursday
Weather:	Mostly Cloudy, 40°F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
www.BostonTrafficData.com

PASSENGER CARS & HEAVY VEHICLES COMBINED

	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	73	121	31	0	15	52	3	0	3	42	13	0	29	152	40
7:15 AM	0	69	116	35	0	17	54	3	0	5	44	15	0	33	159	32
7:30 AM	0	64	105	42	0	21	65	5	0	4	52	18	0	36	167	26
7:45 AM	0	61	128	49	0	25	78	8	0	3	62	24	0	34	175	28
8:00 AM	0	57	152	56	0	36	60	7	0	5	58	25	0	30	182	30
8:15 AM	0	58	124	51	0	23	42	9	0	4	53	28	0	35	160	29
8:30 AM	0	55	93	48	0	28	39	6	0	4	57	21	0	39	146	28
8:45 AM	0	53	91	46	0	34	36	3	0	5	61	15	0	36	143	26

	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	36	49	34	0	47	119	4	0	3	138	52	0	62	101	22
4:15 PM	0	33	52	37	0	49	126	3	0	3	142	55	0	58	122	26
4:30 PM	0	30	56	41	0	55	117	6	0	4	134	53	0	56	138	30
4:45 PM	0	32	54	48	0	60	109	8	0	5	123	49	0	49	135	27
5:00 PM	0	34	53	57	0	63	115	7	0	7	125	52	0	45	137	23
5:15 PM	0	36	55	51	0	67	122	5	0	10	124	54	0	48	125	25
5:30 PM	0	38	52	44	0	58	113	6	0	12	127	49	0	56	112	24
5:45 PM	0	35	50	42	0	45	95	7	0	17	131	45	0	53	108	23

AM PEAK HOUR 7:30 AM to 8:30 AM	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**240**	**509**	**198**	**0**	**105**	**245**	**29**	**0**	**16**	**225**	**95**	**0**	**135**	**684**	**113**
PHF		**0.89**				**0.85**				**0.94**				**0.96**		
HV %	**0.0%**	**0.4%**	**1.2%**	**2.0%**	**0.0%**	**1.9%**	**3.3%**	**6.9%**	**0.0%**	**0.0%**	**10.2%**	**3.2%**	**0.0%**	**3.0%**	**2.5%**	**1.8%**

PM PEAK HOUR 4:30 PM to 5:30 PM	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**132**	**218**	**197**	**0**	**245**	**463**	**26**	**0**	**26**	**506**	**208**	**0**	**198**	**535**	**105**
PHF		**0.95**				**0.95**				**0.97**				**0.94**		
HV %	**0.0%**	**0.8%**	**0.5%**	**0.5%**	**0.0%**	**0.4%**	**0.9%**	**3.8%**	**0.0%**	**3.8%**	**1.6%**	**1.0%**	**0.0%**	**1.0%**	**1.9%**	**0.0%**

Client:	Adriana Santiago
Project #:	352_062_VHB
BTD #:	Location 1
Location:	Braintree, MA
Street 1:	Liberty Street
Street 2:	Grove Street
Count Date:	3/21/2019
Day of Week:	Thursday
Weather:	Mostly Cloudy, 40°F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
www.BostonTrafficData.com

HEAVY VEHICLES

	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	2	0	0	0	0	1	0	0	3	0	0	0	4	0
7:15 AM	0	0	1	1	0	3	4	0	0	1	4	0	0	1	7	0
7:30 AM	0	0	2	0	0	0	2	1	0	0	5	1	0	1	6	1
7:45 AM	0	1	2	3	0	1	1	0	0	0	7	0	0	1	5	0
8:00 AM	0	0	1	1	0	0	3	0	0	0	6	0	0	0	3	1
8:15 AM	0	0	1	0	0	1	2	1	0	0	5	2	0	2	3	0
8:30 AM	0	0	4	1	0	1	1	0	0	0	6	1	0	0	4	0
8:45 AM	0	1	1	0	0	0	1	0	0	0	7	0	0	1	3	0

	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	1	1	0	0	0	1	0	0	1	3	0
4:15 PM	0	0	1	0	0	0	0	0	0	0	2	1	0	0	1	1
4:30 PM	0	1	0	1	0	0	1	0	0	0	2	0	0	0	3	0
4:45 PM	0	0	1	0	0	1	0	1	0	0	3	0	0	0	2	0
5:00 PM	0	0	0	0	0	0	2	0	0	1	2	2	0	1	2	0
5:15 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	1	3	0
5:30 PM	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0

AM PEAK HOUR 7:15 AM to 8:15 AM	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**6**	**5**	**0**	**4**	**10**	**1**	**0**	**1**	**22**	**1**	**0**	**3**	**21**	**2**
PHF	**0.50**				**0.54**				**0.86**				**0.81**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Liberty Street Northbound				Liberty Street Southbound				Grove Street Eastbound				Grove Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**2**	**1**	**0**	**1**	**3**	**1**	**0**	**1**	**9**	**3**	**0**	**1**	**8**	**1**
PHF	**0.50**				**0.63**				**0.65**				**0.83**			

Client:	Adriana Santiago
Project #:	352_062_VHB
BTD #:	Location 1
Location:	Braintree, MA
Street 1:	Liberty Street
Street 2:	Grove Street
Count Date:	3/21/2019
Day of Week:	Thursday
Weather:	Mostly Cloudy, 40°F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
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www.BostonTrafficData.com

PEDESTRIANS & BICYCLES

	Liberty Street Northbound					Liberty Street Southbound					Grove Street Eastbound					Grove Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
7:15 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
7:30 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
7:45 AM	0	0	0	1		0	0	0	0		0	0	0	0		0	1	0	1	
8:00 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
8:15 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
8:30 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
8:45 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	

	Liberty Street Northbound					Liberty Street Southbound					Grove Street Eastbound					Grove Street Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
4:15 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
4:30 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
4:45 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
5:00 PM	0	0	0	2		0	0	0	0		0	0	0	1		0	0	0	1	
5:15 PM	0	0	0	0		0	0	0	0		0	0	0	1		0	0	0	0	
5:30 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
5:45 PM	0	0	0	2		0	0	0	0		0	0	0	2		0	0	0	0	

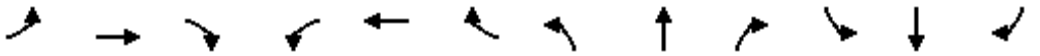
AM PEAK HOUR[1]	Liberty Street Northbound					Liberty Street Southbound					Grove Street Eastbound					Grove Street Westbound				
7:30 AM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:30 AM	0	0	0	1		0	0	0	0		0	0	0	0		0	1	0	1	

PM PEAK HOUR[1]	Liberty Street Northbound					Liberty Street Southbound					Grove Street Eastbound					Grove Street Westbound				
4:30 PM																				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:30 PM	0	0	0	2		0	0	0	0		0	0	0	2		0	0	0	1	

[1] *Peak hours corresponds to vehicular peak hours.*

APPENDIX K

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
2021 Observed Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	186	202	109	328	54	404	473	191	65	217	6
Future Volume (vph)	2	186	202	109	328	54	404	473	191	65	217	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	0		0	0		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1777	1538	1687	1772	0	1736	1863	1568	1770	3379	0
Flt Permitted		0.996		0.500			0.950			0.950		
Satd. Flow (perm)	0	1770	1538	888	1772	0	1731	1863	1568	1770	3379	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			240		6				153		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		152			279			332			259	
Travel Time (s)		3.5			6.3			7.5			5.9	
Confl. Peds. (#/hr)	3					3	2					2
Peak Hour Factor	0.84	0.84	0.84	0.86	0.86	0.86	0.94	0.94	0.94	0.91	0.91	0.91
Heavy Vehicles (%)	0%	7%	5%	7%	5%	2%	4%	2%	3%	2%	6%	17%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	223	240	127	444	0	430	503	203	71	245	0
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		9	5	10	9 10		5	2		1	6	
Permitted Phases	9		9	9 10					2			
Detector Phase	9	9	5	10	9 10		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	10.0	11.0	9.0			11.0	10.0	10.0	11.0	10.0	
Total Split (s)	30.0	30.0	42.0	15.0			42.0	35.0	35.0	22.0	15.0	
Total Split (%)	22.7%	22.7%	31.8%	11.4%			31.8%	26.5%	26.5%	16.7%	11.4%	
Yellow Time (s)	3.0	3.0	3.0	2.0			3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		1.5	1.5	2.5			-1.0	-2.0	2.5	0.0	-1.0	
Total Lost Time (s)		6.5	6.5	6.5			4.0	3.0	7.5	5.0	4.0	
Lead/Lag	Lead	Lead	Lead	Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None			None	Min	Min	None	Min	
Act Effct Green (s)		24.1	51.1	31.1	39.3		29.5	35.1	30.5	8.6	11.8	
Actuated g/C Ratio		0.24	0.52	0.32	0.40		0.30	0.36	0.31	0.09	0.12	
v/c Ratio		0.51	0.26	0.38	0.63		0.83	0.76	0.34	0.46	0.60	
Control Delay		40.9	2.0	30.9	31.3		47.8	39.5	11.6	56.2	50.6	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		40.9	2.0	30.9	31.3		47.8	39.5	11.6	56.2	50.6	
LOS		D	A	C	C		D	D	B	E	D	
Approach Delay		20.8			31.2			37.6			51.8	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)		111	0	47	193		223	257	21	40	71	
Queue Length 95th (ft)		252	24	132	456		#528	#672	106	108	#186	
Internal Link Dist (ft)		72			199			252			179	
Turn Bay Length (ft)												

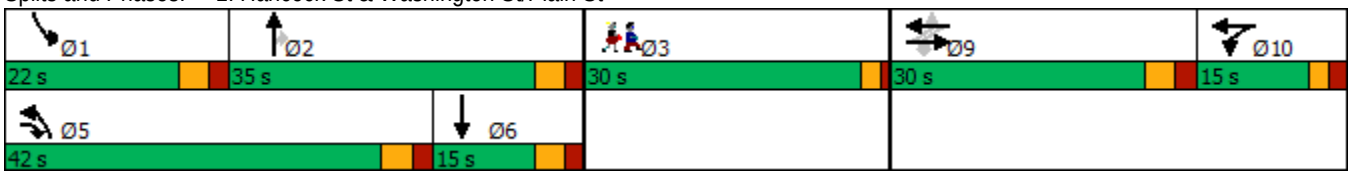
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	23%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

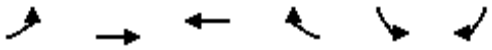
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		434	1039	367	743		688	665	591	313	406	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.51	0.23	0.35	0.60		0.63	0.76	0.34	0.23	0.60	

Intersection Summary			
Area Type:	Other		
Cycle Length: 132			
Actuated Cycle Length: 98.4			
Natural Cycle: 110			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 34.8		Intersection LOS: C	
Intersection Capacity Utilization 76.6%		ICU Level of Service D	
Analysis Period (min) 15			

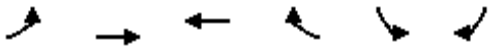
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hancock St & Washington St/Plain St





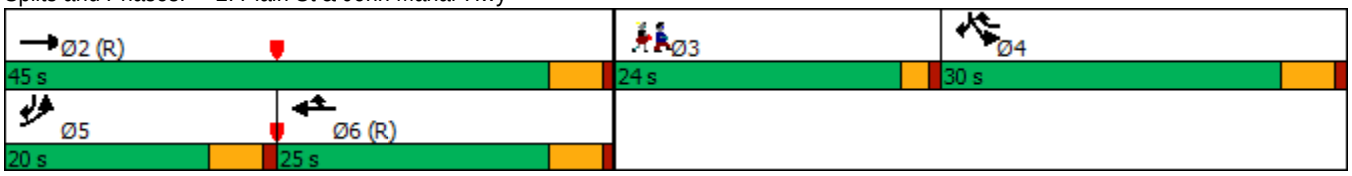
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	141	270	329	257	215	125	
Future Volume (vph)	141	270	329	257	215	125	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	200			125	0	0	
Storage Lanes	1			1	1	1	
Taper Length (ft)	25				25		
Satd. Flow (prot)	1770	1827	1827	1568	1719	1553	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1770	1827	1827	1568	1719	1553	
Right Turn on Red				Yes		No	
Satd. Flow (RTOR)				271			
Link Speed (mph)		30	30		30		
Link Distance (ft)		1145	261		232		
Travel Time (s)		26.0	5.9		5.3		
Peak Hour Factor	0.87	0.87	0.95	0.95	0.90	0.90	
Heavy Vehicles (%)	2%	4%	4%	3%	5%	4%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	162	310	346	271	239	139	
Turn Type	Prot	NA	NA	pt+ov	Prot	pt+ov	
Protected Phases	5	2	6	6 4	4	4 5	3
Permitted Phases							
Detector Phase	5	2	6	6 4	4	4 5	
Switch Phase							
Minimum Initial (s)	7.0	7.0	7.0		5.0		7.0
Minimum Split (s)	12.0	12.0	12.0		10.0		24.0
Total Split (s)	20.0	45.0	25.0		30.0		24.0
Total Split (%)	20.2%	45.5%	25.3%		30.3%		24%
Yellow Time (s)	4.0	4.0	4.0		4.0		2.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0
Lost Time Adjust (s)	3.0	-3.0	-3.0		3.0		
Total Lost Time (s)	8.0	2.0	2.0		8.0		
Lead/Lag	Lead		Lag		Lag		Lead
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	C-Max	C-Max		Min		None
Act Effct Green (s)	10.2	69.2	51.0	66.4	15.0	33.2	
Actuated g/C Ratio	0.10	0.70	0.52	0.67	0.15	0.34	
v/c Ratio	0.89	0.24	0.37	0.24	0.92	0.27	
Control Delay	87.4	9.0	21.0	1.6	78.5	23.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	87.4	9.0	21.0	1.6	78.5	23.5	
LOS	F	A	C	A	E	C	
Approach Delay		35.9	12.5		58.2		
Approach LOS		D	B		E		
Queue Length 50th (ft)	102	50	113	0	150	62	
Queue Length 95th (ft)	#186	189	#351	23	220	96	
Internal Link Dist (ft)		1065	181		152		
Turn Bay Length (ft)	200			125			
Base Capacity (vph)	219	1276	940	1232	382	514	

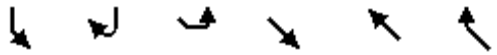


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.74	0.24	0.37	0.22	0.63	0.27	

Intersection Summary			
Area Type:	Other		
Cycle Length: 99			
Actuated Cycle Length: 99			
Offset: 20 (20%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 31.8		Intersection LOS: C	
Intersection Capacity Utilization 53.7%		ICU Level of Service A	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Plain St & John Mahar Hwy





Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (veh/h)	9	36	35	432	573	15
Future Volume (Veh/h)	9	36	35	432	573	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.80	0.80	0.93	0.93
Hourly flow rate (vph)	10	39	44	540	616	16
Pedestrians	4					
Lane Width (ft)	16.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				261		
pX, platoon unblocked	0.93					
vC, conflicting volume	1256	628	636			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1239	628	636			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	92	95			
cM capacity (veh/h)	173	479	952			

Direction, Lane #	SB 1	SE 1	NW 1
Volume Total	49	584	632
Volume Left	10	44	0
Volume Right	39	0	16
cSH	352	952	1700
Volume to Capacity	0.14	0.05	0.37
Queue Length 95th (ft)	12	4	0
Control Delay (s)	16.9	1.2	0.0
Lane LOS	C	A	
Approach Delay (s)	16.9	1.2	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	376	0	0	613	27	19
Future Volume (Veh/h)	376	0	0	613	27	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.95	0.95	0.89	0.89
Hourly flow rate (vph)	404	0	0	645	30	21
Pedestrians					5	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1154					
pX, platoon unblocked						
vC, conflicting volume			409		1054	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			409		1054	409
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		88	97
cM capacity (veh/h)			1155		251	633

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	404	645	51
Volume Left	0	0	30
Volume Right	0	0	21
cSH	1700	1155	334
Volume to Capacity	0.24	0.00	0.15
Queue Length 95th (ft)	0	0	13
Control Delay (s)	0.0	0.0	17.7
Lane LOS			C
Approach Delay (s)	0.0	0.0	17.7
Approach LOS			C

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	396	3	3	608	6	5
Future Volume (Veh/h)	396	3	3	608	6	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.96	0.96	0.92	0.92
Hourly flow rate (vph)	445	3	3	633	7	5
Pedestrians				1	4	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			452		1090	452
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			452		1090	452
tC, single (s)			4.1		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			100		97	99
cM capacity (veh/h)			1115		239	569

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	448	636	12
Volume Left	0	3	7
Volume Right	3	0	5
cSH	1700	1115	315
Volume to Capacity	0.26	0.00	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.0	0.1	16.9
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	16.9
Approach LOS			C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	49	344	568	9	12	38
Future Volume (Veh/h)	49	344	568	9	12	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.97	0.97	0.89	0.89
Hourly flow rate (vph)	56	395	586	9	13	43
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			1027			
pX, platoon unblocked	0.87				0.87	0.87
vC, conflicting volume	596				1098	592
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	461				1038	456
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	94				94	92
cM capacity (veh/h)	947				204	524

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	451	595	56
Volume Left	56	0	13
Volume Right	0	9	43
cSH	947	1700	384
Volume to Capacity	0.06	0.35	0.15
Queue Length 95th (ft)	5	0	13
Control Delay (s)	1.7	0.0	16.0
Lane LOS	A		C
Approach Delay (s)	1.7	0.0	16.0
Approach LOS			C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	50	340	2	5	445	52	5	1	2	44	3	78
Future Volume (Veh/h)	50	340	2	5	445	52	5	1	2	44	3	78
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.87	0.87	0.87	0.50	0.50	0.50	0.87	0.87	0.87
Hourly flow rate (vph)	53	362	2	6	511	60	10	2	4	51	3	90
Pedestrians					1			4				
Lane Width (ft)					12.0			12.0				
Walking Speed (ft/s)					3.5			3.5				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					799							
pX, platoon unblocked	0.84						0.84	0.84		0.84	0.84	0.84
vC, conflicting volume	571			368			1118	1056	368	1028	1027	541
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	390			368			1043	969	368	936	935	354
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			93	99	99	73	99	85
cM capacity (veh/h)	987			1197			139	200	679	191	210	581

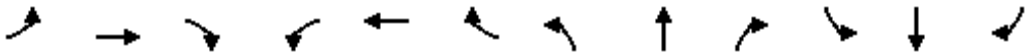
Direction, Lane #	SE 1	NW 1	NE 1	SW 1	SW 2
Volume Total	417	577	16	54	90
Volume Left	53	6	10	51	0
Volume Right	2	60	4	0	90
cSH	987	1197	182	192	581
Volume to Capacity	0.05	0.01	0.09	0.28	0.15
Queue Length 95th (ft)	4	0	7	28	14
Control Delay (s)	1.7	0.1	26.7	30.9	12.3
Lane LOS	A	A	D	D	B
Approach Delay (s)	1.7	0.1	26.7	19.3	
Approach LOS			D	C	

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	62.7%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	17	329	544	69	31	25
Future Volume (Veh/h)	17	329	544	69	31	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.97	0.97	0.88	0.88
Hourly flow rate (vph)	20	378	561	71	35	28
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			3.5			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			437			
pX, platoon unblocked	0.82				0.82	0.82
vC, conflicting volume	632				826	596
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	443				680	400
tC, single (s)	4.1				6.9	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				89	94
cM capacity (veh/h)	926				307	497

Direction, Lane #	SE 1	SE 2	NW 1	SW 1	SW 2
Volume Total	146	252	632	35	28
Volume Left	20	0	0	35	0
Volume Right	0	0	71	0	28
cSH	926	1700	1700	307	497
Volume to Capacity	0.02	0.15	0.37	0.11	0.06
Queue Length 95th (ft)	2	0	0	10	4
Control Delay (s)	1.4	0.0	0.0	18.2	12.7
Lane LOS	A			C	B
Approach Delay (s)	0.5		0.0	15.8	
Approach LOS				C	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	229	110	143	400	96	186	330	190	111	238	37
Future Volume (vph)	14	229	110	143	400	96	186	330	190	111	238	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	3283	0	0	3336	0	0	3338	0	0	3388	0
Flt Permitted		0.912			0.689			0.712			0.532	
Satd. Flow (perm)	0	3000	0	0	2324	0	0	2408	0	0	1828	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			15			32			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)	1		2	2		1						
Peak Hour Factor	0.94	0.94	0.94	0.92	0.92	0.92	0.89	0.89	0.89	0.85	0.85	0.85
Heavy Vehicles (%)	0%	4%	4%	4%	5%	2%	2%	3%	2%	3%	3%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	376	0	0	694	0	0	793	0	0	455	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases		1		2	1 2			9		10	9 10	
Permitted Phases	1			1 2			9			9 10		
Detector Phase	1	1		2	1 2		9	9		10	9 10	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0			10.0	10.0		6.0		
Minimum Split (s)	15.0	15.0		11.0			15.0	15.0		15.0		
Total Split (s)	60.0	60.0		15.0			50.0	50.0		15.0		
Total Split (%)	37.3%	37.3%		9.3%			31.1%	31.1%		9.3%		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.0						5.0				
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Recall Mode	None	None		None			None	None		None		
Act Effct Green (s)		31.5			41.7			46.1			56.3	
Actuated g/C Ratio		0.26			0.34			0.38			0.46	
v/c Ratio		0.46			0.78			0.85			0.46	
Control Delay		34.0			38.0			45.1			23.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		34.0			38.0			45.1			23.3	
LOS		C			D			D			C	
Approach Delay		34.0			38.0			45.1			23.3	
Approach LOS		C			D			D			C	
Queue Length 50th (ft)		106			200			265			92	
Queue Length 95th (ft)		183			325			#624			213	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)												

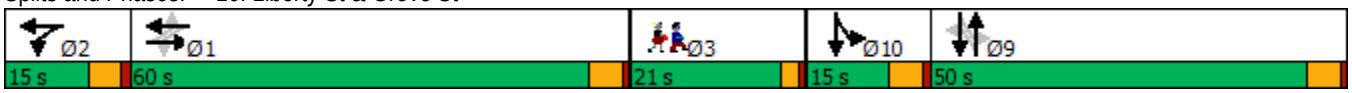
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	13%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

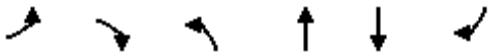
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		1415			1364			932			982	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.27			0.51			0.85			0.46	

