Route 53 Corridor Study in Norwell

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Project Manager
Chen-Yuan Wang

Project Principal
Mark Abbott

Data Analysts
Chen-Yuan Wang
Chaopeng Hu

Graphics
Kenneth Dumas
Kim DeLauri

Cover Design
Kim DeLauri

Editor
Meghan O'Connor

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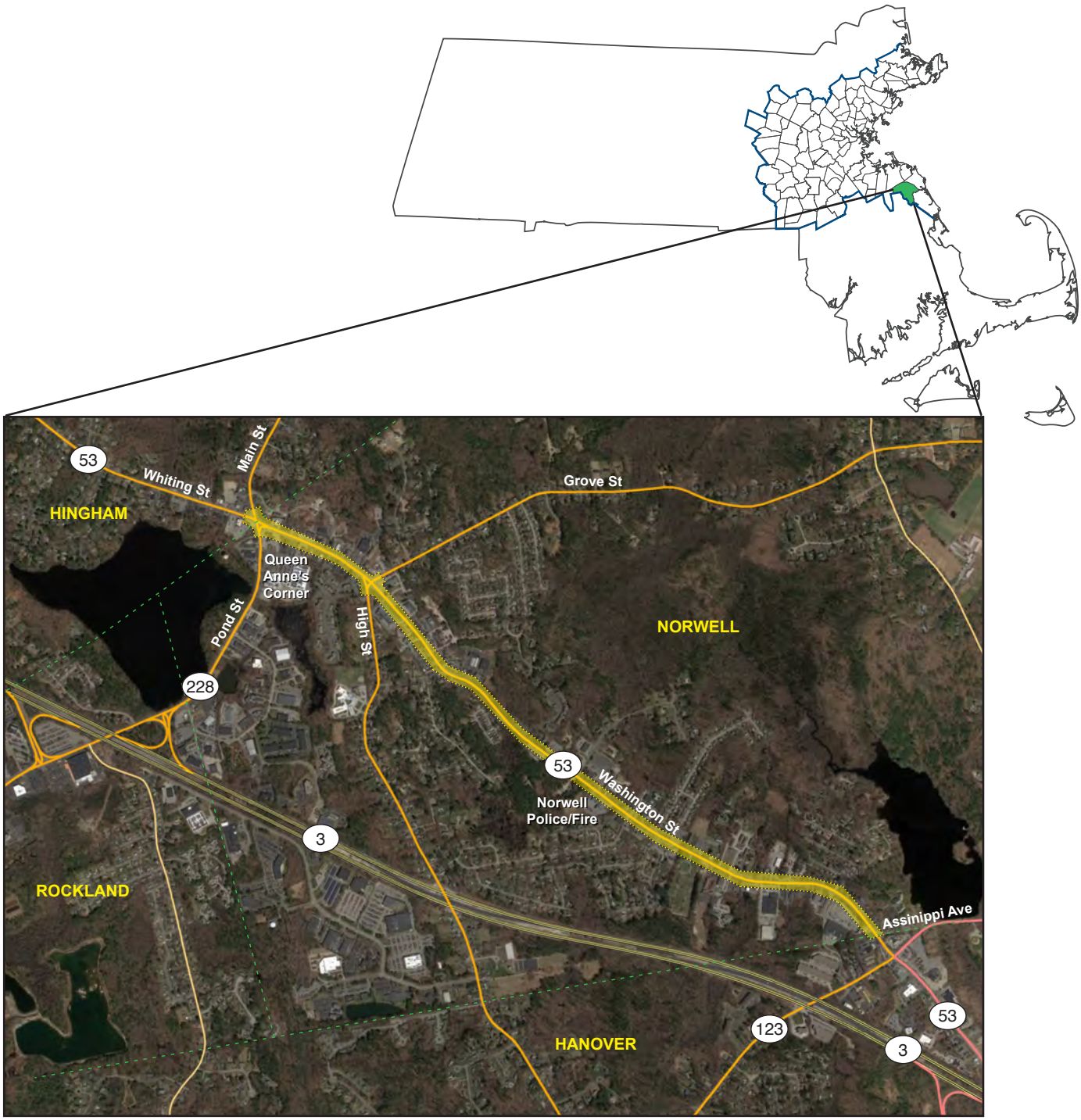

For general inquiries, contact

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

857.702.3700
617.570.9192 (fax)
ctps@ctps.org
ctps.org

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Abstract

The *Route 53 Corridor Study in Norwell* 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 Route 53 corridor in Norwell, 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 Route 53 in Norwell, 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.

Key issues and concerns identified for the corridor include the following:

- High corridor crash rate
- High vehicle travel speeds
- Recurrent traffic congestions
- Unsafe or insufficient access to adjacent developments
- Access management issues
- Insufficient accommodation for people who walk
- Lack of accommodation for people who bike

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. Three projects were identified and recommended for implementation in the short term:

- Review and retime the traffic signals at the three signalized intersections in the corridor.
- Restripe the Route 53 section between Pond Street and High Street.
- Reconstruct the roadways adjacent to the Norwell Public Safety Headquarters and install a traffic control system on Route 53 for emergency vehicle operations.

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

- Improve accommodation and safety for people who walk and bike.
- Improve mobility and safety for people to access adjacent businesses, offices, and residences.
- Sustain appropriate travel speeds and increase safety for all users in the corridor.
- Maintain efficient traffic operations on Route 53.
- Support and enhance economic activities.
- Enhance livability for neighborhoods and the subregion.

This report provides a detailed review and recommendations for improvements that address the transportation issues in the Route 53 corridor in Norwell. 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 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 (MAPC) 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 *Route 53 Corridor Study in Norwell* was documented in the federal fiscal year (FFY) 2020 UPWP, and a work program outlining the study was approved by the MPO board on October 1, 2019.[2]

1.2 STUDY OBJECTIVES

The *Route 53 Corridor Study in Norwell* 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*.

[2] The FFY 2020 UPWP was endorsed by the MPO on June 18, 2019, and was approved by the MPO's federal partners and took effect on October 1, 2019.

1.3 SELECTION PROCEDURE

The MPO selected Route 53 in Norwell by assessing 22 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 2020 UPWP; 2) concerns documented in meeting records from the UPWP outreach process for the past five years; 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 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.[3]

The selected Route 53 corridor contains mainly commercial developments, including large scale shopping plazas and street-front retailers, and some multiunit residents and single-family houses. All the segments in the corridor are classified as urban minor arterial. The roadway carries regional and local traffic, with a crash rate higher than the state average for urban minor arterials. It lacks accommodation for people who bike and has insufficient accommodation for people who walk with many sidewalk gaps.

The Town of Norwell is currently planning to enhance the vibrancy, safety, and livability of the Route 53 corridor through land use changes and roadway improvements. This study supports the Town's goals by analyzing existing transportation conditions and identifying potential improvements to make the

[3] Details of the criteria and rating system may be found in the Central Transportation Planning Staff's technical memorandum, "Selection of FFY 2020 Subregional Priority Roadway Study Location," dated November 7, 2019.

corridor safer and enhance mobility. The study was strongly endorsed by all stakeholders, including the Town of Norwell, MAPC, and MassDOT.

1.4 STUDY AREA AND DATA COLLECTION

The study corridor is approximately 2.2 miles long from Route 228 (Main Street in Hingham and Pond Street in Norwell) to Assinippi Avenue in Norwell. The study area covers Route 53 (Washington Street) and its adjacent areas and connected roadways. Major cross streets in the corridor include Main Street (Hingham), Pond Street, High Street, Grove Street, Oak Street, Hall Drive, Brantwood Road, Jacobs Trail, and Assinippi Avenue. 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. The data collection was delayed due to the COVID-19 pandemic. In September 2020, MassDOT resumed the traffic count programs and collected the data for this study in October.

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

During the study, MPO staff developed a survey to gather feedback from the public on perceived problems with Route 53 in Norwell and to seek improvement ideas.

1.5 STUDY ADVISORY COMMITTEE MEETINGS

During the course of the study, MPO staff worked closely with an advisory committee comprised of representatives from the Town of Norwell, MassDOT, and MAPC. (See Appendix A for a complete list of the study advisory members.)

Three advisory committee meetings were held to guide and support the study. In the first meeting (January 30, 2020), MPO staff introduced the study, received input about the corridor's issues and concerns, and coordinated data collection needs. In the second meeting (January 7, 2021), staff presented the existing condition analyses and discussed ideas for potential improvements with the advisory committee members.

In the final meeting (March 4, 2021), MPO staff reviewed the proposed short- and long-term improvements with the study advisory members. After the meetings, staff received comments and revised the proposed improvements accordingly.

Chapter 2—Existing Conditions and Issues

2.1 CORRIDOR OVERVIEW

Route 53 is one of the major highways in southeastern Massachusetts, along with Route 3 and Route 3A. The 22-mile state highway extends between Route 3A in Quincy and Route 3A in Kingston, serving many communities in the South Shore area. As it generally runs parallel to Route 3, Route 53 is frequently used as an alternative route when Route 3 traffic is congested.

The selected Route 53 corridor in Norwell is about 2.2 miles from Route 228 (Pond Street/Main Street in Hingham) to Assinippi Avenue at the Hanover town line. The corridor is basically a two-lane roadway, one lane in each direction, which carries about 20,000 to 25,000 vehicles per weekday.[4] The entire section is classified as urban minor arterial and under the jurisdiction of MassDOT Highway Division District 5.

The corridor contains three major signalized intersections, one signalized pedestrian crosswalk, a number of unsignalized intersections, and many commercial driveways. The three signalized intersections are Route 53 at Pond Street and Main Street, at High Street and Grove Street, and at Jacobs Trail and Stop & Shop Driveway. The signalized crosswalk is a mid-block location just south of Washington Park Drive, which is equipped with a regular traffic signal on Route 53 and pedestrian signals and push buttons on both sides of the roadway.

The adjacent land uses include commercial, residential, offices, religious, public offices, and open lands. Nearly 90 percent of the adjacent areas in the corridor are under business district zoning. The corridor can be roughly distinguished into three sections in terms of the existing land uses. The north section, Route 53 between Pond Street and Oak Street, is the busiest section with a large number of commercial and business developments, including Queen Anne Plaza that houses Big Y Market and Pharmacy, T.J. Maxx, and HomeGoods.

The middle section, Route 53 between Oak Street and Hull Drive, is the least developed area of the corridor, as a large part of the south side is occupied by a protected town well-field. Meanwhile, Norwell Public Safety Headquarters is located in the section between the town well-field and Hull Drive. This section also contains several small- and medium-scale commercial developments and a condominium, mainly on the north side.

[4] The Route 53 section between Pond Street and High Street has three lanes, two travel lanes and a two-way left-turn lane.

The south section, Route 53 between Hull Drive and Assinippi Avenue, although not as densely developed as the north section, contains a number of small- to large-scale commercial developments, including the Norwell Athletic Club, a large-scale Stop & Shop, and various types of land uses, including a church (Saint Helen Church), a park-like cemetery, and retirement homes. The surrounding areas are wooded and scenic, making this section a potential for village style mixed-use developments and redevelopments.

The corridor does not have sufficient accommodation for people who walk. Sidewalks exist mainly on the north side of Route 53 from Pond Street to CVS and Kappy's (about 600 feet south of High Street). It is unsafe and inconvenient for residents who like to walk to local stores and shops, especially in the sections with insufficient sidewalks.

There are no dedicated bike lanes in the entire corridor. Meanwhile, shoulders on both sides of the roadway are generally narrow (about two to three feet wide). Four- to five-foot shoulders exist in a limited section mainly on the north side between Oak Street and Hall Drive. These shoulders are not suitable for bike travel due to the high vehicle travel speeds over 40 miles per hour (mph) in the section.

There are no Massachusetts Bay Transportation Authority (MBTA) buses or any regional or local bus services in the corridor. Beyond the corridor, there are only two transit services connecting to Boston. The Plymouth & Brockton commuter bus has a station with park-and-ride parking located on Hingham Street in Rockland, just south of Route 3. The MBTA commuter rail Greenbush Line has a station at East Weymouth, located about 1.5 miles north of Route 53 in Weymouth.

2.2 CORRIDOR USER SURVEY

MPO staff developed a survey to help determine the public's opinion about the problems on Route 53 in Norwell, and to gather ideas for resolving them. With the assistance of Norwell and MAPC, the online survey was posted on the town's website and published in local media, and received 217 responses between February 25, and April 6, 2020. More than half (53 percent) of the responses came within the first two days of the website posting. This reflects the strong community engagement by the town.

2.2.1 Survey Questions and Answers

The survey contained the following nine questions:

1) How do you typically travel on Route 53?

2) Please indicate the purpose of your usual trips on Route 53.
3) Please indicate the destination of your usual trips on Route 53.
4) While driving on Route 53, what problems do you encounter?
5) While bicycling or walking along Route 53, what particular problems do you regularly encounter?
6) Please indicate any improvements that you would like to see implemented on Route 53.
7) Please indicate the most important improvement that you would like to see implemented on Route 53.
8) What is your home zip code?
9) Please use the space below to describe specific problem locations and improvements that you would like to see implemented in the Route 53 corridor.

Appendix B provides these questions and the applicable answers from the survey. Multiple choice answers are allowed in Questions 1 to 6, and only one choice is applicable to Question 7. Figure 2 shows the results from the survey for these seven questions, with the number of responses to the answers in each question. In addition, the percentage of answers and comments provided for the answer of "other (please specify)" to Questions 1 to 7 are summarized in Appendix B.

Question 8 is designed to understand the geographical distribution of the respondents. The answers indicate that about 85 percent of the respondents are Norwell residents. The rest of respondents are from the South Shore area, except for one from Boston, two from Cambridge, and two from Cape Cod.

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 response feedback for the question. The comments received are categorized by locations and by problem types in Appendix C.

2.2.2 Summary of Survey Results

The following list includes notable conclusions drawn from the survey.

- All the respondents indicated that they usually drive alone, drive others, or travel as a passenger in an automobile on Route 53 in Norwell. Nearly 90 percent of the respondents included driving alone as a typical travel mode. However, a noticeable portion of the respondents said that they also walk (16 percent) and/or bike (eight percent) in the corridor.

- Shopping and dining are the predominant purposes of trips made in the corridor. Commuting and social and recreational trips are also prevalent in the corridor.
- Even though the north section (Route 53 from Pond Street to Oak Street) has denser commercial developments, the respondents also frequent the other sections of the corridor.
- Difficulty turning into and out of stores and restaurants, and traffic congestion are the two most cited problems for drivers in the corridor.
- For people who walk and bike in the corridor, high volume of traffic and high vehicle speeds are two most cited problems.
- Most respondents (60–70 percent) indicated that they would like to see improvements in reducing traffic congestion, access to and from adjacent commercial development, and safety for all users. In addition, nearly half of the respondents would like to see improvements for pedestrians, including sidewalk conditions and crossings at mid-blocks and intersections. About one third of the respondents supported the improvement of bicycle accommodation.
- Many respondents expressed that that they had an interest in walking or biking in the corridor but were concerned for their safety due to the insufficient accommodation conditions.
- Despite being a population of mostly drivers, some respondents seemed quite receptive to the idea of improving facilities for other modes, and some respondents indicated that they would like to see Complete Streets improvements in the corridor and beyond. In addition to concerns and suggestions related to traffic congestion and access to adjacent businesses, the written comments included preference and ideas for improving the walking and biking experience in the corridor.

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.

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 higher than the state average for urban minor arterials. Meanwhile, both the intersections of Route 53 at Pond

Street/Main Street and at High Street/Grove Street have a crash rate higher than the average of signalized intersections in MassDOT District 5.

- **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, especially those currently unsignalized. 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**

  Both the intersections of Route 53 at Pond Street and Main Street and at High Street and Grove Street are congested during peak traffic hours, especially in the evening. In addition, some corridor sections frequently encounter periodic congestion due to blockages by vehicles waiting for traffic gaps to access the adjacent developments.

- **Unsafe access or lack of access to adjacent developments**

  In the north business section, a two-way left-turn lane (TWLTL) is provided to assist drivers in accessing the adjacent developments. The TWLTL is running continuously for about 1,500 feet with a broad width of about 14 to 15 feet. It is an unsafe condition that allows vehicles to travel fast and travel continuously. Meanwhile, no center left-turn lanes are provided for access to adjacent developments in other business districts in the corridor.

- **Access management issues**

  The frequent curb cuts and driveways in the corridor not only interrupt traffic flow, but they can cause potential conflicts and crashes. The curb cuts and driveways are usually wide and with large turning radii for vehicles, which are unsafe and inconvenient to people who walk and bike.

- **Insufficient accommodation for people who walk**

  Sidewalks are missing on the south side in most sections of the corridor. Meanwhile, in the entire corridor, crosswalks across Route 53 exist only at the three signalized intersections and the signalized crosswalk near Washington Park Drive.

- **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.

The above 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—Roadway Operations Analysis

To analyze the existing roadway operations, MPO staff requested MassDOT's assistance in collecting automatic traffic recorder (ATR) counts on the approaching roadways and intersection turning movement counts (TMCs) 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 delayed by a snowstorm in late November 2019, and periodic snowfall in the following months. In March 2020, just as MassDOT scheduled the collection of the TMCs for this study, the state's traffic data collection operations were suspended because of the COVID-19 pandemic.[5] In September, MassDOT resumed traffic count programs and collected the count data for this study from October 6, to October 11, on both weekend and weekdays.

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, not the pandemic conditions.

3.1 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 from October 7 (Wednesday) to October 9 (Friday) as the basis to estimate the annual average weekday traffic volumes at key locations in the corridor (see Appendix D for the originally recorded counts by hour). Based on the analysis of MassDOT COVID-19 traffic monitoring reports for District 5, staff increased the original counts by eight percent to represent the normal traffic conditions.[6]

Figure 3 shows the estimated 2020 daily traffic volumes. The numbers in the graphic are average weekday directional volumes representing the normal traffic conditions in 2020 that were adjusted from the recorded counts. The two tables in the graphic further summarize the data by count location, originally recorded

[5] Governor Baker's COVID-19 Order #5, which prohibited gatherings of more than 25 people, was issued on March 15, 2020.

[6] 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 MassDOT Mobility Dashboard (https://mobility-massdot.hub.arcgis.com). The eight percent increase was estimated from the counts at the permanent stations near the study area in District 5 in the period from the week of September 21, 2020, to the week of October 19, 2020.

volume, adjusted volume, combined volume of both directions, directional split, and the estimated annual average weekday daily traffic, adjusted by seasonal factors.

In general, the corridor carries an average daily traffic volume of about 16,000 to 24,000 vehicles per weekday in early October. The north section, Route 53 between Pond Street and High Street, carries the highest volume of about 24,000 vehicles per weekday. The south section, Route 53 between Jacobs Trail and Assinippi Avenue, carries about 18,000 vehicles per day. The other sections in the corridor generally carry about 16,000 to 18,000 vehicles per weekday.

Traffic volumes in early October were higher than most other months in the year. Adjusted for seasonal factors, the corridor is estimated to carry an average of 15,000 to 23,000 vehicles per weekday.

3.2 INTERSECTION TURNING MOVEMENT COUNTS

In addition to daily traffic counts, MassDOT collected turning movement counts 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, October 8, and during the midday peak period (10:00 AM–2:00 PM) on Saturday, October 10, 2020. Appendix E contains these counts summarized by 15-minute intervals.

Staff found that these counts are much lower than the counts collected in recent years (before the pandemic) by analyzing historical counts at major intersections in the corridor.[7] The analysis observed the following traffic volume and pattern changes during the pandemic due to many people working or attending school from home with more flexible schedules:

- In the morning, the peak hour traffic decreased significantly and shifted to a half an hour later from 7:45 AM–8:45 AM to 8:15 AM–9:15 AM.
- 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 much more flattened peak pattern. The AM peak period shifted to later than usual in the period

[7] The historical data include the following resources: 1) available traffic counts in and around the study area from MassDOT Transportation Data Management System (Massachusetts government webpage https://www.mass.gov/traffic-volume-and-classification); 2) traffic impact study conducted in 2019 for the area near Queen Anne's Corner; 3) traffic studies for the proposed developments in the corridor since 2000 provided by the Norwell Planning Department.

around 7:45 AM–9:45 AM. The PM peak period expanded to more than three hours and started much earlier, such as 2:30 PM or 2:45 PM.

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 five to eight percent in the PM peak hour to represent normal traffic conditions, except the intersection of Route 53 at Pond Street. Staff used the peak hour turning movement counts at the intersection directly from a recent traffic study for the areas near Queen Anne's Corner (collected on Thursday September 26, 2019; see Appendix F for the counts summarized by 15-minute intervals).[8] Using the 2019 counts at this key intersection as the basis, staff made additional minor adjustments to the counts at other intersections through a count-balancing process.

Figure 4 shows the final adjusted weekday AM and PM peak hour turning movement counts at major intersections in the corridor. The counts indicate that during the busy traffic months, such as September or October, the intersection of Route 53 at Pond Street could carry nearly 3,000 vehicles in the morning peak hour and nearly 3,800 vehicles in the evening peak hour. The intersection of Route 53 at High Street and Grove Street could carry nearly 2,600 vehicles in the morning peak hour and nearly 2,900 vehicles in the evening peak hour. The other intersections in the corridor generally carry a much lower traffic volume ranging from 1,400 vehicles to slightly more than 2,000 vehicles per peak hour.

The counts also indicate that the intersection of Route 53 at Route 228 (Pond Street/High Street) carries a high proportion of left turns on the Route 53 northbound and on both approaches of Route 228, and a high proportion of right turns on the Route 53 northbound and on the Route 228 eastbound. The intersection of Route 53 at High Street and Grove Street carries a high proportion of left turns on the Route 53 southbound and High Street eastbound, a high proportion of right turns on the Route 53 southbound, and a very high proportion of right turns on Grove Street.

Both the 2019 counts at the intersection of Route 53 and Pond Street and the counts collected in 2020 at other intersections in the corridor include Saturday 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.

[8] Technical memorandum, *Community Transportation Technical Assistance Program: Norwell Traffic Impact Study*, Seth Asante, Mark Abbott, Chaopeng Hu, Central Transportation Planning Staff, February 7, 2020.

3.2 PEDESTRIAN AND BICYCLE VOLUMES

In addition to traffic volumes, the intersection turning movement counts—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.

Figure 4 also shows the pedestrian crossing counts in the AM and PM peak hours at major intersections in the corridor. The intersection of Route 53 at Pond Street and High Street had about two to five pedestrian crossings per peak hour. The intersection of Route 53 at High Street and Grove Street had about five pedestrian crossings in the AM or PM peak hour. At the intersection of Route 53 and Queen Anne Plaza Driveway, there were about one or two pedestrian crossings on Route 53 during the peak traffic hour. Other intersections in the corridor had about one to three pedestrian crossings per peak hour and with almost no crossings on Route 53, except the intersection of Route 53 at Washington Park Drive and Brantwood Road where the signalized crosswalk is located; it had about two to four pedestrian crossings on Route 53 per peak traffic hour.

Review of the bicycle counts at the major intersections indicate that about one to two cyclists traveled along the corridor in the weekday AM or PM peak hour. On the fair weather Saturday (October 10, 2020), there were about two to four cyclists traveling in the corridor from 10:00 AM to 11:00 AM.

There are no sidewalks on the south side on most sections of the corridor, no bicycle accommodations in the entire corridor, and limited crosswalks across Route 53 at four signalized locations. These may have impeded walking and biking activities in the corridor.

3.3 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.[9]

Staff reviewed vehicle classifications in the turning movement counts and identified the percentages of heavy vehicles within the total traffic at major

[9] 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, motor homes, and campers (even a passenger car pulling a trailer), are not considered heavy vehicles.

locations in the corridor. On average, heavy vehicles accounted for approximately three to four percent of the Route 53 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.

Adjacent to the corridor, Pond Street was identified as carrying nearly 10 percent of heavy vehicle traffic from Route 3 and Hingham Street (Rockland) toward Route 53 in the AM peak hour. However, heavy vehicle traffic diminished significantly in other times of the day after the AM peak hour.

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.

3.4 INTERSECTION CAPACITY ANALYSES

Based on the estimated turning movement counts, 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.[10] 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 5 shows the results of weekday AM and PM peak-hour capacity analyses for the assumed normal traffic conditions in 2020 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).[11] 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.[12] 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.

[10] 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.

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

[12] 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.

The intersection of Route 53 at Pond Street is estimated to operate at an overall acceptable LOS (LOS D in the AM peak hour and LOS E in the PM peak hour). However, some individual approaches are estimated to operate at an undesirable LOS F, such as the Route 53 northbound left-turn approach with an average delay of nearly two minutes in the AM peak hour and nearly three minutes in the PM peak hour; the Main Street left-turn approach with an average delay of about one and a half minutes in the AM peak hour; and the Pond Street through movement with an average delay of one and a half minutes in the AM peak hour and nearly two minutes in the PM peak hour.

The intersection of Route 53 at High Street and Grove Street is estimated to operate at overall acceptable LOS (LOS C in the AM peak hour and LOS E in the PM peak hour). However, the Route 53 southbound left-turn approach is estimated to operate at an undesirable LOS F with an average delay of more than three minutes in the PM peak hour. Field observations before the pandemic indicated that the left-turn queue in the evening peak hour frequently extended beyond its storage length (about 300 feet) and impeded other vehicles' access to the adjacent businesses.

The third signalized intersection, Route 53 at Jacobs Trail and Stop & Shop Driveway, is evaluated to operate at an overall desirable LOS B in both AM and PM peak hours with no substantial delays at any of the approaches. Field observations before the pandemic indicated that the Route 53 northbound is somewhat congested, but traffic queues mostly cleared in each of the cycles.

At the unsignalized intersections, drivers on the stop-controlled approaches generally experience noticeable delays during the peak hours due to the busy traffic on Route 53. In the AM peak hour, most of the approaches are evaluated to operate at acceptable LOS. In the PM peak hour, left turns from Queen Anne Plaza Driveway and Oak Street are estimated to operate at unacceptable LOS F, with an average delay of nearly one minute. The left turn from Assinippi Avenue is also estimated to operate at unacceptable LOS F, with an average of more than two minutes. However, the left-turn approach of Assinippi Avenue usually has less than 10 vehicles in the AM or PM peak hour.

Staff also explored opportunities of retiming signals or rearranging phasing at the three signalized intersections and found that all signals have the potential to improve from the existing settings, especially the intersection of Route 53 at High Street and Grove Street. 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 assumed 2020 traffic conditions are included in Appendices G and H.

3.5 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 6 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 are collected.

The corridor has three speed limit zones:

1. Route 53 from Queen Anne's Corner to the north of Queen Anne Plaza Driveway: 35 mph
2. Route 53 from the north of Queen Anne Plaza Driveway to the south of Farrar Farm Road: 40 mph
3. Route 53 from the south of Farrar Farm Road to Assinippi Avenue: 35 mph

The regulated speed limit in each zone applies to both directions of Route 53. The 85th percentile speeds estimated from the data indicate that the high vehicle travel speeds (nearly 45 mph) occur in the sections adjacent to Farrar Farm Road, where the commercial developments are not as dense as other sections, except the southbound traffic past Farrar Farm Road. The southbound drivers there tend to slow down as they enter a lower speed limit zone (35 mph) and approach toward the Norwell Police Department. Once the drivers pass the Norwell Safety Headquarters, they tend to speed up to nearly 45 mph again.

The section between Queen Anne Plaza and Oak Street has a lower estimated 85th percentile speed of about 40 mph. Because of the dense commercial developments in the section, it should be examined for the potential of 35 mph speed regulation.

The proposed long-term improvements described in this report with the reduction of travel lane width and the addition of a central left-turn lane or traffic median would potentially reduce travel speeds in the corridor. At the design stage, a consistent 35 mph speed limit could be planned for the entire corridor. 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.[13]

3.6 EXISTING ROADWAY LAYOUTS AND POTENTIAL RECONFIGURATIONS

The corridor generally has a right-of-way width of 60 feet or more. Based on MassGIS' standardized assessors' parcel data, the corridor can be distinguished into four district roadway sections:

1) The section from Pond Street to the south of High Street has a right-of-way of about 65 to 70 feet.
2) The section between High Street and Oak Street, about 900 feet in length, has a narrow right-of-way of about 40 to 42 feet.
3) The section between Oak Street and Jacobs Trail, covering nearly 60 percent of the corridor, has a right-of-way of about 60 feet.
4) The section from the vicinity of Jacobs Trail to Assinippi Avenue has a right-of-way of about 70 feet wide.

Figures 7, 8, 9-1, 9-2, and 10 show the existing roadway cross section and potential reconfiguration alternatives in the four roadway sections based on the approximate right-of-way widths. 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.

Route 53 from Pond Street to High Street

The section of Route 53 between Pond Street and High Street is located in the busiest business district of the corridor. The top graphic in Figure 7 shows that the existing roadway contains a 14-foot wide TWLTL and a wide travel lane of about 15 feet in each direction, which allows vehicles to travel at high speeds. Two potential reconfiguration alternatives are proposed in this roadway section to: 1) reduce the travel lanes to 11-foot and the TWLTL to 12-foot, and to install street-level bike lanes with a three-foot traffic buffer; and 2) reduce the travel lanes and TWLTL the same as Alternative 1, but install sidewalk level bike lanes under a shared use path or separated from sidewalks with a grass buffer, while accommodating the existing utility poles (see the bottom graphic of Figure 7).

[13] 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.

Route 53 between High Street and Oak Street

The roadway section of Route 53 between High Street and Oak Street is narrow and abutted by continuous commercial developments, except the area adjacent to High Street (containing 7-Eleven, CVS, and Kappy's). As shown in the top graphic of Figure 8, this section contains two 12-foot travel lanes (one in each direction), narrow shoulders of about two to three feet, and five-foot sidewalks on the north side only.

The potential improvement proposed by Alternative 1 would reduce the travel lanes to 11-feet wide, install five-foot street-level bike lanes with a two-foot traffic buffer on both sides, and install five-foot sidewalks on both sides. This reconfiguration would require about five feet more width than the available right-of-way. Alternative 2 proposes to reduce the travel lanes to 11 feet, install an 11-foot center lane as a left-turn only lane, TWLTL, or traffic median, maintain two-foot shoulders, and install an eight-foot shared use path on the north side and five-foot sidewalks on the south side. It would require about 10 feet more width than the available right-of-way. Alternative 3 has a similar layout as Alternative 2, but proposes to install an eight-foot shared use path or street-level separated bike lanes with grass buffer, and sidewalks on both sides of the roadway. It would require about 15 feet more width than the available right-of-way.

The proposed center lane and the added pedestrian and bicycle accommodations would significantly improve the access to adjacent developments, the traffic flow along the corridor, and the safety for all users of the roadway. At the design stage, the speed regulation in this section should change from 40 mph to 35 mph. However, variations of the alternatives may need to be considered due to the availability of acquiring the additional right-of-ways.

Route 53 between Oak Street and Jacobs Trails

The extensive roadway section of Route 53 between Oak Street and Jacobs Trail has a consistent right-of-way of about 60 feet. The top graphic of Figure 9-1 shows that the right-of-way is not fully utilized. The roadway has a pavement surface of about 30 feet wide that contains two 12-foot travel lanes, two- to three-foot shoulders on both sides, and five- to six-foot sidewalks on the north side only. The available right-of-way provides opportunities for adding sidewalks on the south side and accommodations on both sides for people who bike.

Alternative 1 is the minimal build option that would maintain the existing two travel lanes, add street-level bike lanes with three-foot street buffers on both sides, and add sidewalks on the south side of the roadway (see the bottom

graphic in Figure 9-1). Alternative 2 proposes to reduce the two travel lanes to 11 feet, install a 12-foot center lane as left-turn only lane or traffic median, and install five-foot street-level bike lanes with a two-foot traffic buffer on both sides (see the top graphic in Figure 9-2). Alternative 3 proposes a similar layout as Alternative 2 to improve access to the adjacent developments, and would install a shared use path with a three-foot traffic buffer on both sides for people who walk and bike (see the bottom graphic of Figure 9-2). All three alternatives may be constructed within a right-of-way of about 60 feet wide.

Although not as densely developed as the first roadway section, this roadway section contains many businesses and developments of different land uses. Adding a center lane to function as a left-turn only lane or traffic median would significantly improve the safety, mobility, and access for all users in the corridor. In addition, it would provide more room for general vehicles to move aside for the emergency vehicles in the section where the Norwell Public Safety Headquarters is located.

Route 53 between Jacobs Trail and Assinippi Avenue

As shown in Figure 10, the roadway section of Route 53 between Jacobs Trail and Assinippi Avenue has a right-of-way of about 70 feet. It contains three 12-foot travel lanes, one in the northbound and two in the southbound, two- to three-foot shoulders on both sides, and sidewalks on the north side only. The roadway in this section carries northbound and southbound traffic equally. However, the current distribution of one travel lane in the northbound and two in the southbound appears to be appropriate.[14]

Alternative 1 proposes to maintain the existing travel lanes with a slight reduction of the two southbound lanes to 11 feet each, install six-foot street-level bike lanes with a three-foot traffic buffer on both sides, and install six-foot sidewalks on both sides. It would require a right-of-way of about 65 feet. Alternative 2 proposes a similar layout for vehicle travel, but instead would install a 10-foot shared use path on the south side and sidewalk-level bike lanes separated by a grass buffer with sidewalks on the north side for people who walk and bike. It would require a right-of-way of about 70 feet.

This roadway section has a profile different from the other sections in the corridor, with northbound running uphill and southbound running downhill.

[14] Synchro tests indicate that if the travel lanes are rearranged to two lanes in the northbound and one in the southbound, the intersection of Route 53 at Jacobs Trail and Stop & Shop driveway would encounter extensive traffic queues during the PM peak hour in the southbound where many businesses are located.

Alternative 2 is much more preferable to Alternative 1, as it provides more separation from traffic and more protection for people who bike.

Chapter 4—Crash Data Analysis

4.1 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, MPO staff collected the most recent five-year (2015–19) crash reports from the Norwell Police Department for the entire corridor and conducted a series of crash data analyses. In total, 287 crashes were recorded in the five-year period at different locations in the corridor.

Major statistics analyzed from the data set including the following:

- Crash severity: 20 percent resulted in personal injuries
- Crash types:
  - 135 (47 percent) rear-end collisions
  - 77 (25 percent) angle collisions
  - 42 (15 percent) sideswipe collisions (mostly same direction)
  - 19 (7 percent) single vehicle collisions
- Two pedestrian crashes and one bicycle crash[15]
- Weekday peak-period crashes (7:00 AM–10:00 AM, 3:30 PM–6:30 PM): 40 percent
- Weekend peak-period crashes (11:30 AM–2:30 PM): 8 percent
- Crashes under daylight conditions: 83 percent
- Crashes with dry roadway conditions: 73 percent

4.2 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 4.11 crashes per million vehicle-miles traveled (MVMT). This crash rate is higher than the statewide average for principal urban arterials, which is 3.49 crashes per MVMT (updated July 2020, based on 2017 crash data).

[15] 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 available data.

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

- Route 53 from Pond Street to High Street: 7.31 crashes per MVMT;
- Route 53 from the south of High Street to Oak Street: 3.29 crashes per MVMT;
- Route 53 from the south of Oak Street to Hall Drive: 1.41 crashes per MVMT;
- Route 53 from the south of Hall Drive to the north of Jacobs Trail: 3.46 crashes per MVMT; and
- Route 53 from the north of Jacobs Trail to the south of Assinippi Avenue: 3.73 crashes per MVMT.

Appendix I 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 Norwell Police Department crash data and the estimated intersection traffic counts. The crash rates for the signalized intersections are as follows:

- Route 53 at Route 228 (Pond Street/Main Street in Hingham): 0.94 crashes per million entering vehicles (MEV)
- Route 53 at High Street/Grove Street: 0.97 crashes per MEV
- Route 53 at Jacobs Trail/Stop & Shop Driveway: 0.50 crashes per MEV

The average crash rate for MassDOT District 5 signalized intersections is 0.75 crashes per MEV (updated June 2018, based on 2016 crash data). Both intersections in the busiest commercial district of the corridor have a crash rate higher than the district average.

Among the unsignalized intersections, Route 53 at Assinippi Avenue is estimated to have the highest crash rate of 0.47 crashes per MEV. This rate is lower than the average crash rate for unsignalized intersections in MassDOT District 5, which is 0.57 crashes per MEV.

Appendix J contains worksheets showing the crash rate calculations for the major intersections in the corridor.

4.3 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 Norwell Police Department crash reports. The crash reports, containing descriptions of how and where those crashes occurred, were useful in constructing the collision diagrams.

Appendix K presents nine collision diagrams for nine 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 [PDO], non-fatal 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 in each of the corridor sections are summarized below.

Route 53 at Pond Street and Main Street (Appendix K-1)

- The intersection has a large skewed layout and is congested during peak hours.
- Fifty-eight (58) crashes were recorded in the recent five-year period.
- About one third of the total crashes (20 in total, mostly rear-end crashes) occurred on the Route 53 northbound approach.
- Another eight crashes on the northbound approach involved a vehicle exiting or entering the adjacent KFC.
- One crash involved a person walking on the crosswalk across the northbound approach and a vehicle turning left from Main Street.
- Other crashes are scattered all over the intersection with no distinct patterns.

Route 53 between Pond Street and High Street (Appendix K-2)

- This section has three wide travel lanes with the center lane operating as a continuous TWLTL. Filed observations in the roadway section indicate

that many people drive fast in this section and some drivers traveled on the TWLTL for an extensive distance.[16]

- Forty-six (46) crashes were recorded in this 1,500-foot roadway section in the recent five-year period.
- Majority of the crashes (31) involved a vehicle attempting to gain access or to exit the adjacent developments. More than one third of crashes occurred in the TWLTL, and others occurred at or near the driveways of the adjacent developments.
- Fifteen (15) rear-end crashes occurred on the travel lanes, mostly in the northbound direction.
- Twelve (12) crashes occurred in the vicinity of Route 53 at the driveway of Queen Anne Plaza.
- One crash involved a person biking on the Route 53 southbound and a vehicle exiting from the Queen Anne Plaza Driveway.

Route 53 at High Street and Grove Street (Appendix K-3)

- The intersection has a large layout and is congested during peak hours.
- Forty-five (45) crashes were recorded in the recent five-year period.
- More than half of the crashes (24 in total) occurred on the Route 53 southbound approach. Among them, 15 crashes were rear-end collisions involving two southbound vehicles and occurred mostly during the PM peak traffic period.
- Six crashes involved a southbound vehicle turning left toward the adjacent 7-Eleven and colliding with a northbound vehicle.
- No crashes involved people who walked or biked at this intersection.

Route 53 between High Street and Oak Street (Appendix K-4)

- This is the narrowest section of the corridor that has two travel lanes and no center left-turn lane to access the adjacent continuous developments.[17]
- Twenty-nine (29) crashes were recorded in the recent five-year period.
- Majority of the crashes were rear-end collisions scattered throughout the section. Most of the crashes occurred on the northbound side of Route 53.

[16] The main purpose of a TWLTL is to provide left-turn access to the adjacent developments. A general rule for driving on TWLTLs is not to travel continuously for more than 200 feet.

[17] The section in this collision diagram is about 1,600 feet long, including the intersection of Route 53 at Oak Street and two driveways from the adjacent developments further south of Oak Street.

- Three left-turn crashes occurred at the north driveway of CVS with a left-turn vehicle from CVS colliding with a vehicle on Route 53 southbound.
- Four crashes, two involving a left-turn vehicle from Oak Street, occurred at the intersection of Route 53 and Oak Street.
- Three single vehicle out-of-control crashes occurred in the area adjacent to Oak Street intersection.

Route 53 between Oak Street and Hall Drive (Appendix K-5)

- This is the least developed section of the corridor, due to the protected town well-field occupying the south side of Route 53. It has two travel lanes and shoulders of about three to four feet on both sides.
- Nineteen (19) crashes were recorded in the recent five-year period.
- Four crashes occurred near Stone House Antique Store on the Route 53 southbound. It is a slightly downhill section with limited sight distance.
- Five crashes occurred on Route 53 near the Norwell Public Safety Headquarters. One rear-end crash was caused by a driver's inattention to an emergency vehicle exit. Currently, no traffic controls on Route 53 for emergency vehicle exists. According to the Norwell Police and Fire Departments, their emergency vehicles frequently encounter near-miss crashes in this section.
- Deer crossing appears to be a problem for drivers in this section. There were three deer crashes. In addition, another three deer crashes occurred in the area just south of this section near Hall Drive (see Appendix K-6).

Route 53 between Hall Drive and Jacobs Trail (Appendices K-6 and K-7)

- As this section is longer than other sections, it was analyzed in two segments: Route 53 from Hall Drive to the driveway of Village Gardens (Appendix K-6) and Route 53 from the east of Village Gardens to the west of Jacobs Trail and Stop & Shop Driveway (Appendix K-7).
- This section contains developments of different land uses, including a number of recent commercial developments (mainly on the south side of Route 53). It has two travel lanes with no center lane for access to the adjacent developments.
- In total, 57 crashes occurred in the section, 32 in the first segment and 25 in the second segment.

- In the first segment, crashes mainly clustered in the area between Brantwood Road and Saint Helen Church, where a number of side streets and driveways from the adjacent stores and shops are closely spaced.
- Four rear-end crashes occurred at the signalized crosswalk just south of Washington Park Drive. Two of the crashes were caused by drivers' inattention to the pedestrian-activated traffic signal.
- In the second segment, crashes were scattered throughout the corridor with some clustered in the area near Norwell Athletic Club and Kitchens & Baths.

Route 53 at Jacobs Trail and Stop & Shop Driveway (Appendix K-8)

- The intersection has a large layout.
- Sixteen (16) crashes were recorded in the recent five-year period.
- Five angle crashes involved a northbound left-turn vehicle colliding with a southbound through vehicle.
- Six rear-end and sideswipe crashes occurred on the Route 53 northbound approach, potentially due to traffic congestion in the PM peak period.
- No crashes involved people who walked or biked at this intersection.

Route 53 between Jacobs Trail and Assinippi Avenue (Appendix K-9)

- This section has three travel lanes; two in the southbound and one in the northbound.
- Seventeen (17) crashes were recorded in the recent five-year period.
- Only one rear-end crash occurred in the middle of the section.
- Sixteen (16) crashes occurred at or near the intersection of Route 53 and Assinippi Avenue.
- Five rear-end crashes occurred on the right-turn approach on Assinippi Avenue. The approach is under stop-control and is usually congested during peak hours.
- Four crashes involved a southbound left-turn vehicle and a northbound through vehicle at the intersection.
- One crash involved a person walking on the crosswalk across the right-turn approach of Assinippi Avenue and colliding with a right-turning vehicle. Note that the approach is very wide, as is the entire intersection, which is not friendly for people who walk.

These 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.

Chapter 5—Proposed Improvements

Based on the analyses in the previous chapters, 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 seven sections. The first section outlines the corridor improvement objectives and design strategies based on the identified issues and concerns for the corridor. The next five sections review the existing roadway conditions, discuss issues and concerns, and propose short- and long-term improvements for five 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
- minimize delays and increase safety at intersections while maintaining continuous traffic flow in the corridor
- provide safe and convenient access to adjacent developments
- enhance access management to reduce traffic conflicts
- improve and provide safe and comfortable accommodation for people who walk and/or bike

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

- reduce travel lane width to 11-foot to 12-foot wide
- add center left-turn lane/median to improve access to adjacent developments and to reduce potential traffic conflicts
- reduce intersection layout and turning radii
- increase left-turn lane storage to improve intersection traffic operations
- reduce or combine driveways where applicable

- improve existing sidewalks and install sidewalks or shared use paths where the sidewalks are currently absent
- provide shared use paths or separated bike lanes for people who bike
- provide sufficient buffer from traffic for people who walk or bike
- preserve existing trees and landscape elements where applicable

5.2 ROUTE 53 FROM POND STREET TO HIGH STREET

This section discusses the Route 53 corridor from Pond Street to High Street. It is the busiest section of the corridor and contains two major intersections that are usually congested during the peak hours. In between the two intersections, the roadway contains three lanes, two wide travel lanes of about 15 feet in each direction, and a continuous TWLTL of about the same width, which allows vehicles to travel at high speeds.

5.2.1 Issues and Concerns

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

- The TWLTL operation is unsafe because of its broad width and its extensive length without intersection gaps or median breaks.
- The frequent curb cuts and driveways in this section are wide, which are unsafe and inconvenient for people to walk and bike in the section.
- This section had a very high crash rate—double the state average for urban minor arterials.
- There are no crosswalks for people to cross Route 53 in between the two signalized intersections.
- The intersection of Route 53 at Pond Street and Main Street is very congested during the PM peak period, especially on the Route 53 northbound approach. The approach had a large number of crashes in recent years.
- The intersection of Route 53 at High Street and Grove Street is congested during the PM peak period, especially on the Route 53 southbound approach. The approaches also had a large number of crashes in recent years.

The TWLTL application aims to reduce crashes and to provide convenient access to adjacent developments; however, many drivers do not know how to use it appropriately. There are general rules for using a TWLTL:

- The TWLTL should be used for turning (should not travel continuously more than 200 feet).

- When merging, slow down and use left-turn blinker.
- Do not use it to pass vehicles in the adjacent lane.
- Do not infringe adjacent lanes while waiting to turn left.
- Do not use it as a refuge for joining the arterial traffic from side streets or from adjacent driveways.

For three-lane urban arterials, the TWLTL is not as safe as the center lane with one-way left-turn pockets and traffic medians, particularly for roadways that carry 20,000 or more vehicles per day. However, in order to provide access to continuous developments existing on both sides of an arterial, such as this roadway section, the TWLTL may be an inevitable choice.

5.2.2 Proposed Short-Term Improvements

In the short term, this roadway section can be considered for restriping to improve the TWLTL operation. Figure 11 shows the conceptual plan for restriping this roadway section. Major elements of the improvement include

- restriping the TWLTL to 12 feet wide and dividing it into three sections by removing the TWLTL makings at the intersection of Route 53 and the Queen Anne Plaza Driveway, and adding a painted traffic median just south of Damon Farm Way;
- replacing the TWLTL with a northbound left-turn only lane on the Route 53 northbound approach at the Queen Anne Plaza intersection;
- reducing the travel lanes to about 11 feet wide and increasing the shoulders to four to five feet wide, depending on the pavement widths;
- maintaining the existing left-turn storage lengths on Route 53 at both intersections; and
- modifying the speed limit in this section from 40 mph to 35 mph.

Synchro tests indicate that traffic operations at the two major intersections can be improved by retiming traffic signals under the existing layout. Appendix L contains the Synchro AM and PM peak-hour analysis reports for the signal retiming scenarios at the three signalized intersections in the corridor (including the intersection of Route 53 at Jacobs Trail). The expected improvements for the two intersections in this section are summarized below:

- At the intersection of Route 53 at Pond Street and Main Street, the overall LOS and average delay would stay about the same in the AM scenario and improve somewhat in the PM scenario. However, in both scenarios, the Route 53 northbound approach would improve significantly with much reduced average delay for the left-turn movements, while the other approaches would maintain at the same LOS or improve slightly.

- At the intersection of Route 53 at High Street and Grove Street, the overall LOS and average delay would improve slightly in the AM scenario, with the most improvement on the Grove Street approach. However, in the PM scenario, the overall LOS would improve significantly from LOS E to LOS C with much reduced average delay, especially on the congested Route 53 southbound approach. Left-turn movements on the approach would improve from LOS F to LOS D with a significant reduction of average delay.

5.2.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section of Route 53 between Pond Street and High Street in general and at three specific locations. Figures 12 and 13 show the proposed improvements for this section in two conceptual plans. Appendix M contains the intersection capacity analyses for the major intersections in the corridor with the proposed improvements under the projected 2030 AM and PM peak-hour traffic conditions.

Route 53 between Pond Street and High Street (Figures 12 and 13)

- Reduce travel lanes to 11 to 12 feet wide
- Modify the TWLTL as the proposed short-term improvements
- Consider installing a traffic signal at the intersection of Route 53 and the Queen Anne Plaza Driveway (detailed below as a specific location)
- Reconstruct the existing sidewalks and the adjacent areas into a shared use path or sidewalks and bike lanes with buffer in between (see the prospective roadway layout in Figure 12)
- Reduce the existing driveway numbers and sizes where applicable
- Change speed limit from 40 mph to 35 mph

Route 53 at Pond Street and Main Street (Figure 12)

- Widen the Main Street approach and extend the storage length of the left-turn lane from 150 feet to 200 feet[18]
- Extend the storage lengths of the right- and left-turn lanes on Pond Street from 150 to 200 feet

[18] The storage length of a turning lane refers to the space where vehicles queue to wait for turning. The storage lane extension is based on the estimated queue lengths from Synchro analyses of the intersection operations under the projected 2030 AM and PM peak-hour traffic volumes and the consideration of available right-of-way. The Synchro reports of the analyses are included in Appendix M.

- Move the stop line and the crosswalks on both the Route 53 southbound and Main Street approaches about 10 feet toward the intersection[19]
- Reduce the turning radius on the Main Street right-turn approach
- Maintain the existing protected left-turn operation at all approaches
- Maintain the existing concurrent pedestrian signal phasing operation at the intersection
- Add sidewalk-level bicycle accommodation and bicycle detection connected to the signal system

Route 53 at the Queen Anne Plaza Driveway (Figure 12)

- Signalize the intersection with accessible countdown pedestrian signals[20]
- Install a crosswalk on the Route 53 northbound approach
- Operate the traffic signal with an exclusive pedestrian signal phase
- Coordinate this signal with the signal at the intersection of Route 53 at Pond Street and High Street[21]

Route 53 at High Street and Grove Street (Figure 13)

- Extend the storage length of the left-turn lane on High Street from 150 to 200 feet
- Reduce the turning radii on both right-turn approaches on Route 53
- Add a crosswalk on the Route 53 southbound approach
- Maintain the existing protected left-turn operation on Route 53
- Maintain the existing exclusive/concurrent pedestrian phasing operation[22]

[19] This improvement will reduce the footprint of the intersection somewhat and improve the views of drivers to each other and to people walking at the intersection. However, the relocations should also take the necessary turning radii for trucks at this skewed intersection.

[20] The intersection carries a significant number of patrons to and from the plaza. It also is a suitable location to provide a protected pedestrian crossing on Route 53. The installation would increase safety and mobility for all users of this intersection, especially if a joined development of the parcels on the north side of the intersection is to be established.

[21] Synchro tests of the proposed coordination indicate that it would not impede the traffic operations at the Route 53/Route 228 intersection, which would maintain the same LOS and average delay (it would even improve slightly in the PM peak hour) as the uncoordinated situation. Synchro analyses also indicate that this new intersection would operate at desirable LOS in both AM and PM peak hours (see Appendix M).

[22] The existing pedestrian signals operate under a combined mode: the signal for crossing Route 53 operates under exclusive signal phases and the signals for crossing High Street and Grove Street (with crosswalks parallel to Route 53) operate concurrently with Route 53 through and right-turn traffic.

- Upgrade the traffic signal system to include accessible pedestrian count-down signals
- Add sidewalk-level bicycle accommodation and bicycle detection connected to the signal system

5.3 ROUTE 53 BETWEEN HIGH STREET AND OAK STREET

This section discusses the Route 53 corridor between High Street and Oak Street, including the intersections of Route 53 at Oak Street and the business district just south of Oak Street. Except the area adjacent to High Street, the roadway is narrow and abutted by continuous commercial developments. It contains two travel lanes, narrow shoulders, and sidewalks on the north side only.

5.3.1 Issues and Concerns

These are the major issues and concerns in this roadway section:

- Traffic flow is frequently impeded by vehicles slowing down or stopping for access to the adjacent developments.
- The existing 40 mph speed limit allows vehicle to travel at high speeds in this narrow roadway section.
- Frequent curb cuts and wide driveways exist on both sides of the roadway.
- The intersection of Route 53 at Oak Street has a large layout with wide turning radii.
- No sidewalks exist on the south side for residents to walk to the adjacent stores and shops.
- No accommodations are provided for people to bike in the section.

5.3.2 Proposed Short-Term Improvements

Proposed short-term improvements in this roadway section to consider include

- changing the speed limit in this section from 35 mph to 40 mph;[23]
- restriping the intersection of Route 53 at Oak Street by reducing the turning radii and increasing the shoulder widths on both side of Oak Street, so as to slow down the turning traffic and reduce the distance for people to walk across Oak Street; and

[23] This proposed improvement would require a further engineering study with speed data collected by using radar gun, laser gun, or LiDAR technology.

- doubling up the stop signs on Oak Street.

5.3.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general and at the intersection of Route 53 at Oak Street. Figure 14 shows the conceptual plan of the proposed improvements.

Route 53 between High Street and Oak Street

- Reduce the travel lanes to 11 feet wide.
- Add an 11-foot center lane to use as TWLTL or one-way left-turn lane, depending on the settings of adjacent developments.
- Reconstruct the existing sidewalks on the north side into a shared use path and construct bike lanes and sidewalks at the same level with buffer in between on the south side (see the prospective roadway layout in Figure 14).[24]
- Reduce the existing driveway numbers and sizes where applicable.
- Change speed limit from 40 mph to 35 mph.

Route 53 at Oak Street

- Reconstruct the intersection by reducing the lane widths and turning radii and shortening the pedestrian crossing distance on Oak Street.
- Reduce the turning radii on the right-turn approaches on Route 53 southbound.
- Install a crosswalk on Oak Street under the reduced intersection layout.
- Add a left-turn lane with 50-foot storage length on the Route 53 northbound approach to improve traffic operations.
- Add sidewalk-level bicycle accommodation at the intersection.

5.4 ROUTE 53 BETWEEN OAK STREET AND HALL DRIVE

This section discusses the Route 53 corridor between Oak Street and Hall Drive, including the intersection of Route 53 at Hall Drive. The adjacent areas in this roadway section are less developed, as a large portion of the south side is the protected town well-field surrounded by woods. Norwell Public Safety Headquarters, including Norwell Police and Fire Departments, is located just south of the town well-field. The section has two 12-foot travel lanes, shoulders of about two to four feet wide, and five-foot sidewalks on the north side only.

[24] Depending on the right-of-availability, other roadway reconfiguration alternatives (see Section 3.6) may have to be considered at the design stage.

5.4.1 Issues and Concerns

These are the major issues and concerns in this roadway section:

- People tend to drive at high speeds in this section because of the less settled surroundings, except in the vicinity of the Norwell Public Safety Headquarters.[25]
- Traffic flow occasionally is impeded by vehicles slowing down or stopping for access to the adjacent developments.
- Currently, there are no traffic controls on Route 53 for emergency vehicles to exist from the Norwell Public Safety Headquarters. The traffic control is crucial for the safety of the public safety officers and the roadway users.
- No sidewalks exist on the south side for people to walk in the section.
- No accommodations are provided for people to bike in the section.

5.4.2 Proposed Short-Term Improvements

Figure 15 shows the conceptual plan of proposed short- and long-term improvements in this section. In the short term, this study proposes to install a traffic control system on Route 53 for the emergency vehicle operations.[26] Major elements of the traffic control system could include

- creating a set of double emergency hybrid beacons facing each direction of Route 53 and a regular traffic signal facing the Headquarters driveway;[27]
- providing a clearance of at least 150 feet wide for the emergency vehicles to turn in and out of the Headquarters;
- installing “Emergency Signal Ahead” (MUTCD W11-8) advance warning signs in both directions of Route 53 about 250 feet from the Headquarters;[28]

[25] The corridor travel spot speed data in the area indicate that the travel speeds in the southbound approaching the Norwell Public Safety Headquarters is lower than other areas in this section.

[26] Originally staff proposed the emergency signal system as a long-term improvement. The study advisory members from Norwell considered it as a high priority and should be implemented in the short term. In addition, the members suggested that the feasibility of incorporating a crosswalk and pedestrian signals should be explored at the design stage, as currently only one protected pedestrian crossing exists in the 1.5-mile stretch between High Street and Jacobs Trails. Also at the design stage, if should be examined if additional warning, such as horn sounds, is necessary to support the signal system.

[27] The beacons and the traffic signal should be all overhung and supported by mast arms. The entire signal system would be equipped with preemption functions controlled by the public safety officers.

[28] Manual on Uniform Traffic Control Devices (MUTCD) Chapter 2C provides more detailed information about the warning sign W11-8.

- installing “Stop Here on Flashing Red” (MUTCD R10-6) regulatory sign at the curbside next to the stop line in each direction of Route 53;[29] and
- installing “Emergency Signal: Stop on Flashing Red” regulatory sign next to the hybrid beacons facing each direction of Route 53.

5.4.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general and at the intersection of Route 53 and Hall Drive:

- reduce the travel lanes to 11 feet wide
- add a 12-foot center lane to use as left-turn only lane or traffic median depending on the settings of adjacent developments
- reconstruct the existing sidewalks into a shared use path on both sides of the roadway (see the prospective roadway layout in Figure 16)
- reduce the existing driveway numbers and sizes where applicable
- reduce turning radii at the intersection of Route 53 and Hall Drive and install a crosswalk on Hall Drive

5.5 ROUTE 53 BETWEEN HALL DRIVE AND JACOBS TRAIL

This section discusses the Route 53 corridor between Hall Drive and Jacobs Trail. The adjacent land uses include commercial developments and other types of land uses, including a church, a park-like cemetery, and senior and retirement homes. The surrounding areas are wooded and have potential for village style mixed-use developments or redevelopments.

The roadway contains two 12-foot travel lanes, shoulders of about two to three feet wide, and five-foot to six-foot sidewalks on the north side only. A signalized crosswalk exists on the south side of Washington Park Drive. The location is controlled by a regular traffic signal with pedestrian signals and push buttons. It provides 21 seconds for people to walk across Route 53. Field observations did not identify major problems at this crosswalk. However, some improvements can be made to increase drivers’ awareness of the crosswalks.

5.5.1 Issues and Concerns

These are the major issues and concerns in this roadway section:

- The roadway does not provide a safe and convenient left-turn access to the adjacent developments on both sides.

[29] See MUTCD Chapter 2B for the regulatory sign R10-6.

- Traffic flow frequently is impeded by vehicles slowing down or stopping for access to the adjacent developments.
- There are frequent curb cuts and wide driveways exist on both sides of the roadway.
- There are faded pavement markings along the roadway.
- No sidewalks exist on the south side for people to walk in the section.
- No accommodations are provided for people to bike in the section.