Intersection Summary			
Area Type:	Other		
Cycle Length: 161			
Actuated Cycle Length: 121.7			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 36.9		Intersection LOS: D	
Intersection Capacity Utilization 76.9%		ICU Level of Service D	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Liberty St & Grove St





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	26	17	426	356	43
Future Volume (Veh/h)	32	26	17	426	356	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.98	0.98	0.85	0.85
Hourly flow rate (vph)	35	29	17	435	419	51
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				287		
pX, platoon unblocked	0.82					
vC, conflicting volume	916	446	472			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	785	446	472			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	88	95	98			
cM capacity (veh/h)	292	607	1067			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	64	452	470
Volume Left	35	17	0
Volume Right	29	0	51
cSH	382	1067	1700
Volume to Capacity	0.17	0.02	0.28
Queue Length 95th (ft)	15	1	0
Control Delay (s)	16.3	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	16.3	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	541	2	0	640	2	2
Future Volume (Veh/h)	541	2	0	640	2	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.88	0.88	0.50	0.50
Hourly flow rate (vph)	564	2	0	727	4	4
Pedestrians	2				2	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	3.5				3.5	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			568		1296	567
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			568		1296	567
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	99
cM capacity (veh/h)			1012		180	526

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	566	727	8
Volume Left	0	0	4
Volume Right	2	0	4
cSH	1700	1012	268
Volume to Capacity	0.33	0.00	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.0	18.8
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.8
Approach LOS			C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	542	3	11	637	2	19
Future Volume (Veh/h)	542	3	11	637	2	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.89	0.89	0.88	0.88
Hourly flow rate (vph)	559	3	12	716	2	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				968		
pX, platoon unblocked						
vC, conflicting volume			562		1300	560
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			562		1300	560
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	96
cM capacity (veh/h)			1019		177	522

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	562	728	24
Volume Left	0	12	2
Volume Right	3	0	22
cSH	1700	1019	449
Volume to Capacity	0.33	0.01	0.05
Queue Length 95th (ft)	0	1	4
Control Delay (s)	0.0	0.3	13.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.3	13.5
Approach LOS			B

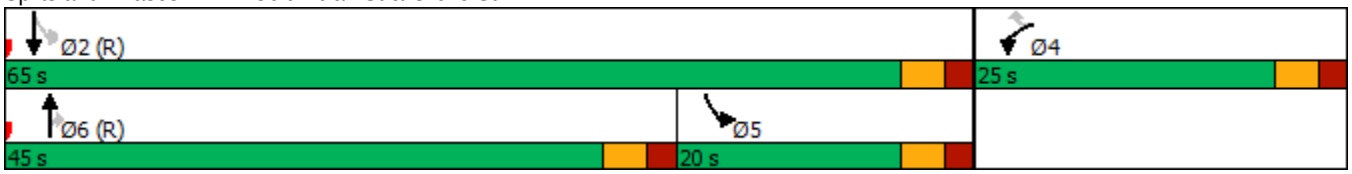
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

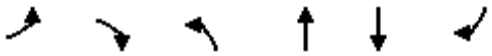
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	202	264	381	240	274	291
Future Volume (vph)	202	264	381	240	274	291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1770	1538	3505	1553	0	3387
Flt Permitted	0.950					0.635
Satd. Flow (perm)	1770	1538	3505	1553	0	2204
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		201		282		
Link Speed (mph)	30		30			30
Link Distance (ft)	637		577			356
Travel Time (s)	14.5		13.1			8.1
Peak Hour Factor	0.88	0.88	0.85	0.85	0.98	0.98
Heavy Vehicles (%)	2%	5%	3%	4%	3%	5%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	230	300	448	282	0	577
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4		6	2	
Detector Phase	4	4	6	6	5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	8.0	12.0
Minimum Split (s)	13.0	13.0	17.0	17.0	13.0	17.0
Total Split (s)	25.0	25.0	45.0	45.0	20.0	65.0
Total Split (%)	27.8%	27.8%	50.0%	50.0%	22.2%	72.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5
Lead/Lag			Lead	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	14.7	16.2	65.3	63.8		65.3
Actuated g/C Ratio	0.16	0.18	0.73	0.71		0.73
v/c Ratio	0.80	0.68	0.18	0.24		0.36
Control Delay	55.6	19.8	3.5	1.8		5.8
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	55.6	19.8	3.5	1.8		5.8
LOS	E	B	A	A		A
Approach Delay	35.3		2.8			5.8
Approach LOS	D		A			A
Queue Length 50th (ft)	126	49	36	0		55
Queue Length 95th (ft)	192	124	58	56		92
Internal Link Dist (ft)	557		497			276
Turn Bay Length (ft)		50		250		
Base Capacity (vph)	363	498	2541	1182		1598

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.63	0.60	0.18	0.24		0.36

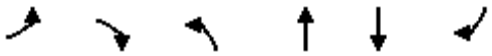
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 13.1		Intersection LOS: B	
Intersection Capacity Utilization 49.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 14: Columbian St & Grove St





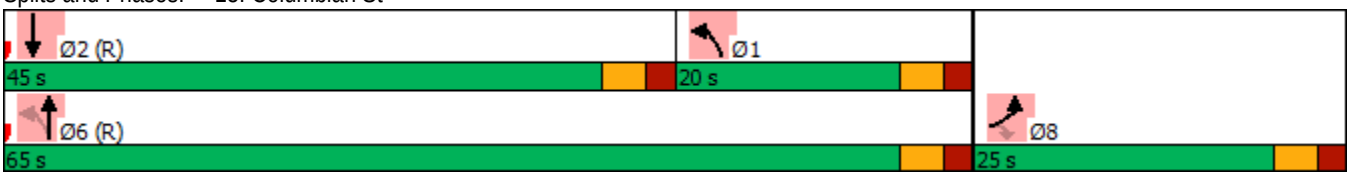
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	4	9	17	617	457	38
Future Volume (vph)	4	9	17	617	457	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1444	1615	0	3504	3429	0
Flt Permitted	0.950			0.934		
Satd. Flow (perm)	1444	1615	0	3276	3429	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		17			12	
Link Speed (mph)	30			30	30	
Link Distance (ft)	272			367	577	
Travel Time (s)	6.2			8.3	13.1	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.54	0.54	0.82	0.82	0.89	0.89
Heavy Vehicles (%)	25%	0%	0%	3%	4%	3%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	17	0	773	556	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	17.0	17.0	
Total Split (s)	25.0	25.0	20.0	65.0	45.0	
Total Split (%)	27.8%	27.8%	22.2%	72.2%	50.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	8.0	8.0		82.8	82.8	
Actuated g/C Ratio	0.09	0.09		0.92	0.92	
v/c Ratio	0.05	0.11		0.26	0.18	
Control Delay	38.8	19.0		1.4	0.7	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	38.8	19.0		1.4	0.7	
LOS	D	B		A	A	
Approach Delay	24.8			1.4	0.7	
Approach LOS	C			A	A	
Queue Length 50th (ft)	4	0		0	0	
Queue Length 95th (ft)	10	8		52	20	
Internal Link Dist (ft)	192			287	497	
Turn Bay Length (ft)						
Base Capacity (vph)	320	372		3014	3155	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	

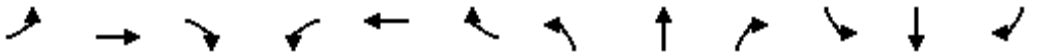


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.02	0.05		0.26	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 77 (86%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.26			
Intersection Signal Delay: 1.5		Intersection LOS: A	
Intersection Capacity Utilization 44.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 15: Columbian St





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	389	530	224	301	50	243	328	163	76	426	5
Future Volume (vph)	5	389	530	224	301	50	243	328	163	76	426	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	0		0	0		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1880	1599	1787	1818	0	1770	1881	1615	1805	3532	0
Flt Permitted		0.995		0.225			0.950			0.950		
Satd. Flow (perm)	0	1872	1599	423	1818	0	1760	1881	1615	1805	3532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			552		8				175		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		152			279			332			259	
Travel Time (s)		3.5			6.3			7.5			5.9	
Confl. Peds. (#/hr)	1					1	3					3
Peak Hour Factor	0.96	0.96	0.96	0.92	0.92	0.92	0.93	0.93	0.93	0.87	0.87	0.87
Heavy Vehicles (%)	0%	1%	1%	1%	2%	2%	2%	1%	0%	0%	2%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	410	552	243	381	0	261	353	175	87	496	0
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		9	5	10	9 10		5	2		1	6	
Permitted Phases	9		9	9 10					2			
Detector Phase	9	9	5	10	9 10		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	10.0	11.0	9.0			11.0	10.0	10.0	11.0	10.0	
Total Split (s)	39.0	39.0	20.0	12.0			20.0	19.0	19.0	20.0	19.0	
Total Split (%)	32.5%	32.5%	16.7%	10.0%			16.7%	15.8%	15.8%	16.7%	15.8%	
Yellow Time (s)	3.0	3.0	3.0	2.0			3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		1.5	1.5	2.5			-1.0	-2.0	2.5	0.0	-1.0	
Total Lost Time (s)		6.5	6.5	6.5			4.0	3.0	7.5	5.0	4.0	
Lead/Lag	Lead	Lead	Lead	Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None			None	Min	Min	None	Min	
Act Effct Green (s)		24.1	38.0	29.8	38.0		16.5	25.5	20.9	8.9	15.4	
Actuated g/C Ratio		0.27	0.43	0.34	0.43		0.19	0.29	0.24	0.10	0.18	
v/c Ratio		0.80	0.55	1.05	0.48		0.79	0.65	0.34	0.48	0.80	
Control Delay		43.3	3.4	105.9	21.3		54.7	39.2	9.0	49.3	47.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		43.3	3.4	105.9	21.3		54.7	39.2	9.0	49.3	47.5	
LOS		D	A	F	C		D	D	A	D	D	
Approach Delay		20.4			54.2			37.6			47.8	
Approach LOS		C			D			D			D	
Queue Length 50th (ft)		188	0	77	124		127	161	0	43	127	
Queue Length 95th (ft)		#451	51	#303	321		#400	#548	68	112	#328	
Internal Link Dist (ft)		72			199			252			179	
Turn Bay Length (ft)												

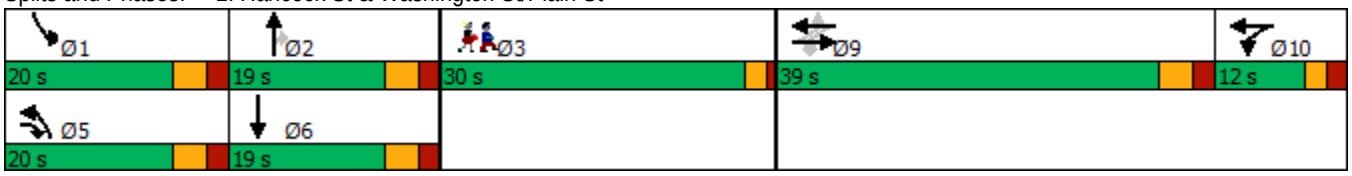
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

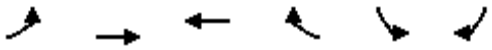
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		714	1005	231	812		332	547	518	317	622	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.57	0.55	1.05	0.47		0.79	0.65	0.34	0.27	0.80	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 87.7			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.05			
Intersection Signal Delay: 37.5		Intersection LOS: D	
Intersection Capacity Utilization 81.3%		ICU Level of Service D	
Analysis Period (min) 15			

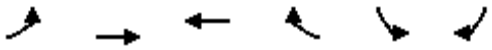
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hancock St & Washington St/Plain St





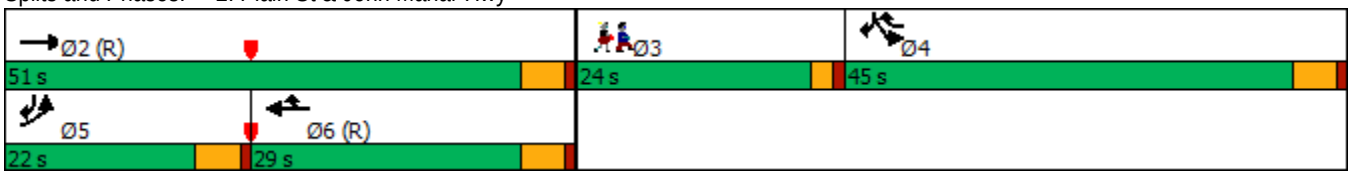
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	170	447	347	281	343	222	
Future Volume (vph)	170	447	347	281	343	222	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	200			125	0	0	
Storage Lanes	1			1	1	1	
Taper Length (ft)	25				25		
Satd. Flow (prot)	1736	1845	1810	1568	1770	1568	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1736	1845	1810	1568	1770	1568	
Right Turn on Red				Yes		No	
Satd. Flow (RTOR)				283			
Link Speed (mph)		30	30		30		
Link Distance (ft)		1145	261		232		
Travel Time (s)		26.0	5.9		5.3		
Confl. Peds. (#/hr)						1	
Peak Hour Factor	0.92	0.92	0.84	0.84	0.99	0.99	
Heavy Vehicles (%)	4%	3%	5%	3%	2%	3%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	185	486	413	335	346	224	
Turn Type	Prot	NA	NA	pt+ov	Prot	pt+ov	
Protected Phases	5	2	6	6 4	4	4 5	3
Permitted Phases							
Detector Phase	5	2	6	6 4	4	4 5	
Switch Phase							
Minimum Initial (s)	7.0	7.0	7.0		5.0		7.0
Minimum Split (s)	12.0	12.0	12.0		10.0		24.0
Total Split (s)	22.0	51.0	29.0		45.0		24.0
Total Split (%)	18.3%	42.5%	24.2%		37.5%		20%
Yellow Time (s)	4.0	4.0	4.0		4.0		2.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0
Lost Time Adjust (s)	3.0	-3.0	-3.0		3.0		
Total Lost Time (s)	8.0	2.0	2.0		8.0		
Lead/Lag	Lead		Lag		Lag		Lead
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	C-Max	C-Max		Min		None
Act Effct Green (s)	15.1	79.8	56.7	82.5	25.4	48.5	
Actuated g/C Ratio	0.13	0.66	0.47	0.69	0.21	0.40	
v/c Ratio	0.85	0.40	0.48	0.29	0.93	0.35	
Control Delay	82.7	13.8	28.6	2.2	76.4	25.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	82.7	13.8	28.6	2.2	76.4	25.0	
LOS	F	B	C	A	E	C	
Approach Delay		32.8	16.8		56.2		
Approach LOS		C	B		E		
Queue Length 50th (ft)	140	134	199	10	265	117	
Queue Length 95th (ft)	#253	402	#479	28	347	156	
Internal Link Dist (ft)		1065	181		152		
Turn Bay Length (ft)	200			125			

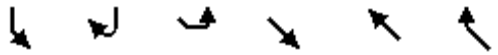


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Base Capacity (vph)	229	1227	855	1290	545	628	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.81	0.40	0.48	0.26	0.63	0.36	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 20 (17%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 33.5		Intersection LOS: C	
Intersection Capacity Utilization 63.4%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Plain St & John Mahar Hwy





Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (veh/h)	5	29	27	828	574	10
Future Volume (Veh/h)	5	29	27	828	574	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.93	0.93	0.91	0.91
Hourly flow rate (vph)	6	34	29	890	631	11
Pedestrians	1					
Lane Width (ft)	16.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				261		
pX, platoon unblocked	0.87					
vC, conflicting volume	1586	638	643			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1598	638	643			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	93	97			
cM capacity (veh/h)	100	475	950			

Direction, Lane #	SB 1	SE 1	NW 1
Volume Total	40	919	642
Volume Left	6	29	0
Volume Right	34	0	11
cSH	303	950	1700
Volume to Capacity	0.13	0.03	0.38
Queue Length 95th (ft)	11	2	0
Control Delay (s)	18.7	0.8	0.0
Lane LOS	C	A	
Approach Delay (s)	18.7	0.8	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	782	0	0	551	26	19
Future Volume (Veh/h)	782	0	0	551	26	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.94	0.94	0.59	0.59
Hourly flow rate (vph)	859	0	0	586	44	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1154					
pX, platoon unblocked						
vC, conflicting volume			859		1445	859
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			859		1445	859
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		69	91
cM capacity (veh/h)			791		144	359

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	859	586	76
Volume Left	0	0	44
Volume Right	0	0	32
cSH	1700	791	192
Volume to Capacity	0.51	0.00	0.40
Queue Length 95th (ft)	0	0	44
Control Delay (s)	0.0	0.0	35.5
Lane LOS			E
Approach Delay (s)	0.0	0.0	35.5
Approach LOS			E

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	787	7	6	568	2	4
Future Volume (Veh/h)	787	7	6	568	2	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.50	0.50
Hourly flow rate (vph)	855	8	6	604	4	8
Pedestrians					3	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			866		1478	862
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			866		1478	862
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	98
cM capacity (veh/h)			784		139	357

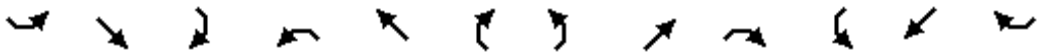
Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	863	610	12
Volume Left	0	6	4
Volume Right	8	0	8
cSH	1700	784	234
Volume to Capacity	0.51	0.01	0.05
Queue Length 95th (ft)	0	1	4
Control Delay (s)	0.0	0.2	21.2
Lane LOS		A	C
Approach Delay (s)	0.0	0.2	21.2
Approach LOS			C

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	61	741	534	9	15	35
Future Volume (Veh/h)	61	741	534	9	15	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	66	805	556	9	16	36
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			1027			
pX, platoon unblocked	0.87				0.87	0.87
vC, conflicting volume	566				1498	562
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	432				1498	427
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				86	93
cM capacity (veh/h)	995				111	552

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	871	565	52
Volume Left	66	0	16
Volume Right	0	9	36
cSH	995	1700	249
Volume to Capacity	0.07	0.33	0.21
Queue Length 95th (ft)	5	0	19
Control Delay (s)	1.7	0.0	23.3
Lane LOS	A		C
Approach Delay (s)	1.7	0.0	23.3
Approach LOS			C

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	70	661	17	1	486	45	6	4	4	46	3	76
Future Volume (Veh/h)	70	661	17	1	486	45	6	4	4	46	3	76
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.95	0.95	0.95	0.88	0.88	0.88	0.89	0.89	0.89
Hourly flow rate (vph)	74	703	18	1	512	47	7	5	5	52	3	85
Pedestrians					2			2			2	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					799							
pX, platoon unblocked	0.84						0.84	0.84		0.84	0.84	0.84
vC, conflicting volume	561			723			1486	1425	716	1409	1410	538
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	383			723			1483	1411	716	1392	1394	355
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			90	95	99	42	97	85
cM capacity (veh/h)	996			887			69	108	432	90	111	580

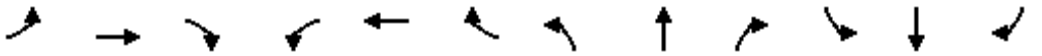
Direction, Lane #	SE 1	NW 1	NE 1	SW 1	SW 2
Volume Total	795	560	17	55	85
Volume Left	74	1	7	52	0
Volume Right	18	47	5	0	85
cSH	996	887	106	91	580
Volume to Capacity	0.07	0.00	0.16	0.61	0.15
Queue Length 95th (ft)	6	0	14	71	13
Control Delay (s)	1.9	0.0	45.2	93.1	12.3
Lane LOS	A	A	E	F	B
Approach Delay (s)	1.9	0.0	45.2	44.0	
Approach LOS			E	E	

Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	84.6%	ICU Level of Service		E
Analysis Period (min)	15			

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	20	706	491	102	58	26
Future Volume (Veh/h)	20	706	491	102	58	26
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.95	0.95	0.81	0.81
Hourly flow rate (vph)	21	735	517	107	72	32
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			437			
pX, platoon unblocked	0.82				0.82	0.82
vC, conflicting volume	625				981	572
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	434				868	369
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				70	94
cM capacity (veh/h)	932				237	520

Direction, Lane #	SE 1	SE 2	NW 1	SW 1	SW 2
Volume Total	266	490	624	72	32
Volume Left	21	0	0	72	0
Volume Right	0	0	107	0	32
cSH	932	1700	1700	237	520
Volume to Capacity	0.02	0.29	0.37	0.30	0.06
Queue Length 95th (ft)	2	0	0	31	5
Control Delay (s)	0.9	0.0	0.0	26.7	12.4
Lane LOS	A			D	B
Approach Delay (s)	0.3		0.0	22.3	
Approach LOS				C	

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	556	184	204	442	97	140	209	191	190	407	24
Future Volume (vph)	31	556	184	204	442	97	140	209	191	190	407	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	3416	0	0	3401	0	0	3349	0	0	3482	0
Flt Permitted		0.878			0.527			0.649			0.560	
Satd. Flow (perm)	0	3005	0	0	1818	0	0	2201	0	0	1979	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			12			63			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.90	0.90	0.90	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	1%	5%	2%	0%	0%	1%	1%	2%	1%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	812	0	0	817	0	0	600	0	0	653	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases		1		2	1 2			9		10	9 10	
Permitted Phases	1			1 2			9			9 10		
Detector Phase	1	1		2	1 2		9	9		10	9 10	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0			10.0	10.0		6.0		
Minimum Split (s)	15.0	15.0		11.0			15.0	15.0		15.0		
Total Split (s)	60.0	60.0		15.0			50.0	50.0		15.0		
Total Split (%)	37.3%	37.3%		9.3%			31.1%	31.1%		9.3%		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.0						5.0				
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Recall Mode	None	None		None			None	None		None		
Act Effct Green (s)		55.2			65.2			43.9			53.9	
Actuated g/C Ratio		0.39			0.46			0.31			0.38	
v/c Ratio		0.69			0.86			0.83			0.77	
Control Delay		40.2			41.2			52.8			41.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		40.2			41.2			52.8			41.9	
LOS		D			D			D			D	
Approach Delay		40.2			41.2			52.8			41.9	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)		309			247			238			216	
Queue Length 95th (ft)		477			#472			#412			340	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)												

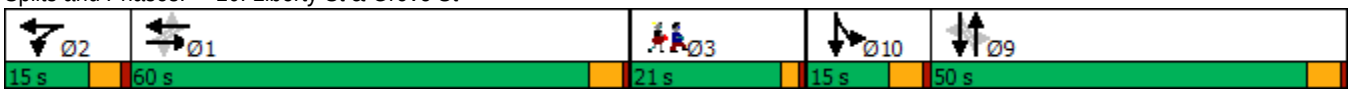
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	13%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