5.5.2 Proposed Short-Term Improvements

Proposed short-term improvements in this section include

- restriping faded pavement markings;
- restriping the stop lines at the signalized crosswalk to 1.5 feet thick and installing “Stop Here on Red” (MUTCD R10-6) regulatory signs on the curbside at the stop line in both directions; and
- installing an advance pedestrian crossing warning sign (MUTCD W11-2) on the Route 53 southbound approach about 200 feet ahead of the signalized crosswalk.[30]

5.5.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general and at the signalized crosswalk. Figure 16 shows the conceptual plan of the proposed improvements:

- reduce the travel lanes to 11 feet wide
- add a 12-foot center lane to use as left-turn only lane or traffic median depending on the settings of adjacent developments
- reconstruct the existing sidewalks into a shared use path on the north side and construct a shared use path on the south side (see the prospective roadway reconfiguration in Figure 16)
- install Americans with Disabilities Act (ADA) compliant wheelchair ramps on both sides of the signalized crosswalk, in conjunction with the construction of shared use paths
- retime the pedestrian crossing signal at the signalized crosswalk based on the reconfigured roadway[31]

[30] Currently, there is a pedestrian crossing warning sign on the northbound approach but no warning sign on the southbound approach.

[31] The signal equipment at the crosswalk may need to be relocated and updated due to the roadway reconfiguration. At the design stage, it should be considered to be replaced by a

- maintain the speed limit at 35 mph in this section

5.6 ROUTE 53 BETWEEN JACOBS TRAIL AND ASSINIPPI AVENUE

This section discusses the Route 53 corridor between Jacobs Trail and Assinippi Avenue, including both the intersections of Route 53 at Jacobs Trail and at Assinippi Avenue. The corridor contains a large-scale Stop & Shop on the south side and local stores and shops, a few residences, and vacant lands on the north side.

The roadway contains three 12-foot travel lanes (two in the southbound and one in the northbound), shoulders of about two to three feet wide, and five-foot sidewalks on the north side only. The intersection of Route 53 at Jacobs Trail and Stop & Shop Driveway is signalized. The intersection of Route 53 at Assinippi Avenue is unsignalized with stop-control on Assinippi Avenue.

5.6.1 Issues and Concerns

These are the major issues and concerns in this roadway section:

- Both intersections have a large layout with wide turning radii, especially the intersection at Assinippi Avenue.
- The intersection of Route 53 at Jacobs Trail has a relatively high number of angle crashes in recent years involving a northbound left-turn vehicle colliding with a southbound through vehicle.
- One crash involved a person walking across the Assinippi Avenue right-turn approach and colliding with a right-turning vehicle.
- No sidewalks exist on the south side for people to walk in the section.
- No accommodations are provided for people to bike in the section.

5.6.2 Proposed Short-Term Improvements

Proposed short-term improvements in this section to be considered include

- retiming the signal at the intersection of Route 53 at Jacobs Trail with the northbound left-turn phase being revised from lagging to leading mode, which runs simultaneously with the southbound left-turn phase;[32]
- restriping the intersection of Route 53 at Assinippi Avenue by reducing the turning radii and increasing the shoulder width on the right-turn lane of

fully functional traffic signal with accessible pedestrian signals at the intersection of Route 53 and Washington Park Drive.

[32] Synchro AM and PM intersection capacity analysis reports for the signal retiming scenarios are included in Appendix L.

Assinippi Avenue, so as to slow down the turning traffic and enhance the safety for people to walk across Assinippi Avenue; and

- increasing the size of the stop signs on Assinippi Avenue.

5.6.3 Proposed Long-Term Improvements

In the long term, this study proposes the following improvements for the section in general and at the intersections of Route 53 at Jacobs Trail and at Assinippi Avenue. Figure 17 shows the conceptual plan of the proposed improvements.

Route 53 between Jacobs Trail and Assinippi Avenue

- Maintain the travel lane distribution (two in the southbound and one in the northbound)[33]
- Reduce the southbound travel lanes to 11 feet wide
- Maintain shoulders of three feet wide on both sides of the roadway
- Reconstruct the existing sidewalks to include sidewalk-level bike lanes with buffer in between and construct a shared use path on the south side of the roadway
- Maintain 35 mph speed limit in this section

Route 53 at Jacobs Trail and Stop & Shop Driveway

- Reduce the turning radii and lane widths at the intersection in conjunction with the corridor reconstruction
- Add a crosswalk on the Route 53 southbound approach[34]
- Reduce the storage length of the left-turn lane on the southbound approach from over 200 feet to 75 feet[35]
- Upgrade the pedestrian signals to accessible countdown signals
- Add bicycle detection connected to the signal system

[33] The roadway section has an about even daily traffic volume in both directions. In the PM peak hour, the northbound approach of the Jacobs Trail intersection is somewhat congested. Synchro tests of switching the southbound/northbound lane distribution indicate that it is not favorable because it would create even longer queues on the intersection's southbound approach and impede accesses to and from the adjacent businesses there.

[34] The addition would not affect the existing exclusive pedestrian signal phasing operation at the intersection.

[35] The storage length is excessive as the approach carries a low volume of left-turn traffic of about 20 to 30 vehicles per peak hour. The remaining space can be used as a left-turn pocket to access the businesses on the south side.

Route 53 at Assinippi Avenue

- Maintain the existing stop-control operation[36]
- Reduce the turning radii and the lane widths and shorten the pedestrian crossing distance on Assinippi Avenue
- Reconstruct the traffic island on Assinippi Avenue with ADA-compliant wheelchair ramps
- Add sidewalk-level bicycle accommodation in the vicinity of the intersection

5.7 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 Route 53 corridor to the horizon year 2030. Staff projected the 2030 traffic volumes by using growth factors estimated from the recent traffic impact study for the Queen Anne's Corner and 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 four percent (about 0.4 percent annually) in the PM peak period from 2020 to 2030.

Figure 18 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 E or better) during the weekday AM and PM peak hours.

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

[36] The unsignalized intersection would operate at an overall acceptable LOS under the projected 2030 traffic conditions (see Appendix M). The only approach encounter undesirable delays during peak hours is the left-turn approach on Assinippi Avenue, which carries about five to ten vehicles per peak hour.

Chapter 6— Summary and Recommendations

This report provides a vision for the long-term development of the Route 53 corridor in Norwell 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 safety and operations 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 from highway maintenance or Chapter 90 funding. Among them, three projects are identified for implementation:

1. Review and retime the traffic signal at the three signalized intersections in the corridor.
2. Restripe the Route 53 section between Pond Street and High Street.
3. Reconstruct the roadways adjacent to the Norwell Public Safety Headquarters and install a traffic control system on Route 53 for emergency vehicle operations.[37]

To significantly improve the safety, mobility, and access for all users in the corridor would require a series of long-term improvements. The benefits expected to result from implementing the proposed long-term improvements from this study include

- improving accommodation and safety for people who walk and bike;
- improving mobility and safety for people to access adjacent businesses, offices, and residences;
- sustaining appropriate travel speeds and increase safety for all users in the corridor;
- maintaining efficient traffic operations on Route 53;
- supporting and enhancing economic activities; and

[37] This improvement would take more time and resources than the usual short-tern improvements, but should be achievable in three years. It is considered a high priority and strongly supported by the Town of Norwell. As it is related to the corridor economic development and public safety, potential resources could include state- or town-supported economic development and public safety improvement funds in addition to the highway-related funds.

- enhancing livability for neighborhoods and the subregion.

Implementing the recommended long-term improvements in this 2.2-mile corridor would require sufficient resources. Four implementation stages can be considered for the entire corridor, as follows:

1. Route 53 between Norwell Public Safety Headquarters and Jacobs Trail
2. Route 53 between High Street and Norwell Public Safety Headquarters
3. Route 53 from Pond Street to High Street
4. Route 53 from Jacobs Trail to Assinippi Avenue

Depending on the available and potential resources, the Town of Norwell could consult with MassDOT District 5 and reprioritize the implementation stages by rearranging, combining, or dividing the four proposed segments.

Meanwhile, achieving the proposed Complete Streets vision for Route 53 via the recommended improvements would require significant effort and collaboration on the part of all stakeholders, including the Town of Norwell, 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 of Route 53 and work with MassDOT District 5 to initiate a project. For municipalities to initiate roadway projects, MassDOT recently developed an online tool for submission. The Massachusetts Project Intake Tool (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 (GeoDOT) website, https://massdothpi.esriemcs.com/mapit.

To move a project from the initiation to the development stage, the Town of Norwell 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 providing assistance with further project planning and the funding process. In addition, staff will continue to monitor the progress toward implementing this study's recommendations via the MPO's UPWP Study Recommendations Tracking Database.

Appendix N 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.

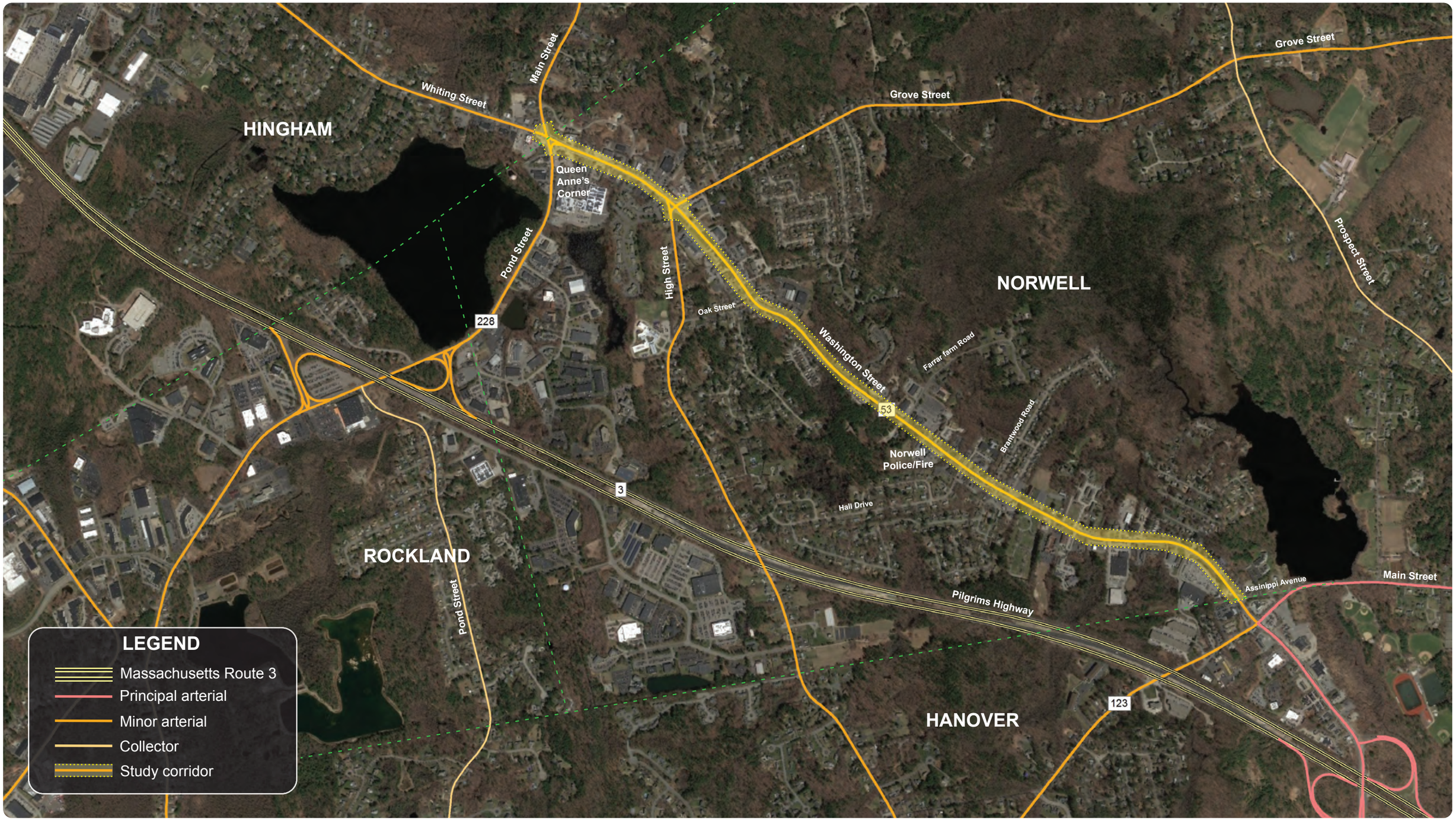

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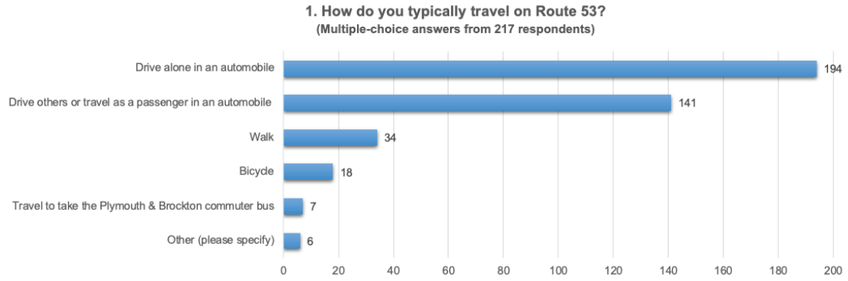
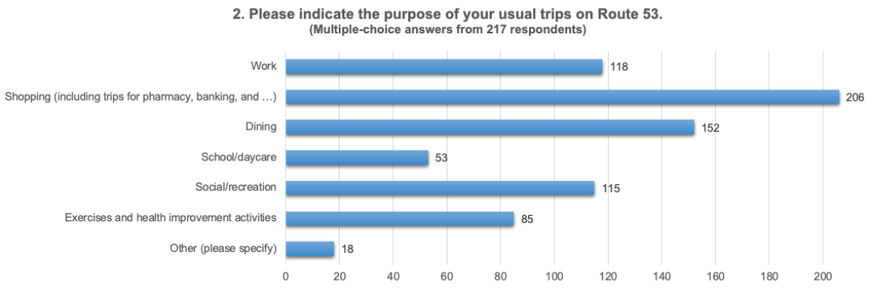
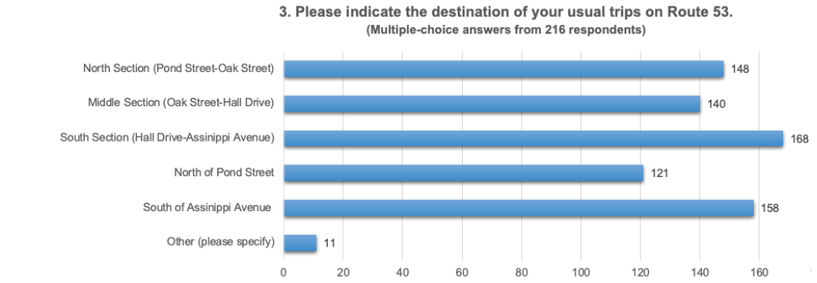
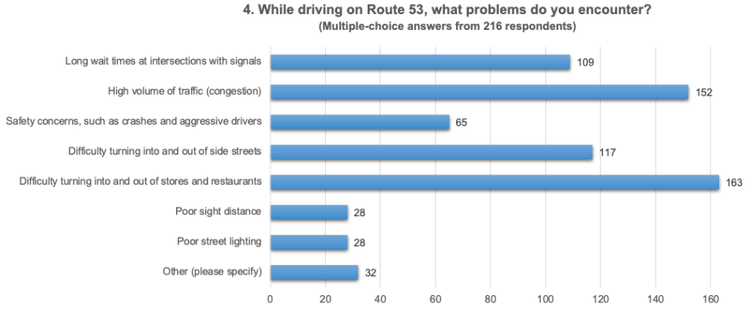
Figure 1
Study Area Map
Route 53 in Norwell

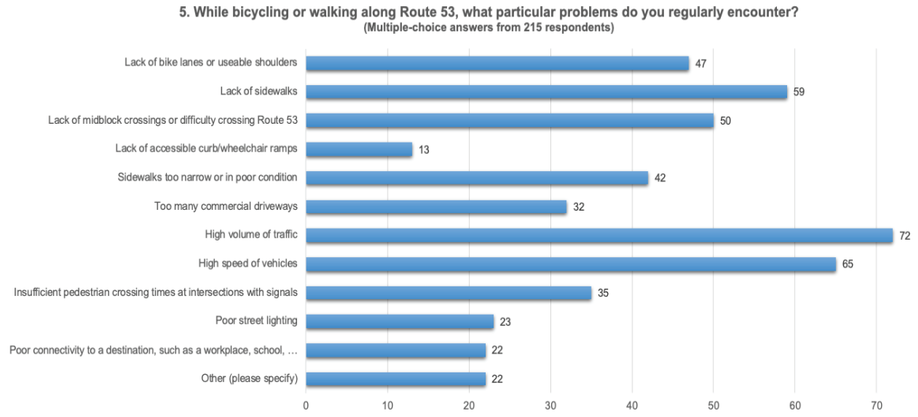
Addressing Safety, Mobility, and Access on Subregional Priority Roadways

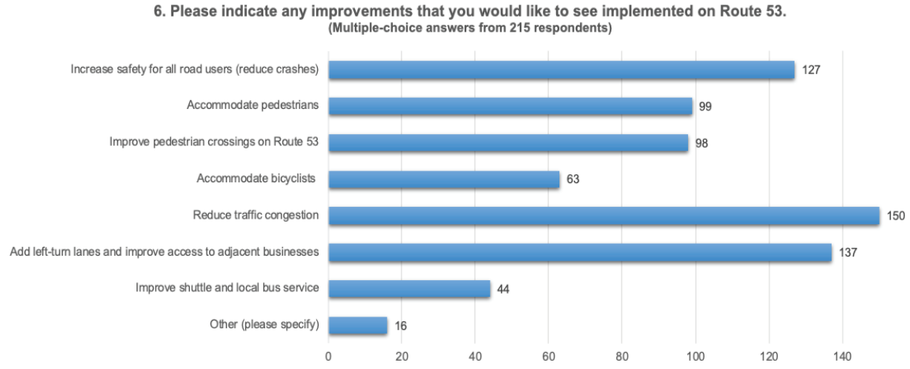












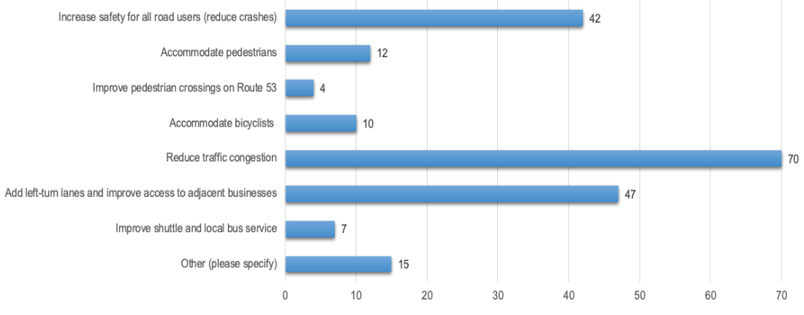


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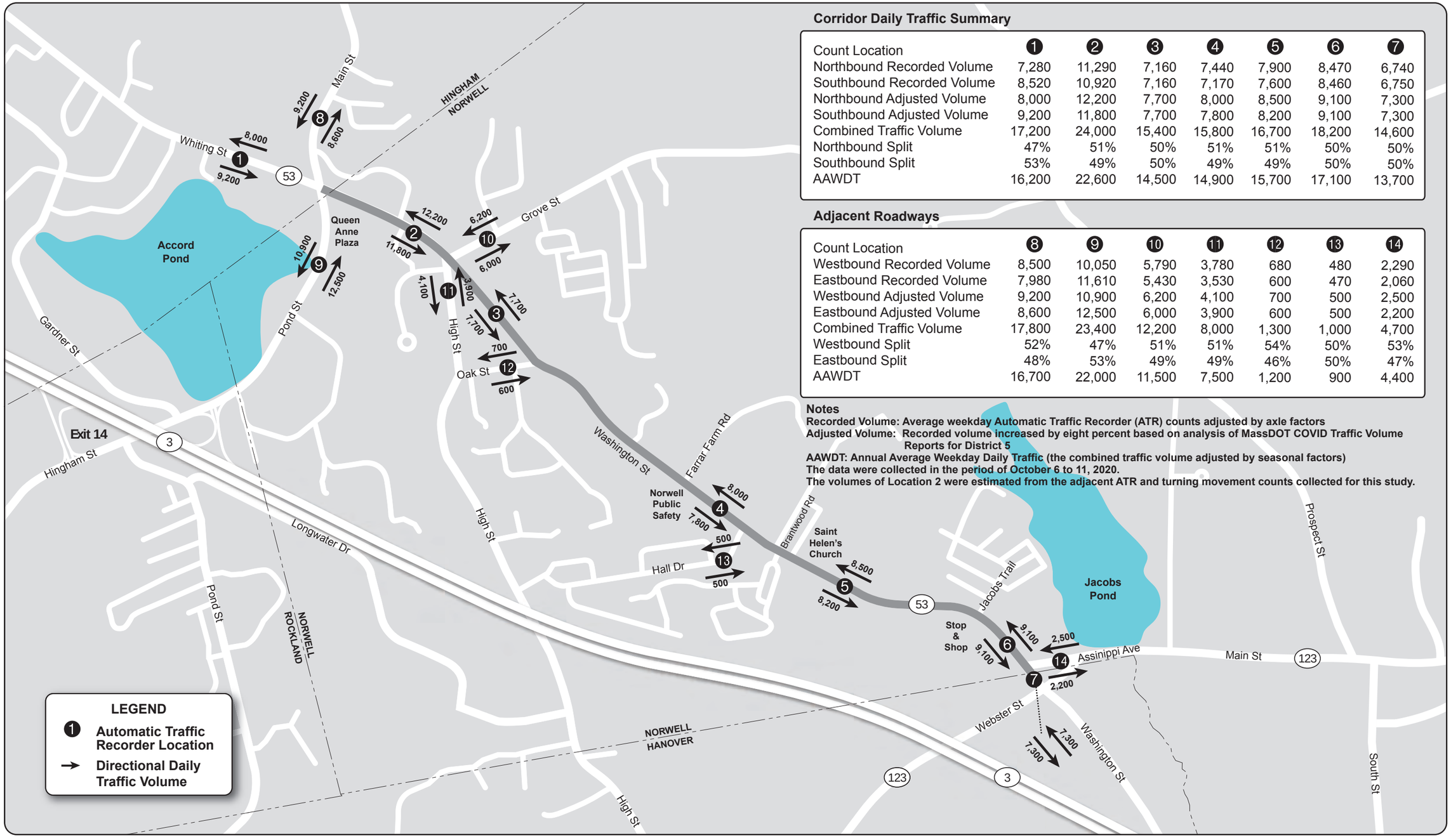
Figure 2
Survey Questions and Responding Scores
Route 53 in Norwell

Addressing Safety,
Mobility, and Access on
Subregional Priority Roadways



Corridor Daily Traffic Summary

Count Location	❶	❷	❸	❹	❺	❻	❼
Northbound Recorded Volume	7,280	11,290	7,160	7,440	7,900	8,470	6,740
Southbound Recorded Volume	8,520	10,920	7,160	7,170	7,600	8,460	6,750
Northbound Adjusted Volume	8,000	12,200	7,700	8,000	8,500	9,100	7,300
Southbound Adjusted Volume	9,200	11,800	7,700	7,800	8,200	9,100	7,300
Combined Traffic Volume	17,200	24,000	15,400	15,800	16,700	18,200	14,600
Northbound Split	47%	51%	50%	51%	51%	50%	50%
Southbound Split	53%	49%	50%	49%	49%	50%	50%
AAWDT	16,200	22,600	14,500	14,900	15,700	17,100	13,700

Adjacent Roadways

Count Location	❽	❾	❿	⓫	⓬	⓭	⓮
Westbound Recorded Volume	8,500	10,050	5,790	3,780	680	480	2,290
Eastbound Recorded Volume	7,980	11,610	5,430	3,530	600	470	2,060
Westbound Adjusted Volume	9,200	10,900	6,200	4,100	700	500	2,500
Eastbound Adjusted Volume	8,600	12,500	6,000	3,900	600	500	2,200
Combined Traffic Volume	17,800	23,400	12,200	8,000	1,300	1,000	4,700
Westbound Split	52%	47%	51%	51%	54%	50%	53%
Eastbound Split	48%	53%	49%	49%	46%	50%	47%
AAWDT	16,700	22,000	11,500	7,500	1,200	900	4,400

Notes
Recorded Volume: Average weekday Automatic Traffic Recorder (ATR) counts adjusted by axle factors
Adjusted Volume: Recorded volume increased by eight percent based on analysis of MassDOT COVID Traffic Volume Reports for District 5
AAWDT: Annual Average Weekday Daily Traffic (the combined traffic volume adjusted by seasonal factors)
The data were collected in the period of October 6 to 11, 2020.
The volumes of Location 2 were estimated from the adjacent ATR and turning movement counts collected for this study.

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Figure 3
Estimated 2020 Daily Traffic Volumes
Route 53 in Norwell

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

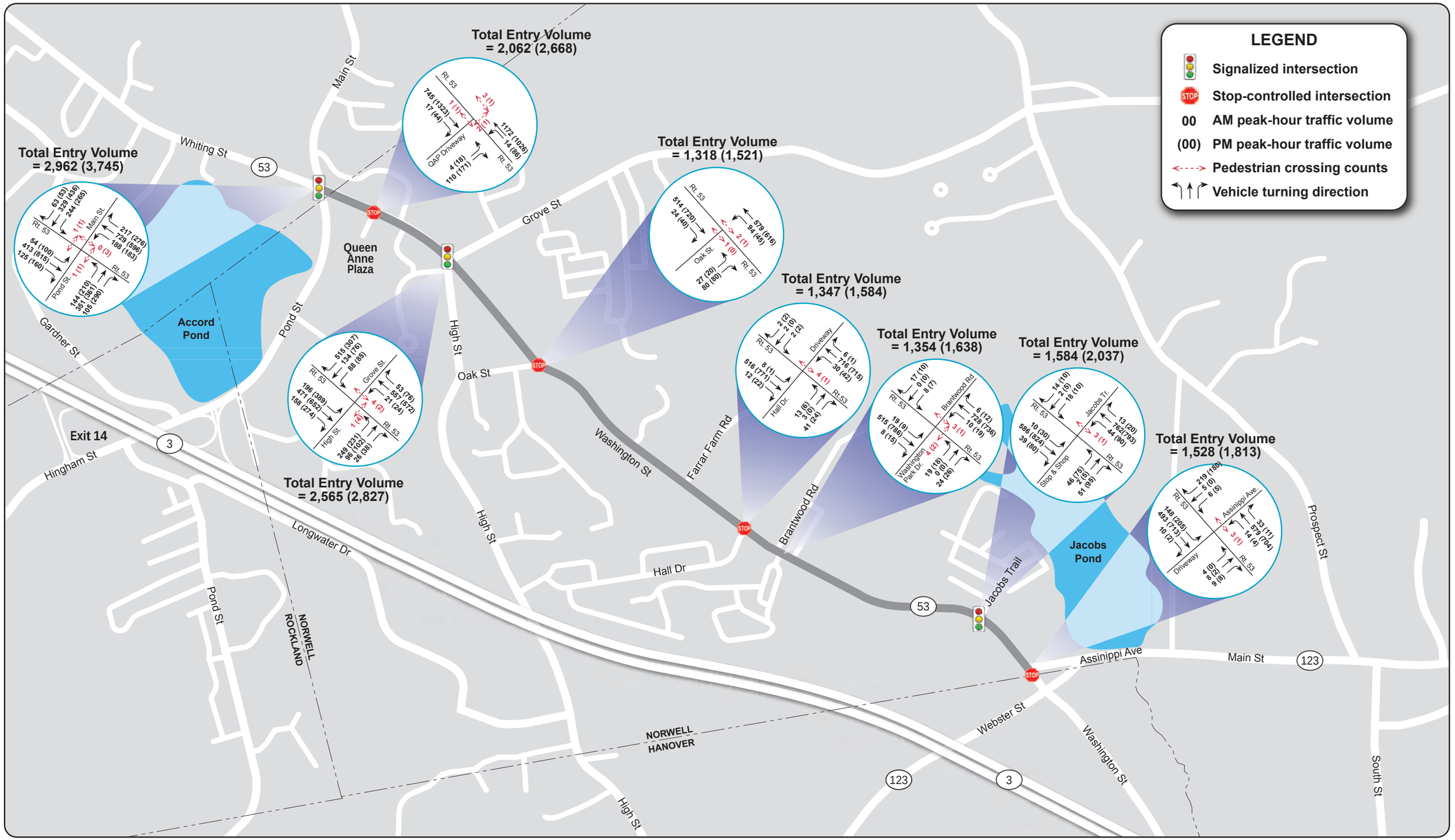

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Figure 4
Estimated 2020 Weekday AM/PM Peak-Hour Intersection Traffic and Pedestrian Volumes
Route 53 in Norwell

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

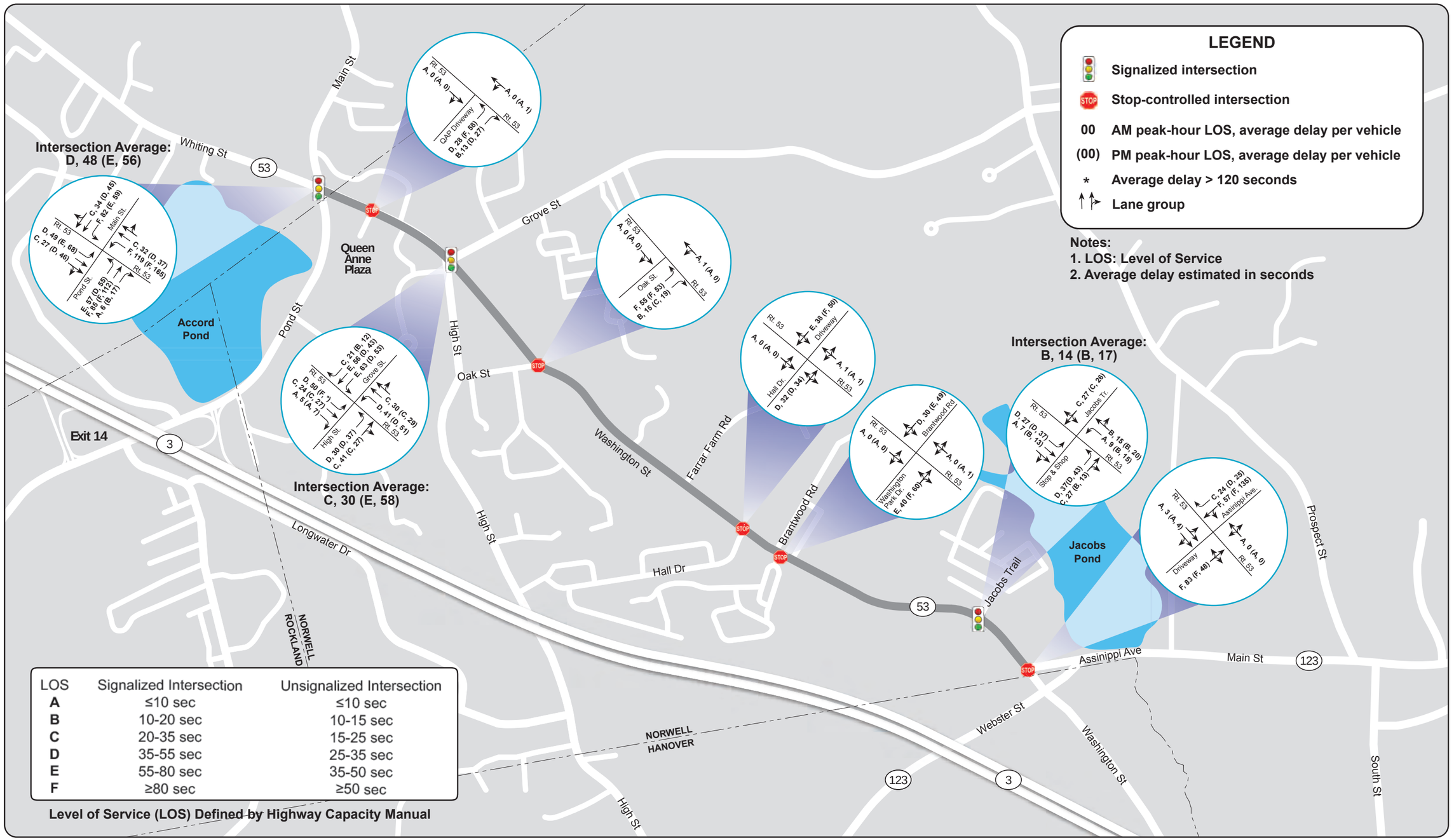

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Figure 5
2020 Weekday AM/PM Peak-Hour Intersection Capacity Analyses
Route 53 in Norwell

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

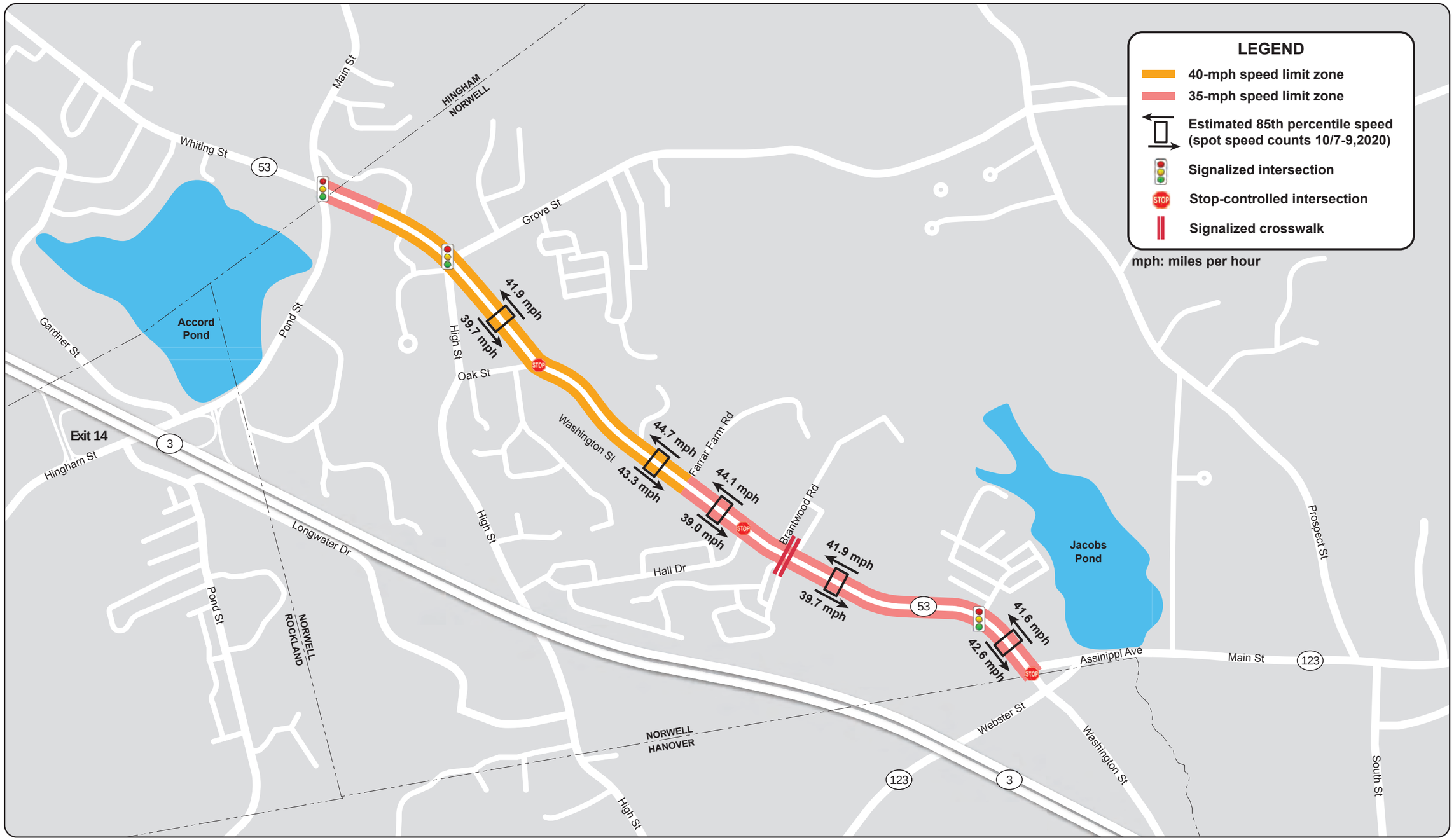

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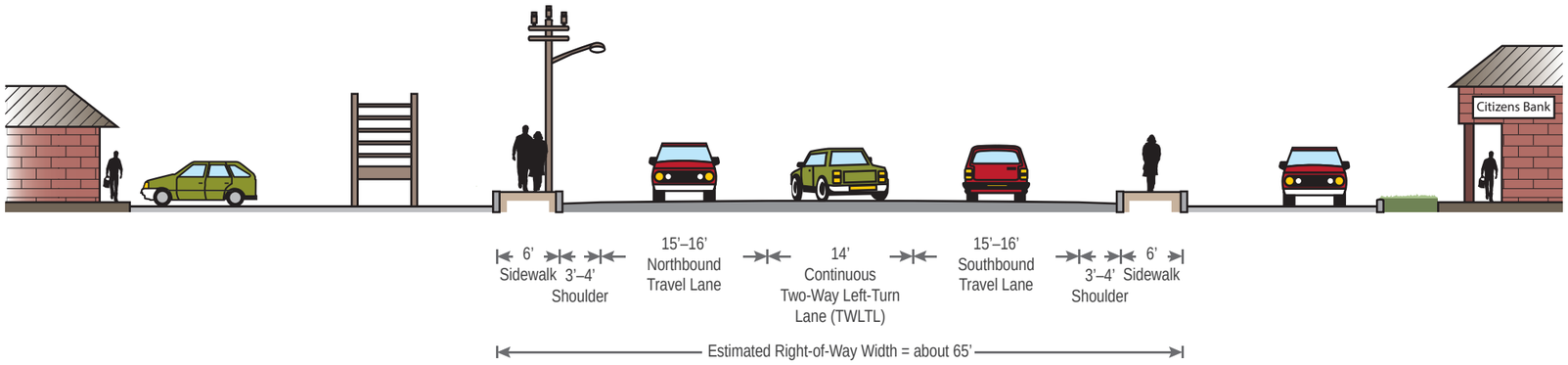
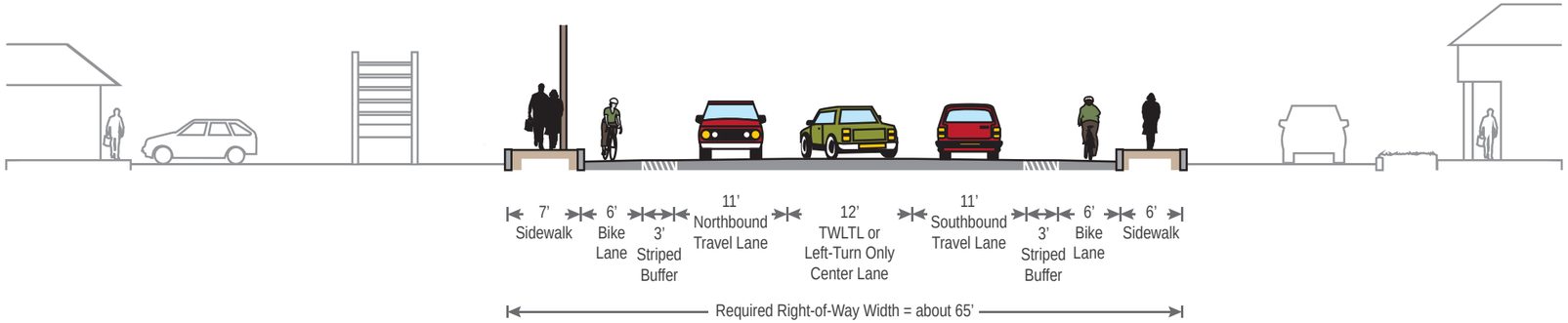
Figure 6
Speed Regulations and Estimated 85th Percentile Speeds
Route 53 in Norwell

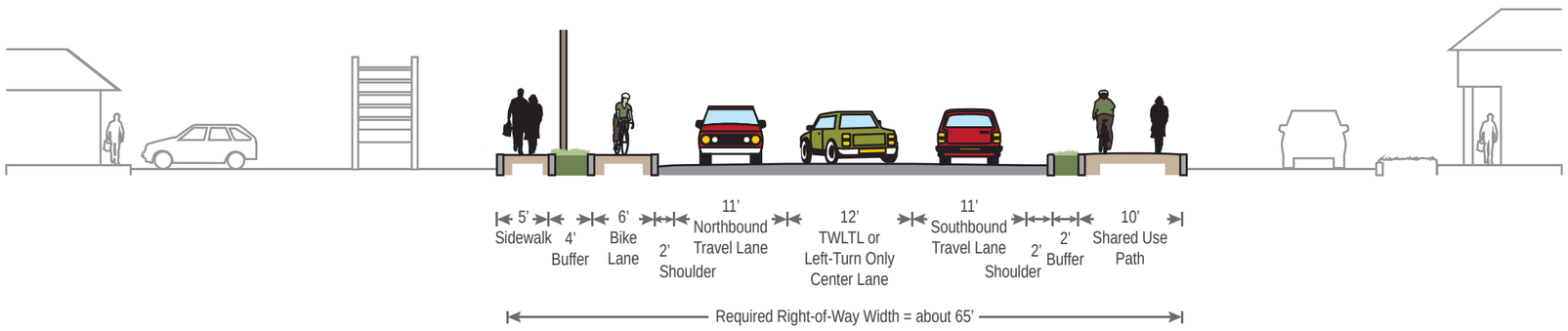
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



Existing Roadway Cross-Section



Potential Improvement Alternative 1

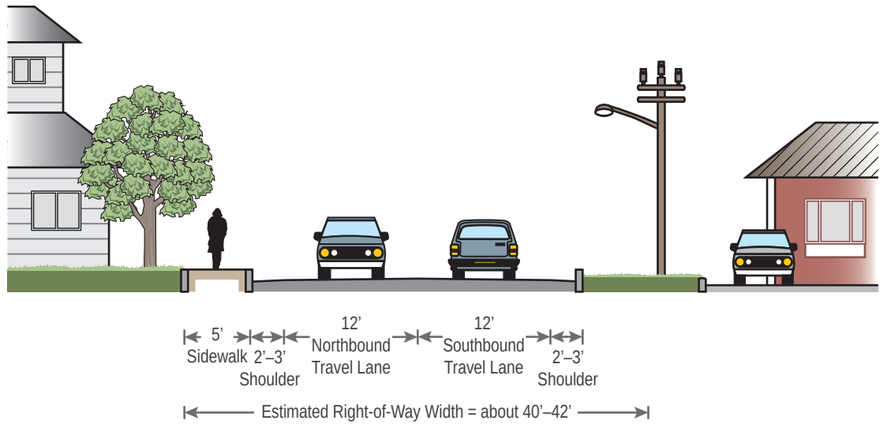


Potential Improvement Alternative 2

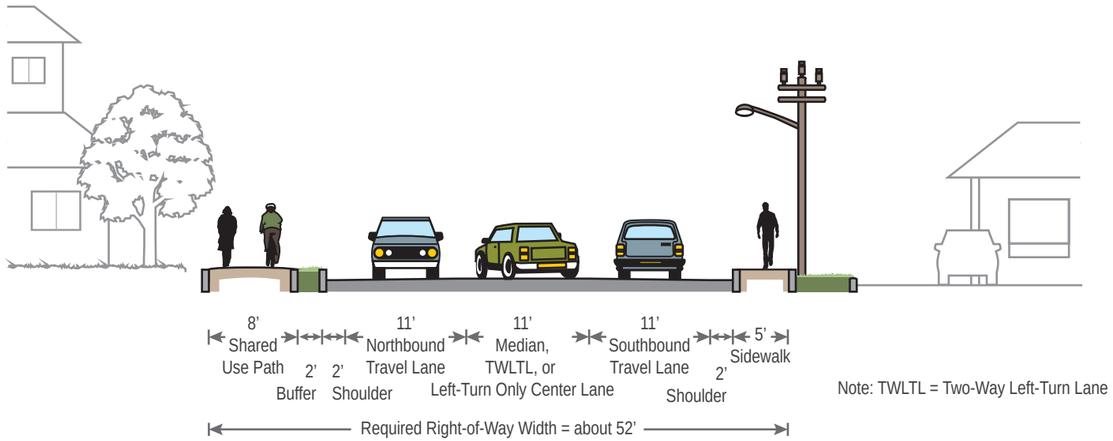
BOSTON REGION MPO

Figure 7
Existing Roadway Cross Section and Potential Reconfigurations
Route 53 between Pond Street and High Street

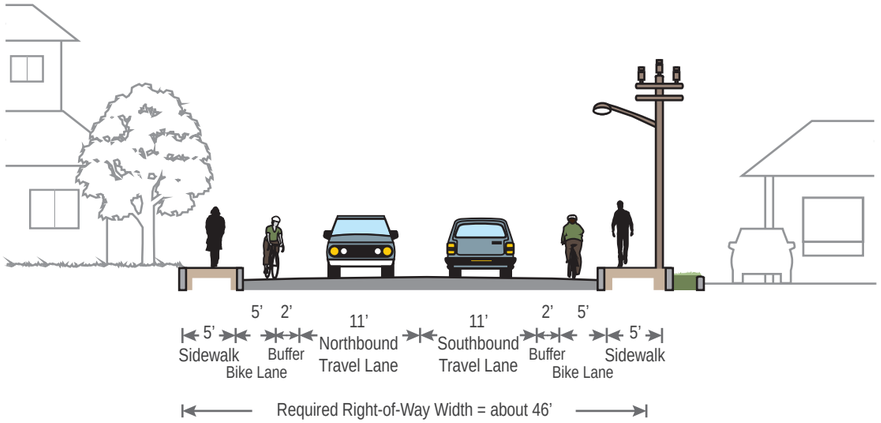
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



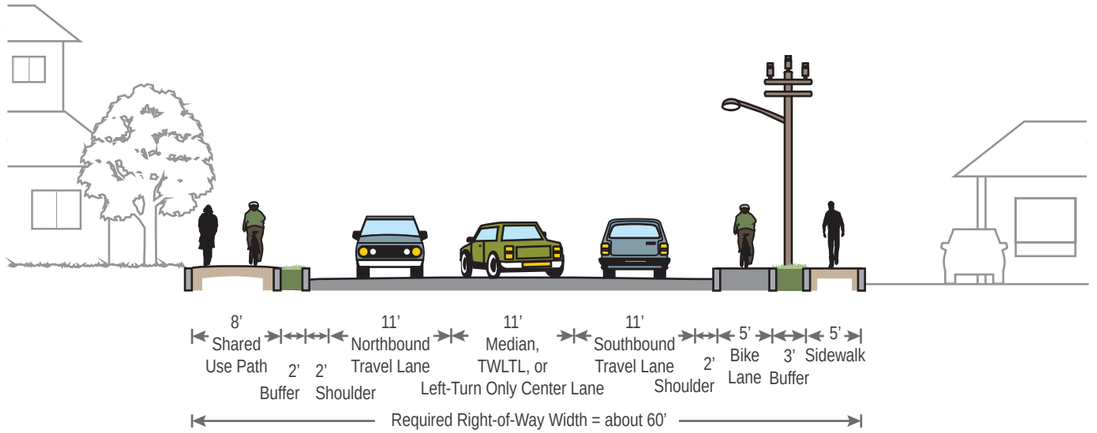
Existing Roadway Cross-Section



Potential Improvement Alternative 2



Potential Improvement Alternative 1



Potential Improvement Alternative 3

BOSTON
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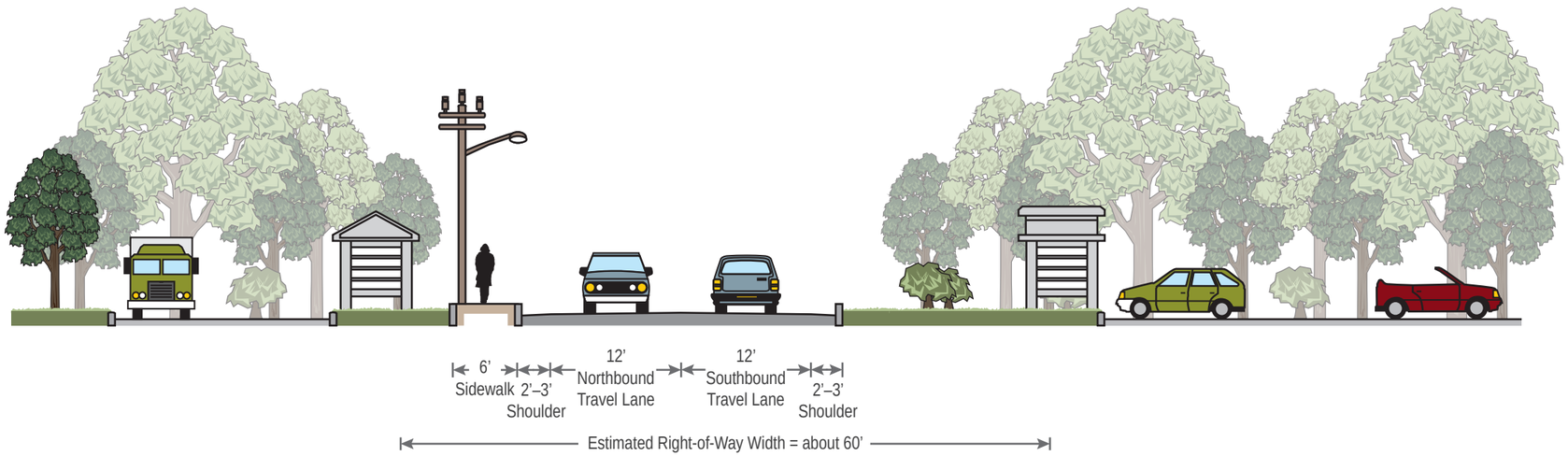
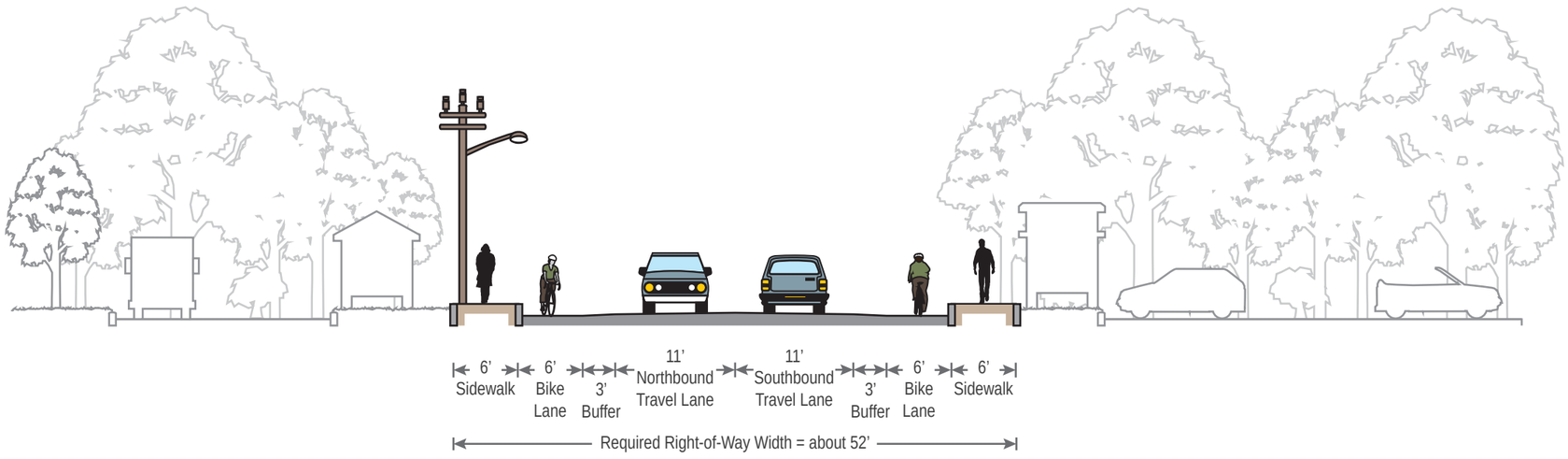
Figure 8
Existing Roadway Cross Section and Potential Reconfigurations
Route 53 between High Street and Oak Street

Addressing Safety,
Mobility, and Access on
Subregional Priority Roadways



Existing Roadway Cross-Section

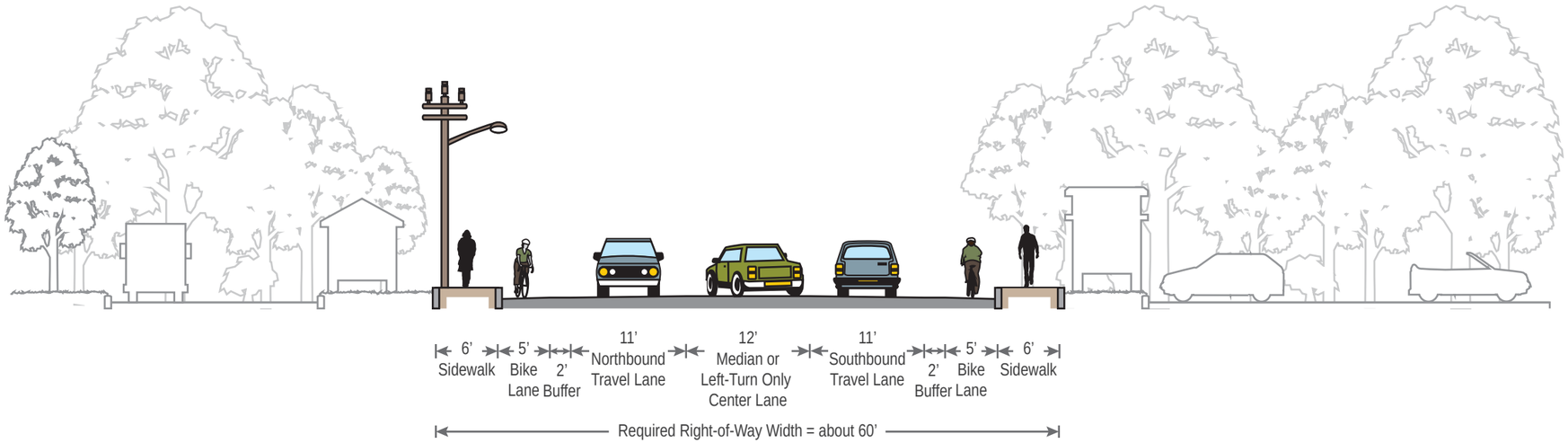


Potential Improvement Alternative 1

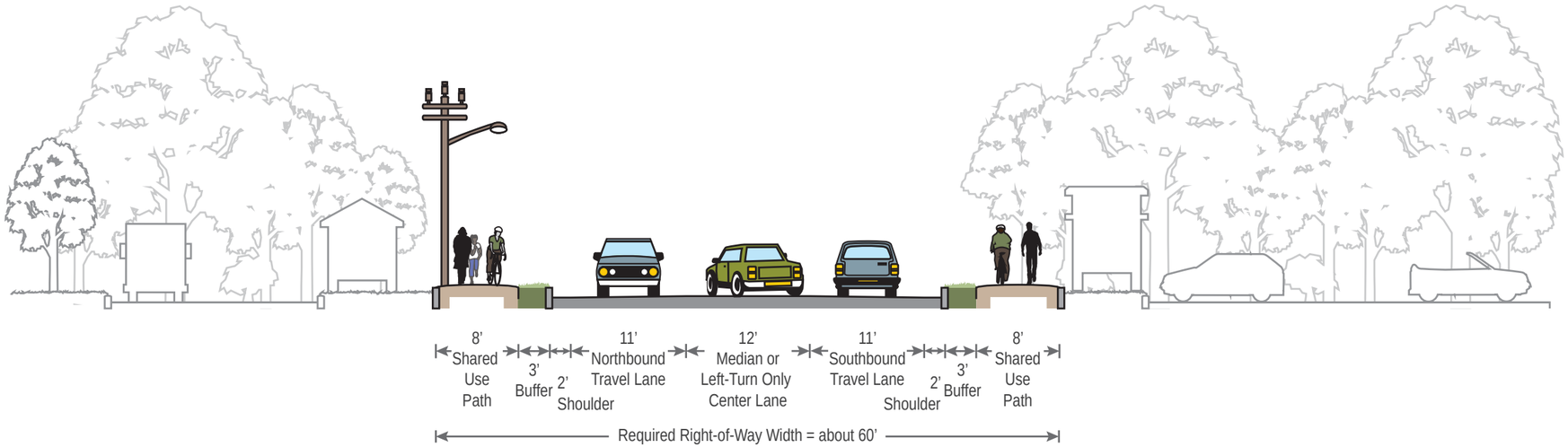
BOSTON
REGION
MPO

Figure 9-1
Existing Roadway Cross Section and Potential Reconfigurations
Route 53 between Oak Street and Jacobs Trail

Addressing Safety,
Mobility, and Access on
Subregional Priority Roadways



Potential Improvement Alternative 2

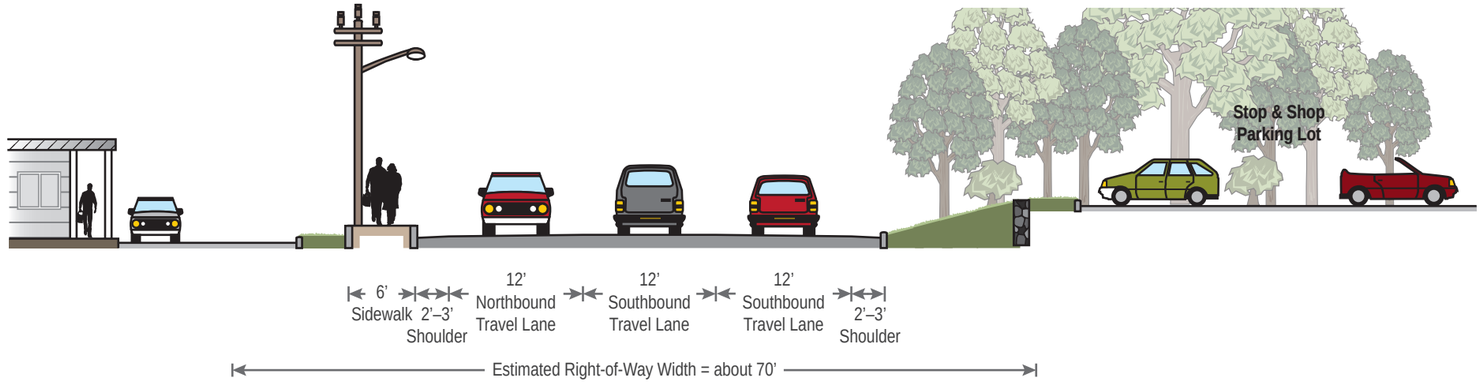


Potential Improvement Alternative 3

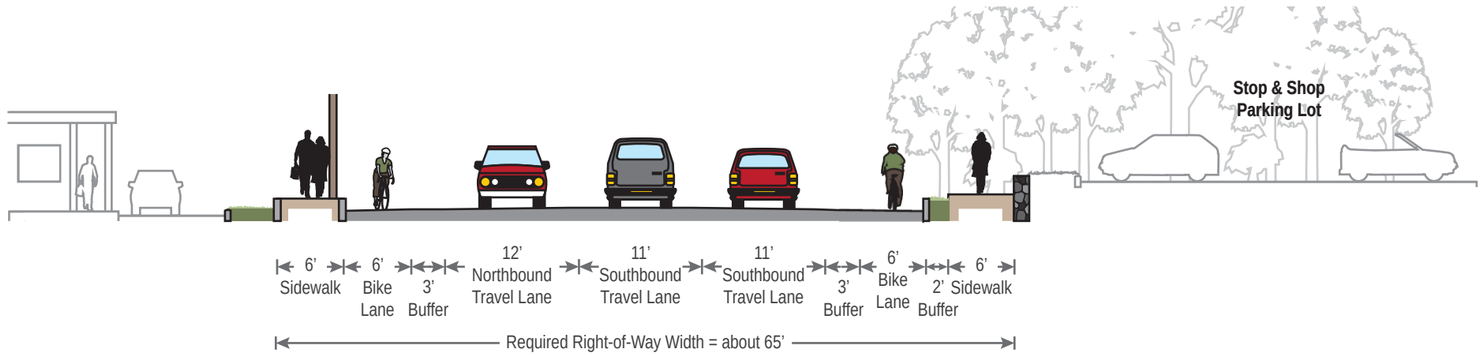
BOSTON REGION MPO

Figure 9-2
Existing Roadway Cross Section and Potential Reconfigurations
Route 53 between Oak Street and Jacobs Trail