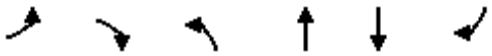
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		1177			947			738			871	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.69			0.86			0.81			0.75	

Intersection Summary			
Area Type:	Other		
Cycle Length: 161			
Actuated Cycle Length: 143			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 43.5		Intersection LOS: D	
Intersection Capacity Utilization 93.6%		ICU Level of Service F	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Liberty St & Grove St





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	63	23	320	568	83
Future Volume (Veh/h)	66	63	23	320	568	83
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.91	0.91	0.92	0.92
Hourly flow rate (vph)	86	82	25	352	617	90
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				287		
pX, platoon unblocked	0.87					
vC, conflicting volume	1066	664	709			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	999	664	709			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	62	82	97			
cM capacity (veh/h)	229	463	898			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	168	377	707
Volume Left	86	25	0
Volume Right	82	0	90
cSH	304	898	1700
Volume to Capacity	0.55	0.03	0.42
Queue Length 95th (ft)	78	2	0
Control Delay (s)	30.6	0.9	0.0
Lane LOS	D	A	
Approach Delay (s)	30.6	0.9	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	896	4	1	798	1	0
Future Volume (Veh/h)	896	4	1	798	1	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.94	0.94	0.25	0.25
Hourly flow rate (vph)	963	4	1	849	4	0
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			968		1817	966
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			968		1817	966
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			719		86	311

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	967	850	4
Volume Left	0	1	4
Volume Right	4	0	0
cSH	1700	719	86
Volume to Capacity	0.57	0.00	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	48.6
Lane LOS		A	E
Approach Delay (s)	0.0	0.0	48.6
Approach LOS			E

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	879	9	24	793	7	23
Future Volume (Veh/h)	879	9	24	793	7	23
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.63	0.63
Hourly flow rate (vph)	966	10	26	862	11	37
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				968		
pX, platoon unblocked					0.95	
vC, conflicting volume			977		1886	972
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			977		1907	972
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		84	88
cM capacity (veh/h)			714		70	309

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	976	888	48
Volume Left	0	26	11
Volume Right	10	0	37
cSH	1700	714	173
Volume to Capacity	0.57	0.04	0.28
Queue Length 95th (ft)	0	3	27
Control Delay (s)	0.0	1.0	33.6
Lane LOS		A	D
Approach Delay (s)	0.0	1.0	33.6
Approach LOS			D

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		

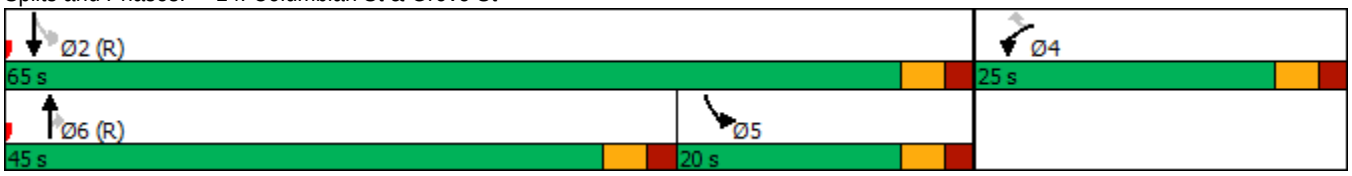
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	304	368	441	259	343	561
Future Volume (vph)	304	368	441	259	343	561
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1770	1599	3539	1583	0	3472
Flt Permitted	0.950					0.655
Satd. Flow (perm)	1770	1599	3539	1583	0	2318
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		187		276		
Link Speed (mph)	30		30			30
Link Distance (ft)	637		577			356
Travel Time (s)	14.5		13.1			8.1
Peak Hour Factor	0.93	0.93	0.94	0.94	0.91	0.91
Heavy Vehicles (%)	2%	1%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	327	396	469	276	0	993
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4		6	2	
Detector Phase	4	4	6	6	5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	8.0	12.0
Minimum Split (s)	13.0	13.0	17.0	17.0	13.0	17.0
Total Split (s)	25.0	25.0	45.0	45.0	20.0	65.0
Total Split (%)	27.8%	27.8%	50.0%	50.0%	22.2%	72.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5
Lead/Lag			Lead	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	17.9	19.4	62.1	60.6		62.1
Actuated g/C Ratio	0.20	0.22	0.69	0.67		0.69
v/c Ratio	0.93	0.81	0.19	0.24		0.62
Control Delay	70.6	31.6	4.6	2.3		9.8
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	70.6	31.6	4.6	2.3		9.8
LOS	E	C	A	A		A
Approach Delay	49.2		3.7			9.8
Approach LOS	D		A			A
Queue Length 50th (ft)	182	113	51	0		143
Queue Length 95th (ft)	#337	#260	71	59		201
Internal Link Dist (ft)	557		497			276
Turn Bay Length (ft)		50		250		
Base Capacity (vph)	363	500	2442	1156		1599

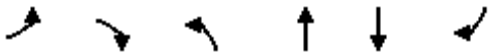
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.90	0.79	0.19	0.24		0.62

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 19.6		Intersection LOS: B	
Intersection Capacity Utilization 66.6%		ICU Level of Service C	
Analysis Period (min) 15			

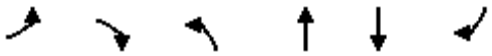
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Columbian St & Grove St





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	17	10	4	691	885	8
Future Volume (vph)	17	10	4	691	885	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1703	1615	0	3540	3571	0
Flt Permitted	0.950			0.952		
Satd. Flow (perm)	1703	1591	0	3370	3571	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		15			1	
Link Speed (mph)	30			30	30	
Link Distance (ft)	272			367	577	
Travel Time (s)	6.2			8.3	13.1	
Confl. Peds. (#/hr)		2				
Peak Hour Factor	0.68	0.68	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	6%	0%	0%	2%	1%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	25	15	0	747	961	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	17.0	17.0	
Total Split (s)	25.0	25.0	20.0	65.0	45.0	
Total Split (%)	27.8%	27.8%	22.2%	72.2%	50.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	8.2	8.2		79.0	79.0	
Actuated g/C Ratio	0.09	0.09		0.88	0.88	
v/c Ratio	0.16	0.09		0.25	0.31	
Control Delay	40.3	19.3		1.9	1.2	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	40.3	19.3		1.9	1.2	
LOS	D	B		A	A	
Approach Delay	32.4			1.9	1.2	
Approach LOS	C			A	A	
Queue Length 50th (ft)	13	0		42	33	
Queue Length 95th (ft)	28	12		60	m43	
Internal Link Dist (ft)	192			287	497	
Turn Bay Length (ft)						
Base Capacity (vph)	378	365		2960	3136	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	

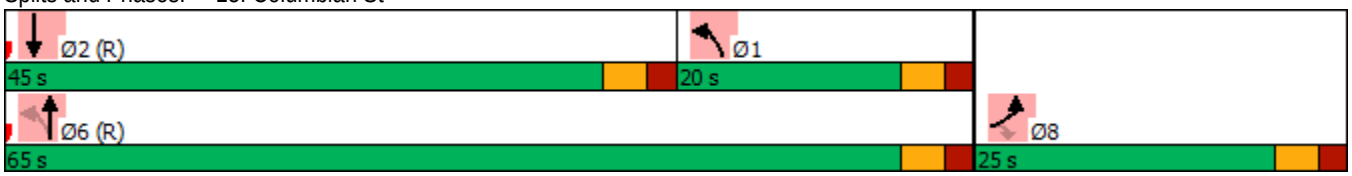


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.07	0.04		0.25	0.31	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 77 (86%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.31			
Intersection Signal Delay: 2.2		Intersection LOS: A	
Intersection Capacity Utilization 39.7%		ICU Level of Service A	
Analysis Period (min) 15			

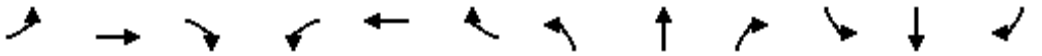
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Columbian St



APPENDIX L

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
2021 Estimated Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	208	226	129	387	64	477	558	225	73	243	7
Future Volume (vph)	2	208	226	129	387	64	477	558	225	73	243	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	0		0	0		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1777	1538	1687	1772	0	1736	1863	1568	1770	3379	0
Flt Permitted		0.645		0.402			0.950			0.950		
Satd. Flow (perm)	0	1146	1538	714	1772	0	1731	1863	1568	1770	3379	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			269		6				152		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		152			279			332			259	
Travel Time (s)		3.5			6.3			7.5			5.9	
Confl. Peds. (#/hr)	3					3	2					2
Peak Hour Factor	0.84	0.84	0.84	0.86	0.86	0.86	0.94	0.94	0.94	0.91	0.91	0.91
Heavy Vehicles (%)	0%	7%	5%	7%	5%	2%	4%	2%	3%	2%	6%	17%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	250	269	150	524	0	507	594	239	80	275	0
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		9	5	10	9 10		5	2		1	6	
Permitted Phases	9		9	9 10					2			
Detector Phase	9	9	5	10	9 10		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	10.0	11.0	9.0			11.0	10.0	10.0	11.0	10.0	
Total Split (s)	30.0	30.0	42.0	15.0			42.0	35.0	35.0	22.0	15.0	
Total Split (%)	22.7%	22.7%	31.8%	11.4%			31.8%	26.5%	26.5%	16.7%	11.4%	
Yellow Time (s)	3.0	3.0	3.0	2.0			3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		1.5	1.5	2.5			-1.0	-2.0	2.5	0.0	-1.0	
Total Lost Time (s)		6.5	6.5	6.5			4.0	3.0	7.5	5.0	4.0	
Lead/Lag	Lead	Lead	Lead	Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None			None	Min	Min	None	Min	
Act Effct Green (s)		23.8	59.6	32.3	40.4		38.4	42.5	38.0	9.3	11.1	
Actuated g/C Ratio		0.22	0.55	0.30	0.37		0.36	0.39	0.35	0.09	0.10	
v/c Ratio		0.99	0.28	0.52	0.79		0.82	0.81	0.37	0.53	0.79	
Control Delay		98.5	2.0	39.1	40.8		45.5	42.0	14.3	61.3	64.5	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		98.5	2.0	39.1	40.8		45.5	42.0	14.3	61.3	64.5	
LOS		F	A	D	D		D	D	B	E	E	
Approach Delay		48.4			40.4			38.4			63.8	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		161	0	66	286		289	338	39	51	92	
Queue Length 95th (ft)		#395	25	153	#620		#676	#857	148	118	#218	
Internal Link Dist (ft)		72			199			252			179	
Turn Bay Length (ft)												

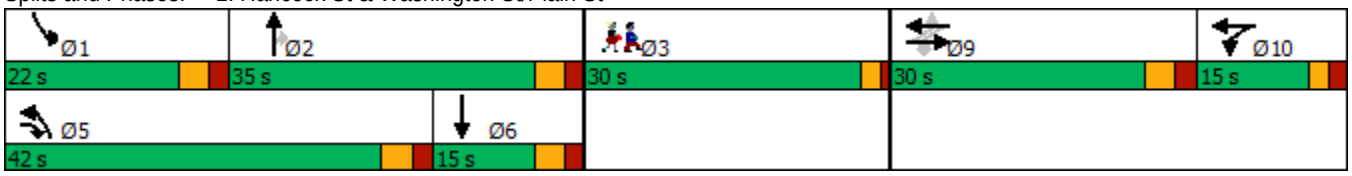
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	23%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

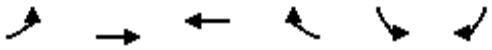
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		252	970	291	667		617	733	649	281	349	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.99	0.28	0.52	0.79		0.82	0.81	0.37	0.28	0.79	

Intersection Summary			
Area Type:	Other		
Cycle Length: 132			
Actuated Cycle Length: 108			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 43.8		Intersection LOS: D	
Intersection Capacity Utilization 86.0%		ICU Level of Service E	
Analysis Period (min) 15			

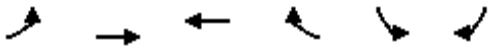
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hancock St & Washington St/Plain St





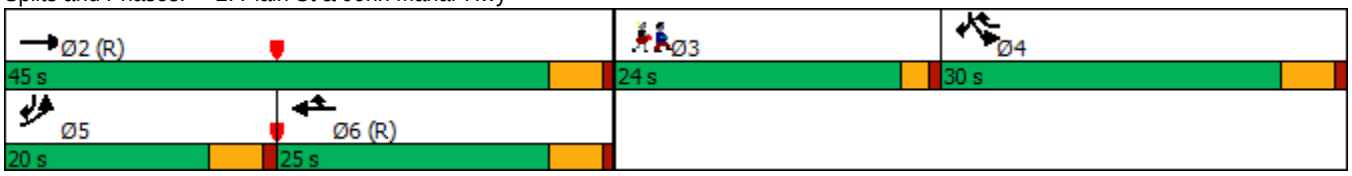
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	151	274	568	391	225	127	
Future Volume (vph)	151	274	568	391	225	127	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	200			125	0	0	
Storage Lanes	1			1	1	1	
Taper Length (ft)	25				25		
Satd. Flow (prot)	1770	1827	1827	1568	1719	1553	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1770	1827	1827	1568	1719	1553	
Right Turn on Red				Yes		No	
Satd. Flow (RTOR)				248			
Link Speed (mph)		30	30		30		
Link Distance (ft)		1145	261		232		
Travel Time (s)		26.0	5.9		5.3		
Peak Hour Factor	0.87	0.87	0.95	0.95	0.90	0.90	
Heavy Vehicles (%)	2%	4%	4%	3%	5%	4%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	174	315	598	412	250	141	
Turn Type	Prot	NA	NA	pt+ov	Prot	pt+ov	
Protected Phases	5	2	6	6 4	4	4 5	3
Permitted Phases							
Detector Phase	5	2	6	6 4	4	4 5	
Switch Phase							
Minimum Initial (s)	7.0	7.0	7.0		5.0		7.0
Minimum Split (s)	12.0	12.0	12.0		10.0		24.0
Total Split (s)	20.0	45.0	25.0		30.0		24.0
Total Split (%)	20.2%	45.5%	25.3%		30.3%		24%
Yellow Time (s)	4.0	4.0	4.0		4.0		2.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0
Lost Time Adjust (s)	3.0	-3.0	-3.0		3.0		
Total Lost Time (s)	8.0	2.0	2.0		8.0		
Lead/Lag	Lead		Lag		Lag		Lead
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	C-Max	C-Max		Min		None
Act Effct Green (s)	11.0	68.6	49.6	65.6	15.6	34.6	
Actuated g/C Ratio	0.11	0.69	0.50	0.66	0.16	0.35	
v/c Ratio	0.89	0.25	0.65	0.37	0.93	0.26	
Control Delay	84.5	9.3	27.1	4.0	78.8	22.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	84.5	9.3	27.1	4.0	78.8	22.6	
LOS	F	A	C	A	E	C	
Approach Delay		36.0	17.7		58.6		
Approach LOS		D	B		E		
Queue Length 50th (ft)	108	52	246	28	157	62	
Queue Length 95th (ft)	#208	194	#719	69	229	97	
Internal Link Dist (ft)		1065	181		152		
Turn Bay Length (ft)	200			125			
Base Capacity (vph)	222	1266	916	1208	382	545	

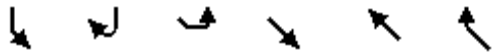


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.78	0.25	0.65	0.34	0.65	0.26	

Intersection Summary			
Area Type:	Other		
Cycle Length: 99			
Actuated Cycle Length: 99			
Offset: 20 (20%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 30.9		Intersection LOS: C	
Intersection Capacity Utilization 67.4%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Plain St & John Mahar Hwy





Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (veh/h)	6	39	32	394	925	17
Future Volume (Veh/h)	6	39	32	394	925	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.80	0.80	0.93	0.93
Hourly flow rate (vph)	6	42	40	492	995	18
Pedestrians	4					
Lane Width (ft)	16.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				261		
pX, platoon unblocked	0.94					
vC, conflicting volume	1580	1008	1017			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1586	1008	1017			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	85	94			
cM capacity (veh/h)	106	289	686			

Direction, Lane #	SB 1	SE 1	NW 1
Volume Total	48	532	1013
Volume Left	6	40	0
Volume Right	42	0	18
cSH	238	686	1700
Volume to Capacity	0.20	0.06	0.60
Queue Length 95th (ft)	18	5	0
Control Delay (s)	24.0	1.6	0.0
Lane LOS	C	A	
Approach Delay (s)	24.0	1.6	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	376	0	0	943	27	19
Future Volume (Veh/h)	376	0	0	943	27	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.95	0.95	0.89	0.89
Hourly flow rate (vph)	404	0	0	993	30	21
Pedestrians					5	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1154					
pX, platoon unblocked						
vC, conflicting volume			409		1402	409
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			409		1402	409
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		81	97
cM capacity (veh/h)			1155		155	633

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	404	993	51
Volume Left	0	0	30
Volume Right	0	0	21
cSH	1700	1155	225
Volume to Capacity	0.24	0.00	0.23
Queue Length 95th (ft)	0	0	21
Control Delay (s)	0.0	0.0	25.6
Lane LOS			D
Approach Delay (s)	0.0	0.0	25.6
Approach LOS			D

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	396	3	3	938	6	5
Future Volume (Veh/h)	396	3	3	938	6	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.96	0.96	0.92	0.92
Hourly flow rate (vph)	445	3	3	977	7	5
Pedestrians					4	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			452		1434	450
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			452		1434	450
tC, single (s)			4.1		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			100		95	99
cM capacity (veh/h)			1115		148	571

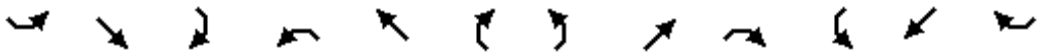
Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	448	980	12
Volume Left	0	3	7
Volume Right	3	0	5
cSH	1700	1115	214
Volume to Capacity	0.26	0.00	0.06
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.1	22.8
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	22.8
Approach LOS			C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	49	344	898	9	12	38
Future Volume (Veh/h)	49	344	898	9	12	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.97	0.97	0.89	0.89
Hourly flow rate (vph)	56	395	926	9	13	43
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			1027			
pX, platoon unblocked	0.75				0.75	0.75
vC, conflicting volume	936				1438	932
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745				1418	739
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	91				87	86
cM capacity (veh/h)	637				100	310

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	451	935	56
Volume Left	56	0	13
Volume Right	0	9	43
cSH	637	1700	208
Volume to Capacity	0.09	0.55	0.27
Queue Length 95th (ft)	7	0	26
Control Delay (s)	2.5	0.0	28.6
Lane LOS	A		D
Approach Delay (s)	2.5	0.0	28.6
Approach LOS			D

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	51	301	1	3	842	48	4	0	5	39	3	59
Future Volume (Veh/h)	51	301	1	3	842	48	4	0	5	39	3	59
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.87	0.87	0.87	0.50	0.50	0.50	0.87	0.87	0.87
Hourly flow rate (vph)	54	320	1	3	968	55	8	0	10	45	3	68
Pedestrians					1			4				
Lane Width (ft)					12.0			12.0				
Walking Speed (ft/s)					3.5			3.5				
Percent Blockage					0			0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					799							
pX, platoon unblocked	0.72						0.72	0.72		0.72	0.72	0.72
vC, conflicting volume	1023			325			1504	1462	326	1441	1434	996
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	841			325			1505	1447	326	1419	1410	803
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			100			84	100	99	40	97	76
cM capacity (veh/h)	581			1241			50	87	717	75	91	280

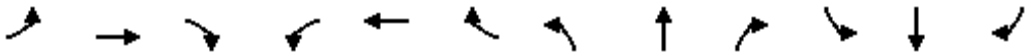
Direction, Lane #	SE 1	NW 1	NE 1	SW 1	SW 2
Volume Total	375	1026	18	48	68
Volume Left	54	3	8	45	0
Volume Right	1	55	10	0	68
cSH	581	1241	103	76	280
Volume to Capacity	0.09	0.00	0.18	0.64	0.24
Queue Length 95th (ft)	8	0	15	71	23
Control Delay (s)	2.9	0.1	47.4	113.3	21.9
Lane LOS	A	A	E	F	C
Approach Delay (s)	2.9	0.1	47.4	59.7	
Approach LOS			E	F	

Intersection Summary				
Average Delay	5.8			
Intersection Capacity Utilization	66.9%	ICU Level of Service		C
Analysis Period (min)	15			

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	17	329	874	69	31	25
Future Volume (Veh/h)	17	329	874	69	31	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.97	0.97	0.88	0.88
Hourly flow rate (vph)	20	378	901	71	35	28
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			3.5			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			437			
pX, platoon unblocked	0.73				0.73	0.73
vC, conflicting volume	972				1166	936
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	777				1044	729
tC, single (s)	4.1				6.9	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				78	90
cM capacity (veh/h)	620				158	270

Direction, Lane #	SE 1	SE 2	NW 1	SW 1	SW 2
Volume Total	146	252	972	35	28
Volume Left	20	0	0	35	0
Volume Right	0	0	71	0	28
cSH	620	1700	1700	158	270
Volume to Capacity	0.03	0.15	0.57	0.22	0.10
Queue Length 95th (ft)	2	0	0	20	9
Control Delay (s)	1.8	0.0	0.0	34.3	19.9
Lane LOS	A			D	C
Approach Delay (s)	0.7		0.0	27.9	
Approach LOS				D	

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	227	86	140	717	122	264	526	191	104	270	24
Future Volume (vph)	18	227	86	140	717	122	264	526	191	104	270	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	3313	0	0	3357	0	0	3374	0	0	3418	0
Flt Permitted		0.864			0.769			0.706			0.534	
Satd. Flow (perm)	0	2871	0	0	2599	0	0	2414	0	0	1849	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33			12			18			4	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)	1		2	2		1						
Peak Hour Factor	0.94	0.94	0.94	0.96	0.96	0.96	0.89	0.89	0.89	0.85	0.85	0.85
Heavy Vehicles (%)	0%	4%	4%	4%	5%	2%	2%	3%	2%	3%	3%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	351	0	0	1020	0	0	1103	0	0	468	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases		1		2	1 2			9		10	9 10	
Permitted Phases	1			1 2			9			9 10		
Detector Phase	1	1		2	1 2		9	9		10	9 10	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0			10.0	10.0		6.0		
Minimum Split (s)	15.0	15.0		11.0			15.0	15.0		15.0		
Total Split (s)	60.0	60.0		15.0			50.0	50.0		15.0		
Total Split (%)	37.3%	37.3%		9.3%			31.1%	31.1%		9.3%		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.0						5.0				
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Recall Mode	None	None		None			None	None		None		
Act Effct Green (s)		51.5			61.5			45.3			55.4	
Actuated g/C Ratio		0.37			0.44			0.32			0.39	
v/c Ratio		0.33			0.85			1.40			0.56	
Control Delay		30.4			41.2			222.6			32.6	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		30.4			41.2			222.6			32.6	
LOS		C			D			F			C	
Approach Delay		30.4			41.2			222.6			32.6	
Approach LOS		C			D			F			C	
Queue Length 50th (ft)		103			338			~703			145	
Queue Length 95th (ft)		178			#564			#995			221	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)												

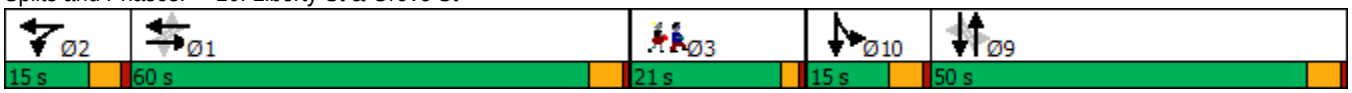
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	13%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

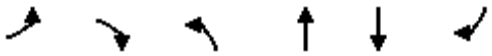
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		1149			1269			789			841	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.31			0.80			1.40			0.56	

Intersection Summary			
Area Type:	Other		
Cycle Length: 161			
Actuated Cycle Length: 140.7			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.40			
Intersection Signal Delay: 106.6		Intersection LOS: F	
Intersection Capacity Utilization 93.6%		ICU Level of Service F	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Liberty St & Grove St





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	26	17	646	356	43
Future Volume (Veh/h)	32	26	17	646	356	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.98	0.98	0.85	0.85
Hourly flow rate (vph)	35	29	17	659	419	51
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				287		
pX, platoon unblocked	0.69					
vC, conflicting volume	1140	446	472			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	977	446	472			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	82	95	98			
cM capacity (veh/h)	190	607	1067			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	64	676	470
Volume Left	35	17	0
Volume Right	29	0	51
cSH	276	1067	1700
Volume to Capacity	0.23	0.02	0.28
Queue Length 95th (ft)	22	1	0
Control Delay (s)	22.0	0.4	0.0
Lane LOS	C	A	
Approach Delay (s)	22.0	0.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	541	2	0	970	2	2
Future Volume (Veh/h)	541	2	0	970	2	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.88	0.88	0.50	0.50
Hourly flow rate (vph)	564	2	0	1102	4	4
Pedestrians	2				2	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	3.5				3.5	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			568		1671	567
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			568		1671	567
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	99
cM capacity (veh/h)			1012		106	526

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	566	1102	8
Volume Left	0	0	4
Volume Right	2	0	4
cSH	1700	1012	177
Volume to Capacity	0.33	0.00	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	26.3
Lane LOS			D
Approach Delay (s)	0.0	0.0	26.3
Approach LOS			D

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	542	3	11	967	2	19
Future Volume (Veh/h)	542	3	11	967	2	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.89	0.89	0.88	0.88
Hourly flow rate (vph)	559	3	12	1087	2	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				968		
pX, platoon unblocked					0.82	
vC, conflicting volume			562		1672	560
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			562		1708	560
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	96
cM capacity (veh/h)			1019		82	522

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	562	1099	24
Volume Left	0	12	2
Volume Right	3	0	22
cSH	1700	1019	361
Volume to Capacity	0.33	0.01	0.07
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	0.4	15.7
Lane LOS		A	C
Approach Delay (s)	0.0	0.4	15.7
Approach LOS			C

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		69.7%	ICU Level of Service C
Analysis Period (min)		15	

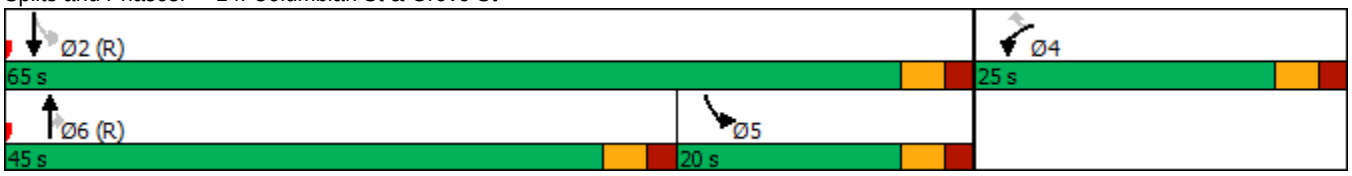
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	237	315	672	266	288	247
Future Volume (vph)	237	315	672	266	288	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1752	1568	3505	1599	0	3303
Flt Permitted	0.950					0.552
Satd. Flow (perm)	1752	1568	3505	1599	0	1872
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		205		289		
Link Speed (mph)	30		30			30
Link Distance (ft)	637		577			356
Travel Time (s)	14.5		13.1			8.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	1%	6%	7%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	258	342	730	289	0	608
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4		6	2	
Detector Phase	4	4	6	6	5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	8.0	12.0
Minimum Split (s)	13.0	13.0	17.0	17.0	13.0	17.0
Total Split (s)	25.0	25.0	45.0	45.0	20.0	65.0
Total Split (%)	27.8%	27.8%	50.0%	50.0%	22.2%	72.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5
Lead/Lag			Lead	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	15.9	17.4	64.1	62.6		64.1
Actuated g/C Ratio	0.18	0.19	0.71	0.70		0.71
v/c Ratio	0.83	0.73	0.29	0.24		0.46
Control Delay	58.4	23.1	4.5	1.7		7.3
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	58.4	23.1	4.5	1.7		7.3
LOS	E	C	A	A		A
Approach Delay	38.3		3.7			7.3
Approach LOS	D		A			A
Queue Length 50th (ft)	140	69	74	2		70
Queue Length 95th (ft)	#243	165	110	62		105
Internal Link Dist (ft)	557		497			276
Turn Bay Length (ft)		50		250		
Base Capacity (vph)	360	507	2496	1200		1333

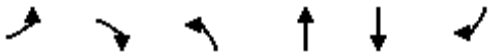
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.72	0.67	0.29	0.24		0.46

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 14.0		Intersection LOS: B	
Intersection Capacity Utilization 59.7%		ICU Level of Service B	
Analysis Period (min) 15			

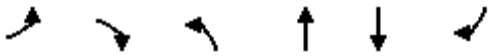
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Columbian St & Grove St





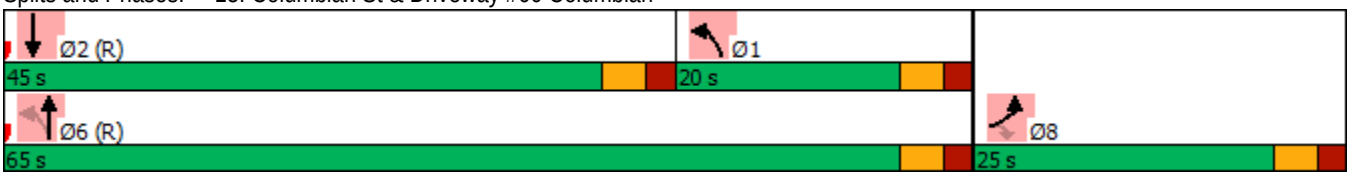
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	7	3	17	931	463	21
Future Volume (vph)	7	3	17	931	463	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1583	1615	0	3537	3412	0
Flt Permitted	0.950			0.943		
Satd. Flow (perm)	1583	1615	0	3339	3412	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		5			7	
Link Speed (mph)	30			30	30	
Link Distance (ft)	272			367	577	
Travel Time (s)	6.2			8.3	13.1	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.65	0.65	0.92	0.92	0.97	0.97
Heavy Vehicles (%)	14%	0%	0%	2%	5%	5%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	5	0	1030	499	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	17.0	17.0	
Total Split (s)	25.0	25.0	20.0	65.0	45.0	
Total Split (%)	27.8%	27.8%	22.2%	72.2%	50.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	8.0	8.0		82.8	82.8	
Actuated g/C Ratio	0.09	0.09		0.92	0.92	
v/c Ratio	0.08	0.03		0.34	0.16	
Control Delay	39.1	24.0		1.6	0.6	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	39.1	24.0		1.6	0.6	
LOS	D	C		A	A	
Approach Delay	34.4			1.6	0.6	
Approach LOS	C			A	A	
Queue Length 50th (ft)	6	0		0	0	
Queue Length 95th (ft)	16	7		85	16	
Internal Link Dist (ft)	192			287	497	
Turn Bay Length (ft)						
Base Capacity (vph)	351	362		3072	3140	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	

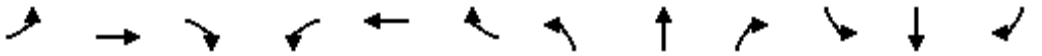


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.03	0.01		0.34	0.16	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 77 (86%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.34			
Intersection Signal Delay: 1.6		Intersection LOS: A	
Intersection Capacity Utilization 52.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 15: Columbian St & Driveway #60 Columbian





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	412	562	237	319	53	258	348	173	81	452	5
Future Volume (vph)	5	412	562	237	319	53	258	348	173	81	452	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	0		0	0		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1880	1599	1787	1818	0	1770	1881	1615	1805	3532	0
Flt Permitted		0.995		0.207			0.950			0.950		
Satd. Flow (perm)	0	1872	1599	389	1818	0	1760	1881	1615	1805	3532	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			585		8				182		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		152			279			332			259	
Travel Time (s)		3.5			6.3			7.5			5.9	
Confl. Peds. (#/hr)	1					1	3					3
Peak Hour Factor	0.96	0.96	0.96	0.92	0.92	0.92	0.93	0.93	0.93	0.87	0.87	0.87
Heavy Vehicles (%)	0%	1%	1%	1%	2%	2%	2%	1%	0%	0%	2%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	434	585	258	405	0	277	374	186	93	526	0
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		9	5	10	9 10		5	2		1	6	
Permitted Phases	9		9	9 10					2			
Detector Phase	9	9	5	10	9 10		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	10.0	11.0	9.0			11.0	10.0	10.0	11.0	10.0	
Total Split (s)	39.0	39.0	20.0	12.0			20.0	19.0	19.0	20.0	19.0	
Total Split (%)	32.5%	32.5%	16.7%	10.0%			16.7%	15.8%	15.8%	16.7%	15.8%	
Yellow Time (s)	3.0	3.0	3.0	2.0			3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		1.5	1.5	2.5			-1.0	-2.0	2.5	0.0	-1.0	
Total Lost Time (s)		6.5	6.5	6.5			4.0	3.0	7.5	5.0	4.0	
Lead/Lag	Lead	Lead	Lead	Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None			None	Min	Min	None	Min	
Act Effct Green (s)		25.7	39.5	31.3	39.5		16.4	25.2	20.5	9.2	15.4	
Actuated g/C Ratio		0.29	0.44	0.35	0.44		0.18	0.28	0.23	0.10	0.17	
v/c Ratio		0.81	0.57	1.15	0.50		0.85	0.71	0.36	0.50	0.86	
Control Delay		43.3	3.4	137.3	21.5		62.3	42.3	9.6	50.3	53.1	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		43.3	3.4	137.3	21.5		62.3	42.3	9.6	50.3	53.1	
LOS		D	A	F	C		E	D	A	D	D	
Approach Delay		20.4			66.5			41.6			52.7	
Approach LOS		C			E			D			D	
Queue Length 50th (ft)		202	0	~94	134		141	181	2	47	141	
Queue Length 95th (ft)		#494	52	#345	345		#429	#593	73	118	#355	
Internal Link Dist (ft)		72			199			252			179	
Turn Bay Length (ft)												

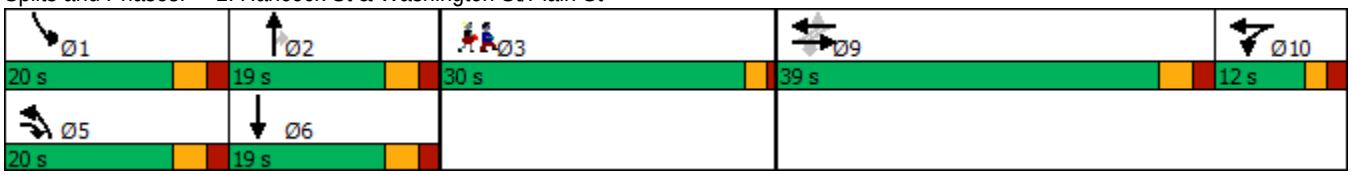
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

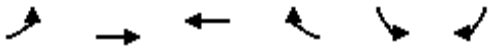
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		700	1034	225	814		326	530	512	311	610	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.62	0.57	1.15	0.50		0.85	0.71	0.36	0.30	0.86	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 89.2			
Natural Cycle: 140			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.15			
Intersection Signal Delay: 42.2		Intersection LOS: D	
Intersection Capacity Utilization 85.2%		ICU Level of Service E	
Analysis Period (min) 15			

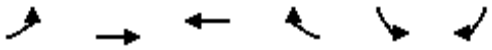
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hancock St & Washington St/Plain St





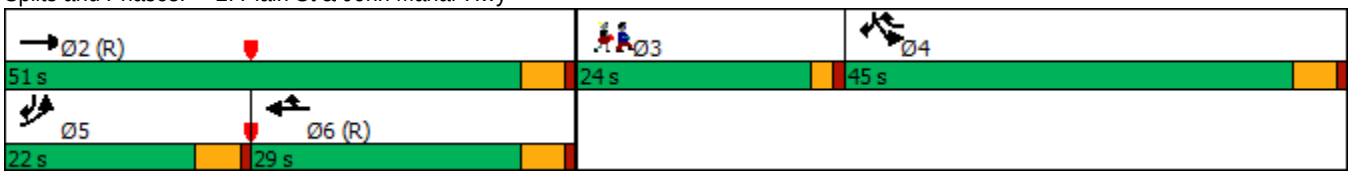
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	159	493	426	297	392	181	
Future Volume (vph)	159	493	426	297	392	181	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	200			125	0	0	
Storage Lanes	1			1	1	1	
Taper Length (ft)	25				25		
Satd. Flow (prot)	1736	1845	1810	1568	1770	1568	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1736	1845	1810	1568	1770	1568	
Right Turn on Red				Yes		No	
Satd. Flow (RTOR)				243			
Link Speed (mph)		30	30		30		
Link Distance (ft)		1145	261		232		
Travel Time (s)		26.0	5.9		5.3		
Confl. Peds. (#/hr)						1	
Peak Hour Factor	0.92	0.92	0.84	0.84	0.99	0.99	
Heavy Vehicles (%)	4%	3%	5%	3%	2%	3%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	173	536	507	354	396	183	
Turn Type	Prot	NA	NA	pt+ov	Prot	pt+ov	
Protected Phases	5	2	6	6 4	4	4 5	3
Permitted Phases							
Detector Phase	5	2	6	6 4	4	4 5	
Switch Phase							
Minimum Initial (s)	7.0	7.0	7.0		5.0		7.0
Minimum Split (s)	12.0	12.0	12.0		10.0		24.0
Total Split (s)	22.0	51.0	29.0		45.0		24.0
Total Split (%)	18.3%	42.5%	24.2%		37.5%		20%
Yellow Time (s)	4.0	4.0	4.0		4.0		2.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0
Lost Time Adjust (s)	3.0	-3.0	-3.0		3.0		
Total Lost Time (s)	8.0	2.0	2.0		8.0		
Lead/Lag	Lead		Lag		Lag		Lead
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	C-Max	C-Max		Min		None
Act Effct Green (s)	13.3	76.7	55.4	84.3	28.5	49.8	
Actuated g/C Ratio	0.11	0.64	0.46	0.70	0.24	0.42	
v/c Ratio	0.90	0.45	0.61	0.30	0.94	0.28	
Control Delay	95.6	16.2	31.9	2.9	76.1	22.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	95.6	16.2	31.9	2.9	76.1	22.8	
LOS	F	B	C	A	E	C	
Approach Delay		35.6	20.0		59.2		
Approach LOS		D	B		E		
Queue Length 50th (ft)	132	171	272	21	303	90	
Queue Length 95th (ft)	#261	476	#632	41	392	127	
Internal Link Dist (ft)		1065	181		152		
Turn Bay Length (ft)	200			125			

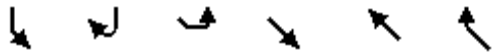


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Base Capacity (vph)	213	1179	835	1267	545	658	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.81	0.45	0.61	0.28	0.73	0.28	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 20 (17%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 35.7		Intersection LOS: D	
Intersection Capacity Utilization 69.6%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Plain St & John Mahar Hwy





Movement	SBL	SBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (veh/h)	5	29	32	848	689	15
Future Volume (Veh/h)	5	29	32	848	689	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.93	0.93	0.91	0.91
Hourly flow rate (vph)	6	34	34	912	757	16
Pedestrians	1					
Lane Width (ft)	16.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				261		
pX, platoon unblocked	0.84					
vC, conflicting volume	1746	766	774			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1793	766	774			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	92	96			
cM capacity (veh/h)	72	401	850			

Direction, Lane #	SB 1	SE 1	NW 1
Volume Total	40	946	773
Volume Left	6	34	0
Volume Right	34	0	16
cSH	238	850	1700
Volume to Capacity	0.17	0.04	0.45
Queue Length 95th (ft)	15	3	0
Control Delay (s)	23.1	1.1	0.0
Lane LOS	C	A	
Approach Delay (s)	23.1	1.1	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	802	0	0	671	26	19
Future Volume (Veh/h)	802	0	0	671	26	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.94	0.94	0.59	0.59
Hourly flow rate (vph)	881	0	0	714	44	32
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1154					
pX, platoon unblocked						
vC, conflicting volume			881		1595	881
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			881		1595	881
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		62	91
cM capacity (veh/h)			776		116	349

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	881	714	76
Volume Left	0	0	44
Volume Right	0	0	32
cSH	1700	776	162
Volume to Capacity	0.52	0.00	0.47
Queue Length 95th (ft)	0	0	55
Control Delay (s)	0.0	0.0	45.7
Lane LOS			E
Approach Delay (s)	0.0	0.0	45.7
Approach LOS			E

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	807	7	6	688	2	4
Future Volume (Veh/h)	807	7	6	688	2	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.50	0.50
Hourly flow rate (vph)	877	8	6	732	4	8
Pedestrians					3	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			888		1628	884
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			888		1628	884
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		96	98
cM capacity (veh/h)			769		112	346

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	885	738	12
Volume Left	0	6	4
Volume Right	8	0	8
cSH	1700	769	204
Volume to Capacity	0.52	0.01	0.06
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	0.2	23.7
Lane LOS		A	C
Approach Delay (s)	0.0	0.2	23.7
Approach LOS			C

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	61	761	654	9	15	35
Future Volume (Veh/h)	61	761	654	9	15	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	66	827	681	9	16	36
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			1027			
pX, platoon unblocked	0.80				0.80	0.80
vC, conflicting volume	691				1646	686
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	491				1681	486
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				79	92
cM capacity (veh/h)	867				78	469

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	893	690	52
Volume Left	66	0	16
Volume Right	0	9	36
cSH	867	1700	184
Volume to Capacity	0.08	0.41	0.28
Queue Length 95th (ft)	6	0	28
Control Delay (s)	2.0	0.0	32.1
Lane LOS	A		D
Approach Delay (s)	2.0	0.0	32.1
Approach LOS			D

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	79	683	13	3	575	47	7	0	3	55	1	71
Future Volume (Veh/h)	79	683	13	3	575	47	7	0	3	55	1	71
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.95	0.95	0.95	0.88	0.88	0.88	0.89	0.89	0.89
Hourly flow rate (vph)	84	727	14	3	605	49	8	0	3	62	1	80
Pedestrians					2			2			2	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					3.5			3.5			3.5	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					799							
pX, platoon unblocked	0.79						0.79	0.79		0.79	0.79	0.79
vC, conflicting volume	656			743			1620	1566	738	1544	1548	632
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	430			743			1652	1584	738	1556	1561	399
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			100			83	100	99	6	99	84
cM capacity (veh/h)	898			872			48	78	420	66	80	514

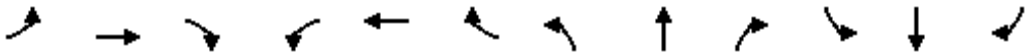
Direction, Lane #	SE 1	NW 1	NE 1	SW 1	SW 2
Volume Total	825	657	11	63	80
Volume Left	84	3	8	62	0
Volume Right	14	49	3	0	80
cSH	898	872	64	66	514
Volume to Capacity	0.09	0.00	0.17	0.95	0.16
Queue Length 95th (ft)	8	0	14	117	14
Control Delay (s)	2.4	0.1	73.0	201.3	13.3
Lane LOS	A	A	F	F	B
Approach Delay (s)	2.4	0.1	73.0	96.1	
Approach LOS			F	F	

Intersection Summary				
Average Delay	10.1			
Intersection Capacity Utilization	91.5%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	23	721	603	96	56	23
Future Volume (Veh/h)	23	721	603	96	56	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.95	0.95	0.81	0.81
Hourly flow rate (vph)	24	751	635	101	69	28
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			437			
pX, platoon unblocked	0.78				0.78	0.78
vC, conflicting volume	737				1110	686
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	522				1000	457
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				63	94
cM capacity (veh/h)	822				184	433

Direction, Lane #	SE 1	SE 2	NW 1	SW 1	SW 2
Volume Total	274	501	736	69	28
Volume Left	24	0	0	69	0
Volume Right	0	0	101	0	28
cSH	822	1700	1700	184	433
Volume to Capacity	0.03	0.29	0.43	0.37	0.06
Queue Length 95th (ft)	2	0	0	40	5
Control Delay (s)	1.1	0.0	0.0	35.8	13.9
Lane LOS	A			E	B
Approach Delay (s)	0.4		0.0	29.5	
Approach LOS				D	