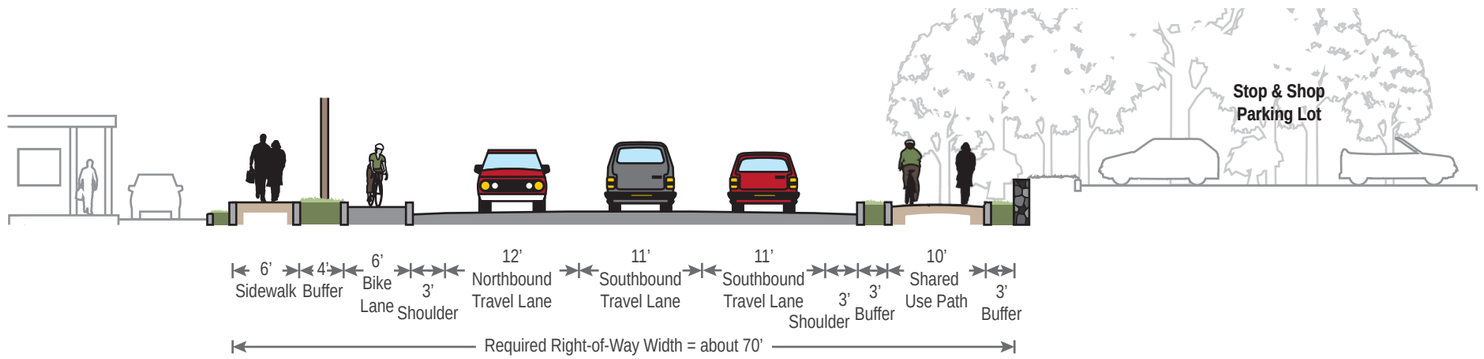
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



Existing Roadway Cross Section



Potential Improvement Alternative 1



Potential Improvement Alternative 2

BOSTON
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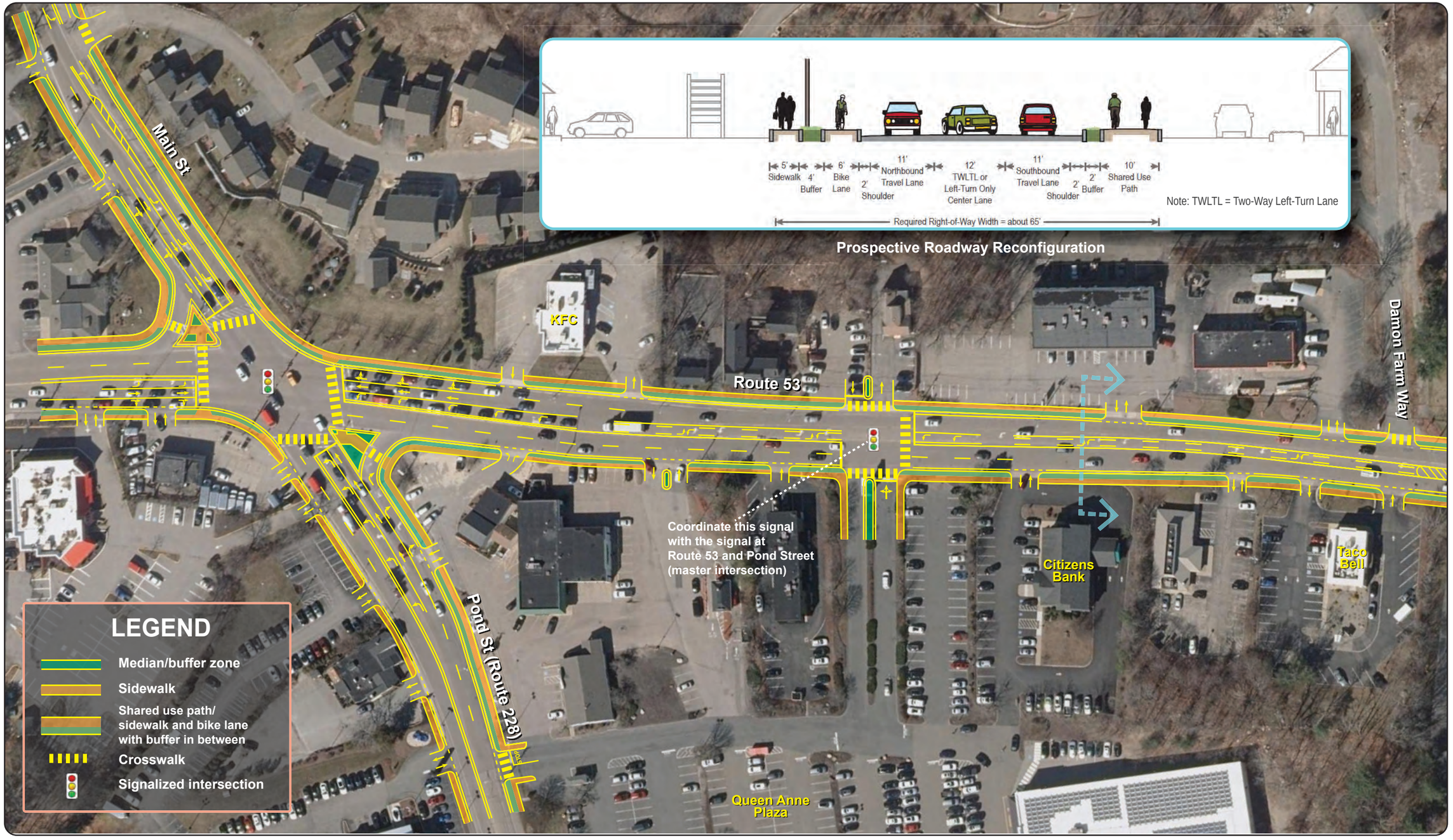
Figure 10
Existing Roadway Cross Section and Potential Reconfigurations
Route 53 between Jacobs Trail and Assinippi Avenue

Addressing Safety,
Mobility, and Access on
Subregional Priority Roadways

BOSTON REGION MPO

Figure 11
Proposed Roadway Restriping Conceptual Plan
Route 53 between Pond Street and High Street

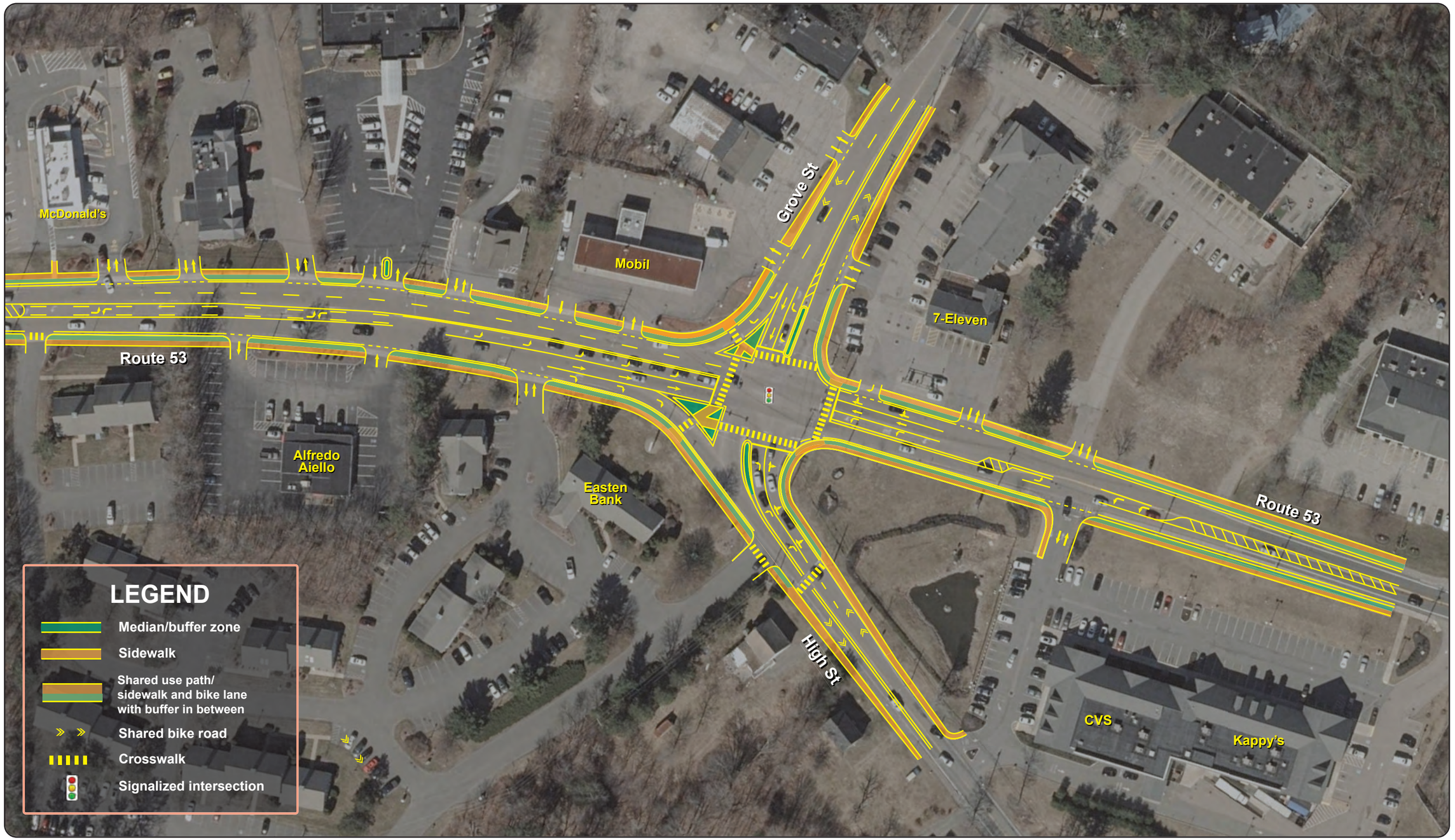
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



BOSTON REGION MPO

Figure 12
Proposed Long-Term Improvements Conceptual Plan
Route 53 between Pond Street and High Street (Section 1)

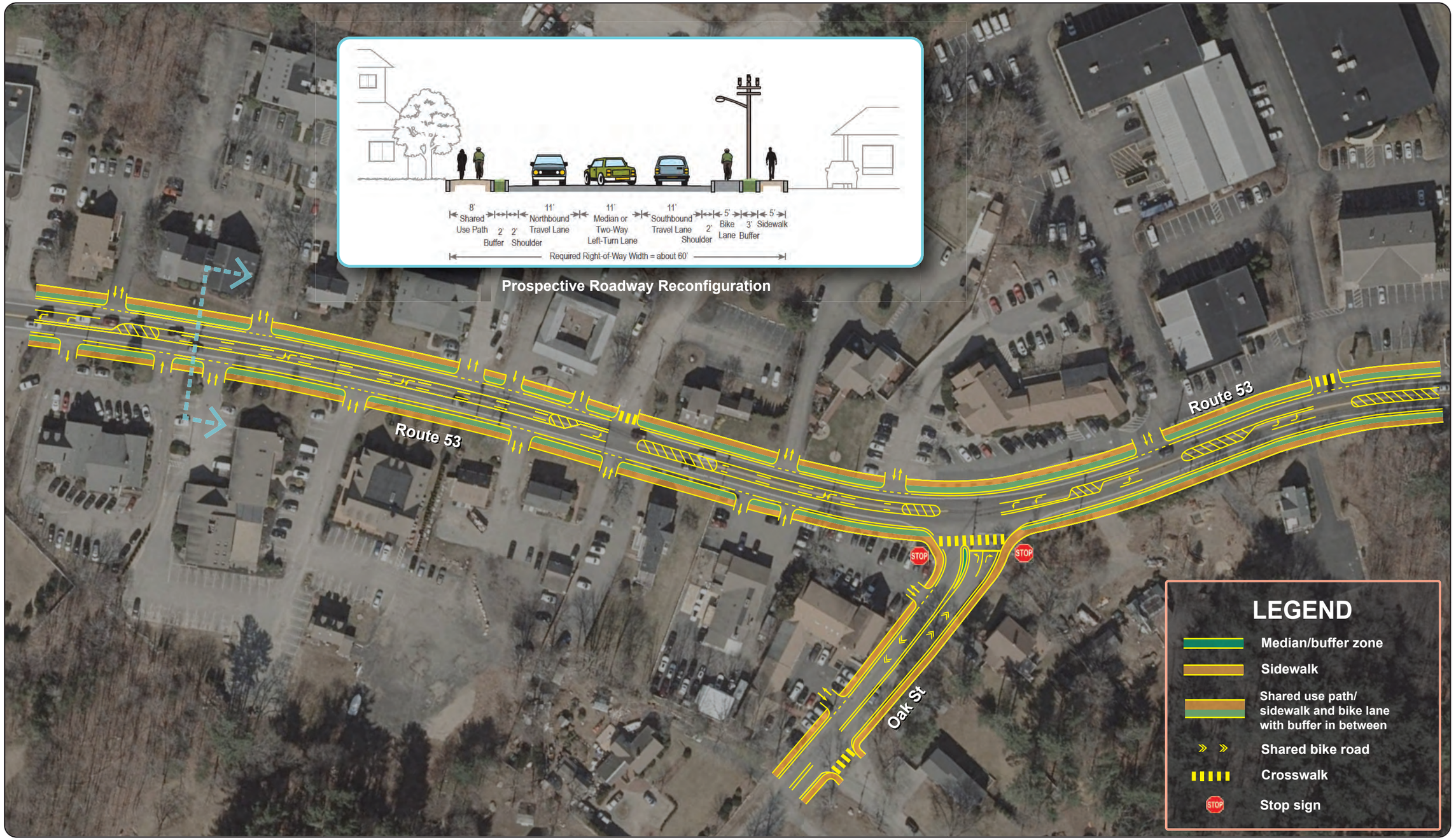
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



BOSTON REGION MPO

Figure 13
Proposed Long-Term Improvements Conceptual Plan
Route 53 between Pond Street and High Street (Section 2)

Addressing Safety, Mobility, and Access on Subregional Priority Roadways



BOSTON REGION MPO

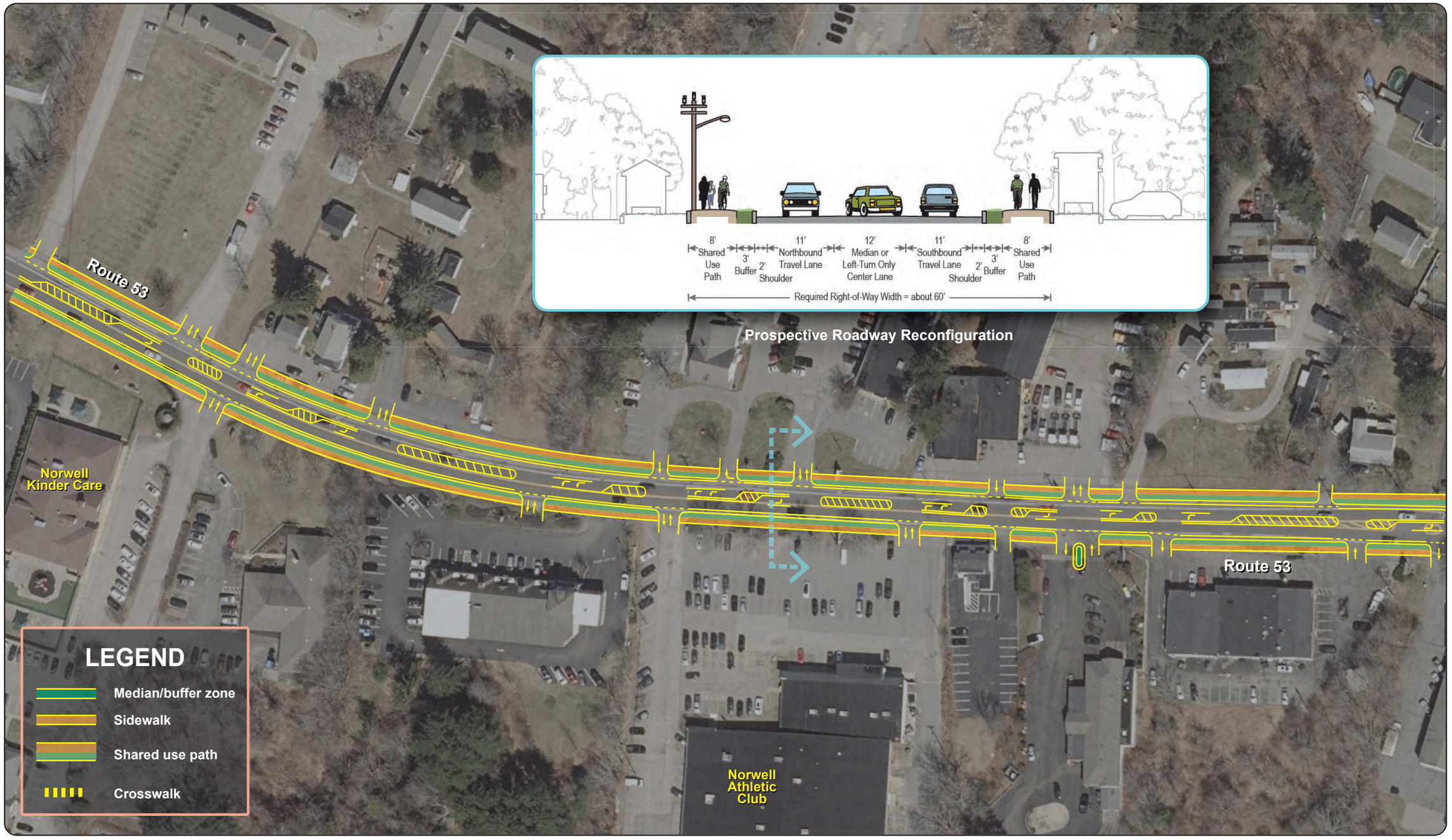
Figure 14
Proposed Long-Term Improvements Conceptual Plan
Route 53 between High Street and Oak Street

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

BOSTON REGION MPO

Figure 15
Proposed Short- and Long-Term Improvements Conceptual Plan
Route 53 between Oak Street and Hall Drive

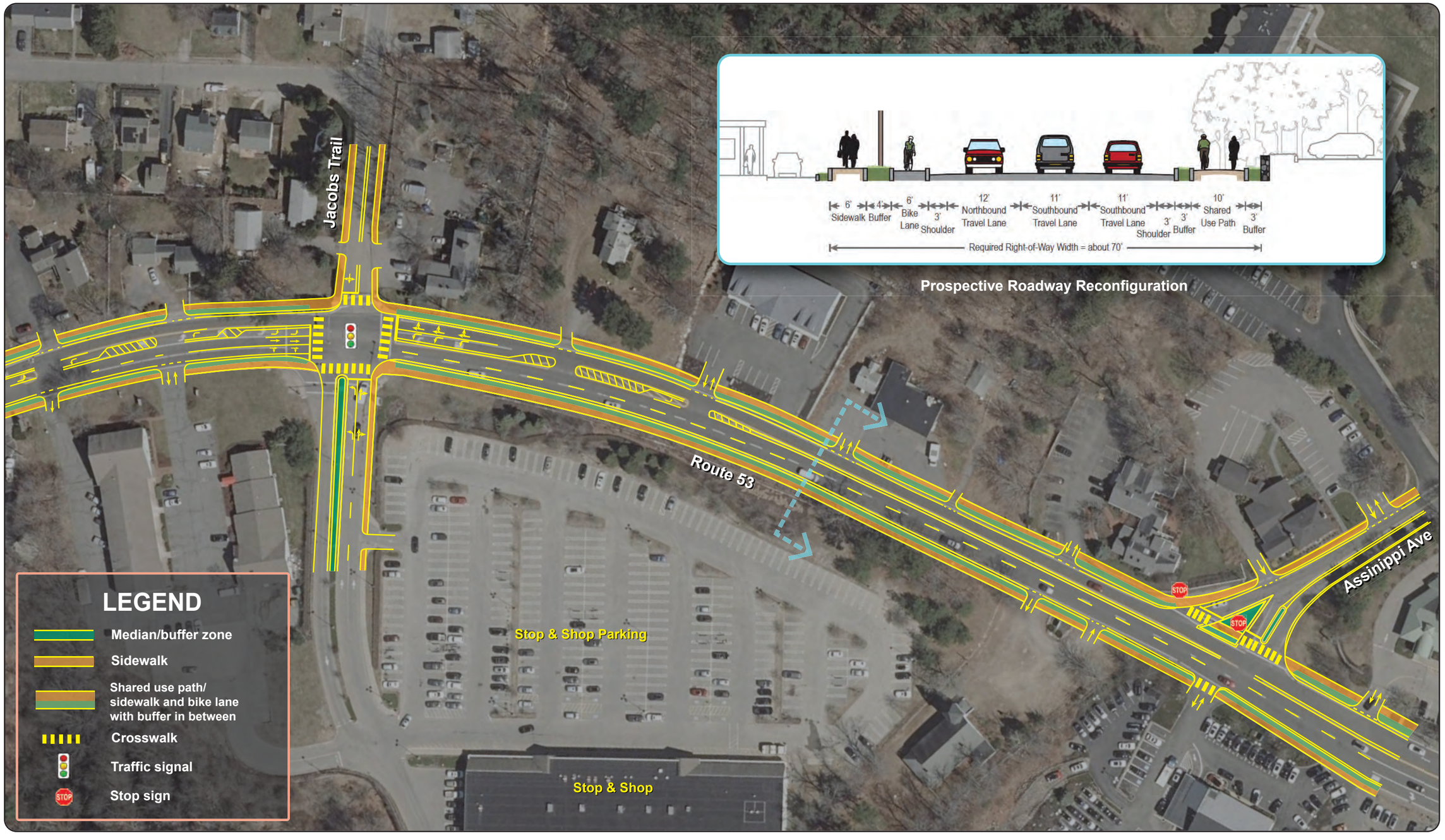
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



BOSTON REGION MPO

Figure 16
Proposed Long-Term Improvements Conceptual Plan
Route 53 between Hall Drive and Jacobs Trail

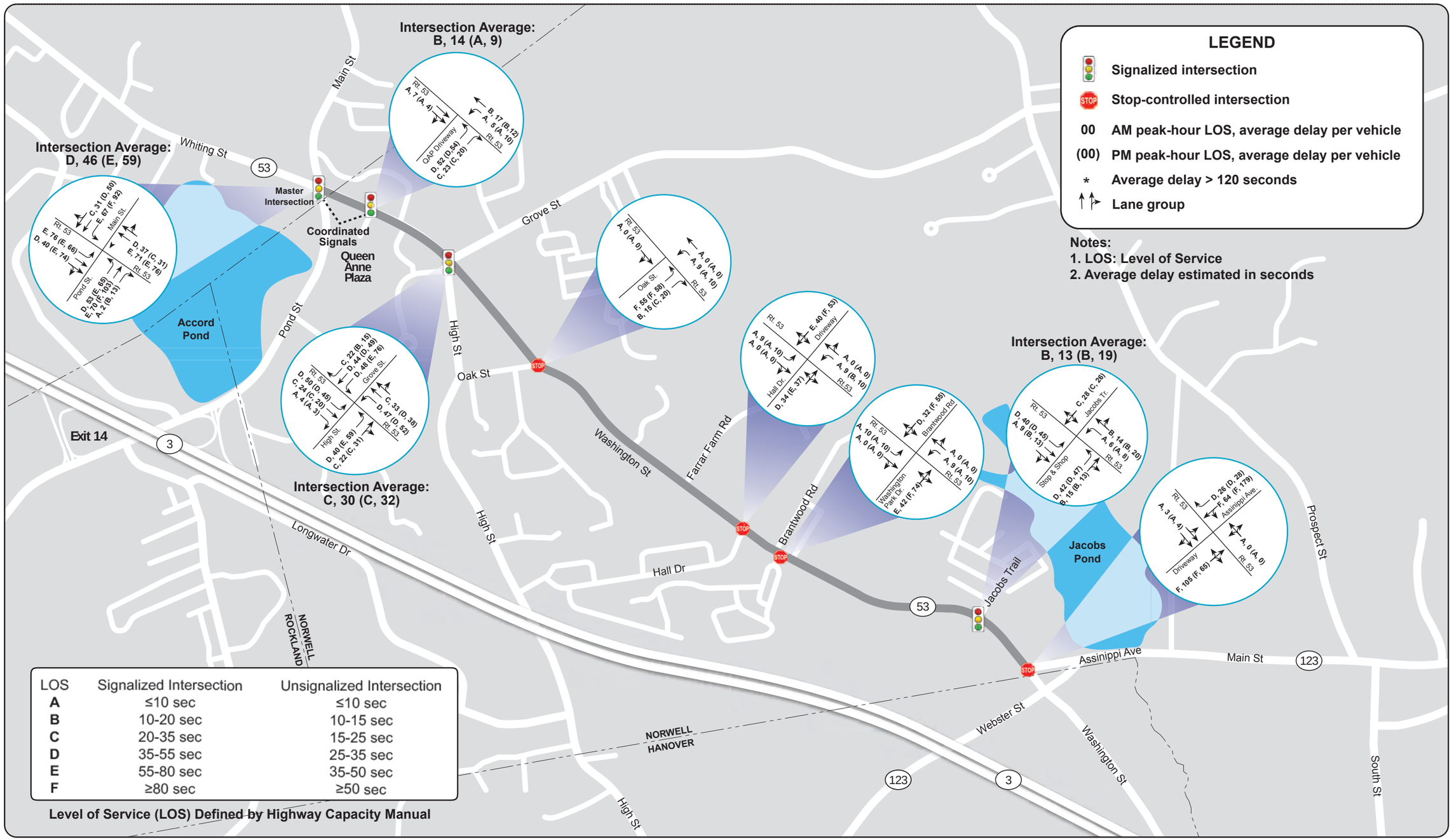
Addressing Safety, Mobility, and Access on Subregional Priority Roadways



BOSTON REGION MPO

Figure 17
Proposed Long-Term Improvements Conceptual Plan
Route 53 between Jacobs Trail and Assinippi Avenue

Addressing Safety, Mobility, and Access on Subregional Priority Roadways



BOSTON REGION MPO

Figure 18
2030 Weekday AM/PM Peak-Hour Intersection Capacity Analyses with Proposed Long-Term Improvements
Route 53 in Norwell

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

APPENDIX A

Study Advisory Members

Study Advisory Members

Subregional Priority Roadway Study: Route 53 in Norwell

Name	Affiliation	Email
Ellen Allen	Norwell Board of Selectmen	ellenallennorwell@comcast.net
Bruce Graham	Norwell Board of Selectmen	Bruce.graham@comcast.net
Ellen Moshier	Norwell Traffic/Complete Streets Committee	ellenmoshier@gmail.com
Peter Morin	Norwell Town Administrator	pmorin@townofnorwell.net
Kenneth Kirkland	Norwell Town Planner	KKirkland@townofnorwell.net
Glenn Ferguson	Norwell Highway Director	Glenn.Ferguson@townofnorwell.net
Andrew Reardon	Norwell Fire Chief (retired)	areardon@norwellfire.org
Jeffery Simpson	Norwell Fire Chief	jsimpson@norwellfire.org
Ted Ross	Norwell Police Chief (retired)	tross@norwellpolice.com
Edward Lee	Norwell Police Chief	ELee@norwellpolice.com
Carol Brzuszek	Norwell Deputy Police Chief	cbrzuszek@norwellpolice.com
William Crowley	Norwell Police Safety Officer	wcrowley@norwellpolice.com
Pamela Haznar	MassDOT District 5	pamela.haznar@dot.state.ma.us
David Soares	MassDOT District 5	david.soares@dot.state.ma.us
Barbara Lachance	MassDOT District 5	barbara.lachance@dot.state.ma.us
Daniel Vieira	MassDOT District 5	daniel.vieira@dot.state.ma.us
Makaela Niles	MassDOT Office of Transportation Planning	makaela.niles@state.ma.us
Josh Eichen	MAPC	jeichen@mapc.org
Mark Abbott	Boston Region MPO	mabbott@ctps.org
Chen-Yuan Wang	Boston Region MPO	cwang@ctps.org

APPENDIX B

Summary of Survey Results by Questions and Answers

Summary of Route 53 Survey Results by Question and Answer

A\Q	1. How do you typically travel on Route 53? (Check all that apply.)	217 Total Responses	
1	*Drive alone in an automobile*	194	89.4%
2	*Drive others or travel as a passenger in an automobile*	141	65.0%
3	*Walk*	34	15.7%
4	*Bicycle*	18	8.3%
5	*Travel to take the Plymouth & Brockton commuter bus*	7	3.2%
6	*Other (please specify)*	6	2.8%

Drive to commuter rail in East Weymouth
shopping
Running for exercise; and my kids walk and bike on the sidewalk; and we live on Farrar Farm Rd which is right off of Washington St
Also run
Motorcycle
shopping

A\Q	2. Please indicate the purpose of your usual trips on Route 53. (Check all that apply.)	217 Total Responses	
1	*Work*	118	54.4%
2	*Shopping (including trips for pharmacy, banking, and ……)*	206	94.9%
3	*Dining*	152	70.0%
4	*School/daycare*	53	24.4%
5	*Social/recreation*	115	53.0%
6	*Exercises and health improvement activities*	85	39.2%
7	*Other (please specify)*	18	8.3%

St Helen Church, Highway Access (via Grove St)
Own property
Live off Washington St, so use it multiple times per day.
I live off of Washington Street so I am on it countless times throughout the day. Please don't add a turning lane on this residential section of Washington Street-it will only encourage people to drive faster. This is a cut through for many, but this is OUR neighborhood! If they don't want to have to wait for someone to turn into a business or street then they can hop of Route 3 at the Home Depot and get off at The Hanover Mall.
traveling to another town
Doctors & Dentists. Also we live in a neighborhood off Rt 53 so we have to use it every time we leave the house.
passing through
Home
Church and Meetings
Healthcare providers
Going to Rte 3 South
I live in Jacobs Trail, so by definition, I must drive or walk on 53 to go anywhere at all.
To access route 3
To get home
Library
church

A\Q	3. Please indicate the destination of your usual trips on Route 53. (Check all that apply.)	216 Total Responses	
1	*North Section (Pond Street-Oak Street)*	148	68.5%
2	*Middle Section (Oak Street-Hall Drive)*	140	64.8%
3	*South Section (Hall Drive-Assinippi Avenue)*	168	77.8%
4	*North of Pond Street*	121	56.0%
5	*South of Assinippi Avenue*	158	73.1%
6	*Other (please specify)*	11	5.1%

Queen Anne's Corner

Washington Street

Farrar Farm Road-that is where we live, right off of Washington Street

I live close to it and use it to get to everywhere in my life.