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	531	218	208	562	110	139	229	207	257	486	27
Future Volume (vph)	27	531	218	208	562	110	139	229	207	257	486	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	3391	0	0	3447	0	0	3341	0	0	3493	0
Flt Permitted		0.881			0.538			0.586			0.554	
Satd. Flow (perm)	0	2993	0	0	1877	0	0	1980	0	0	1966	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			12			68			2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.97	0.97	0.97	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	2%	1%	1%	2%	0%	1%	1%	1%	1%	1%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	800	0	0	936	0	0	605	0	0	811	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases		1		2	1 2			9		10	9 10	
Permitted Phases	1			1 2			9			9 10		
Detector Phase	1	1		2	1 2		9	9		10	9 10	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0			10.0	10.0		6.0		
Minimum Split (s)	15.0	15.0		11.0			15.0	15.0		15.0		
Total Split (s)	60.0	60.0		15.0			50.0	50.0		15.0		
Total Split (%)	37.3%	37.3%		9.3%			31.1%	31.1%		9.3%		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.0						5.0				
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Recall Mode	None	None		None			None	None		None		
Act Effct Green (s)		55.2			65.2			45.1			55.2	
Actuated g/C Ratio		0.38			0.45			0.31			0.38	
v/c Ratio		0.68			0.97			0.91			0.94	
Control Delay		39.8			56.6			60.9			58.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		39.8			56.6			60.9			58.7	
LOS		D			E			E			E	
Approach Delay		39.8			56.6			60.9			58.7	
Approach LOS		D			E			E			E	
Queue Length 50th (ft)		298			296			249			285	
Queue Length 95th (ft)		462			#633			#448			#569	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)												

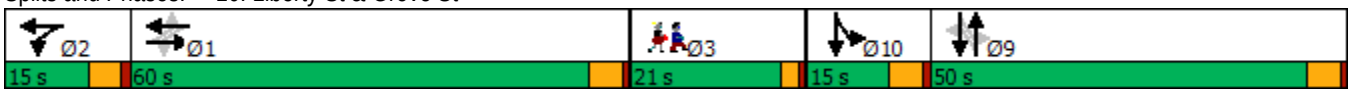
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	13%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

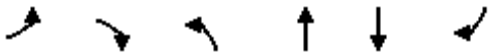
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		1169			964			666			859	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.68			0.97			0.91			0.94	

Intersection Summary			
Area Type:	Other		
Cycle Length: 161			
Actuated Cycle Length: 144.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 53.7		Intersection LOS: D	
Intersection Capacity Utilization 103.0%		ICU Level of Service G	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 10: Liberty St & Grove St





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	63	23	320	708	83
Future Volume (Veh/h)	66	63	23	320	708	83
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.91	0.91	0.92	0.92
Hourly flow rate (vph)	86	82	25	352	770	90
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				287		
pX, platoon unblocked	0.86					
vC, conflicting volume	1219	817	862			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1175	817	862			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	52	78	97			
cM capacity (veh/h)	179	379	787			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	168	377	860
Volume Left	86	25	0
Volume Right	82	0	90
cSH	241	787	1700
Volume to Capacity	0.70	0.03	0.51
Queue Length 95th (ft)	115	2	0
Control Delay (s)	48.5	1.0	0.0
Lane LOS	E	A	
Approach Delay (s)	48.5	1.0	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1002	2	2	832	1	0
Future Volume (Veh/h)	1002	2	2	832	1	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.94	0.94	0.25	0.25
Hourly flow rate (vph)	1077	2	2	885	4	0
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1080		1968	1079
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1080		1968	1079
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	100
cM capacity (veh/h)			653		70	268

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1079	887	4
Volume Left	0	2	4
Volume Right	2	0	0
cSH	1700	653	70
Volume to Capacity	0.63	0.00	0.06
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.1	59.9
Lane LOS		A	F
Approach Delay (s)	0.0	0.1	59.9
Approach LOS			F

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	991	6	24	837	3	16
Future Volume (Veh/h)	991	6	24	837	3	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.63	0.63
Hourly flow rate (vph)	1089	7	26	910	5	25
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				968		
pX, platoon unblocked					0.93	
vC, conflicting volume			1097		2056	1094
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1097		2099	1094
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		90	90
cM capacity (veh/h)			643		51	262

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1096	936	30
Volume Left	0	26	5
Volume Right	7	0	25
cSH	1700	643	156
Volume to Capacity	0.64	0.04	0.19
Queue Length 95th (ft)	0	3	17
Control Delay (s)	0.0	1.2	33.6
Lane LOS		A	D
Approach Delay (s)	0.0	1.2	33.6
Approach LOS			D

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

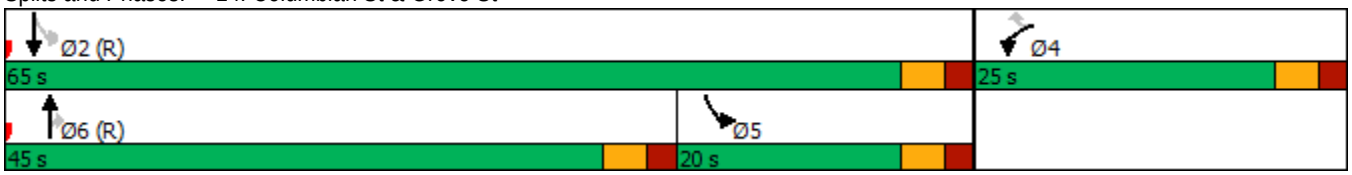
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	354	371	497	293	395	677
Future Volume (vph)	354	371	497	293	395	677
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1787	1599	3610	1599	0	3510
Flt Permitted	0.950					0.647
Satd. Flow (perm)	1787	1599	3610	1599	0	2313
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		161		296		
Link Speed (mph)	30		30			30
Link Distance (ft)	637		577			356
Travel Time (s)	14.5		13.1			8.1
Peak Hour Factor	0.96	0.96	0.99	0.99	0.91	0.91
Heavy Vehicles (%)	1%	1%	0%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	369	386	502	296	0	1178
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4		6	2	
Detector Phase	4	4	6	6	5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	8.0	12.0
Minimum Split (s)	13.0	13.0	17.0	17.0	13.0	17.0
Total Split (s)	25.0	25.0	45.0	45.0	20.0	65.0
Total Split (%)	27.8%	27.8%	50.0%	50.0%	22.2%	72.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5
Lead/Lag			Lead	Lead	Lag	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	18.5	20.0	61.5	60.0		61.5
Actuated g/C Ratio	0.21	0.22	0.68	0.67		0.68
v/c Ratio	1.01	0.80	0.20	0.25		0.75
Control Delay	86.2	33.6	4.9	2.3		13.0
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	86.2	33.6	4.9	2.3		13.0
LOS	F	C	A	A		B
Approach Delay	59.3		4.0			13.0
Approach LOS	E		A			B
Queue Length 50th (ft)	~213	123	60	0		197
Queue Length 95th (ft)	#392	#271	74	44		283
Internal Link Dist (ft)	557		497			276
Turn Bay Length (ft)		50		250		
Base Capacity (vph)	367	480	2466	1164		1580

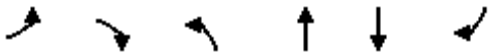
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	1.01	0.80	0.20	0.25		0.75

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.01			
Intersection Signal Delay: 23.1		Intersection LOS: C	
Intersection Capacity Utilization 75.6%		ICU Level of Service D	
Analysis Period (min) 15			

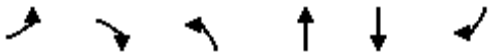
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Columbian St & Grove St





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	40	19	2	750	1026	5
Future Volume (vph)	40	19	2	750	1026	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1752	1615	0	3570	3567	0
Flt Permitted	0.950			0.953		
Satd. Flow (perm)	1752	1591	0	3402	3567	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		29			1	
Link Speed (mph)	30			30	30	
Link Distance (ft)	272			367	577	
Travel Time (s)	6.2			8.3	13.1	
Confl. Peds. (#/hr)		2				
Peak Hour Factor	0.65	0.65	0.96	0.96	0.90	0.90
Heavy Vehicles (%)	3%	0%	50%	1%	1%	20%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	62	29	0	783	1146	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	17.0	17.0	
Total Split (s)	25.0	25.0	20.0	65.0	45.0	
Total Split (%)	27.8%	27.8%	22.2%	72.2%	50.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	9.2	9.2		74.4	74.4	
Actuated g/C Ratio	0.10	0.10		0.83	0.83	
v/c Ratio	0.35	0.15		0.28	0.39	
Control Delay	42.6	15.4		2.8	2.3	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	42.6	15.4		2.8	2.3	
LOS	D	B		A	A	
Approach Delay	33.9			2.8	2.3	
Approach LOS	C			A	A	
Queue Length 50th (ft)	34	0		46	45	
Queue Length 95th (ft)	50	13		78	m100	
Internal Link Dist (ft)	192			287	497	
Turn Bay Length (ft)						
Base Capacity (vph)	389	376		2810	2947	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	

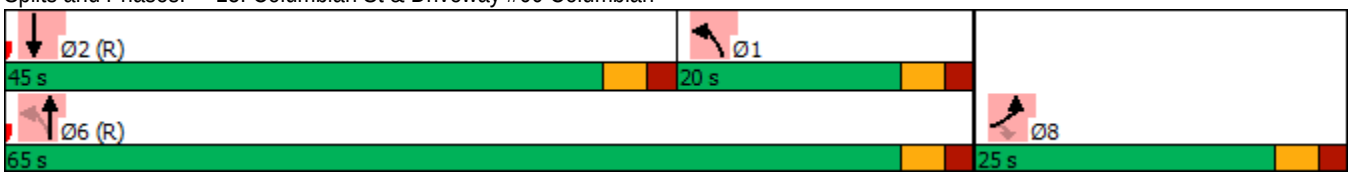


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.16	0.08		0.28	0.39	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 77 (86%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.39			
Intersection Signal Delay: 3.9		Intersection LOS: A	
Intersection Capacity Utilization 43.5%		ICU Level of Service A	
Analysis Period (min) 15			

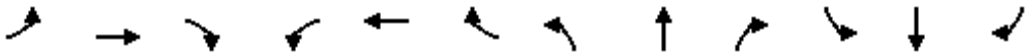
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Columbian St & Driveway #60 Columbian



APPENDIX M

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
Signal Retiming Scenarios under 2021 Estimated Traffic Conditions



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	227	86	140	717	122	264	526	191	104	270	24
Future Volume (vph)	18	227	86	140	717	122	264	526	191	104	270	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	3312	0	0	3357	0	0	3374	0	0	3418	0
Flt Permitted		0.846			0.760			0.704			0.510	
Satd. Flow (perm)	0	2810	0	0	2568	0	0	2407	0	0	1766	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			11			21			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)	1		2	2		1						
Peak Hour Factor	0.94	0.94	0.94	0.96	0.96	0.96	0.89	0.89	0.89	0.85	0.85	0.85
Heavy Vehicles (%)	0%	4%	4%	4%	5%	2%	2%	3%	2%	3%	3%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	351	0	0	1020	0	0	1103	0	0	468	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases		1		2	1 2			9		10	9 10	
Permitted Phases	1			1 2			9			9 10		
Detector Phase	1	1		2	1 2		9	9		10	9 10	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0			10.0	10.0		5.0		
Minimum Split (s)	15.0	15.0		11.0			15.0	15.0		10.0		
Total Split (s)	44.0	44.0		13.0			56.0	56.0		10.0		
Total Split (%)	29.3%	29.3%		8.7%			37.3%	37.3%		6.7%		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.0						5.0				
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Recall Mode	None	None		None			None	None		None		
Act Effct Green (s)		39.2			47.2			51.2			56.2	
Actuated g/C Ratio		0.31			0.37			0.40			0.44	
v/c Ratio		0.40			1.01			1.12			0.86dl	
Control Delay		34.0			68.6			104.5			26.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		34.0			68.6			104.5			26.7	
LOS		C			E			F			C	
Approach Delay		34.0			68.6			104.5			26.7	
Approach LOS		C			E			F			C	
Queue Length 50th (ft)		103			344			~516			110	
Queue Length 95th (ft)		182			#727			#808			182	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)												

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	18%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		886			1009			981			848	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.40			1.01			1.12			0.55	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 127.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.12			
Intersection Signal Delay: 71.2		Intersection LOS: E	
Intersection Capacity Utilization 93.6%		ICU Level of Service F	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

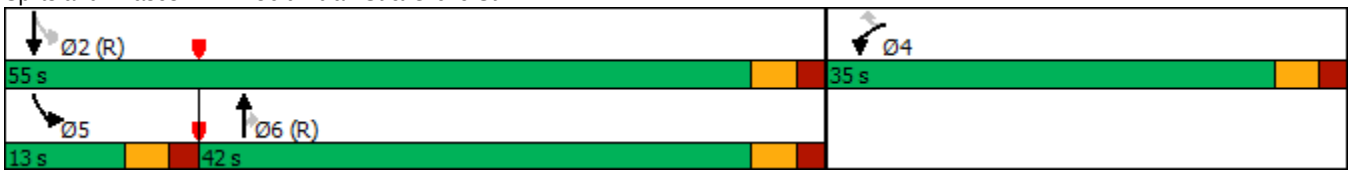
Splits and Phases: 10: Liberty St & Grove St

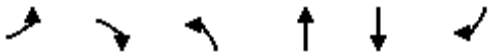
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	237	315	672	266	288	247
Future Volume (vph)	237	315	672	266	288	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1752	1568	3505	1599	0	3303
Flt Permitted	0.950					0.551
Satd. Flow (perm)	1752	1568	3505	1599	0	1868
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		239		289		
Link Speed (mph)	30		30			30
Link Distance (ft)	637		577			356
Travel Time (s)	14.5		13.1			8.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.88	0.88
Heavy Vehicles (%)	3%	3%	3%	1%	6%	7%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	258	342	730	289	0	608
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4		6	2	
Detector Phase	4	4	6	6	5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	8.0	12.0
Minimum Split (s)	13.0	13.0	17.0	17.0	13.0	17.0
Total Split (s)	35.0	35.0	42.0	42.0	13.0	55.0
Total Split (%)	38.9%	38.9%	46.7%	46.7%	14.4%	61.1%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	17.4	18.9	62.6	61.1		62.6
Actuated g/C Ratio	0.19	0.21	0.70	0.68		0.70
v/c Ratio	0.76	0.66	0.30	0.25		0.47
Control Delay	48.5	16.1	5.0	0.8		8.6
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	48.5	16.1	5.0	0.8		8.6
LOS	D	B	A	A		A
Approach Delay	30.1		3.8			8.6
Approach LOS	C		A			A
Queue Length 50th (ft)	141	50	74	2		69
Queue Length 95th (ft)	203	127	63	9		133
Internal Link Dist (ft)	557		497			276
Turn Bay Length (ft)		50		250		
Base Capacity (vph)	554	682	2438	1178		1299

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.47	0.50	0.30	0.25		0.47

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 59.7%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 14: Columbian St & Grove St



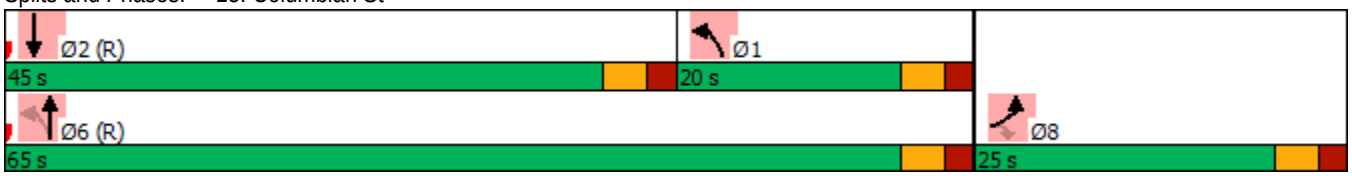


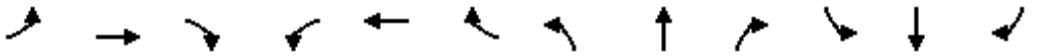
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	7	3	17	931	463	21
Future Volume (vph)	7	3	17	931	463	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1583	1615	0	3537	3412	0
Flt Permitted	0.950			0.943		
Satd. Flow (perm)	1583	1615	0	3339	3412	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		5			7	
Link Speed (mph)	30			30	30	
Link Distance (ft)	272			367	577	
Travel Time (s)	6.2			8.3	13.1	
Confl. Peds. (#/hr)			2			2
Peak Hour Factor	0.65	0.65	0.92	0.92	0.97	0.97
Heavy Vehicles (%)	14%	0%	0%	2%	5%	5%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	5	0	1030	499	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	17.0	17.0	
Total Split (s)	25.0	25.0	20.0	65.0	45.0	
Total Split (%)	27.8%	27.8%	22.2%	72.2%	50.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	8.0	8.0		82.8	82.8	
Actuated g/C Ratio	0.09	0.09		0.92	0.92	
v/c Ratio	0.08	0.03		0.34	0.16	
Control Delay	39.1	24.0		1.6	0.6	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	39.1	24.0		1.6	0.6	
LOS	D	C		A	A	
Approach Delay	34.4			1.6	0.6	
Approach LOS	C			A	A	
Queue Length 50th (ft)	6	0		0	0	
Queue Length 95th (ft)	16	7		85	8	
Internal Link Dist (ft)	192			287	497	
Turn Bay Length (ft)						
Base Capacity (vph)	351	362		3072	3140	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.03	0.01		0.34	0.16	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.34			
Intersection Signal Delay: 1.7		Intersection LOS: A	
Intersection Capacity Utilization 52.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 15: Columbian St





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	531	218	208	562	110	139	229	207	257	486	27
Future Volume (vph)	27	531	218	208	562	110	139	229	207	257	486	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	3391	0	0	3447	0	0	3341	0	0	3493	0
Flt Permitted		0.885			0.543			0.573			0.565	
Satd. Flow (perm)	0	3007	0	0	1894	0	0	1937	0	0	2005	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			12			73			2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.97	0.97	0.97	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	2%	1%	1%	2%	0%	1%	1%	1%	1%	1%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	800	0	0	936	0	0	605	0	0	811	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		pm+pt	NA	
Protected Phases		1		2	1 2			9		10	9 10	
Permitted Phases	1			1 2			9			9 10		
Detector Phase	1	1		2	1 2		9	9		10	9 10	
Switch Phase												
Minimum Initial (s)	10.0	10.0		6.0			10.0	10.0		5.0		
Minimum Split (s)	15.0	15.0		11.0			15.0	15.0		10.0		
Total Split (s)	54.0	54.0		12.0			47.0	47.0		10.0		
Total Split (%)	36.0%	36.0%		8.0%			31.3%	31.3%		6.7%		
Yellow Time (s)	4.0	4.0		4.0			4.0	4.0		4.0		
All-Red Time (s)	1.0	1.0		1.0			1.0	1.0		1.0		
Lost Time Adjust (s)		0.0						0.0				
Total Lost Time (s)		5.0						5.0				
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes		Yes		
Recall Mode	None	None		None			None	None		None		
Act Effct Green (s)		49.2			56.2			42.2			47.2	
Actuated g/C Ratio		0.39			0.44			0.33			0.37	
v/c Ratio		0.67			1.01			0.88			1.09dl	
Control Delay		34.9			63.4			50.6			71.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		34.9			63.4			50.6			71.8	
LOS		C			E			D			E	
Approach Delay		34.9			63.4			50.6			71.8	
Approach LOS		C			E			D			E	
Queue Length 50th (ft)		255			259			210			250	
Queue Length 95th (ft)		417			#621			#402			#572	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)												

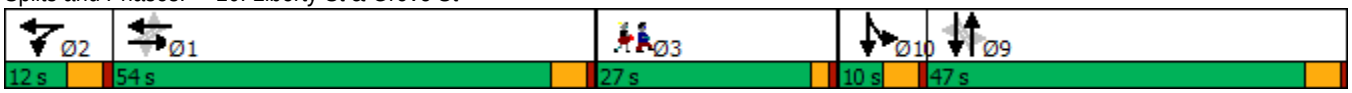
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	18%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)		1188			929			690			803	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.67			1.01			0.88			1.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 127.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.01			
Intersection Signal Delay: 55.9		Intersection LOS: E	
Intersection Capacity Utilization 103.0%		ICU Level of Service G	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 10: Liberty St & Grove St



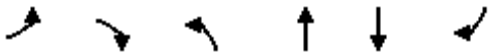
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	354	371	497	293	395	677
Future Volume (vph)	354	371	497	293	395	677
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Satd. Flow (prot)	1787	1599	3610	1599	0	3510
Flt Permitted	0.950					0.645
Satd. Flow (perm)	1787	1599	3610	1599	0	2305
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		179		296		
Link Speed (mph)	30		30			30
Link Distance (ft)	637		577			356
Travel Time (s)	14.5		13.1			8.1
Peak Hour Factor	0.96	0.96	0.99	0.99	0.91	0.91
Heavy Vehicles (%)	1%	1%	0%	1%	1%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	369	386	502	296	0	1178
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	4		6		5	2
Permitted Phases		4		6	2	
Detector Phase	4	4	6	6	5	2
Switch Phase						
Minimum Initial (s)	8.0	8.0	12.0	12.0	8.0	12.0
Minimum Split (s)	13.0	13.0	17.0	17.0	13.0	17.0
Total Split (s)	32.0	32.0	45.0	45.0	13.0	58.0
Total Split (%)	35.6%	35.6%	50.0%	50.0%	14.4%	64.4%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Act Effct Green (s)	21.6	23.1	58.4	56.9		58.4
Actuated g/C Ratio	0.24	0.26	0.65	0.63		0.65
v/c Ratio	0.86	0.71	0.21	0.26		0.79
Control Delay	52.1	23.0	6.7	1.3		17.5
Queue Delay	0.0	0.0	0.0	0.0		0.0
Total Delay	52.1	23.0	6.7	1.3		17.5
LOS	D	C	A	A		B
Approach Delay	37.3		4.7			17.5
Approach LOS	D		A			B
Queue Length 50th (ft)	197	103	53	0		238
Queue Length 95th (ft)	#296	198	80	23		373
Internal Link Dist (ft)	557		497			276
Turn Bay Length (ft)		50		250		
Base Capacity (vph)	506	605	2341	1119		1494

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0		0
Spillback Cap Reductn	0	0	0	0		0
Storage Cap Reductn	0	0	0	0		0
Reduced v/c Ratio	0.73	0.64	0.21	0.26		0.79

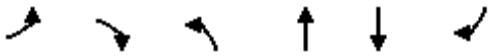
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 19.2		Intersection LOS: B	
Intersection Capacity Utilization 75.6%		ICU Level of Service D	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Columbian St & Grove St