Transit to Hingham/Hanover

travel through to Brockton

I live in Jacobs Trail, so by definition, I must drive or walk on 53 to go anywhere at all.

I usually travel between Rts 3 and 123, but occasionally from Assinippi Ave. to Rt 3 at Derby St Interchange

Oak to 228

reside off of Route 53, travel to all locations

A\Q	4. While driving on Route 53, what problems do you encounter? (Check all that apply.)	216 Total Responses	
1	*Long wait times at intersections with signals*	109	50.5%
2	*High volume of traffic (congestion)*	152	70.4%
3	*Safety concerns, such as crashes and aggressive drivers*	65	30.1%
4	*Difficulty turning into and out of side streets*	117	54.2%
5	*Difficulty turning into and out of stores and restaurants*	163	75.5%
6	*Poor sight distance*	28	13.0%
7	*Poor street lighting*	28	13.0%
8	*Other (please specify)*	32	14.8%

lane merges and drivers who don't get left to turn left or right to turn right

Other drivers running red lights

The lane dividers are getting "washed" out and are tough to see at night especially when it is raining.

Excessive entrances and exits

Speeding

Overall appearance if this major thoroughfare.

Often when you are waiting to turn into a side street or store people will try to drive around your car causing a dangerous situation. If there was a sidewalk on both sides of the street cars would no longer be able to try to squeeze past cars to get around-they would just have to wait 30 seconds to a minute for you to turn!!

I work at 515 Washington and often encounter people blowing through the right hand stop sign from 123 to 53. It makes it impossible to safely pull out of my office.

poorly marked and enforced merging

when it snows a lot snow banks are difficult to see around when pulling out of stores. The noise of the traffic on 53 wakes me up in the morning and i am on Prouty Ave

Driver's don't understand how to use the turning lane

corner

We live in Jacob Shores neighborhood & even though there is a light, people drive extremely fast trying to make the light & often run it.

Poor pedestrian accommodations

Occassionally there is traffic during typical commute times but I have never really had a problem.

very long wait times to turn left from washington street on to Pond St

The one section between grove and pond street that goes to one lane backs up a lot and is dangerous. Drivers get impatient and drive erratically.

very slow moving traffic

worn painted lines on edge of road

Too many signs and lights too bright

poor turn signal use

drivers sometimes cut through corner businesses to dodge traffic light at intersections

1. Traffic on the weekends is backed up from QA Corner all the way to the Catholic Church. 2. I work at NEC bldg (#167 Washington @ Oak) - VERY hard to turn left out of our driveway. 3. @ the Stop & Shop light, there is a lane on the SB side for turning left into Jacobs Trail. But people on the NB side use this as a turning lane for the Beijing House plaza. Dangerous (and rude).

Trying to pull out of the neighborhood at Jacobs Trail is hard since people are running the red light constantly

Pot holes

speeding

traffic literally stopped from and backed up at various times of the day from High Street down past Oak towards the fire station because of the light

THE LIGHT NEAR STOP & SHOP -- GET BACKED UP ON 53 GOING NORTH

Speed to fast

Too many temporary signs, both temporary and permanent that obstruct vision. Safe biking is confined to sidewalks which causes other problems.

A\Q	5. While bicycling or walking along Route 53, what particular problems do you regularly encounter? (Check all that apply.)	215 Total Responses	
1	*Lack of bike lanes or useable shoulders*	47	21.9%
2	*Lack of sidewalks*	59	27.4%
3	*Lack of midblock crossings or difficulty crossing Route 53*	50	23.3%
4	*Lack of accessible curb/wheelchair ramps*	13	6.0%
5	*Sidewalks too narrow or in poor condition*	42	19.5%
6	*Too many commercial driveways*	32	14.9%
7	*High volume of traffic*	72	33.5%
8	*High speed of vehicles*	65	30.2%
9	*Insufficient pedestrian crossing times at intersections with signals*	35	16.3%
10	*Poor street lighting*	23	10.7%
11	*Poor connectivity to a destination, such as a workplace, school, recreational area, or residence*	22	10.2%
12	*Other (please specify)*	22	10.2%

Insufficient crosswalks by Queen Anne's corner on Washington St.

Vehicle drivers who don't respect bichyclists right to ride on the road.

See walkers on sidewalks. Never see bikes!!

I would never walk or bicycle on that road - way too dangerous

My kids are always nervous when biking on the sidewalks because cars are going so fast past them-my kids wouldn't even think of riding their bike on the actual side of the street because of the fast cars and distracted drivers.

Much too dangerous to bike or walk

It would be good to cut the brush back as you go up the hill toward oak street on 53 for us joggers

Have never walked due to poor connection issue from Main Street in Hanover

unclear pavement markings/signage for lane designations and merges

I would never bike or walk on 53

biking is not safe

question as posed is not be applicable to some...personally, I would not want to walk or bicycle on this road as it's not safe, but I do witness locals who do (including children), and also going for a "run" along this road as there are several fitness centers here.

It's too dangerous to walk or bicycle on Route 53

This is not a street for bike riding, unless you want to die.

I live in Jacobs Trail and would LOVE to be riding my bike or walking more for errands, but (1) the road is too scary to cross, sidewalks are nonexistent in some places, and (3) sidewalks are strewn with gravel and dirt.

A\Q	6. Please indicate any improvements that you would like to see implemented on Route 53. (Check all that apply.)	215 Total Responses	
1	*Increase safety for all road users (reduce crashes)*	127	59.1%
2	*Accommodate pedestrians*	99	46.0%
3	*Improve pedestrian crossings on Route 53*	98	45.6%
4	*Accommodate bicyclists*	63	29.3%

5	*Reduce traffic congestion*	150	69.8%
6	*Add left-turn lanes and improve access to adjacent commercial developments*	137	63.7%
7	*Improve shuttle and local bus service*	44	20.5%
8	*Other (please specify)*	16	7.4%

I would like to ride my bike to work from Norwell Center to Washington St, but, it's too dangerous. How can we assist with global warming, when we don't have the tools like a safe bike path?

4 or 5lanes between Grove and Queen Anne's corner..

When RT-3 is backed up, people get off the highway onto 53. Causes congestion

Slow traffic down.

reduce driveways

The segment of Washington Street from Rt123(Main St) to Grove Street is a highly residential area in addition to the many shops and businesses. It is very important for the Town of Norwell to maintain the safety of the residents-especially the youth and teenagers of Norwell that live in that area. We can't turn this section into the major roadway like in front of the old Hanover Mall. We need to encourage people to walk to the restaurants, shops, gyms, clothing stores-we need sidewalks on that section on the side of the Norwell Fire/Police Station.

Combine acces points or areas to turn Left onto 53 out of a business. Starbucks area is a challenge to get in and out of especially at high traffic areas

make 53 two lanes in Norwell

traffic calming

better surface for roads

Repaint side lines on streets often

The phrase "accommodate pedestrians" isn't quite right. It should be "encourage multi-modal usage, emphasizing pedestrian and bike usability." Also, this is not transportation-related, but the entire 53 corridor is unsightly. It lacks aesthetic and coherence.

increase police presence? (rarely does this seem to be occurring in Norwell as often as they are seen on lesser busy roadways.)

Queen Anne Corner is a chokepoint

completely eliminate "sandwich board" and other temporary signs that reduce site lines for everyone

A\Q 7. Please indicate the most important improvement that you would like to see implemented on Route 53. (Check only one.) — **207 Total Responses**

1	*Increase safety for all road users (reduce crashes)*	42	20.3%
2	*Accommodate pedestrians*	12	5.8%
3	*Improve pedestrian crossings on Route 53*	4	1.9%
4	*Accommodate bicyclists*	10	4.8%
5	*Reduce traffic congestion*	70	33.8%
6	*Add left-turn lanes and improve access to adjacent commercial developments*	47	22.7%
7	*Improve shuttle and local bus service*	7	3.4%
8	*Other (please specify)*	15	7.2%

Widen Grove Street to Route 123.

Add lighting between Hall and Oak.

Improve safety for turning Left onto 53 out of businesses

Add more travel lanes to road like Whiting Street in Hingham.

Reduce Allowable Speed

Make two lanes each way between grove and Pond streets

Congestion is a Queen Anne's Corner issue. The larger concern is getting people out of their cars, so yes, more shuttles and bus service would be positive.

fix Queen Anne Corner

slower speeds

remove all temporary signs

APPENDIX C

Summary of Survey Comments by Locations and Issues

Summary of Route 53 Survey Comments by Location and Issue

Index	Location	Issue	Comments
8	Corridor	Access	Explore ways to combine side by side curb cuts for adjacent properties. Eliminate one-way (in or out) curb cuts. Where they do exist, nobody complies. So what's the point?
15	Corridor	Access	I don't know how to fix it.....sometimes I am stuck for very long periods of time trying to get out of store parking lots.
19	Corridor	Access	Third lanes
61	Corridor	Access, Bike	middle turn lane and bike lane
143	Corridor	Access, Bike	It is annoying to drive from assinippi to queen anne's and constantly stop for people turning across the oncoming lane to the gym, a street or a business. Then traffic goes 20 to 30 miles an hour for .....? Often those cars causing the slowness turn or end up just going very slow even when traffic is light. Sorry, this is just a complaint and probably not what you are looking for. I am assuming these drivers are jittery or afraid or maybe just overly cautious when they drive which could be their perception that the road is dangerous or ...whatever. This said, the Hanover side of assinippi route 53 moves along quite well. More businesses and less neighborhoods I guess. I bike and yes - I avoid 53 usually. All of it.
185	Corridor	Access, Bike, Pedestrian	A middle turning lane would be helpful, but we still need the sidewalks and some space for runners and bicyclists.
62	Corridor	Access, Pedestrian, Speeding	I think it is very important to note that this RESIDENTIAL section of Washington from Main Street (Rt 123) to Grove Street IS the Norwell Town Center for many residents of Norwell. It is so important to help the residents and shops owners to thrive and be safe in their neighborhood. I also think it is very important to have a sidewalk in front of the new Norwell Fire/Police Station and additional crosswalks to get to the station from across Washington Street. Sidewalks on both sides and crosswalks will only encourage more people to walk to get a sandwich at On Rye, BoCafe, or the Juice Barn or Press Juice Bar or dinner at the Fours, Trattoria San Pietro or Norwell Pizza, etc... I do think the lights near Grove and Pond greatly impact the backups that do occur on Washington Street on the weekends. Especially, the left turn only signal at the Pond Street intersection doesn't let enough cars turn left-most people are still turning in the intersection when the light is red. And the Grove Street light seems to get backed up because of it. Maybe there is some way to consolidate entrances/exits for some of the shopping areas that are adjacent to each other so it would be more feasible to have safe sidewalks on both sides of Washington Street.
118	Corridor	Access, Pedestrian, Speeding	The road design and allowable speeds have been in place since it was much less develoPedestrian. Needs to slow traffic down and accomodate walkers and turning from side streets
31	Corridor	Access, Traffic	cannot get in or out of anyplace because no one lets drivers out and there are few breaks in traffic. turning lanes would be great, but traffic light timing would be useful too
74	Corridor	Access, Traffic	I live off Washington Park Drive so I use 53 literally every day. It works fairly well most days but the most problems are with the amount of traffic which tends to increase greatly whenever there is high traffic or congestion on Route 3 (think Cape traffic on Friday and Sunday afternoons in the summer). Because the Norwell stretch of 53 is one lane, it can get really backed up. Additionally the stretch of 53 between Route 228 and Grove Street is extremely difficult to enter when using businesses there because there are too few lanes for traffic to flow naturally
79	Corridor	Access, Traffic	The horrible road situation adds to a general unkempt sprawl condition. It's an eyesore and lanes change indiscriminately from 1 to 2 to 3 lanes causing merging backups.
84	Corridor	Access, Traffic	Lane drops create bottlenecks. No turning lane at some traffic lights creates congestion. These issues are most evident in the Hanover/Pembroke stretch of 53.
109	Corridor	Access, Traffic	After Queen Anne's Corner going south, the traffic bottles up because of the reduction in lanes It's always difficult trying to take a left hand turn coming out of the businesses.
13	Corridor	Bike	Make it better for the cyclists Too!
121	Corridor	Bike	Please do not consider adding bike lanes unless and until the road is widened along its entire length - at least the Norwell portion. And that makes not much sense unless neighborhood towns - Hingham and Hanover - do the same. There are sidewalks already along 53 - poorly designed and installed but existing.
141	Corridor	Bike, Pedestrian	I would like to see sidewalks and bicycle lanes. The road surface has to many bumps, cracks and holes.
144	Corridor	Bike, Pedestrian	There are no crosswalks or sidewalks in most places. Riding a bike is a deathwish. It'd be good to have that option to run errands without a car like you can do in the city.
55	Corridor	Pedestrian	Would love sidewalks!
76	Corridor	Pedestrian	Sidewalks are poorly plowed and maintained. During snow events and after people walk on the road rather than the sidewalk. VERY DANGEROUS. The frustrating part is that it could be easily cured by taking more time to clear the sidewalks
77	Corridor	Pedestrian	sidewalks
86	Corridor	Pedestrian	In general, it would be nice to have sidewalks on Route 53 so that Pedestrianestrians can travel along the road, especially with Hanover Crossing coming. Norwell is a town that has lots of kids and allowing families to get from one point to another by walking would be a huge benefit to the town.
120	Corridor	Pedestrian	I would love to take a walk every day but I don't want to have to get in my car to drive somewhere to feel safe. Summer street is beautiful but not safe for Pedestrianestrians.
180	Corridor	Pedestrian	there are few sidewalks and that makes the road dangerous for Pedestrianestrians and drivers
51	Corridor	Pedestrian, Safety	I would never walk/go running on Main Street for fear of getting hit by a car
45	Corridor	Pedestrian, Zoning	Reduce the commercial "look"and improve the traffic congestion. This is a highly populated area with families and children. Focus on beautifying it and making it Pedestrianestrian friendly. Encourage community by allowing children and families to safely walk to local businesses. Keep the commercial growth away from densely populated areas and grow the industrial park in our backyard!!
66	Corridor	Road Maintence	It's not something that needs to be addressed immediately, but would be nice to see general upkeep along the route.
116	Corridor	Road Maintence	improve the condition of the roads, some areas have a lot of pot holes.
195	Corridor	Road Maintence	Traffic is awful roads need to be repaired
125	Corridor	Safety	Traffics and people running lights
213	Corridor	Safety	People do not obey lights. Increase break between changing lights.More lights along Rt 53 are needed.
6	Corridor	Speeding, Enforcement	In addition to reducing congestion, better traffic enforcement overall. There are lots of speeders, running red lights, especially at the Rt 3 onramp intersection... aggressive driving in general. I never see anyone ever pulled over, but I see tons of violations, or so it seems.
165	Corridor	Speeding, Pavement	Reduce speed, fix the road

Summary of Route 53 Survey Comments by Location and Issue

14	Corridor	Traffic	Sometimes the traffic is so backed up you have to wait several changes of lights to proceed.
17	Corridor	Traffic	Traffic is stopPedestrian every time a car turns into Starbucks and other restaurants or businesses. Makes travel time extra long.
18	Corridor	Traffic	2 lane roads through all sections of rt 53 would be advantageous
53	Corridor	Traffic	Correct timing of traffic lights at all intersections, turning lanes and education on HOW to use them correctly (!)
54	Corridor	Traffic	There appear to be too many traffic signals too close to one another. You get stopPedestrian at one light and then when you go to the next one you get stopPedestrian again. They are not timed for traffic and that causes congestion and backup.
58	Corridor	Traffic	The lane configuration on Rte. 53 South at Grove Street is poor. 1. Approaching the intersection it is unclear which lane is the through lane. 2. The storage area for left turning traffic onto Grove Street East (toward Scituate) is insufficient during peak volume times. A smarter signal needs to be added that gives left turning traffic a longer left turn signal or two left turning lanes need to be added with perhaps a lane drop near Bay Path Lane. 3. The lane drop from two lanes to one through lane on Rte 53 South is poor - two southbound lanes should continue on Rte 53 South from the Citizens bank past the Kappy's Liquor store. The lane drop on Rte 53 North between Grove Street and Rte 228 needs to be eliminated - two lanes need to be maintained from South of Grove Street to the existing two lanes North of Rte. 228. The left turning lane on Rte 53 North onto Rte 228 West (toward Rte 3) is insufficient and the timing is too short for left turning traffic much of the time. (Many cars run the amber and red left turn light.) Again, a smarter signal needs to be added that gives left turning traffic a longer left turn signal or two left turning lanes need to be added. I realize that my comments do not address Pedestrianestrians or bicyclists but sidewalks do exist in the Queen Anne area and I'm not sure that I have ever seen a bicyclist in this area. While not as bad as the Queen Anne area, the Rte 53 Rte 123 intersection can be annoying. Left turning traffic on Rte 53 North onto Rte 123 West can tie up the intersection and the flow of traffic. Perhaps a dedicated left turn lane on Rte 53 North at Rte 123 would help traffic flow more smoothly. (And moving the lane drop on Rte 53 North past Assinippi Ave. might help also.)
71	Corridor	Traffic	TOO MUCH TRAFFIC!
122	Corridor	Traffic	South of queen annes corner on 53 entire way to Hanover is usually completely congested on a daily basis as well as route 123.
158	Corridor	Traffic	Increase the width of the roadway.
161	Corridor	Traffic	**Better signage to signal a lane reduction in places would also help somewhat.** The towns along 53 are allowing too much construction of new business and housing. The problem will continue to get worse unless until they address the over development along route 53. Adding lanes would help, but make it more unsafe. Left hand turn signals would definitely help.
210	Corridor	Traffic	It is just the sheer volume of traffic and not sure there is any way to improve that. People use Rte 53 as a way to avoid traffic on Rte 3 in the summer months and then 53 is all jammed up
94	Corridor	Zoning	Stop over building on the road .. I would not want it to look like rte 53 at main st by the big y
90	Corridor	Emergency	Widen the road in Norwell. I don't want to see what happened in **Paradise, California** happen here!
164	Corridor	Greenscape	I would like to see more greenscape to increase the aesthetic appeal of the commercial areas.
150	Corridor	Light	Poor lighting, increased traffic congestion, poor lines painted on sides of streets all especially adjacent to Queen Anne's Corner & High Street
220	Corridor	Pathway	Pathway between High School and Cole School as planned by pathway report.
35	Corridor	general	The whole route 53 is a disaster, there is not a specific area
60	Corridor	general	Between assinippi and queen anne's corner.
172	Corridor, Int-5	Safety, Zoning	Zoning has resulted in transformation of Route 53 to a strip mall which results in hazardous traffic flows...There is a need to review and revise zoning. Improve traffic flow by better demarcation of lanes. Traffic flow is especially dangerous at the Assinippi intersection. Expand system of sidewalks!
4	Int-1	Pedestrian, Bike	Impossible to cross Route 53 by Queen Anne's corner. Insufficient cross walks. Dangerous speeds and aggressive drivers. Pedestrianestrians DO NOT have the right of way. If we are going to tackle global warming and climate change, give us the tools to allow us to walk or bike to our destinations. It's inevitable anyway that we will have to go that way. Reduce traffic. Encourage bikes and walking.
103	Int-1	Traffic	long wait times due to congestion and short green arrow for left hand turn from washington street on to pond street
178	Int-1	Traffic	Traffic light timing at Queen Anne's Corner needs to be re-evaulated.
182	Int-1	Traffic	I travel through Queen Anne Corner daily to and from work. The area is too highly congested and a chokepoint to smoothly flowing traffic.
186	Int-1	Traffic	I work from home so I time my outings on 53 to avoid traffic. I think Queen Anne Corners could be re-configured better for commuter traffic. I think the recent improvements have made a huge improvement.
41	Int-1	general	Queen Anne's Corner
151	Int-1	general	Queen Anne's Corner and Pond Street
83	Int-1, Int-5	Traffic	Traffic Congestion at Queen Annes Corner and Lack of planning at Assinippi
176	Int-1, Int-5	Traffic, Safety	Turning from Dunkin Donuts to Pond Street heading to Rockland. Can't cross two lanes easily. Really risky. Don't like the Y on the backside of DD in front of Hingham Savings. Very difficult to join Main Street. Don't like turning from Washington onto Assinippi Avenue to go to HIS.
127	Int-2	Traffic	Where a left turn arrow exists, ensure they all turn to a yield (blinking yellow arrow) rather than a red light. This will decrease traffic congestion is many cases, specifically at the intersection of Route 53 and Grove St.
181	Int-2, CVS	Traffic, Access, Pedestrian	Add traffic signal for those heading south along Washington who veer onto High street to avoid when light on Washington and Grove is red. Allow left turn onto High street when exiting the CVS. Add more speed limit signs. More crossing walks with signage stating motorist must stop for pedestrians.
27	Int-3	Traffic	It's difficult to turn left obtain Washington St from Hall Drive
119	Int-4	Pedestrian, Safety	The intersection of Jacobs Trail and Stop and Shop is dangerous for Pedestrianestrians crossing Jacobs Trail. Vehicles exiting the neighborhood cannot see anyone on the sidewalk until they are in the street. This is especially dangerous for baby carriages and bicycles. The line of sight coming up Jacobs Trail to Washington Street needs to be improved so Pedestrianestrians on the sidewalk are visible.
189	Int-4	Safety	The light at Jacobs Trail and stop and shop. Hard to get out of neighborhood since people running red lights
216	Int-4	Safety	Traveling northbound from Assinippi Avenue, trying to turn into small commercial development containing Beijing House is very confusing because, just there's a left turn lane into the Stop and Shop driveway. It is a very short lane and the entrance to Beijing House (BH) is a short distance beyond. One thinks the left turn lane extends to the BH entrance, but it doesn't. Instead, it turns into a southbound left turn lane into Jacobs Trail. Several times after it was first put in, inadvertently I was over the yellow line encroaching in that wrong lane but there were no oncoming cars, so no conflict. Plus the location is on a sharp curve with little sight distance. I wonder if that curve could be flattened and the turning lanes extended through the intersection and possibly beyond to other close-by commercial developments to promote safer access and turns in that whole section. There looks to be green space on the south side that would limit Right-of-Way impacts for such a change.
88	Int-4	Speeding	People speeding to run the red light on Rt 53 at the Jacobs Trail intersection.

Summary of Route 53 Survey Comments by Location and Issue

63	Int-5	Access, Safety	William Raveis office at 515 Washington St. Northbound cars on 53 ignore the stop sign and make it tricky to pull out of driveway. I've been almost hit MANY times. *Also: PROBLEM WITH YOUR ZIP CODE QUESTION...IT WANTS AN EMAIL!!**
26	Sec-1	Access	Left turn out of Starbucks Left turn from strawberry fair, dry cleaner Any crossing between grove and 228
105	Sec-1	Access	A majority of the issues are attempting to re-enter the roadways after leaving businesses/restaurants/shops with congestion of traffic.
152	Sec-1	Access	trying to get out of places along the rte and poor vision when turning left from Grove Street to Hall Dr.
154	Sec-1	Access	Queen Anne's corner down to 7-11 and CVS is congested more times than not. Headed south on 53 in front of Big Y is too wide with not guidance as to what cars should do. You cars aggressively heading south on that stretch thinking it is 2 lanes, but then it merges to one lane in front of Taco Bell without any road lines to anticipate what is happening. Maybe make part of that stretch a right turn lane into the Big Y shopping center
177	Sec-1	Access	It's very difficult to exit many shops and businesses on 53. I am afraid to exit some businesses into four lanes of traffic. I often go in the easy direction and u-turn when possible or get to an intersection with a light.
52	Sec-1	Access, Traffic	widen from grove to 228. it is so hard to pull out into traffic and cross safely.
2	Sec-1	Traffic	the area between the Mobil station and Queen Anne's corner is a mess. It need to be five lanes. Two in each direction and a middle turn lane.
123	Sec-1	Traffic	Add two lanes between grove and pond streets.
130	Sec-1	Traffic	The bottleneck in front of the Pizza Hut need to be fixed. The roadway goes from 4 lanes to 2 then back to 4 after 100 yards. It should be 4 lanes through to Grove St. An alternative could be a bypass road leading from Pond St directly to the Grove St intersection traveling behind the Big Y supermarket. That would remove about 1/3 of the traffic passing through Queen Anne's Corner.
198	Sec-1	Traffic	Congestion is the biggest problem, particularly on the northern end of 53 between Kappys and Queen Anne's Corner.
211	Sec-1	Traffic	The stretch between RT53/RT228 and RT53/Grove ST gets congested, causing traffic to backup towards the south on RT53. It also tends to backup on Pond ST when this happens. It can be difficult turning into or out of the street my house is on sometimes.
221	Sec-1	Traffic	Reduce congestion, especially between Grove Street, Queen Anne's Corner and Pond St.
78	Sec-1, Int-1	Access, Traffic	The merge after Big Y and before Alfredo's is dangerous. People do not give an inch. The turn left onto Pond St from Washington. (Queen Ann's Corner) The light cycle is too short.
38	Sec-1, Int-2	Access, Pavement	Grove and Washington improve road condition (potholes and better maintenance of islands to improve visalbility. Queen Anne plaza exit to Washington St eliminate all business exits and provide traffic signals at one common exit.
87	Sec-1, Int-2	Access, Traffic	I actually don't think 53 is too bad on most days. It gets really backed up when cars exit rte. 3 North at exit 13 to avoid traffic delays. For me **the worst location is from High and Grove toward Queen Anne's corner**. Practically impossible to take a left hand turn from any of the businesses. Also the cars taking a right from Grove st do not stop/yield to the cars taking a left on the light from High st.. Many times that intersection is completely blocked. Keep 2 lanes from High/Grove to Queens Anne's corner rather than making them merge.
85	Sec-2	Access, Traffic	Starbucks entrance, lane delimitation on 123 where it crosses 53, which are turn lanes vs straight, congestion at entrance and ability to exit at Norwell fitness club and my gym childrenâ€™s fitness
128	Sec-2, Sec-3	Safety, Speeding	People using Hall Drive as a cut through from Rt 53 to Assinippi is a huge safety issue. The rate of speed used around the times that children are getting on/off buses is ridiculous.
131	Sec-2, Sec-3, Hall Drive	Safety, Speeding	Hall drive is often used as a cut through. This is a very heavily settled neighborhood and the people who dont live in here FLY at a very high speed and often do not stop at the stop signs. I would like something that deters people who are not coming in the neighborhood and just cutting through to go all the way down 53 instead. Otherwise more stop signs or speed bumps NEED to be put in place before a neighborhood kid gets hit. This includes the fire and police trucks who need to be extra careful when coming down with their sirens on and going fast to get to call as they use it to cut through also.
124	Sec-3	Access	Trying to take a left from SS Bank onto Route 53.... sometimes will turn right and go to Stop and Shop to get the light!
9	Sec-3	general	Norwell improved 53 from Grove street to Queen Anne Corner intersection years ago. Hingham improved 53 from Queen Anne to RT-3. Hanover improved 53 from Assinippi to RT-3. Time to finish the middle section from Assinippi to Grove Street.
166	Sec-3, Int-4	Safety	The Jacobs Trail/Route 53 intersection is dangerous. **Northbound drivers consistently run yellow and red lights.** Also, stretches of sidewalk up and down 53 are dirty and covered with gravel and sand (eg. Assinippi Ave/Dunkin Donuts), making it a constant eyesore and harsh for walking. More crosswalks from the sidewalk to the storefronts on the west side of 53 would slow traffic (the speed limit should be decreased, too) and increase safety. Thank you for your attention to 53!
117	CVS Driveway at High Street	Access	ENFORCE no left turn signage at the exit to CVS on to High St and move the No Left Turn sign across the street so it is facing motorists directly.
16	Outside Corridor		Crossing near town offices and middle school. Intersection with Washington Street. Intersection with Prospect.
29	Outside Corridor		Savers traffic is a nightmare. People get frustrated and just go. The turn onto Rt3 is also dangerous. You can't tell when people are going straight and it is dangerous

Notes

Int-1: Route 53 at Route 228 (Pond Street/Main Street)
Int-2: Route 53 at High Street/Grove Street
Int-3: Route 53 at Hall Drive
Int-4: Route 53 at Jacobs Trail/Stop&Shop Driveway
Int-5: Route 53 at Assinippi Avenue
Sec-1: Route 53 between Pond Street and Oak Street
Sec-2: Route 53 Oak Street and Hall Drive
Sec-3: Route 53 between Hall Drive and Assinippi Avenue

APPENDIX D

Automatic Traffic Recorder Counts
October 6–11, 2020

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

Station #: 000000000022
Site ID: 000000000101
Location: Rte.53 NB, West of Rte.228
Direction: NORTH

STA 1 NB

File: D1006001.prn
City: Hingham
County: Volume

TIME	MON	TUE 6	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00			22	15	15	17	15	21	18	88
02:00			7	7	7	7	12	14	9	47
03:00			6	5	7	6	7	5	6	30
04:00			10	20	19	16	8	4	12	61
05:00			53	40	41	45	12	14	32	160
06:00			174	143	173	163	67	43	120	600
07:00			284	319	314	306	123	90	226	1130
08:00			451	442	446	446	156	100	319	1595
09:00			443	452	446	447	298	176	363	1815
10:00			367	443	396	402	371	273	370	1850
11:00		414	418	418	467	429	470	339	421	2526
12:00		512	475	530	578	524	555	447	516	3097
13:00		571	595	568	602	584	582	713	605	3631
14:00		545	536	559	556	549	639	656	582	3491
15:00		548	574	540	554	554	555	517	548	3288
16:00		565	527	553	555	550	508	438	524	3146
17:00		518	497	528	620	541	533	383	513	3079
18:00		440	498	621	528	522	470	360	486	2917
19:00		394	467	526	486	468	393	363	438	2629
20:00		297	343	320	362	330	288	240	308	1850
21:00		201	204	223	222	212	161	182	199	1193
22:00		115	134	131	133	128	142	85	123	740
23:00		55	60	66	88	67	95	78	74	442
24:00		36	29	38	53	39	56	27	40	239
TOTALS		5211	7174	7507	7668	7352	6516	5568	6852	39644
% AVG WKDY		70.9	97.6	102.1	104.3		88.6	75.7		
% AVG WEEK		76.1	104.7	109.6	111.9		95.1	81.3		
AM Times		12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks		512	475	530	578	524	555	447	516	
PM Times		13:00	13:00	18:00	17:00	13:00	14:00	13:00	13:00	
PM Peaks		571	595	621	620	584	639	713	605	

44

NB 7352
SB 8603
15955
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Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

Station #: 000000000147
Site ID: 000000000102
Location: Rte.53 SB, West of Rte.228
Direction: SOUTH

STA. 1 SB

File: D1006003.prn
City: Hingham
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			21	14	20	18	19	22	19	96
02:00			13	7	12	11	12	6	10	50
03:00			1	4	3	3	6	8	4	22
04:00			8	6	9	8	8	2	7	33
05:00			18	16	23	19	17	8	16	82
06:00			53	44	47	48	28	11	37	183
07:00			132	165	171	156	62	39	114	569
08:00			393	374	378	382	172	124	288	1441
09:00			432	500	463	465	308	205	382	1908
10:00			403	446	426	425	425	256	391	1956
11:00		491	523	509	565	522	602	375	511	3065
12:00		649	672	691	693	676	722	515	657	3942
13:00		663	688	701	728	695	807	579	694	4166
14:00		626	654	684	743	677	746	580	672	4033
15:00		649	627	730	859	716	701	636	700	4202
16:00		712	755	738	885	772	675	553	720	4318
17:00		800	724	794	842	790	574	495	705	4229
18:00		723	691	766	770	738	498	437	648	3885
19:00		509	554	575	641	570	445	342	511	3066
20:00		359	402	378	378	379	325	255	350	2097
21:00		328	261	252	272	278	203	110	238	1426
22:00		148	110	120	142	130	132	93	124	745
23:00		85	58	74	70	72	86	71	74	444
24:00		73	54	37	49	53	43	40	49	296
TOTALS		6815	8247	8625	9189	8603	7616	5762	7921	46254
% AVG WKDY		79.2	95.9	100.3	106.8		88.5	67.0		
% AVG WEEK		86.0	104.1	108.9	116.0		96.1	72.7		
AM Times		12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks		649	672	691	693	676	722	515	657	
PM Times		17:00	16:00	17:00	16:00	17:00	13:00	15:00	16:00	
PM Peaks		800	755	794	885	790	807	636	720	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

Station #: 000000000079
Site ID: 000000000201
Location: Rte.228 NB, North of Rte.53
Direction: NORTH

STA. 2 NB

File: D1006004.prn
City: Hingham
County: Volume

TIME	MON	TUE 6	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00			16	14	13	14	30	31	21	104
02:00			9	9	8	9	11	10	9	47
03:00			7	8	5	7	10	5	7	35
04:00			9	14	1	8	9	6	8	39
05:00			20	26	19	22	10	10	17	85
06:00			69	59	70	66	32	33	53	263
07:00			308	353	299	320	94	85	228	1139
08:00			589	633	637	620	262	126	449	2247
09:00			587	604	580	590	364	258	479	2393
10:00			459	493	441	464	467	393	451	2253
11:00		497	426	509	504	484	520	439	482	2895
12:00		534	453	577	585	537	561	521	538	3231
13:00		540	513	573	585	553	634	539	564	3384
14:00		540	498	602	569	552	567	557	556	3333
15:00		582	577	614	651	606	601	507	589	3532
16:00		620	596	661	636	628	543	522	596	3578
17:00		573	588	687	621	617	511	451	572	3431
18:00		608	664	627	606	626	500	405	568	3410
19:00		513	536	583	547	545	419	337	489	2935
20:00		308	361	366	337	343	269	257	316	1898
21:00		206	213	252	231	226	192	167	210	1261
22:00		126	115	128	131	125	139	116	126	755
23:00		56	57	55	84	63	88	72	69	412
24:00		31	27	39	51	37	67	49	44	264
TOTALS		5734	7697	8486	8211	8062	6900	5896	7441	42924
% AVG WKDY		71.1	95.5	105.3	101.8		85.6	73.1		
% AVG WEEK		77.1	103.4	114.0	110.3		92.7	79.2		
AM Times		12:00	08:00	08:00	08:00	08:00	12:00	12:00	12:00	
AM Peaks		534	589	633	637	620	561	521	538	
PM Times		16:00	18:00	17:00	15:00	16:00	13:00	14:00	16:00	
PM Peaks		620	664	687	651	628	634	557	596	

U4

NB 8062
SB 8590
16652

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Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

Station #: 000000000043
Site ID: 000000000202
Location: Rte.228 SB, North of Rte.53
Direction: SOUTH

STA 2 SB

File: D1006005.prn
City: Hingham
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			12	26	15	18	33	34	24	120
02:00			8	9	5	7	11	11	9	44
03:00			5	2	4	4	8	5	5	24
04:00			5	16	7	9	8	6	8	42
05:00			32	19	29	27	16	8	21	104
06:00			81	90	66	79	54	20	62	311
07:00			223	215	219	219	91	63	162	811
08:00			518	499	486	501	237	183	385	1923
09:00			546	582	531	553	394	258	462	2311
10:00			516	589	536	547	504	358	501	2503
11:00		561	283	537	549	482	637	606	529	3173
12:00		576	271	685	566	524	621	590	552	3309
13:00		639	534	681	710	641	713	613	648	3890
14:00		629	598	721	677	656	696	553	646	3874
15:00		796	729	804	871	800	600	535	722	4335
16:00		764	801	881	898	836	642	546	755	4532
17:00		765	803	766	760	774	616	483	699	4193
18:00		746	620	795	647	702	575	354	623	3737
19:00		495	467	535	531	507	446	366	473	2840
20:00		298	278	315	283	294	316	188	280	1678
21:00		174	184	214	220	198	154	119	178	1065
22:00		106	95	115	141	114	148	110	119	715
23:00		36	50	57	100	61	114	63	70	420
24:00		23	34	39	51	37	59	31	40	237
TOTALS		6608	7693	9192	8902	8590	7693	6103	7973	46191
% AVG WKDY		76.9	89.6	107.0	103.6		89.6	71.0		
% AVG WEEK		82.9	96.5	115.3	111.7		96.5	76.5		
AM Times		12:00	09:00	12:00	12:00	09:00	11:00	11:00	12:00	
AM Peaks		576	546	685	566	553	637	606	552	
PM Times		15:00	17:00	16:00	16:00	16:00	13:00	13:00	16:00	
PM Peaks		796	803	881	898	836	713	613	755	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 3 NB

Station #: 000000000154
Site ID: 000000000301
Location: Rte.228 NB, North of Accord Park Dr.
Direction: NORTH

File: D1006006.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			31	36	36	34	44	42	38	189
02:00			19	11	17	16	25	29	20	101
03:00			9	15	20	15	11	14	14	69
04:00			22	28	20	23	14	18	20	102
05:00			38	49	38	42	29	22	35	176
06:00			118	114	125	119	76	54	97	487
07:00			426	443	407	425	166	108	310	1550
08:00			914	1096	797	936	421	190	684	3418
09:00			821	894	755	823	528	374	674	3372
10:00			652	754	729	712	706	519	672	3360
11:00		629	682	708	759	694	818	566	694	4162
12:00		749	793	793	814	787	863	735	791	4747
13:00		804	820	897	851	843	1105	1188	944	5665
14:00		776	826	931	760	823	812	864	828	4969
15:00		820	800	869	1108	899	757	717	845	5071
16:00		839	887	1136	900	940	762	701	871	5225
17:00		856	893	1017	972	934	678	611	838	5027
18:00		810	900	879	821	852	650	538	766	4598
19:00		659	718	810	708	724	576	460	655	3931
20:00		446	425	470	488	457	415	368	435	2612
21:00		260	278	335	342	304	262	248	288	1725
22:00		164	148	167	176	164	186	147	165	988
23:00		87	71	100	130	97	141	96	104	625
24:00		57	53	57	97	66	84	70	70	418
TOTALS		7956	11344	12609	11870	11729	10129	8679	10858	62587
% AVG WKDY		67.8	96.7	107.5	101.2		86.4	74.0		
% AVG WEEK		73.3	104.5	116.1	109.3		93.3	79.9		
AM Times		12:00	08:00	08:00	12:00	08:00	12:00	12:00	12:00	
AM Peaks		749	914	1096	814	936	863	735	791	
PM Times		17:00	18:00	16:00	15:00	16:00	13:00	13:00	13:00	
PM Peaks		856	900	1136	1108	940	1105	1188	944	

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NB 11729
SB 10150

COMB AWD 21879

FAC .94 (.99)

COMB ADT 20,400

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 3 SB

Station #: 000000000019
Site ID: 000000000302
Location: Rte.228 SB, North of Accord Park Dr.
Direction: WEST

File: D1006007.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			24	24	19	22	37	35	28	139
02:00			22	17	14	18	20	20	19	93
03:00			9	8	8	8	14	7	9	46
04:00			16	9	21	15	8	9	13	63
05:00			50	40	51	47	17	15	35	173
06:00			119	124	125	123	62	28	92	458
07:00			277	267	253	266	114	62	195	973
08:00			521	476	467	488	261	181	381	1906
09:00			566	617	567	583	438	281	494	2469
10:00			543	630	633	602	576	357	548	2739
11:00		582	473	594	599	562	696	594	590	3538
12:00		650	531	677	699	639	751	626	656	3934
13:00		703	757	765	831	764	784	639	746	4479
14:00		782	806	787	815	798	747	587	754	4524
15:00		847	849	871	898	866	711	663	806	4839
16:00		828	918	933	994	918	798	658	855	5129
17:00		863	933	894	903	898	739	599	822	4931
18:00		840	762	881	721	801	644	476	721	4324
19:00		605	564	715	675	640	619	468	608	3646
20:00		450	371	442	434	424	402	291	398	2390
21:00		319	310	312	329	318	315	203	298	1788
22:00		189	172	180	219	190	206	156	187	1122
23:00		87	81	103	130	100	155	69	104	625
24:00		59	51	47	81	60	66	49	59	353
TOTALS		7804	9725	10413	10486	10150	9180	7073	9418	54681
% AVG WKDY		76.9	95.8	102.6	103.3		90.4	69.7		
% AVG WEEK		82.9	103.3	110.6	111.3		97.5	75.1		
AM Times		12:00	09:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks		650	566	677	699	639	751	626	656	
PM Times		17:00	17:00	16:00	16:00	16:00	16:00	15:00	16:00	
PM Peaks		863	933	933	994	918	798	663	855	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA · 4 EB

Station #: 000000000145
Site ID: 000000000403
Location: Grove St. EB, East of Bay Path Dr.
Direction: EAST

File: D1006008.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			7	19	13	13	21	24	17	84
02:00			7	9	12	9	15	17	12	60
03:00			4	1	4	3	8	6	5	23
04:00			4	3	3	3	4	9	5	23
05:00			7	6	9	7	13	4	8	39
06:00			21	24	24	23	17	9	19	95
07:00			108	99	92	100	50	17	73	366
08:00			217	228	219	221	102	58	165	824
09:00			278	286	283	282	159	127	227	1133
10:00			231	285	256	257	257	187	243	1216
11:00			266	280	296	281	298	222	272	1362
12:00		368	337	438	371	378	384	342	373	2240
13:00		401	367	399	396	391	410	332	384	2305
14:00		368	390	408	403	392	430	359	393	2358
15:00		395	427	435	438	424	430	369	416	2494
16:00		488	500	505	528	505	382	354	460	2757
17:00		549	535	528	533	536	385	334	477	2864
18:00		561	559	552	466	534	321	321	463	2780
19:00		449	412	465	414	435	321	256	386	2317
20:00		296	285	302	279	290	234	206	267	1602
21:00		195	187	215	209	202	150	131	181	1087
22:00		102	101	125	119	112	132	90	112	669
23:00		47	42	50	66	51	76	51	55	332
24:00		24	32	31	56	36	46	34	37	223
TOTALS		4243	5324	5693	5489	5485	4645	3859	5050	29253
% AVG WKDY		77.4	97.1	103.8	100.1		84.7	70.4		
% AVG WEEK		84.0	105.4	112.7	108.7		92.0	76.4		
AM Times		12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks		368	337	438	371	378	384	342	373	
PM Times		18:00	18:00	18:00	17:00	17:00	14:00	15:00	17:00	
PM Peaks		561	559	552	533	536	430	369	477	

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EB 5485
WB 5852
COMB AWDT 11337
FAC .94 (.99)
COMB ADT 10,600

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 4WB

Station #: 000000000088
Site ID: 000000000404
Location: Grove St. WB, East of Bay Path Dr.
Direction: WEST

File: D1006009.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			7	4	6	6	15	13	9	45
02:00			1	4	9	5	10	7	6	31
03:00			5	4	1	3	5	6	4	21
04:00			9	8	12	10	4	4	7	37
05:00			60	49	51	53	20	17	39	197
06:00			148	139	146	144	45	31	102	509
07:00			283	274	288	282	105	72	204	1022
08:00			549	490	471	503	208	129	369	1847
09:00			507	545	475	509	302	202	406	2031
10:00			399	420	416	412	420	272	385	1927
11:00			401	417	441	420	399	330	398	1988
12:00		401	466	383	461	428	473	386	428	2570
13:00		452	439	435	481	452	425	410	440	2642
14:00		362	364	364	420	378	402	372	381	2284
15:00		392	460	412	445	427	407	340	409	2456
16:00		413	385	413	445	414	340	315	385	2311
17:00		368	386	383	351	372	324	269	347	2081
18:00		363	397	410	354	381	313		367	1837
19:00		268	243	333	319	291	292		291	1455
20:00		185	128	150	207	168	178		170	848
21:00		100	105	108	92	101	131		107	536
22:00		40	39	50	55	46	68		50	252
23:00		18	33	32	34	29	43		32	160
24:00		24	7	17	26	18	29		21	103
TOTALS		3386	5821	5844	6006	5852	4958	3175	5357	29190
% AVG WKDY		57.9	99.5	99.9	102.6		84.7	54.3		
% AVG WEEK		63.2	108.7	109.1	112.1		92.6	59.3		
AM Times		12:00	08:00	09:00	09:00	09:00	12:00	12:00	12:00	
AM Peaks		401	549	545	475	509	473	386	428	
PM Times		13:00	15:00	13:00	13:00	13:00	13:00	13:00	13:00	
PM Peaks		452	460	435	481	452	425	410	440	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 5 NB

Station #: 000000000038
Site ID: 000000000501
Location: High St. NB, North of Oak St.
Direction: NORTH

File: D1006010.prn
City: Norwell
County: Volume

TIME	MON	TUE 6	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00			3	1	5	3	6	9	5	24
02:00			1	3	5	3	6	7	4	22
03:00			1	0	3	1	4	4	2	12
04:00			4	6	2	4	6	1	4	19
05:00			7	5	6	6	5	3	5	26
06:00			42	31	38	37	16	8	27	135
07:00			95	104	97	99	34	17	69	347
08:00			230	232	200	221	80	45	157	787
09:00			243	291	261	265	125	74	199	994
10:00			189	222	204	205	160	138	183	913
11:00			192	218	223	211	216	151	200	1000
12:00		307	274	289	258	282	266	194	265	1588
13:00		309	295	332	319	314	250	217	287	1722
14:00		232	262	265	263	256	279	234	256	1535
15:00		268	257	289	272	272	252	210	258	1548
16:00		385	315	346	331	344	228	209	302	1814
17:00		306	277	348	331	316	177	163	267	1602
18:00		290	238	387	279	298	193	134	254	1521
19:00		176	172	271	215	208	155	110	183	1099
20:00		94	107	117	82	100	87	65	92	552
21:00		62	56	69	60	62	47	48	57	342
22:00		21	34	42	26	31	33	34	32	190
23:00		9	13	20	29	18	32	11	19	114
24:00		6	8	12	16	10	16	13	12	71
TOTALS		2465	3315	3900	3525	3566	2673	2099	3139	17977
% AVG WKDY		69.1	93.0	109.4	98.9		75.0	58.9		
% AVG WEEK		78.5	105.6	124.2	112.3		85.2	66.9		
AM Times		12:00	12:00	09:00	09:00	12:00	12:00	12:00	12:00	
AM Peaks		307	274	291	261	282	266	194	265	
PM Times		16:00	16:00	18:00	16:00	16:00	14:00	14:00	16:00	
PM Peaks		385	315	387	331	344	279	234	302	

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NB 3566
SB 3822
comb AWD 7388
FAC .94 (.99)
comb ADT 6,900

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 5 SB

Station #: 000000000094
Site ID: 000000000502
Location: High St. SB, North of Oak St.
Direction: SOUTH

File: D1006011.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			4	8	12	8	12	17	11	53
02:00			4	3	7	5	5	6	5	25
03:00			0	1	0	0	2	3	1	6
04:00			1	2	1	1	2	1	1	7
05:00			3	4	3	3	4	3	3	17
06:00			15	10	15	13	7	2	10	49
07:00			37	40	46	41	11	7	28	141
08:00			174	158	134	155	46	32	109	544
09:00			253	293	188	245	82	61	175	877
10:00			171	189	169	176	136	85	150	750
11:00			206	203	193	201	188	122	182	912
12:00		257	278	251	260	262	259	170	246	1475
13:00		363	338	356	303	340	297	209	311	1866
14:00		323	315	327	352	329	304	226	308	1847
15:00		300	331	340	353	331	288	217	305	1829
16:00		423	368	415	416	406	239	222	347	2083
17:00		342	385	388	355	368	223	172	311	1865
18:00		362	326	381	374	361	203	142	298	1788
19:00		232	220	298	244	248	189	130	219	1313
20:00		145	127	163	145	145	130	72	130	782
21:00		93	80	96	99	92	83	48	83	499
22:00		52	43	52	62	52	54	39	50	302
23:00		12	20	31	41	26	35	20	26	159
24:00		7	13	18	20	14	22	20	17	100
TOTALS		2911	3712	4027	3792	3822	2821	2026	3326	19289
% AVG WKDY		76.2	97.1	105.4	99.2		73.8	53.0		
% AVG WEEK		87.5	111.6	121.1	114.0		84.8	60.9		
AM Times		12:00	12:00	09:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks		257	278	293	260	262	259	170	246	
PM Times		16:00	17:00	16:00	16:00	16:00	14:00	14:00	16:00	
PM Peaks		423	385	415	416	406	304	226	347	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 6 EB

Station #: 000000000136
Site ID: 000000060304
Location: Oak St., West of Rte.53
Direction: EAST

File: D1006041.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			0	1	2	1	1	3	1	7
02:00			1	1	1	1	3	3	2	9
03:00			1	0	0	0	0	1	0	2
04:00			0	0	0	0	0	2	0	2
05:00			1	1	1	1	0	0	1	3
06:00			10	8	15	11	1	0	7	34
07:00			21	17	18	19	6	2	13	64
08:00			73	40	36	50	18	16	37	183
09:00			55	83	51	63	36	14	48	239
10:00			36	44	21	34	29	16	29	146
11:00			30	29	34	31	28	22	29	143
12:00		56	51	69	32	52	26	21	42	255
13:00		67	43	57	40	52	36	20	44	263
14:00		51	33	54	32	42	28	23	37	221
15:00		44	37	46	45	43	30	23	38	225
16:00		89	58	91	55	73	15	17	54	325
17:00		60	45	47	29	45	41	21	40	243
18:00		27	37	35	42	35	22	19	30	182
19:00		21	24	20	25	22	14	18	20	122
20:00		13	19	17	17	16	13	5	14	84
21:00		9	5	9	9	8	7	7	8	46
22:00		0	3	3	6	3	4	5	4	21
23:00		3	3	4	6	4	4	1	4	21
24:00		1	1	3	1	2	3	3	2	12
TOTALS		441	587	679	518	608	365	262	504	2852
% AVG WKDY		72.5	96.5	111.7	85.2		60.0	43.1		
% AVG WEEK		87.5	116.5	134.7	102.8		72.4	52.0		
AM Times		12:00	08:00	09:00	09:00	09:00	09:00	11:00	09:00	
AM Peaks		56	73	83	51	63	36	22	48	
PM Times		16:00	16:00	16:00	16:00	16:00	17:00	14:00	16:00	
PM Peaks		89	58	91	55	73	41	23	54	

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EB 608

WB 682

COMB AWD 1290

FAC .94 (.99)

COMB ADT 1,200

Mass Highway Department

WEEKLY SUMMARY FOR LANE 2 Page: 2
Starting: 10/6/2020

Station #: 000000000136
Site ID: 000000060304
Location: Oak St., West of Rte.53
Direction: WEST

STA. 6 WB

File: D1006041.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			0	1	1	1	3	1	1	6
02:00			0	0	0	0	1	4	1	5
03:00			0	0	0	0	0	1	0	1
04:00			1	1	1	1	1	1	1	5
05:00			0	0	0	0	0	0	0	0
06:00			3	3	3	3	1	0	2	10
07:00			5	8	9	7	2	0	5	24
08:00			30	35	28	31	10	3	21	106
09:00			61	89	38	63	20	8	43	216
10:00			31	38	30	33	24	22	29	145
11:00			34	44	41	40	30	13	32	162
12:00		56	64	65	37	56	32	25	46	279
13:00		75	45	78	59	64	29	28	52	314
14:00		43	45	51	45	46	44	35	44	263
15:00		55	65	71	51	60	38	35	52	315
16:00		74	54	70	60	64	39	35	55	332
17:00		51	53	64	58	56	39	35	50	300
18:00		41	54	86	55	59	37	29	50	302
19:00		39	37	64	35	44	21	18	36	214
20:00		25	18	21	25	22	28	14	22	131
21:00		17	15	26	7	16	14	7	14	86
22:00		6	10	6	19	10	12	5	10	58
23:00		4	5	5	4	4	8	3	5	29
24:00		0	2	3	2	2	3	3	2	13
TOTALS		486	632	829	608	682	436	325	573	3316
% AVG WKDY		71.3	92.7	121.6	89.1		63.9	47.7		
% AVG WEEK		84.8	110.3	144.7	106.1		76.1	56.7		
AM Times		12:00	12:00	09:00	11:00	09:00	12:00	12:00	12:00	
AM Peaks		56	64	89	41	63	32	25	46	
PM Times		13:00	15:00	18:00	16:00	13:00	14:00	14:00	16:00	
PM Peaks		75	65	86	60	64	44	35	55	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

Station #: 000000000127
Site ID: 000000000703
Location: Hall Dr. EB, West Rte.53
Direction: EAST

STA. 7 EB

File: D1006012.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			0	1	3	1	1	3	2	8
02:00			0	0	0	0	2	0	0	2
03:00			0	1	1	1	0	0	0	2
04:00			3	1	1	2	3	1	2	9
05:00			3	3	1	2	0	1	2	8
06:00			5	5	4	5	2	0	3	16
07:00			10	11	12	11	7	5	9	45
08:00			33	28	23	28	21	8	23	113
09:00			48	54	39	47	32	11	37	184
10:00			30	37	43	37	57	17	37	184
11:00			23	20	29	24	38	14	25	124
12:00			28	32	43	34	30	19	30	152
13:00		39	36	38	38	38	24	24	33	199
14:00		35	31	29	31	32	25	21	29	172
15:00		34	44	40	31	37	26	28	34	203
16:00		47	41	47	49	46	25	26	39	235
17:00		27	32	35	33	32	41	22	32	190
18:00		46	30	35	31	36	33	21	33	196
19:00		24	25	24	23	24	11	15	20	122
20:00		15	14	18	19	16	14	14	16	94
21:00		7	7	10	14	10	8	10	9	56
22:00		6	2	5	5	4	7	3	5	28
23:00		5	3	5	10	6	6	5	6	34
24:00		5	5	1	5	4	3	4	4	23
TOTALS		290	453	480	488	477	416	272	430	2399
% AVG WKDY		60.8	95.0	100.6	102.3		87.2	57.0		
% AVG WEEK		67.4	105.3	111.6	113.5		96.7	63.3		
AM Times			09:00	09:00	10:00	09:00	10:00	12:00	09:00	
AM Peaks			48	54	43	47	57	19	37	
PM Times		16:00	15:00	16:00	16:00	16:00	17:00	15:00	16:00	
PM Peaks		47	44	47	49	46	41	28	39	

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EB 477

WB 484

COMB AWD 961

FAC .94(.99)

COMB ADT 900

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

Station #: 000000000112
Site ID: 000000000704
Location: Hall Dr. WB, West Rte.53
Direction: WEST

STA. 7 WB

File: D1006013.prn
City: Norwell
County: Volume

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			0	2	4	2	4	5	3	15
02:00			0	0	0	0	1	1	0	2
03:00			0	0	0	0	0	0	0	0
04:00			1	0	1	1	1	1	1	4
05:00			2	3	0	2	0	0	1	5
06:00			4	2	1	2	0	0	1	7
07:00			6	6	9	7	5	3	6	29
08:00			30	30	21	27	14	5	20	100
09:00			38	44	34	39	31	12	32	159
10:00			31	30	28	30	19	17	25	125
11:00			22	26	32	27	23	14	23	117
12:00			33	31	46	37	29	19	32	158
13:00		45	31	39	39	38	37	21	35	212
14:00		40	32	33	31	34	35	34	34	205
15:00		31	40	29	28	32	28	22	30	178
16:00		34	38	40	37	37	29	30	35	208
17:00		36	45	28	34	36	36	30	35	209
18:00		55	34	70	42	50	37	20	43	258
19:00		33	37	33	35	34	19	18	29	175
20:00		20	12	21	24	19	15	20	19	112
21:00		11	9	18	15	13	14	9	13	76
22:00		3	6	8	9	6	11	6	7	43
23:00		4	6	5	9	6	6	4	6	34
24:00		5	8	3	5	5	8	5	6	34
TOTALS		317	465	501	484	484	402	296	436	2465
% AVG WKDY		65.5	96.1	103.5	100.0		83.1	61.2		
% AVG WEEK		72.7	106.7	114.9	111.0		92.2	67.9		
AM Times			09:00	09:00	12:00	09:00	09:00	12:00	09:00	
AM Peaks			38	44	46	39	31	19	32	
PM Times		18:00	17:00	18:00	18:00	18:00	13:00	14:00	18:00	
PM Peaks		55	45	70	42	50	37	34	43	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 8 NB

Station #: 000000000096
Site ID: 000000000801
Location: Rte.53 NB, South of Assinippi Ave.
Direction: NORTH