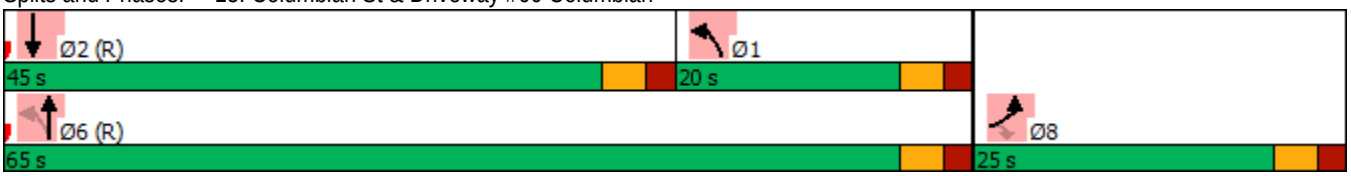
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	40	19	2	750	1026	5
Future Volume (vph)	40	19	2	750	1026	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	1752	1615	0	3570	3567	0
Flt Permitted	0.950			0.953		
Satd. Flow (perm)	1752	1591	0	3402	3567	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		29			1	
Link Speed (mph)	30			30	30	
Link Distance (ft)	272			367	577	
Travel Time (s)	6.2			8.3	13.1	
Confl. Peds. (#/hr)		2				
Peak Hour Factor	0.65	0.65	0.96	0.96	0.90	0.90
Heavy Vehicles (%)	3%	0%	50%	1%	1%	20%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	62	29	0	783	1146	0
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	8		1	6	2	
Permitted Phases		8	6			
Detector Phase	8	8	1	6	2	
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	12.0	12.0	
Minimum Split (s)	13.0	13.0	13.0	17.0	17.0	
Total Split (s)	25.0	25.0	20.0	65.0	45.0	
Total Split (%)	27.8%	27.8%	22.2%	72.2%	50.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None	None	None	C-Max	C-Max	
Act Effct Green (s)	9.2	9.2		74.4	74.4	
Actuated g/C Ratio	0.10	0.10		0.83	0.83	
v/c Ratio	0.35	0.15		0.28	0.39	
Control Delay	42.6	15.4		2.8	2.0	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	42.6	15.4		2.8	2.0	
LOS	D	B		A	A	
Approach Delay	33.9			2.8	2.0	
Approach LOS	C			A	A	
Queue Length 50th (ft)	34	0		46	22	
Queue Length 95th (ft)	50	13		78	91	
Internal Link Dist (ft)	192			287	497	
Turn Bay Length (ft)						
Base Capacity (vph)	389	376		2810	2947	
Starvation Cap Reductn	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Storage Cap Reductn	0	0		0	0	
Reduced v/c Ratio	0.16	0.08		0.28	0.39	

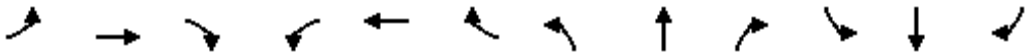
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 16 (18%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.39			
Intersection Signal Delay: 3.7		Intersection LOS: A	
Intersection Capacity Utilization 43.5%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 15: Columbian St & Driveway #60 Columbian



APPENDIX N

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
2030 Projected Traffic Conditions with the Proposed Improvements



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	208	226	129	387	64	477	558	225	73	243	7
Future Volume (vph)	2	208	226	129	387	64	477	558	225	73	243	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	0		0	0		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		152			279			332			259	
Travel Time (s)		3.5			6.3			7.5			5.9	
Confl. Peds. (#/hr)	3					3	2					2
Peak Hour Factor	0.84	0.84	0.84	0.86	0.86	0.86	0.94	0.94	0.94	0.91	0.91	0.91
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	7%	5%	7%	5%	2%	4%	2%	3%	2%	6%	17%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	257	277	155	541	0	523	611	247	83	283	0
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		9	5	10	9 10		5	2		1	6	
Permitted Phases	9		9	9 10					2			
Detector Phase	9	9	5	10	9 10		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	10.0	11.0	9.0			11.0	10.0	10.0	11.0	10.0	
Total Split (s)	30.0	30.0	42.0	15.0			42.0	35.0	35.0	22.0	15.0	
Total Split (%)	22.7%	22.7%	31.8%	11.4%			31.8%	26.5%	26.5%	16.7%	11.4%	
Yellow Time (s)	3.0	3.0	3.0	2.0			3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		1.5	1.5	2.5			-1.0	-2.0	2.5	0.0	-1.0	
Total Lost Time (s)		6.5	6.5	6.5			4.0	3.0	7.5	5.0	4.0	
Lead/Lag	Lead	Lead	Lead	Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None			None	Min	Min	None	Min	
Act Effct Green (s)		23.8	59.6	32.3	40.4		38.4	42.3	37.8	9.4	11.1	
Actuated g/C Ratio		0.22	0.55	0.30	0.37		0.36	0.39	0.35	0.09	0.10	
v/c Ratio		1.03	0.28	0.54	0.81		0.85	0.84	0.38	0.54	0.81	
Control Delay		107.0	2.0	40.6	42.4		47.6	43.9	14.8	61.4	66.4	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		107.0	2.0	40.6	42.4		47.6	43.9	14.8	61.4	66.4	
LOS		F	A	D	D		D	D	B	E	E	
Approach Delay		52.5			42.0			40.1			65.3	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		167	0	68	299		301	355	42	53	95	
Queue Length 95th (ft)		#410	25	158	#651		#706	#891	156	122	#228	
Internal Link Dist (ft)		72			199			252			179	
Turn Bay Length (ft)												
Base Capacity (vph)		250	973	285	667		617	730	648	281	349	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	

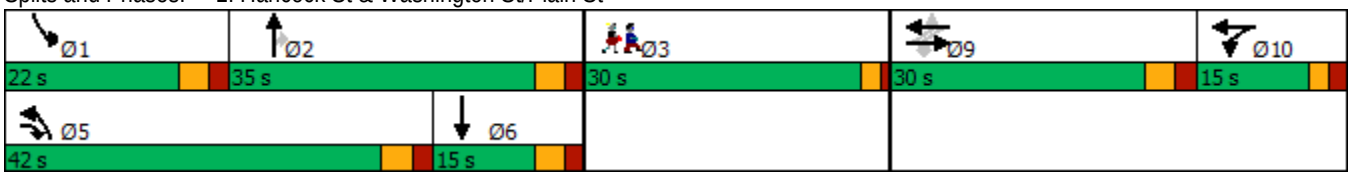
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	23%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	

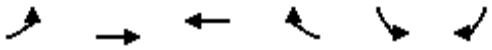
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		1.03	0.28	0.54	0.81		0.85	0.84	0.38	0.30	0.81	

Intersection Summary			
Area Type:	Other		
Cycle Length: 132			
Actuated Cycle Length: 108			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.03			
Intersection Signal Delay: 45.9		Intersection LOS: D	
Intersection Capacity Utilization 87.9%		ICU Level of Service E	
Analysis Period (min) 15			

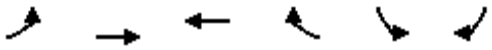
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hancock St & Washington St/Plain St





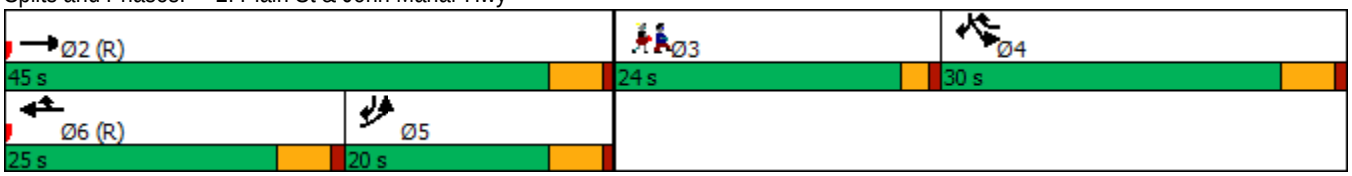
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	151	254	568	391	225	127	
Future Volume (vph)	151	254	568	391	225	127	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	200			125	0	0	
Storage Lanes	1			1	1	1	
Taper Length (ft)	75				25		
Right Turn on Red				Yes		No	
Link Speed (mph)		30	30		30		
Link Distance (ft)		1145	260		232		
Travel Time (s)		26.0	5.9		5.3		
Peak Hour Factor	0.87	0.87	0.95	0.95	0.90	0.90	
Growth Factor	103%	103%	103%	103%	103%	103%	
Heavy Vehicles (%)	2%	4%	4%	3%	5%	4%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	179	301	616	424	258	145	
Turn Type	Prot	NA	NA	pt+ov	Prot	pt+ov	
Protected Phases	5	2	6	6 4	4	4 5	3
Permitted Phases							
Detector Phase	5	2	6	6 4	4	4 5	
Switch Phase							
Minimum Initial (s)	7.0	7.0	7.0		5.0		7.0
Minimum Split (s)	12.0	12.0	12.0		10.0		24.0
Total Split (s)	20.0	45.0	25.0		30.0		24.0
Total Split (%)	20.2%	45.5%	25.3%		30.3%		24%
Yellow Time (s)	4.0	4.0	4.0		4.0		2.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0
Lost Time Adjust (s)	3.0	-3.0	-3.0		3.0		
Total Lost Time (s)	8.0	2.0	2.0		8.0		
Lead/Lag	Lag		Lead		Lag		Lead
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	C-Max	C-Max		Min		None
Act Effct Green (s)	12.0	68.3	48.3	66.2	15.9	34.3	
Actuated g/C Ratio	0.12	0.69	0.49	0.67	0.16	0.35	
v/c Ratio	0.84	0.24	0.69	0.37	0.93	0.27	
Control Delay	74.5	9.3	28.5	4.3	80.1	20.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	74.5	9.3	28.5	4.3	80.1	20.2	
LOS	E	A	C	A	F	C	
Approach Delay		33.6	18.6		58.5		
Approach LOS		C	B		E		
Queue Length 50th (ft)	112	50	260	23	162	63	
Queue Length 95th (ft)	#216	185	#744	121	236	53	
Internal Link Dist (ft)		1065	180		152		
Turn Bay Length (ft)	200			125			
Base Capacity (vph)	214	1260	890	1124	382	633	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	

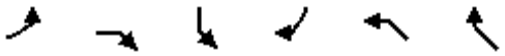


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Reduced v/c Ratio	0.84	0.24	0.69	0.38	0.68	0.23	

Intersection Summary			
Area Type:	Other		
Cycle Length: 99			
Actuated Cycle Length: 99			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 30.7		Intersection LOS: C	
Intersection Capacity Utilization 68.9%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Plain St & John Mahar Hwy





Movement	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	32	394	6	39	925	17
Future Volume (Veh/h)	32	394	6	39	925	17
Sign Control	Free		Stop		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.80	0.80	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	41	507	7	43	1024	19
Pedestrians			4			
Lane Width (ft)			16.0			
Walking Speed (ft/s)			3.5			
Percent Blockage			1			
Right turn flare (veh)						
Median type	None				None	
Median storage veh)						
Upstream signal (ft)	260					
pX, platoon unblocked			0.94			
vC, conflicting volume	1047		1626	1038		
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1047		1634	1038		
tC, single (s)	4.1		6.4	6.2		
tC, 2 stage (s)						
tF (s)	2.2		3.5	3.3		
p0 queue free %	94		93	85		
cM capacity (veh/h)	669		99	278		

Direction, Lane #	EB 1	EB 2	SB 1	NW 1
Volume Total	41	507	50	1043
Volume Left	41	0	7	0
Volume Right	0	0	43	19
cSH	669	1700	222	1700
Volume to Capacity	0.06	0.30	0.23	0.61
Queue Length 95th (ft)	5	0	21	0
Control Delay (s)	10.7	0.0	25.9	0.0
Lane LOS	B		D	
Approach Delay (s)	0.8		25.9	0.0
Approach LOS			D	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	376	0	0	943	27	19
Future Volume (Veh/h)	376	0	0	943	27	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.95	0.95	0.89	0.89
Hourly flow rate (vph)	416	0	0	1022	31	22
Pedestrians					5	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			421		1443	421
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			421		1443	421
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		79	96
cM capacity (veh/h)			1144		146	623

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	416	1022	53
Volume Left	0	0	31
Volume Right	0	0	22
cSH	1700	1144	215
Volume to Capacity	0.24	0.00	0.25
Queue Length 95th (ft)	0	0	24
Control Delay (s)	0.0	0.0	27.2
Lane LOS			D
Approach Delay (s)	0.0	0.0	27.2
Approach LOS			D

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	396	3	3	938	6	5
Future Volume (Veh/h)	396	3	3	938	6	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.96	0.96	0.92	0.92
Hourly flow rate (vph)	458	3	3	1006	7	6
Pedestrians				1	4	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				700		
pX, platoon unblocked					0.50	
vC, conflicting volume			465		1476	464
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			465		1451	464
tC, single (s)			4.1		6.4	6.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.5
p0 queue free %			100		90	99
cM capacity (veh/h)			1103		72	560

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	461	1009	13
Volume Left	0	3	7
Volume Right	3	0	6
cSH	1700	1103	120
Volume to Capacity	0.27	0.00	0.11
Queue Length 95th (ft)	0	0	9
Control Delay (s)	0.0	0.1	38.7
Lane LOS		A	E
Approach Delay (s)	0.0	0.1	38.7
Approach LOS			E

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	442	898	9	0	38
Future Volume (Veh/h)	0	442	898	9	0	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.97	0.97	0.89	0.89
Hourly flow rate (vph)	0	523	954	10	0	44
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			228			
pX, platoon unblocked	0.50				0.50	0.50
vC, conflicting volume	965				1483	960
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	439				1466	429
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	100				100	86
cM capacity (veh/h)	559				69	314

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	523	964	44
Volume Left	0	0	0
Volume Right	0	10	44
cSH	559	1700	314
Volume to Capacity	0.00	0.57	0.14
Queue Length 95th (ft)	0	0	12
Control Delay (s)	0.0	0.0	18.3
Lane LOS			C
Approach Delay (s)	0.0	0.0	18.3
Approach LOS			C

Intersection Summary			
Average Delay		0.5	
Intersection Capacity Utilization		59.2%	ICU Level of Service B
Analysis Period (min)		15	

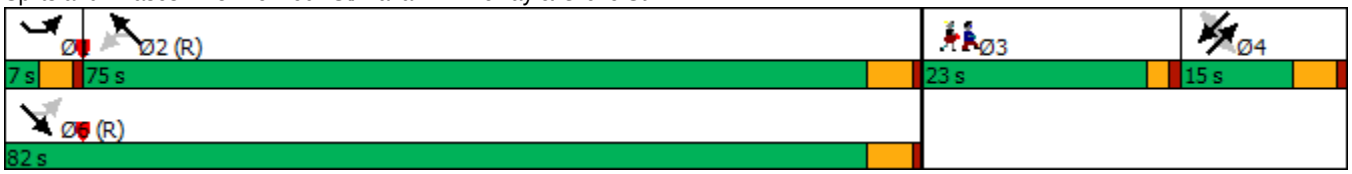
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	100	301	1	3	842	48	4	0	5	82	3	59
Future Volume (vph)	100	301	1	3	842	48	4	0	5	82	3	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	75		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		228			362			214			162	
Travel Time (s)		5.2			8.2			4.9			3.7	
Confl. Peds. (#/hr)			4	4					1	1		
Peak Hour Factor	0.94	0.94	0.94	0.87	0.87	0.87	0.50	0.50	0.50	0.87	0.87	0.87
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	5%	0%	0%	4%	2%	0%	0%	0%	4%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	110	331	0	0	1058	0	0	18	0	0	101	70
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Detector Phase	1	6		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)	3.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	7.0	15.0		15.0	15.0		15.0	15.0		15.0	15.0	15.0
Total Split (s)	7.0	82.0		75.0	75.0		15.0	15.0		15.0	15.0	15.0
Total Split (%)	5.8%	68.3%		62.5%	62.5%		12.5%	12.5%		12.5%	12.5%	12.5%
Yellow Time (s)	3.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.0	5.0			5.0			5.0			5.0	5.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Min		C-Min	C-Min		None	None		None	None	None
Act Effct Green (s)	91.9	90.9			80.9			14.5			14.5	14.5
Actuated g/C Ratio	0.77	0.76			0.67			0.12			0.12	0.12
v/c Ratio	0.27	0.24			0.87			0.07			0.64	0.26
Control Delay	6.6	5.8			26.0			0.6			69.2	10.9
Queue Delay	0.0	0.0			6.7			0.0			0.0	0.0
Total Delay	6.6	5.8			32.7			0.6			69.2	10.9
LOS	A	A			C			A			E	B
Approach Delay		6.0			32.7			0.6			45.3	
Approach LOS		A			C			A			D	
Queue Length 50th (ft)	16	59			562			0			74	0
Queue Length 95th (ft)	51	152			#1042			0			#181	33
Internal Link Dist (ft)		148			282			134			82	
Turn Bay Length (ft)	75											
Base Capacity (vph)	402	1371			1223			255			158	266
Starvation Cap Reductn	0	0			132			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	19%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.27	0.24			0.97			0.07			0.64	0.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 7 (6%), Referenced to phase 2:NWTL and 6:SETL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 26.6		Intersection LOS: C	
Intersection Capacity Utilization 87.0%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

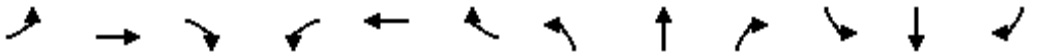
Splits and Phases: 8: Hemlock St/Plaza M.Driveway & Grove St



Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	17	329	874	69	0	25
Future Volume (Veh/h)	17	329	874	69	0	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.97	0.97	0.88	0.88
Hourly flow rate (vph)	20	390	928	73	0	29
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			3.5			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		362	437			
pX, platoon unblocked	0.47				0.47	0.47
vC, conflicting volume	1001				1200	964
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	437				862	360
tC, single (s)	4.1				6.9	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	90
cM capacity (veh/h)	532				132	302

Direction, Lane #	SE 1	SE 2	NW 1	SW 1	SW 2
Volume Total	150	260	1001	0	29
Volume Left	20	0	0	0	0
Volume Right	0	0	73	0	29
cSH	532	1700	1700	1700	302
Volume to Capacity	0.04	0.15	0.59	0.00	0.10
Queue Length 95th (ft)	3	0	0	0	8
Control Delay (s)	2.0	0.0	0.0	0.0	18.2
Lane LOS	A			A	C
Approach Delay (s)	0.7		0.0	18.2	
Approach LOS				C	

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		



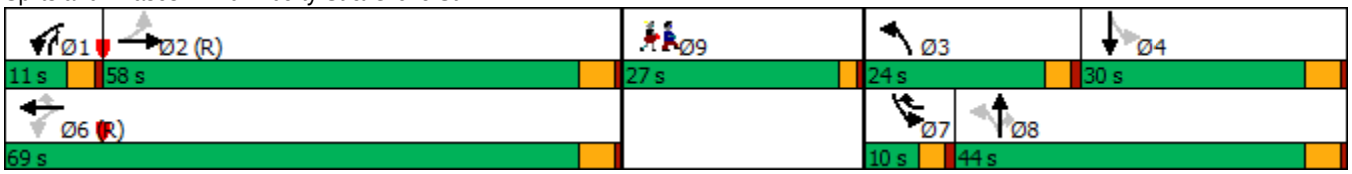
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	227	86	140	717	122	264	526	191	104	270	24
Future Volume (vph)	18	227	86	140	717	122	264	526	191	104	270	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		50	175		50	0		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			50			50			50		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)	1		2	2		1						
Peak Hour Factor	0.94	0.94	0.94	0.96	0.96	0.96	0.89	0.89	0.89	0.85	0.85	0.85
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	0%	4%	4%	4%	5%	2%	2%	3%	2%	3%	3%	8%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	343	0	150	769	131	306	609	221	126	356	0
Turn Type	Perm	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases		2		1	6	7	3	8	1	7	4	
Permitted Phases	2			6		6	8		8	4		
Detector Phase	2	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		5.0	10.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	15.0	15.0		9.0	15.0	9.0	9.0	15.0	9.0	9.0	15.0	
Total Split (s)	58.0	58.0		11.0	69.0	10.0	24.0	44.0	11.0	10.0	30.0	
Total Split (%)	38.7%	38.7%		7.3%	46.0%	6.7%	16.0%	29.3%	7.3%	6.7%	20.0%	
Yellow Time (s)	4.0	4.0		3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	
Lead/Lag	Lag	Lag		Lead		Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	C-Max	C-Max		None	C-Max	None	None	None	None	None	None	
Act Effct Green (s)	53.0	53.0		65.0	64.0	78.1	71.6	53.5	65.5	52.7	38.6	
Actuated g/C Ratio	0.35	0.35		0.43	0.43	0.52	0.48	0.36	0.44	0.35	0.26	
v/c Ratio	0.38	0.29		0.38	1.00	0.16	0.69	0.93	0.30	0.62	0.76	
Control Delay	60.7	31.4		29.9	74.0	7.6	36.5	66.8	21.5	45.5	61.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	60.7	31.4		29.9	74.0	7.6	36.5	66.8	21.5	45.5	61.8	
LOS	E	C		C	E	A	D	E	C	D	E	
Approach Delay		33.0			59.4			49.9			57.5	
Approach LOS		C			E			D			E	
Queue Length 50th (ft)	15	111		90	743	29	172	546	91	63	307	
Queue Length 95th (ft)	47	153		141	#1028	43	#411	#972	187	#232	#568	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)						50	175		50			
Base Capacity (vph)	53	1194		394	772	841	442	658	728	203	469	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	

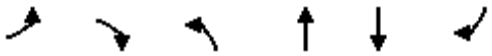
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	18%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.38	0.29		0.38	1.00	0.16	0.69	0.93	0.30	0.62	0.76	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green, Master Intersection			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 52.4		Intersection LOS: D	
Intersection Capacity Utilization 97.5%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 10: Liberty St & Grove St





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	26	17	646	356	43
Future Volume (Veh/h)	32	26	17	646	356	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.98	0.98	0.85	0.85
Hourly flow rate (vph)	36	29	18	679	431	52
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				287		
pX, platoon unblocked	0.68					
vC, conflicting volume	1174	459	485			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1022	459	485			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	80	95	98			
cM capacity (veh/h)	177	597	1055			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	65	697	483
Volume Left	36	18	0
Volume Right	29	0	52
cSH	257	1055	1700
Volume to Capacity	0.25	0.02	0.28
Queue Length 95th (ft)	24	1	0
Control Delay (s)	23.6	0.5	0.0
Lane LOS	C	A	
Approach Delay (s)	23.6	0.5	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	541	2	0	970	2	2
Future Volume (Veh/h)	541	2	0	970	2	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.88	0.88	0.50	0.50
Hourly flow rate (vph)	580	2	0	1135	4	4
Pedestrians	2				2	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	3.5				3.5	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			584		1720	583
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			584		1720	583
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	99
cM capacity (veh/h)			999		99	515

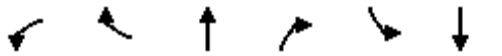
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	582	1135	8
Volume Left	0	0	4
Volume Right	2	0	4
cSH	1700	999	166
Volume to Capacity	0.34	0.00	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	27.7
Lane LOS			D
Approach Delay (s)	0.0	0.0	27.7
Approach LOS			D

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	542	3	11	967	2	19
Future Volume (Veh/h)	542	3	11	967	2	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.89	0.89	0.88	0.88
Hourly flow rate (vph)	576	3	13	1119	2	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				968		
pX, platoon unblocked					0.74	
vC, conflicting volume			579		1722	578
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			579		1799	578
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	96
cM capacity (veh/h)			1005		65	510

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	579	1132	24
Volume Left	0	13	2
Volume Right	3	0	22
cSH	1700	1005	325
Volume to Capacity	0.34	0.01	0.07
Queue Length 95th (ft)	0	1	6
Control Delay (s)	0.0	0.4	16.9
Lane LOS		A	C
Approach Delay (s)	0.0	0.4	16.9
Approach LOS			C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

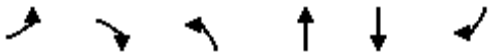


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Lane Configurations							
Traffic Volume (vph)	237	315	672	266	288	247	
Future Volume (vph)	237	315	672	266	288	247	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	50		250	150		
Storage Lanes	1	1		1	0		
Taper Length (ft)	25				25		
Right Turn on Red		Yes		Yes			
Link Speed (mph)	30		30			30	
Link Distance (ft)	637		577			356	
Travel Time (s)	14.5		13.1			8.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.88	0.88	
Growth Factor	103%	103%	103%	103%	103%	103%	
Heavy Vehicles (%)	3%	3%	3%	1%	6%	7%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	265	353	752	298	0	626	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA	
Protected Phases	4		6		5	2	9
Permitted Phases		4		6	2		
Detector Phase	4	4	6	6	5	2	
Switch Phase							
Minimum Initial (s)	8.0	8.0	12.0	12.0	4.0	12.0	5.0
Minimum Split (s)	13.0	13.0	17.0	17.0	9.0	17.0	22.0
Total Split (s)	27.0	27.0	51.0	51.0	12.0	63.0	22.0
Total Split (%)	24.1%	24.1%	45.5%	45.5%	10.7%	56.3%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5	
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Recall Mode	None	None	C-Max	C-Max	None	C-Max	None
Act Effct Green (s)	18.9	20.4	78.7	77.2		78.7	
Actuated g/C Ratio	0.17	0.18	0.70	0.69		0.70	
v/c Ratio	0.90	0.85	0.58	0.25		0.99dl	
Control Delay	77.7	43.2	7.3	1.2		11.6	
Queue Delay	0.0	0.0	0.4	0.0		0.0	
Total Delay	77.7	43.2	7.6	1.2		11.6	
LOS	E	D	A	A		B	
Approach Delay	58.0		5.8			11.6	
Approach LOS	E		A			B	
Queue Length 50th (ft)	185	137	223	13		86	
Queue Length 95th (ft)	#322	#286	294	22		225	
Internal Link Dist (ft)	557		497			276	
Turn Bay Length (ft)		50		250			
Base Capacity (vph)	320	436	1296	1176		1236	
Starvation Cap Reductn	0	0	167	0		0	
Spillback Cap Reductn	0	0	0	0		0	
Storage Cap Reductn	0	0	0	0		0	

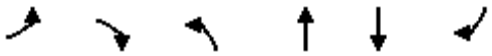
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Reduced v/c Ratio	0.83	0.81	0.67	0.25		0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 112			
Actuated Cycle Length: 112			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 21.5		Intersection LOS: C	
Intersection Capacity Utilization 78.5%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
dl Defacto Left Lane. Recode with 1 though lane as a left lane.			

Splits and Phases: 14: Columbian St & Grove St



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	7	3	17	931	463	21	
Future Volume (vph)	7	3	17	931	463	21	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	0	50			0	
Storage Lanes	1	1	1			0	
Taper Length (ft)	25		50				
Right Turn on Red		Yes				Yes	
Link Speed (mph)	30			30	30		
Link Distance (ft)	272			367	577		
Travel Time (s)	6.2			8.3	13.1		
Confl. Peds. (#/hr)			2			2	
Peak Hour Factor	0.65	0.65	0.92	0.92	0.97	0.97	
Growth Factor	103%	103%	103%	103%	103%	103%	
Heavy Vehicles (%)	14%	0%	0%	2%	5%	5%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	11	5	19	1042	514	0	
Turn Type	Prot	Perm	pm+pt	NA	NA		
Protected Phases	8		1	6	2		9
Permitted Phases		8	6				
Detector Phase	8	8	1	6	2		
Switch Phase							
Minimum Initial (s)	5.0	5.0	4.0	12.0	12.0		5.0
Minimum Split (s)	13.0	13.0	9.0	17.0	17.0		22.0
Total Split (s)	25.0	25.0	10.0	65.0	55.0		22.0
Total Split (%)	22.3%	22.3%	8.9%	58.0%	49.1%		20%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Recall Mode	None	None	None	C-Max	C-Max		None
Act Effct Green (s)	6.4	6.4	97.6	100.6	96.6		
Actuated g/C Ratio	0.06	0.06	0.87	0.90	0.86		
v/c Ratio	0.12	0.05	0.02	0.62	0.17		
Control Delay	52.6	30.7	4.0	8.0	4.8		
Queue Delay	0.0	0.0	0.0	0.0	0.0		
Total Delay	52.6	30.7	4.0	8.0	4.8		
LOS	D	C	A	A	A		
Approach Delay	45.7			7.9	4.8		
Approach LOS	D			A	A		
Queue Length 50th (ft)	8	0	1	0	0		
Queue Length 95th (ft)	19	8	13	#830	m197		
Internal Link Dist (ft)	192			287	497		
Turn Bay Length (ft)			50				
Base Capacity (vph)	282	292	806	1674	2948		
Starvation Cap Reductn	0	0	0	0	0		
Spillback Cap Reductn	0	0	0	20	0		

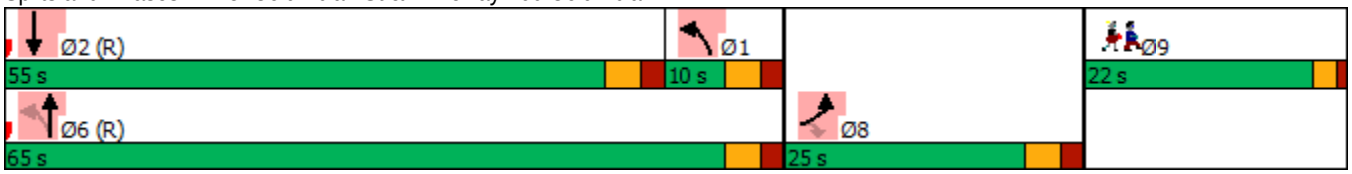


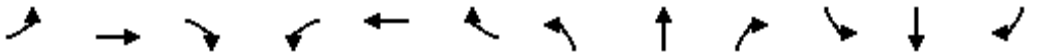
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø9
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.04	0.02	0.02	0.63	0.17		

Intersection Summary			
Area Type:	Other		
Cycle Length: 112			
Actuated Cycle Length: 112			
Offset: 87 (78%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 7.3		Intersection LOS: A	
Intersection Capacity Utilization 63.0%		ICU Level of Service B	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Columbian St & Driveway #60 Columbian





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	412	562	237	319	53	258	348	173	81	452	5
Future Volume (vph)	5	412	562	237	319	53	258	348	173	81	452	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		75	0		0	0		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		152			279			332			259	
Travel Time (s)		3.5			6.3			7.5			5.9	
Confl. Peds. (#/hr)	1					1	3					3
Peak Hour Factor	0.96	0.96	0.96	0.92	0.92	0.92	0.93	0.93	0.93	0.87	0.87	0.87
Growth Factor	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Heavy Vehicles (%)	0%	1%	1%	1%	2%	2%	2%	1%	0%	0%	2%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	443	597	263	413	0	283	382	190	95	536	0
Turn Type	Perm	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases		9	5	10	9 10		5	2		1	6	
Permitted Phases	9		9	9 10					2			
Detector Phase	9	9	5	10	9 10		5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	10.0	11.0	9.0			11.0	10.0	10.0	11.0	10.0	
Total Split (s)	39.0	39.0	20.0	12.0			20.0	19.0	19.0	20.0	19.0	
Total Split (%)	32.5%	32.5%	16.7%	10.0%			16.7%	15.8%	15.8%	16.7%	15.8%	
Yellow Time (s)	3.0	3.0	3.0	2.0			3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		1.5	1.5	2.5			-1.0	-2.0	2.5	0.0	-1.0	
Total Lost Time (s)		6.5	6.5	6.5			4.0	3.0	7.5	5.0	4.0	
Lead/Lag	Lead	Lead	Lead	Lag			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	None	None	None			None	Min	Min	None	Min	
Act Effct Green (s)		26.4	40.3	32.1	40.3		16.4	25.1	20.4	9.3	15.4	
Actuated g/C Ratio		0.29	0.45	0.36	0.45		0.18	0.28	0.23	0.10	0.17	
v/c Ratio		0.81	0.57	1.17	0.50		0.88	0.73	0.37	0.51	0.89	
Control Delay		43.0	3.4	145.3	21.5		66.3	43.8	10.2	50.9	56.2	
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		43.0	3.4	145.3	21.5		66.3	43.8	10.2	50.9	56.2	
LOS		D	A	F	C		E	D	B	D	E	
Approach Delay		20.3			69.7			43.8			55.4	
Approach LOS		C			E			D			E	
Queue Length 50th (ft)		208	0	~99	138		147	190	3	49	147	
Queue Length 95th (ft)		#510	52	#356	353		#442	#607	78	120	#364	
Internal Link Dist (ft)		72			199			252			179	
Turn Bay Length (ft)												
Base Capacity (vph)		694	1046	224	815		323	524	507	308	605	
Starvation Cap Reductn		0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0		0	0	0	0	0	

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	30.0
Total Split (s)	30.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	

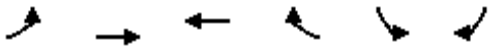
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn		0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio		0.64	0.57	1.17	0.51		0.88	0.73	0.37	0.31	0.89	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 89.9			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.17			
Intersection Signal Delay: 43.9		Intersection LOS: D	
Intersection Capacity Utilization 86.6%		ICU Level of Service E	
Analysis Period (min) 15			

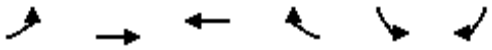
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Hancock St & Washington St/Plain St



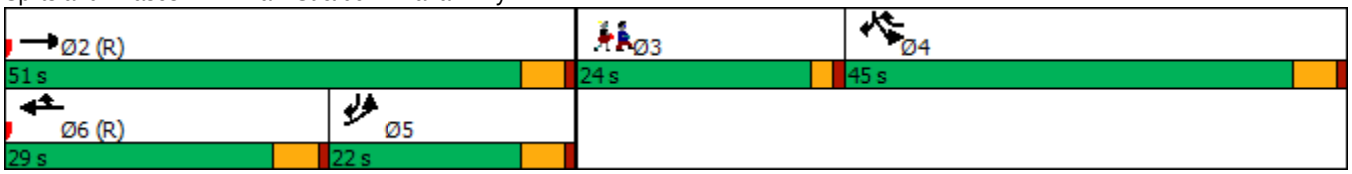
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	159	493	426	297	392	181	
Future Volume (vph)	159	493	426	297	392	181	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	200			125	0	0	
Storage Lanes	1			1	1	1	
Taper Length (ft)	75				25		
Right Turn on Red				Yes		No	
Link Speed (mph)		30	30		30		
Link Distance (ft)		1145	260		232		
Travel Time (s)		26.0	5.9		5.3		
Confl. Peds. (#/hr)						1	
Peak Hour Factor	0.92	0.92	0.84	0.84	0.99	0.99	
Growth Factor	102%	102%	102%	102%	102%	102%	
Heavy Vehicles (%)	4%	3%	5%	3%	2%	3%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	176	547	517	361	404	186	
Turn Type	Prot	NA	NA	pt+ov	Prot	pt+ov	
Protected Phases	5	2	6	6 4	4	4 5	3
Permitted Phases							
Detector Phase	5	2	6	6 4	4	4 5	
Switch Phase							
Minimum Initial (s)	7.0	7.0	7.0		5.0		7.0
Minimum Split (s)	12.0	12.0	12.0		10.0		24.0
Total Split (s)	22.0	51.0	29.0		45.0		24.0
Total Split (%)	18.3%	42.5%	24.2%		37.5%		20%
Yellow Time (s)	4.0	4.0	4.0		4.0		2.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0
Lost Time Adjust (s)	3.0	-3.0	-3.0		3.0		
Total Lost Time (s)	8.0	2.0	2.0		8.0		
Lead/Lag	Lag		Lead		Lag		Lead
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	None	C-Max	C-Max		Min		None
Act Effct Green (s)	14.0	76.3	54.3	85.2	28.9	49.3	
Actuated g/C Ratio	0.12	0.64	0.45	0.71	0.24	0.41	
v/c Ratio	0.87	0.47	0.63	0.30	0.95	0.29	
Control Delay	89.6	16.6	32.6	2.9	76.6	20.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	89.6	16.6	32.6	2.9	76.6	20.7	
LOS	F	B	C	A	E	C	
Approach Delay		34.3	20.4		59.0		
Approach LOS		C	C		E		
Queue Length 50th (ft)	136	179	277	14	308	92	
Queue Length 95th (ft)	#266	489	#649	63	401	73	
Internal Link Dist (ft)		1065	180		152		
Turn Bay Length (ft)	200			125			
Base Capacity (vph)	202	1173	819	1183	545	749	
Starvation Cap Reductn	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	

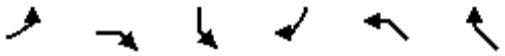


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø3
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.87	0.47	0.63	0.31	0.74	0.25	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 100			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 35.4		Intersection LOS: D	
Intersection Capacity Utilization 70.7%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 2: Plain St & John Mahar Hwy





Movement	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	32	848	5	29	689	15
Future Volume (Veh/h)	32	848	5	29	689	15
Sign Control	Free		Stop		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.93	0.93	0.85	0.85	0.91	0.91
Hourly flow rate (vph)	35	930	6	35	772	17
Pedestrians			1			
Lane Width (ft)			16.0			
Walking Speed (ft/s)			3.5			
Percent Blockage			0			
Right turn flare (veh)						
Median type	None				None	
Median storage veh)						
Upstream signal (ft)	260					
pX, platoon unblocked			0.84			
vC, conflicting volume	790		1782	782		
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	790		1837	782		
tC, single (s)	4.1		6.4	6.2		
tC, 2 stage (s)						
tF (s)	2.2		3.5	3.3		
p0 queue free %	96		91	91		
cM capacity (veh/h)	838		67	392		

Direction, Lane #	EB 1	EB 2	SB 1	NW 1
Volume Total	35	930	41	789
Volume Left	35	0	6	0
Volume Right	0	0	35	17
cSH	838	1700	230	1700
Volume to Capacity	0.04	0.55	0.18	0.46
Queue Length 95th (ft)	3	0	16	0
Control Delay (s)	9.5	0.0	24.0	0.0
Lane LOS	A		C	
Approach Delay (s)	0.3		24.0	0.0
Approach LOS			C	

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	802	0	0	671	26	19
Future Volume (Veh/h)	802	0	0	671	26	19
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.94	0.94	0.59	0.59
Hourly flow rate (vph)	899	0	0	728	45	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			899		1627	899
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			899		1627	899
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		59	90
cM capacity (veh/h)			764		111	340

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	899	728	78
Volume Left	0	0	45
Volume Right	0	0	33
cSH	1700	764	155
Volume to Capacity	0.53	0.00	0.50
Queue Length 95th (ft)	0	0	61
Control Delay (s)	0.0	0.0	49.5
Lane LOS			E
Approach Delay (s)	0.0	0.0	49.5
Approach LOS			E

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	807	7	6	688	2	4
Future Volume (Veh/h)	807	7	6	688	2	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.94	0.94	0.50	0.50
Hourly flow rate (vph)	895	8	7	747	4	8
Pedestrians					3	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				700		
pX, platoon unblocked					0.78	
vC, conflicting volume			906		1663	902
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			906		1709	902
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	98
cM capacity (veh/h)			757		78	338

Direction, Lane #	SE 1	NW 1	NE 1
Volume Total	903	754	12
Volume Left	0	7	4
Volume Right	8	0	8
cSH	1700	757	160
Volume to Capacity	0.53	0.01	0.08
Queue Length 95th (ft)	0	1	6
Control Delay (s)	0.0	0.3	29.3
Lane LOS		A	D
Approach Delay (s)	0.0	0.3	29.3
Approach LOS			D

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	822	654	9	0	35
Future Volume (Veh/h)	0	822	654	9	0	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	911	695	10	0	37
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			228			
pX, platoon unblocked	0.78				0.78	0.78
vC, conflicting volume	706				1612	701
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	483				1644	476
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	850				86	462

Direction, Lane #	SE 1	NW 1	SW 1
Volume Total	911	705	37
Volume Left	0	0	0
Volume Right	0	10	37
cSH	850	1700	462
Volume to Capacity	0.00	0.41	0.08
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.0	0.0	13.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	13.5
Approach LOS			B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

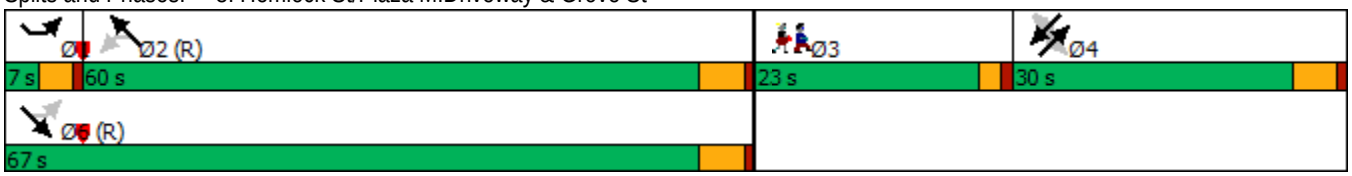
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	138	683	13	3	575	47	7	0	3	126	1	71
Future Volume (vph)	138	683	13	3	575	47	7	0	3	126	1	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	75		0	0		0	0		0	0		0
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		228			362			214			162	
Travel Time (s)		5.2			8.2			4.9			3.7	
Confl. Peds. (#/hr)	2		2	2		2			2	2		
Peak Hour Factor	0.94	0.94	0.94	0.95	0.95	0.95	0.88	0.88	0.88	0.89	0.89	0.89
Growth Factor	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	2%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	150	755	0	0	670	0	0	11	0	0	145	81
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	1	6			2			4			4	
Permitted Phases	6			2			4			4		4
Detector Phase	1	6		2	2		4	4		4	4	4
Switch Phase												
Minimum Initial (s)	3.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	7.0	15.0		15.0	15.0		10.0	10.0		10.0	10.0	10.0
Total Split (s)	7.0	67.0		60.0	60.0		30.0	30.0		30.0	30.0	30.0
Total Split (%)	5.8%	55.8%		50.0%	50.0%		25.0%	25.0%		25.0%	25.0%	25.0%
Yellow Time (s)	3.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.0	5.0			5.0			5.0			5.0	5.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	C-Min		C-Min	C-Min		None	None		None	None	None
Act Effct Green (s)	88.3	87.3			76.7			18.1			18.1	18.1
Actuated g/C Ratio	0.74	0.73			0.64			0.15			0.15	0.15
v/c Ratio	0.28	0.56			0.57			0.04			0.72	0.26
Control Delay	9.2	12.7			17.6			0.2			67.6	10.6
Queue Delay	0.0	0.0			0.4			0.0			0.0	0.0
Total Delay	9.2	12.7			18.0			0.2			67.6	10.6
LOS	A	B			B			A			E	B
Approach Delay		12.1			18.0			0.2			47.2	
Approach LOS		B			B			A			D	
Queue Length 50th (ft)	24	196			248			0			108	0
Queue Length 95th (ft)	95	635			594			0			167	40
Internal Link Dist (ft)		148			282			134			82	
Turn Bay Length (ft)	75											
Base Capacity (vph)	541	1351			1177			376			278	398
Starvation Cap Reductn	0	0			164			0			0	0
Spillback Cap Reductn	0	0			0			0			0	0

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	19%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Storage Cap Reductn	0	0			0			0			0	0
Reduced v/c Ratio	0.28	0.56			0.66			0.03			0.52	0.20

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 7 (6%), Referenced to phase 2:NWTL and 6:SETL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 93.3%		ICU Level of Service F	
Analysis Period (min) 15			

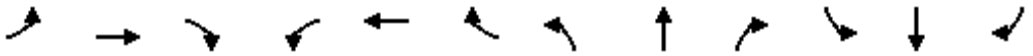
Splits and Phases: 8: Hemlock St/Plaza M.Driveway & Grove St



Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	23	721	603	96	0	23
Future Volume (Veh/h)	23	721	603	96	0	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.95	0.95	0.81	0.81
Hourly flow rate (vph)	24	766	647	103	0	29
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		362	437			
pX, platoon unblocked	0.63				0.63	0.63
vC, conflicting volume	751				1130	700
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	307				912	225
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	94
cM capacity (veh/h)	794				169	492

Direction, Lane #	SE 1	SE 2	NW 1	SW 1	SW 2
Volume Total	279	511	750	0	29
Volume Left	24	0	0	0	0
Volume Right	0	0	103	0	29
cSH	794	1700	1700	1700	492
Volume to Capacity	0.03	0.30	0.44	0.00	0.06
Queue Length 95th (ft)	2	0	0	0	5
Control Delay (s)	1.1	0.0	0.0	0.0	12.8
Lane LOS	A			A	B
Approach Delay (s)	0.4		0.0	12.8	
Approach LOS				B	

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		



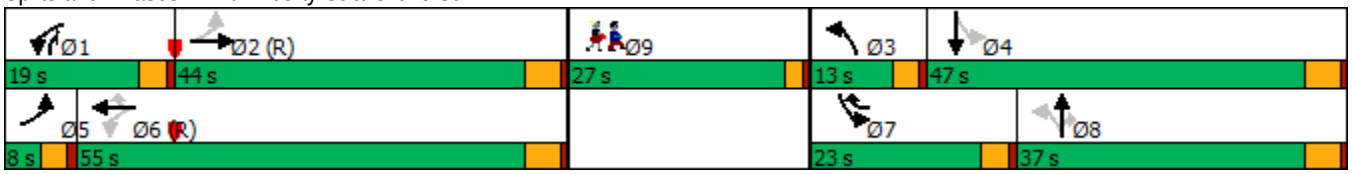
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	531	218	208	562	110	139	229	207	257	486	27
Future Volume (vph)	27	531	218	208	562	110	139	229	207	257	486	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		50	175		50	0		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25			50			50			50		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		437			335			367			287	
Travel Time (s)		9.9			7.6			8.3			6.5	
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.97	0.97	0.97	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Heavy Vehicles (%)	4%	2%	1%	1%	2%	0%	1%	1%	1%	1%	1%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	28	787	0	226	610	119	149	246	222	276	551	0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	5	2		1	6	7	3	8	1	7	4	
Permitted Phases	2			6		6	8		8	4		
Detector Phase	5	2		1	6	7	3	8	1	7	4	
Switch Phase												
Minimum Initial (s)	4.0	10.0		5.0	10.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	8.0	15.0		9.0	15.0	9.0	9.0	15.0	9.0	9.0	15.0	
Total Split (s)	8.0	44.0		19.0	55.0	23.0	13.0	37.0	19.0	23.0	47.0	
Total Split (%)	5.3%	29.3%		12.7%	36.7%	15.3%	8.7%	24.7%	12.7%	15.3%	31.3%	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.0	5.0		4.0	5.0	4.0	4.0	5.0	4.0	4.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max		None	C-Max	None	None	None	None	None	None	
Act Effct Green (s)	46.6	39.6		64.5	57.4	79.7	62.8	49.0	73.9	71.5	54.4	
Actuated g/C Ratio	0.31	0.26		0.43	0.38	0.53	0.42	0.33	0.49	0.48	0.36	
v/c Ratio	0.23	0.85		0.78	0.86	0.13	0.59	0.40	0.26	0.55	0.82	
Control Delay	31.7	59.6		54.7	56.3	7.6	36.7	43.7	14.8	30.2	54.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	31.7	59.6		54.7	56.3	7.6	36.7	43.7	14.8	30.2	54.2	
LOS	C	E		D	E	A	D	D	B	C	D	
Approach Delay		58.7			49.8			31.6			46.2	
Approach LOS		E			D			C			D	
Queue Length 50th (ft)	15	372		156	566	26	77	181	60	154	473	
Queue Length 95th (ft)	39	#456		#344	#847	39	#204	317	160	284	#823	
Internal Link Dist (ft)		357			255			287			207	
Turn Bay Length (ft)						50	175		50			
Base Capacity (vph)	122	925		290	713	903	252	614	838	519	675	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	

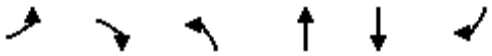
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	18%
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.23	0.85		0.78	0.86	0.13	0.59	0.40	0.26	0.53	0.82	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green, Master Intersection			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 47.6		Intersection LOS: D	
Intersection Capacity Utilization 84.5%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 10: Liberty St & Grove St





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	66	63	23	320	708	83
Future Volume (Veh/h)	66	63	23	320	708	83
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.91	0.91	0.92	0.92
Hourly flow rate (vph)	87	83	26	359	785	92
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	3.5					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				287		
pX, platoon unblocked	0.90					
vC, conflicting volume	1244	833	879			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1215	833	879			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	50	78	97			
cM capacity (veh/h)	175	371	776			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	170	385	877
Volume Left	87	26	0
Volume Right	83	0	92
cSH	236	776	1700
Volume to Capacity	0.72	0.03	0.52
Queue Length 95th (ft)	121	3	0
Control Delay (s)	51.6	1.1	0.0
Lane LOS	F	A	
Approach Delay (s)	51.6	1.1	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1002	2	2	832	1	0
Future Volume (Veh/h)	1002	2	2	832	1	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.94	0.94	0.25	0.25
Hourly flow rate (vph)	1099	2	2	903	4	0
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1102		2008	1101
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1102		2008	1101
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	100
cM capacity (veh/h)			640		66	260

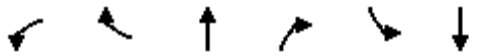
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1101	905	4
Volume Left	0	2	4
Volume Right	2	0	0
cSH	1700	640	66
Volume to Capacity	0.65	0.00	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	0.1	63.4
Lane LOS		A	F
Approach Delay (s)	0.0	0.1	63.4
Approach LOS			F

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	991	6	24	837	3	16
Future Volume (Veh/h)	991	6	24	837	3	16
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.92	0.92	0.63	0.63
Hourly flow rate (vph)	1111	7	27	928	5	26
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				968		
pX, platoon unblocked					0.88	
vC, conflicting volume			1119		2098	1116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1119		2178	1116
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		89	90
cM capacity (veh/h)			631		43	255

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1118	955	31
Volume Left	0	27	5
Volume Right	7	0	26
cSH	1700	631	143
Volume to Capacity	0.66	0.04	0.22
Queue Length 95th (ft)	0	3	20
Control Delay (s)	0.0	1.3	37.0
Lane LOS		A	E
Approach Delay (s)	0.0	1.3	37.0
Approach LOS			E

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

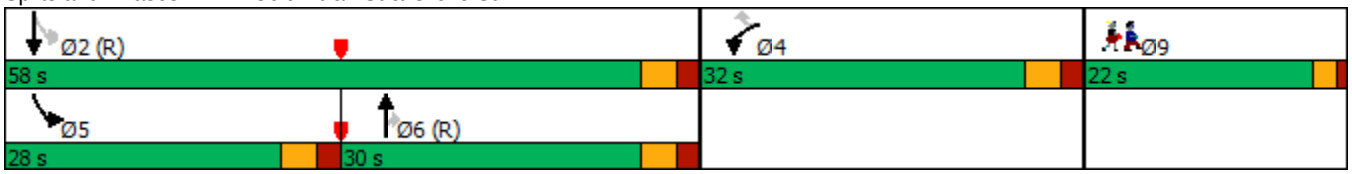


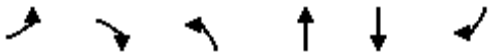
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Lane Configurations							
Traffic Volume (vph)	354	371	497	293	395	677	
Future Volume (vph)	354	371	497	293	395	677	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	50		250	150		
Storage Lanes	1	1		1	0		
Taper Length (ft)	25				25		
Right Turn on Red		Yes		Yes			
Link Speed (mph)	30		30			30	
Link Distance (ft)	637		577			356	
Travel Time (s)	14.5		13.1			8.1	
Peak Hour Factor	0.96	0.96	0.99	0.99	0.91	0.91	
Growth Factor	102%	102%	102%	102%	102%	102%	
Heavy Vehicles (%)	1%	1%	0%	1%	1%	1%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	376	394	512	302	0	1202	
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA	
Protected Phases	4		6		5	2	9
Permitted Phases		4		6	2		
Detector Phase	4	4	6	6	5	2	
Switch Phase							
Minimum Initial (s)	8.0	8.0	12.0	12.0	8.0	12.0	5.0
Minimum Split (s)	13.0	13.0	17.0	17.0	13.0	17.0	22.0
Total Split (s)	32.0	32.0	30.0	30.0	28.0	58.0	22.0
Total Split (%)	28.6%	28.6%	26.8%	26.8%	25.0%	51.8%	20%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Lost Time Adjust (s)	1.5	0.0	-1.5	0.0		-1.5	
Total Lost Time (s)	6.5	5.0	3.5	5.0		3.5	
Lead/Lag			Lag	Lag	Lead		
Lead-Lag Optimize?			Yes	Yes	Yes		
Recall Mode	None	None	C-Max	C-Max	None	C-Max	None
Act Effct Green (s)	24.8	26.3	72.8	71.3		72.8	
Actuated g/C Ratio	0.22	0.23	0.65	0.64		0.65	
v/c Ratio	0.95	0.83	0.41	0.27		0.94dl	
Control Delay	78.7	42.3	8.8	1.3		24.6	
Queue Delay	0.0	0.0	0.0	0.0		0.0	
Total Delay	78.7	42.3	8.8	1.3		24.6	
LOS	E	D	A	A		C	
Approach Delay	60.1		6.0			24.6	
Approach LOS	E		A			C	
Queue Length 50th (ft)	266	183	104	2		290	
Queue Length 95th (ft)	#447	#339	132	16		#667	
Internal Link Dist (ft)	557		497			276	
Turn Bay Length (ft)		50		250			
Base Capacity (vph)	406	486	1235	1115		1411	
Starvation Cap Reductn	0	0	0	0		0	
Spillback Cap Reductn	0	0	0	0		0	
Storage Cap Reductn	0	0	0	0		0	

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Reduced v/c Ratio	0.93	0.81	0.41	0.27		0.85	

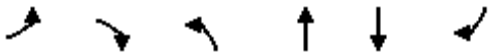
Intersection Summary			
Area Type:	Other		
Cycle Length: 112			
Actuated Cycle Length: 112			
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green, Master Intersection			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 29.0		Intersection LOS: C	
Intersection Capacity Utilization 89.6%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
dl Defacto Left Lane. Recode with 1 though lane as a left lane.			

Splits and Phases: 14: Columbian St & Grove St





Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø9
Lane Configurations							
Traffic Volume (vph)	40	19	2	750	1026	5	
Future Volume (vph)	40	19	2	750	1026	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0	0	50			0	
Storage Lanes	1	1	1			0	
Taper Length (ft)	25		50				
Right Turn on Red		Yes				Yes	
Link Speed (mph)	30			30	30		
Link Distance (ft)	272			367	577		
Travel Time (s)	6.2			8.3	13.1		
Confl. Peds. (#/hr)		2					
Peak Hour Factor	0.65	0.65	0.96	0.96	0.90	0.90	
Growth Factor	102%	102%	102%	102%	102%	102%	
Heavy Vehicles (%)	3%	0%	50%	1%	1%	20%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	63	30	2	797	1169	0	
Turn Type	Prot	Perm	pm+pt	NA	NA		
Protected Phases	8		1	6	2		9
Permitted Phases		8	6				
Detector Phase	8	8	1	6	2		
Switch Phase							
Minimum Initial (s)	8.0	8.0	4.0	12.0	12.0		5.0
Minimum Split (s)	13.0	13.0	9.0	17.0	17.0		22.0
Total Split (s)	13.0	13.0	9.0	77.0	68.0		22.0
Total Split (%)	11.6%	11.6%	8.0%	68.8%	60.7%		20%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		2.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Recall Mode	None	None	None	C-Max	C-Max		None
Act Effct Green (s)	8.0	8.0	92.4	93.4	91.6		
Actuated g/C Ratio	0.07	0.07	0.82	0.83	0.82		
v/c Ratio	0.50	0.21	0.01	0.51	0.40		
Control Delay	64.6	20.8	5.0	6.3	6.0		
Queue Delay	0.0	0.0	0.0	0.0	0.2		
Total Delay	64.6	20.8	5.0	6.3	6.2		
LOS	E	C	A	A	A		
Approach Delay	50.5			6.3	6.2		
Approach LOS	D			A	A		
Queue Length 50th (ft)	45	0	0	115	90		
Queue Length 95th (ft)	64	16	3	444	m262		
Internal Link Dist (ft)	192			287	497		
Turn Bay Length (ft)			50				
Base Capacity (vph)	125	140	257	1568	2917		
Starvation Cap Reductn	0	0	0	0	879		
Spillback Cap Reductn	0	0	0	0	0		

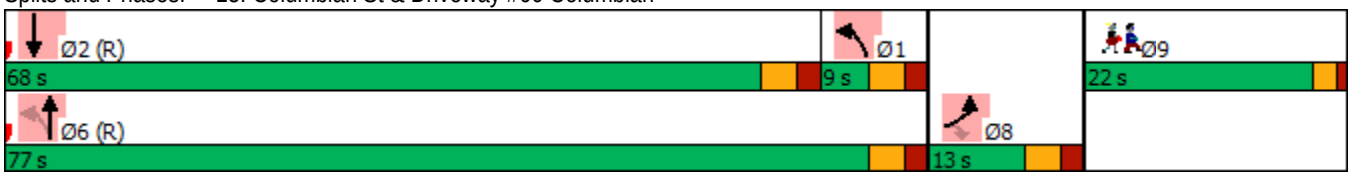


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	Ø9
Storage Cap Reductn	0	0	0	0	0		
Reduced v/c Ratio	0.50	0.21	0.01	0.51	0.57		

Intersection Summary			
Area Type:	Other		
Cycle Length: 112			
Actuated Cycle Length: 112			
Offset: 76 (68%), Referenced to phase 2:SBT and 6:NBTL, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 8.3		Intersection LOS: A	
Intersection Capacity Utilization 55.3%		ICU Level of Service B	
Analysis Period (min) 15			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: Columbian St & Driveway #60 Columbian



APPENDIX O

MassDOT Project Development Process

Overview of the Project Development Process

Transportation decision-making is complex and can be influenced by legislative mandates, environmental regulations, financial limitations, agency programmatic commitments, and partnering opportunities. Decision-makers and reviewing agencies, when consulted early and often throughout the project development process, can ensure that all participants understand the potential impact these factors can have on project implementation. Project development is the process that takes a transportation improvement from concept through construction.

The MassDOT Highway Division has developed a comprehensive project development process which is contained in Chapter 2 of the *MassDOT Highway Division's Project Development and Design Guide*. The eight-step process covers a range of activities extending from identification of a project need, through completion of a set of finished contract plans, to construction of the project. The sequence of decisions made through the project development process progressively narrows the project focus and, ultimately, leads to a project that addresses the identified needs. The descriptions provided below are focused on the process for a highway project, but the same basic process will need to be followed for non-highway projects as well.

1. Needs Identification

For each of the locations at which an improvement is to be implemented, MassDOT leads an effort to define the problem, establishes project goals and objectives, and defines the scope of the planning needed for implementation. To that end, it has to complete a Project Need Form (PNF), which states in general terms the deficiencies or needs related to the transportation facility or location. The PNF documents the problems and explains why corrective action is needed. For this study, the information defining the need for the project will be drawn primarily, perhaps exclusively, from the present report. Also, at this point in the process, MassDOT meets with potential participants, such as the Metropolitan Planning Organization (MPO) and community members, to allow for an informal review of the project.

The PNF is reviewed by the MassDOT Highway Division district office whose jurisdiction includes the location of the proposed project. MassDOT also sends the PNF to the MPO, for informational purposes. The outcome of this step determines whether the project requires further planning, whether it is already well supported by prior planning studies, and, therefore, whether it is ready to move forward into the design phase, or whether it should be dismissed from further consideration.

2. Planning

This phase will likely not be required for the implementation of the improvements proposed in this planning study, as this planning report should constitute the outcome of this step. However, in general, the purpose of this implementation step is for the project proponent to identify issues, impacts, and approvals that may need to be obtained, so that the subsequent design and permitting processes are understood.

The level of planning needed will vary widely, based on the complexity of the project. Typical tasks include: define the existing context, confirm project need, establish goals and objectives, initiate public outreach, define the project, collect data, develop and analyze alternatives, make

recommendations, and provide documentation. Likely outcomes include consensus on the project definition to enable it to move forward into environmental documentation (if needed) and design, or a recommendation to delay the project or dismiss it from further consideration.

3. Project Initiation

At this point in the process, the proponent, MassDOT Highway Division, fills out a Project Initiation Form (PIF) for each improvement, which is reviewed by its Project Review Committee (PRC) and the MPO. The PRC is composed of the Chief Engineer, each District Highway Director, and representatives of the Project Management, Environmental, Planning, Right-of-Way, Traffic, and Bridge departments, and the MassDOT Federal Aid Program Office (FAPO). The PIF documents the project type and description, summarizes the project planning process, identifies likely funding and project management responsibility, and defines a plan for interagency and public participation. First the PRC reviews and evaluates the proposed project based on the MassDOT's statewide priorities and criteria. If the result is positive, MassDOT Highway Division moves the project forward to the design phase, and to programming review by the MPO. The PRC may provide a Project Management Plan to define roles and responsibilities for subsequent steps. The MPO review includes project evaluation based on the MPO's regional priorities and criteria. The MPO may assign project evaluation criteria score, a Transportation Improvement Program (TIP) year, a tentative project category, and a tentative funding category.

4. Environmental Permitting, Design, and Right-of-Way Process

This step has four distinct but closely integrated elements: public outreach, environmental documentation and permitting (if required), design, and right-of-way acquisition (if required). The outcome of this step is a fully designed and permitted project ready for construction. However, a project does not have to be fully designed in order for the MPO to program it in the TIP. The sections below provide more detailed information on the four elements of this step of the project development process.

Public Outreach

Continued public outreach in the design and environmental process is essential to maintain public support for the project and to seek meaningful input on the design elements. The public outreach is often in the form of required public hearings, but can also include less formal dialogues with those interested in and affected by a proposed project.

Environmental Documentation and Permitting

The project proponent, in coordination with the Environmental Services section of the MassDOT Highway Division, will be responsible for identifying and complying with all applicable federal, state, and local environmental laws and requirements. This includes determining the appropriate project category for both the Massachusetts Environmental Protection Act (MEPA) and the National Environmental Protection Act (NEPA). Environmental documentation and permitting is often completed in conjunction with the **Preliminary Design** phase described below.

Design
There are three major phases of design. The first is **Preliminary Design**, which is also referred to as the 25-percent submission. The major components of this phase include full survey of the project area, preparation of base plans, development of basic geometric layout, development of preliminary cost estimates, and submission of a functional design report. Preliminary Design, although not required to, is often completed in conjunction with the Environmental Documentation and Permitting. The next phase is **Final Design**, which is also referred to as the 75-percent and 100-percent submission. The major components of this phase include preparation of a subsurface exploratory plan (if required), coordination of utility relocations, development of traffic management plans through construction zones, development of final cost estimates, and refinement and finalization of the construction plans. Once Final Design is complete, a full set of **Plans, Specifications, and Estimates (PS&E)** is developed for the project.

Right-of-Way Acquisition
A separate set of Right-of-Way plans are required for any project that requires land acquisition or easements. The plans must identify the existing and proposed layout lines, easements, property lines, names of property owners, and the dimensions and areas of estimated takings and easements.

5. Programming (Identification of Funding)
Programming, which typically begins during the design phase, can actually occur at any time during the process, from planning to design. In this step, which is distinct from project initiation, the proponent requests that the MPO place the project in the region's Transportation Improvement Program (TIP). The proponent requesting the project's listing on the TIP can be the community or it can be one of the MPO member agencies (the Regional Planning Agency, MassDOT, and the Regional Transit Authority). The MPO then considers the project in terms of state and regional needs, evaluation criteria, and compliance with the regional Transportation Plan and decides whether to place it in the draft TIP for public review and then in the final TIP.

6. Procurement
Following project design and programming of a highway project, the MassDOT Highway Division publishes a request for proposals. It then reviews the bids and awards the contract to the qualified bidder with the lowest bid.

7. Construction
After a construction contract is awarded, MassDOT Highway Division and the contractor develop a public participation plan and a management plan for the construction process.

8. Project Assessment
The purpose of this step is to receive constituents' comments on the project development process and the project's design elements. MassDOT Highway Division can apply what is learned in this process to future projects.

Project Development Schematic Timetable

Description	Schedule Influence	Typical Duration
Step I: Problem/Need/Opportunity Identification The proponent completes a Project Need Form (PNF). This form is then reviewed by the MassDOT Highway District office which provides guidance to the proponent on the subsequent steps of the process.	The Project Need Form has been developed so that it can be prepared quickly by the proponent, including any supporting data that is readily available. The District office shall return comments to the proponent within one month of PNF submission.	1 to 3 months
Step II: Planning Project planning can range from agreement that the problem should be addressed through a clear solution to a detailed analysis of alternatives and their impacts.	For some projects, no planning beyond preparation of the Project Need Form is required. Some projects require a planning study centered on specific project issues associated with the proposed solution or a narrow family of alternatives. More complex projects will likely require a detailed alternatives analysis.	Project Planning Report: 3 to 24+ months
Step III: Project Initiation The proponent prepares and submits a Project Initiation Form (PIF) and a Transportation Evaluation Criteria (TEC) form in this step. The PIF and TEC are informally reviewed by the Metropolitan Planning Organization (MPO) and MassDOT Highway District office, and formally reviewed by the PRC.	The PIF includes refinement of the preliminary information contained in the PNF. Additional information summarizing the results of the planning process, such as the Project Planning Report, are included with the PIF and TEC. The schedule is determined by PRC staff review (dependent on project complexity) and meeting schedule.	1 to 4 months
Step IV: Design, Environmental, and Right of Way The proponent completes the project design. Concurrently, the proponent completes necessary environmental permitting analyses and files applications for permits. Any right of way needed for the project is identified and the acquisition process begins.	The schedule for this step is dependent upon the size of the project and the complexity of the design, permitting, and right-of-way issues. Design review by the MassDOT Highway district and appropriate sections is completed in this step.	3 to 48+ months
Step V: Programming The MPO considers the project in terms of its regional priorities and determines whether or not to include the project in the draft Regional Transportation Improvement Program (TIP) which is then made available for public comment. The TIP includes a project description and funding source.	The schedule for this step is subject to each MPO's programming cycle and meeting schedule. It is also possible that the MPO will not include a project in its Draft TIP based on its review and approval procedures.	3 to 12+ months
Step VI: Procurement The project is advertised for construction and a contract awarded.	Administration of competing projects can influence the advertising schedule.	1 to 12 months
Step VII: Construction The construction process is initiated including public notification and any anticipated public involvement. Construction continues to project completion.	The duration for this step is entirely dependent upon project complexity and phasing.	3 to 60+ months
Step VIII: Project Assessment The construction period is complete and project elements and processes are evaluated on a voluntary basis.	The duration for this step is dependent upon the proponent's approach to this step and any follow-up required.	1 month

Source: MassDOT Highway Division Project Development and Design Guide