File: D1006014.prn
City: Hanover
County: Volume

TIME	MON	TUE 6	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00			5	7	15	9	19	18	13	64
02:00			3	6	8	6	3	8	6	28
03:00			4	4	3	4	6	4	4	21
04:00			4	8	5	6	6	9	6	32
05:00			14	19	14	16	7	5	12	59
06:00			87	85	90	87	37	31	66	330
07:00			168	218	157	181	83	54	136	680
08:00			396	406	393	398	162	95	290	1452
09:00			517	517	443	492	331	152	392	1960
10:00			452	483	444	460	406	230	403	2015
11:00			433	471	497	467	487	359	449	2247
12:00			498	530	554	527	530	426	508	2538
13:00		550	531	533	563	544	551	658	564	3386
14:00		495	575	544	563	544	585	560	554	3322
15:00		469	568	542	562	535	576	480	533	3197
16:00		540	546	561	576	556	502	451	529	3176
17:00		494	510	519	526	512	456	467	495	2972
18:00		451	511	826	430	554	408	317	490	2943
19:00		351	367	368	362	362	322	244	336	2014
20:00		202	233	272	240	237	229	160	223	1336
21:00		142	131	162	161	149	141	97	139	834
22:00		73	88	96	107	91	83	57	84	504
23:00		38	35	46	49	42	56	50	46	274
24:00		20	18	26	36	25	26	16	24	142
TOTALS		3825	6694	7249	6798	6804	6012	4948	6302	35526
% AVG WKDY		56.2	98.4	106.5	99.9		88.4	72.7		
% AVG WEEK		60.7	106.2	115.0	107.9		95.4	78.5		
AM Times			09:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks			517	530	554	527	530	426	508	
PM Times		13:00	14:00	18:00	16:00	16:00	14:00	13:00	13:00	
PM Peaks		550	575	826	576	556	585	658	564	

U7

NB 6804
SB 6820
Comb AWD 13624
FAC .94 (99)
Comb ADT 12,700

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

Station #: 000000000142 STA. 8 SB File: D1006015.prn
Site ID: 000000000802 City: Hanover
Location: Rte.53 SB, South of Assinippi Ave. County: Volume
Direction: SOUTH

TIME	MON	TUE	WED	THU	FRI	WKDAY	SAT	SUN	WEEK	TOTAL
		6	7	8	9	AVG	10	11	AVG	
01:00			14	9	15	13	17	18	15	73
02:00			6	8	8	7	10	4	7	36
03:00			0	4	7	4	1	2	3	14
04:00			4	4	6	5	6	2	4	22
05:00			14	14	13	14	6	7	11	54
06:00			37	38	33	36	28	12	30	148
07:00			75	93	92	87	43	29	66	332
08:00			220	211	226	219	131	73	172	861
09:00			311	347	320	326	231	163	274	1372
10:00			370	399	378	382	359	219	345	1725
11:00			398	435	494	442	476	338	428	2141
12:00			506	554	505	522	587	382	507	2534
13:00		536	578	593	593	575	635	448	564	3383
14:00		556	577	613	565	578	655	469	572	3435
15:00		569	605	600	674	612	598	465	585	3511
16:00		573	635	657	698	641	505	425	582	3493
17:00		636	640	678	694	662	493	357	583	3498
18:00		569	564	593	612	584	403	330	512	3071
19:00		407	430	440	430	427	323	267	383	2297
20:00		301	283	299	296	295	215	155	258	1549
21:00		191	184	217	203	199	151	101	174	1047
22:00		98	114	85	120	104	99	59	96	575
23:00		49	45	50	70	54	73	43	55	330
24:00		38	22	25	43	32	44	19	32	191
TOTALS		4523	6632	6966	7095	6820	6089	4387	6258	35692
% AVG WKDY		66.3	97.2	102.1	104.0		89.3	64.3		
% AVG WEEK		72.3	106.0	111.3	113.4		97.3	70.1		
AM Times			12:00	12:00	12:00	12:00	12:00	12:00	12:00	
AM Peaks			506	554	505	522	587	382	507	
PM Times		17:00	17:00	17:00	16:00	17:00	14:00	14:00	15:00	
PM Peaks		636	640	678	698	662	655	469	585	

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA.9 EB

Station #: 000000000107
Site ID: 000000000903
Location: Assinippi Ave. EB, East of Rte.53
Direction: EAST

File: D1006016.prn
City: Hanover
County: Volume

TIME	MON	TUE 6	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN 11	WEEK AVG	TOTAL
01:00			1	4	5	3	5	7	4	22
02:00			0	3	1	1	3	5	2	12
03:00			2	3	1	2	3	2	2	11
04:00			1	3	1	2	1	2	2	8
05:00			3	8	6	6	0	3	4	20
06:00			20	21	13	18	9	6	14	69
07:00			41	38	46	42	21	14	32	160
08:00			111	118	95	108	39	22	77	385
09:00			158	195	171	175	89	40	131	653
10:00			122	155	148	142	124	77	125	626
11:00			111	141	106	119	142	86	117	586
12:00			192	190	150	177	177	132	168	841
13:00			166	180	172	173	168	135	164	821
14:00		138	156	162	170	156	157	138	154	921
15:00		165	195	203	148	178	148	116	162	975
16:00		175	177	175	183	178	131	121	160	962
17:00		145	163	183	158	162	132	116	150	897
18:00		144	171	165	168	162	129	110	148	887
19:00		125	94	120	127	116	105	81	109	652
20:00		50	64	81	79	68	53	40	61	367
21:00		41	33	37	43	38	50	21	38	225
22:00		24	15	17	21	19	22	14	19	113
23:00		10	25	18	14	17	10	11	15	88
24:00		9	15	12	20	14	18	10	14	84
TOTALS		1026	2036	2232	2046	2076	1736	1309	1872	10385
% AVG WKDY		49.4	98.1	107.5	98.6		83.6	63.1		
% AVG WEEK		54.8	108.8	119.2	109.3		92.7	69.9		
AM Times			12:00	09:00	09:00	12:00	12:00	12:00	12:00	
AM Peaks			192	195	171	177	177	132	168	
PM Times		16:00	15:00	15:00	16:00	15:00	13:00	14:00	13:00	
PM Peaks		175	195	203	183	178	168	138	164	

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EB 2076
WB 2318
COMB AWD 4394
FAC .94(.99)
COMB ADT 4,100

Mass Highway Department

WEEKLY SUMMARY FOR LANE 1 Page: 1
Starting: 10/6/2020

STA. 9 WB

Station #: 000000000023
Site ID: 000000000904
Location: Assinippi Ave. WB, East of Rte.53
Direction: WEST

File: D1006017.prn
City: Hanover
County: Volume

TIME	MON	TUE 6	WED 7	THU 8	FRI 9	WKDAY AVG	SAT 10	SUN	WEEK AVG	TOTAL
01:00			2	2	5	3	4		3	13
02:00			2	1	1	1	0		1	4
03:00			1	1	0	1	1		1	3
04:00			0	0	0	0	1		0	1
05:00			1	1	1	1	2		1	5
06:00			4	5	13	7	3		6	25
07:00			36	54	43	44	14		37	147
08:00			132	106	84	107	42		91	364
09:00			99	118	120	112	75		103	412
10:00			99	128	112	113	144		121	483
11:00			114	124	183	140	136		139	557
12:00			156	151	258	188	155		180	720
13:00			145	171	285	200	193		198	794
14:00		162	175	181	301	205			205	819
15:00		172	168	201	278	205			205	819
16:00		178	185	207	261	208			208	831
17:00		218	210	207	219	214			214	854
18:00		206	215	202	186	202			202	809
19:00		158	146	195	134	158			158	633
20:00		96	92	103	106	99			99	397
21:00		61	54	71	64	62			62	250
22:00		21	18	29	37	26			26	105
23:00		11	11	14	18	14			14	54
24:00		2	9	7	16	8			8	34
TOTALS		1285	2074	2279	2725	2318	770		2282	9133
% AVG WKDY		55.4	89.5	98.3	117.6		33.2			
% AVG WEEK		56.3	90.9	99.9	119.4		33.7			
AM Times			12:00	12:00	12:00	12:00	12:00		12:00	
AM Peaks			156	151	258	188	155		180	
PM Times		17:00	18:00	16:00	14:00	17:00	13:00		17:00	
PM Peaks		218	215	207	301	214	193		214	

APPENDIX E

Turning Movement Counts
October 8 and 10, 2020

207637-A Washington Street (Route 53) @ Grov... - TMC
Thu Oct 8, 2020
Full Length (6 AM-10 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: 789284, Location: 42.1721, -70.878832

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						High Street						Grove 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
2020-10-08 6:00AM	2	190	10	0	**202**	1	61	99	28	0	**188**	0	103	7	4	0	**114**	1	11	8	233	0	**252**	1	**756**
7:00AM	7	314	23	0	**344**	0	146	218	108	0	**472**	0	172	42	4	0	**218**	0	32	65	353	0	**450**	0	**1484**
8:00AM	19	345	41	0	**405**	4	185	313	183	0	**681**	0	194	56	18	0	**268**	0	62	102	369	0	**533**	1	**1887**
9:00AM	10	380	52	0	**442**	0	209	366	147	0	**722**	0	145	46	23	0	**214**	0	58	50	325	0	**433**	1	**1811**
2:00PM	20	522	78	0	**620**	0	306	557	263	0	**1126**	0	191	47	33	0	**271**	1	73	55	253	1	**382**	0	**2399**
3:00PM	22	488	81	0	**591**	15	329	562	315	0	**1206**	0	230	101	29	0	**360**	0	83	85	291	0	**459**	1	**2616**
4:00PM	15	507	103	0	**625**	6	340	555	281	0	**1176**	0	222	100	22	0	**344**	3	88	54	252	0	**394**	0	**2539**
5:00PM	12	626	64	0	**702**	5	386	567	279	0	**1232**	0	233	112	20	0	**365**	0	69	64	301	0	**434**	0	**2733**
2020-10-10 10:00AM	10	436	47	0	**493**	2	221	446	155	0	**822**	0	146	41	14	0	**201**	0	42	22	319	0	**383**	4	**1899**
11:00AM	14	507	57	0	**578**	1	305	544	185	0	**1034**	0	191	37	12	0	**240**	1	81	50	355	0	**486**	0	**2338**
12:00PM	12	528	73	0	**613**	0	308	621	224	0	**1153**	0	167	40	14	0	**221**	1	64	50	338	0	**452**	0	**2439**
1:00PM	13	546	78	0	**637**	1	333	649	232	0	**1214**	0	187	47	17	0	**251**	0	63	57	323	0	**443**	1	**2545**
Total	156	5389	707	0	**6252**	35	3129	5497	2400	0	**11026**	0	2181	676	210	0	**3067**	7	726	662	3712	1	**5101**	9	**25446**
% Approach	2.5%	86.2%	11.3%	0%	**-**	-	28.4%	49.9%	21.8%	0%	**-**	-	71.1%	22.0%	6.8%	0%	**-**	-	14.2%	13.0%	72.8%	0%	**-**	-	-
% Total	0.6%	21.2%	2.8%	0%	**24.6%**	-	12.3%	21.6%	9.4%	0%	**43.3%**	-	8.6%	2.7%	0.8%	0%	**12.1%**	-	2.9%	2.6%	14.6%	0%	**20.0%**	-	-
Motorcycles	0	15	1	0	**16**	-	5	15	4	0	**24**	-	0	1	0	0	**1**	-	0	2	4	0	**6**	-	47
% Motorcycles	0%	0.3%	0.1%	0%	**0.3%**	-	0.2%	0.3%	0.2%	0%	**0.2%**	-	0%	0.1%	0%	0%	**0%**	-	0%	0.3%	0.1%	0%	**0.1%**	-	0.2%
Lights	156	5281	684	0	**6121**	-	3078	5391	2354	0	**10823**	-	2137	659	207	0	**3003**	-	707	643	3653	1	**5004**	-	24951
% Lights	100%	98.0%	96.7%	0%	**97.9%**	-	98.4%	98.1%	98.1%	0%	**98.2%**	-	98.0%	97.5%	98.6%	0%	**97.9%**	-	97.4%	97.1%	98.4%	100%	**98.1%**	-	98.1%
Single-Unit Trucks	0	79	11	0	**90**	-	41	76	32	0	**149**	-	36	12	2	0	**50**	-	14	12	45	0	**71**	-	360
% Single-Unit Trucks	0%	1.5%	1.6%	0%	**1.4%**	-	1.3%	1.4%	1.3%	0%	**1.4%**	-	1.7%	1.8%	1.0%	0%	**1.6%**	-	1.9%	1.8%	1.2%	0%	**1.4%**	-	1.4%
Articulated Trucks	0	10	6	0	**16**	-	5	11	6	0	**22**	-	3	3	0	0	**6**	-	3	1	4	0	**8**	-	52
% Articulated Trucks	0%	0.2%	0.8%	0%	**0.3%**	-	0.2%	0.2%	0.3%	0%	**0.2%**	-	0.1%	0.4%	0%	0%	**0.2%**	-	0.4%	0.2%	0.1%	0%	**0.2%**	-	0.2%
Buses	0	3	4	0	**7**	-	0	4	4	0	**8**	-	4	1	1	0	**6**	-	2	4	5	0	**11**	-	32
% Buses	0%	0.1%	0.6%	0%	**0.1%**	-	0%	0.1%	0.2%	0%	**0.1%**	-	0.2%	0.1%	0.5%	0%	**0.2%**	-	0.3%	0.6%	0.1%	0%	**0.2%**	-	0.1%
Bicycles on Road	0	1	1	0	**2**	-	0	0	0	0	**0**	-	1	0	0	0	**1**	-	0	0	1	0	**1**	-	4
% Bicycles on Road	0%	0%	0.1%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	28	-	-	-	-	-	0	-	-	-	-	-	6	-	-	-	-	-	7	
% Pedestrians	-	-	-	-	-	80.0%	-	-	-	-	-	-	-	-	-	-	-	85.7%	-	-	-	-	-	77.8%	-
Bicycles on Crosswalk	-	-	-	-	-	7	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	2	
% Bicycles on Crosswalk	-	-	-	-	-	20.0%	-	-	-	-	-	-	-	-	-	-	-	14.3%	-	-	-	-	-	22.2%	-

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

207637-A Washington Street (Route 53) @ Grov... - TMC

Thu Oct 8, 2020
AM Peak (Oct 08 2020 8:15AM - 9:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 789284, Location: 42.1721, -70.878832

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						High Street						Grove 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
2020-10-08 8:15AM	6	88	11	0	**105**	0	40	71	51	0	**162**	0	56	9	6	0	**71**	0	15	24	126	0	**165**	1	**503**
8:30AM	4	92	10	0	**106**	3	48	80	47	0	**175**	0	47	8	6	0	**61**	0	16	35	81	0	**132**	0	**474**
8:45AM	6	88	12	0	**106**	1	51	100	34	0	**185**	0	48	22	5	0	**75**	0	20	29	85	0	**134**	0	**500**
9:00AM	0	99	20	0	**119**	0	57	100	36	0	**193**	0	43	15	7	0	**65**	0	14	5	108	0	**127**	0	**504**
Total	16	367	53	0	**436**	4	196	351	168	0	**715**	0	194	54	24	0	**272**	0	65	93	400	0	**558**	1	**1981**
% Approach	3.7%	84.2%	12.2%	0%	-	-	27.4%	49.1%	23.5%	0%	-	-	71.3%	19.9%	8.8%	0%	-	-	11.6%	16.7%	71.7%	0%	-	-	-
% Total	0.8%	18.5%	2.7%	0%	**22.0%**	-	9.9%	17.7%	8.5%	0%	**36.1%**	-	9.8%	2.7%	1.2%	0%	**13.7%**	-	3.3%	4.7%	20.2%	0%	**28.2%**	-	-
PHF	0.667	0.927	0.663	-	**0.916**	-	0.860	0.878	0.824	-	**0.926**	-	0.866	0.614	0.857	-	**0.907**	-	0.813	0.664	0.794	-	**0.845**	-	0.983
Motorcycles	0	0	0	0	**0**	-	0	0	0	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%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Lights	16	353	49	0	**418**	-	186	338	162	0	**686**	-	189	54	23	0	**266**	-	62	92	393	0	**547**	-	1917
% Lights	100%	96.2%	92.5%	0%	**95.9%**	-	94.9%	96.3%	96.4%	0%	**95.9%**	-	97.4%	100%	95.8%	0%	**97.8%**	-	95.4%	98.9%	98.3%	0%	**98.0%**	-	96.8%
Single-Unit Trucks	0	13	2	0	**15**	-	9	10	6	0	**25**	-	5	0	0	0	**5**	-	2	1	6	0	**9**	-	54
% Single-Unit Trucks	0%	3.5%	3.8%	0%	**3.4%**	-	4.6%	2.8%	3.6%	0%	**3.5%**	-	2.6%	0%	0%	0%	**1.8%**	-	3.1%	1.1%	1.5%	0%	**1.6%**	-	2.7%
Articulated Trucks	0	1	1	0	**2**	-	1	2	0	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	5
% Articulated Trucks	0%	0.3%	1.9%	0%	**0.5%**	-	0.5%	0.6%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Buses	0	0	1	0	**1**	-	0	1	0	0	**1**	-	0	0	1	0	**1**	-	1	0	1	0	**2**	-	5
% Buses	0%	0%	1.9%	0%	**0.2%**	-	0%	0.3%	0%	0%	**0.1%**	-	0%	0%	4.2%	0%	**0.4%**	-	1.5%	0%	0.3%	0%	**0.4%**	-	0.3%
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	-	-	-	-	-	4	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	
% 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

207637-A Washington Street (Route 53) @ Grov... - TMC

Thu Oct 8, 2020

PM Peak (Oct 08 2020 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: 789284, Location: 42.1721, -70.878832

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

Leg / Direction	Washington Street (Route 53) Northbound						Washington Street (Route 53) Southbound						High Street Eastbound						Grove Street 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
2020-10-08 4:45PM	4	140	28	0	**172**	0	85	155	73	0	**313**	0	58	18	2	0	**78**	0	27	12	81	0	**120**	0	**683**
5:00PM	1	135	18	0	**154**	3	95	143	69	0	**307**	0	49	32	9	0	**90**	0	22	21	76	0	**119**	0	**670**
5:15PM	6	164	12	0	**182**	2	93	145	77	0	**315**	0	60	18	6	0	**84**	0	21	19	72	0	**112**	0	**693**
5:30PM	3	167	18	0	**188**	0	105	143	55	0	**303**	0	64	31	3	0	**98**	0	15	13	78	0	**106**	0	**695**
Total	14	606	76	0	**696**	5	378	586	274	0	**1238**	0	231	99	20	0	**350**	0	85	65	307	0	**457**	0	**2741**
% Approach	2.0%	87.1%	10.9%	0%	**-**	-	30.5%	47.3%	22.1%	0%	**-**	-	66.0%	28.3%	5.7%	0%	**-**	-	18.6%	14.2%	67.2%	0%	**-**	-	-
% Total	0.5%	22.1%	2.8%	0%	**25.4%**	-	13.8%	21.4%	10.0%	0%	**45.2%**	-	8.4%	3.6%	0.7%	0%	**12.8%**	-	3.1%	2.4%	11.2%	0%	**16.7%**	-	-
PHF	0.583	0.906	0.679	-	**0.924**	-	0.900	0.945	0.890	-	**0.983**	-	0.902	0.773	0.556	-	**0.893**	-	0.787	0.774	0.948	-	**0.952**	-	0.986
Motorcycles	0	0	0	0	**0**	-	1	2	2	0	**5**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	5
% Motorcycles	0%	0%	0%	0%	**0%**	-	0.3%	0.3%	0.7%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Lights	14	600	76	0	**690**	-	374	568	269	0	**1211**	-	230	99	20	0	**349**	-	85	64	299	0	**448**	-	2698
% Lights	100%	99.0%	100%	0%	**99.1%**	-	98.9%	96.9%	98.2%	0%	**97.8%**	-	99.6%	100%	100%	0%	**99.7%**	-	100%	98.5%	97.4%	0%	**98.0%**	-	98.4%
Single-Unit Trucks	0	4	0	0	**4**	-	3	14	2	0	**19**	-	1	0	0	0	**1**	-	0	1	8	0	**9**	-	33
% Single-Unit Trucks	0%	0.7%	0%	0%	**0.6%**	-	0.8%	2.4%	0.7%	0%	**1.5%**	-	0.4%	0%	0%	0%	**0.3%**	-	0%	1.5%	2.6%	0%	**2.0%**	-	1.2%
Articulated Trucks	0	0	0	0	**0**	-	0	2	1	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0.3%	0.4%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Buses	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Buses	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Bicycles on Road	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	5	-	-	-	-	-	0	-	-	-	-	-	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

207637-B Washington Street (Route 53) @ Oak ... - TMC
Thu Oct 8, 2020
Full Length (6 AM-10 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: 789285, Location: 42.168512, -70.874877

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						Oak Street						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
2020-10-08 6:00AM	5	190	0	0	**195**	0	0	98	2	0	**100**	0	8	1	8	0	**17**	0	0	0	0	0	**0**	3	**312**
7:00AM	34	341	1	0	**376**	0	4	221	9	0	**234**	0	12	1	21	0	**34**	0	0	0	1	0	**1**	3	**645**
8:00AM	77	408	4	0	**489**	0	1	336	15	0	**352**	0	25	3	57	0	**85**	1	2	3	3	0	**8**	4	**934**
9:00AM	28	407	0	0	**435**	0	4	401	16	0	**421**	0	9	1	30	0	**40**	0	1	0	4	0	**5**	0	**901**
2:00PM	39	590	0	1	**630**	0	4	607	28	0	**639**	0	11	0	32	0	**43**	0	1	0	7	0	**8**	1	**1320**
3:00PM	48	532	0	0	**580**	0	2	624	33	0	**659**	0	12	0	74	0	**86**	0	1	1	1	0	**3**	0	**1328**
4:00PM	28	556	0	0	**584**	0	0	610	27	0	**637**	0	10	0	11	0	**21**	0	5	2	5	0	**12**	2	**1254**
5:00PM	40	686	0	1	**727**	0	1	591	39	0	**631**	0	7	0	32	0	**39**	0	2	2	7	0	**11**	1	**1408**
2020-10-10 10:00AM	10	449	0	0	**459**	0	2	461	18	0	**481**	0	10	0	17	0	**27**	0	0	0	1	0	**1**	3	**968**
11:00AM	13	552	1	0	**566**	1	0	604	21	0	**625**	0	10	0	17	0	**27**	0	0	1	1	0	**2**	2	**1220**
12:00PM	10	579	0	0	**589**	0	1	655	16	0	**672**	0	5	0	27	0	**32**	0	1	0	3	0	**4**	1	**1297**
1:00PM	16	602	0	0	**618**	0	0	683	29	0	**712**	0	11	0	17	0	**28**	0	0	0	2	0	**2**	5	**1360**
Total	348	5892	6	2	**6248**	1	19	5891	253	0	**6163**	0	130	6	343	0	**479**	1	13	9	35	0	**57**	25	**12947**
% Approach	5.6%	94.3%	0.1%	0%	**-**	-	0.3%	95.6%	4.1%	0%	**-**	-	27.1%	1.3%	71.6%	0%	**-**	-	22.8%	15.8%	61.4%	0%	**-**	-	-
% Total	2.7%	45.5%	0%	0%	**48.3%**	-	0.1%	45.5%	2.0%	0%	**47.6%**	-	1.0%	0%	2.6%	0%	**3.7%**	-	0.1%	0.1%	0.3%	0%	**0.4%**	-	-
Motorcycles	0	12	1	0	**13**	-	0	14	0	0	**14**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	27
% Motorcycles	0%	0.2%	16.7%	0%	**0.2%**	-	0%	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Lights	328	5763	5	2	**6098**	-	18	5756	244	0	**6018**	-	125	5	329	0	**459**	-	13	9	34	0	**56**	-	12631
% Lights	94.3%	97.8%	83.3%	100%	**97.6%**	-	94.7%	97.7%	96.4%	0%	**97.6%**	-	96.2%	83.3%	95.9%	0%	**95.8%**	-	100%	100%	97.1%	0%	**98.2%**	-	97.6%
Single-Unit Trucks	6	90	0	0	**96**	-	1	95	5	0	**101**	-	4	1	8	0	**13**	-	0	0	1	0	**1**	-	211
% Single-Unit Trucks	1.7%	1.5%	0%	0%	**1.5%**	-	5.3%	1.6%	2.0%	0%	**1.6%**	-	3.1%	16.7%	2.3%	0%	**2.7%**	-	0%	0%	2.9%	0%	**1.8%**	-	1.6%
Articulated Trucks	6	16	0	0	**22**	-	0	12	3	0	**15**	-	1	0	1	0	**2**	-	0	0	0	0	**0**	-	39
% Articulated Trucks	1.7%	0.3%	0%	0%	**0.4%**	-	0%	0.2%	1.2%	0%	**0.2%**	-	0.8%	0%	0.3%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Buses	8	8	0	0	**16**	-	0	13	1	0	**14**	-	0	0	5	0	**5**	-	0	0	0	0	**0**	-	35
% Buses	2.3%	0.1%	0%	0%	**0.3%**	-	0%	0.2%	0.4%	0%	**0.2%**	-	0%	0%	1.5%	0%	**1.0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Bicycles on Road	0	3	0	0	**3**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	4
% Bicycles on Road	0%	0.1%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	21	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	84.0%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	4	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	16.0%	-

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

207637-B Washington Street (Route 53) @ Oak ... - TMC

Thu Oct 8, 2020
AM Peak (Oct 08 2020 8:30AM - 9:30 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 789285, Location: 42.168512, -70.874877

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						Oak Street						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
2020-10-08 8:30AM	27	105	0	0	**132**	0	1	78	4	0	**83**	0	8	0	8	0	**16**	0	0	0	1	0	**1**	2	**232**
8:45AM	29	111	1	0	**141**	0	0	119	5	0	**124**	0	6	2	36	0	**44**	1	0	0	1	0	**1**	0	**310**
9:00AM	12	117	0	0	**129**	0	1	106	5	0	**112**	0	1	1	10	0	**12**	0	1	0	0	0	**1**	0	**254**
9:15AM	7	90	0	0	**97**	0	0	108	5	0	**113**	0	3	0	10	0	**13**	0	0	0	1	0	**1**	0	**224**
Total	75	423	1	0	**499**	0	2	411	19	0	**432**	0	18	3	64	0	**85**	1	1	0	3	0	**4**	2	**1020**
% Approach	15.0%	84.8%	0.2%	0%	**-**	-	0.5%	95.1%	4.4%	0%	**-**	-	21.2%	3.5%	75.3%	0%	**-**	-	25.0%	0%	75.0%	0%	**-**	-	**-**
% Total	7.4%	41.5%	0.1%	0%	**48.9%**	-	0.2%	40.3%	1.9%	0%	**42.4%**	-	1.8%	0.3%	6.3%	0%	**8.3%**	-	0.1%	0%	0.3%	0%	**0.4%**	-	-
PHF	0.647	0.904	0.250	-	**0.885**	-	0.500	0.863	0.950	-	**0.871**	-	0.563	0.375	0.444	-	**0.483**	-	0.250	-	0.750	-	**1.000**	-	0.823
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%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	65	406	1	0	**472**	-	2	386	19	0	**407**	-	15	3	61	0	**79**	-	1	0	3	0	**4**	-	962
% Lights	86.7%	96.0%	100%	0%	**94.6%**	-	100%	93.9%	100%	0%	**94.2%**	-	83.3%	100%	95.3%	0%	**92.9%**	-	100%	0%	100%	0%	**100%**	-	94.3%
Single-Unit Trucks	3	15	0	0	**18**	-	0	17	0	0	**17**	-	3	0	3	0	**6**	-	0	0	0	0	**0**	-	41
% Single-Unit Trucks	4.0%	3.5%	0%	0%	**3.6%**	-	0%	4.1%	0%	0%	**3.9%**	-	16.7%	0%	4.7%	0%	**7.1%**	-	0%	0%	0%	0%	**0%**	-	4.0%
Articulated Trucks	6	2	0	0	**8**	-	0	2	0	0	**2**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	10
% Articulated Trucks	8.0%	0.5%	0%	0%	**1.6%**	-	0%	0.5%	0%	0%	**0.5%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	1.0%
Buses	1	0	0	0	**1**	-	0	5	0	0	**5**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	6
% Buses	1.3%	0%	0%	0%	**0.2%**	-	0%	1.2%	0%	0%	**1.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.6%
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	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	2	
% 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

207637-B Washington Street (Route 53) @ Oak ... - TMC

Thu Oct 8, 2020
PM Peak (Oct 08 2020 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: 789285, Location: 42.168512, -70.874877

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

Leg / Direction	Washington Street (Route 53) Northbound						Washington Street (Route 53) Southbound						Oak Street Eastbound						Driveway 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**
2020-10-08 5:00PM	3	149	0	0	**152**	0	0	159	14	0	**173**	0	2	0	15	0	**17**	0	0	1	4	0	**5**	1	**347**
5:15PM	5	206	0	0	**211**	0	0	160	9	0	**169**	0	3	0	3	0	**6**	0	0	1	1	0	**2**	0	**388**
5:30PM	18	175	0	1	**194**	0	1	138	6	0	**145**	0	2	0	6	0	**8**	0	2	0	1	0	**3**	0	**350**
5:45PM	14	156	0	0	**170**	0	0	134	10	0	**144**	0	0	0	8	0	**8**	0	0	0	1	0	**1**	0	**323**
Total	40	686	0	1	**727**	0	1	591	39	0	**631**	0	7	0	32	0	**39**	0	2	2	7	0	**11**	1	**1408**
% Approach	5.5%	94.4%	0%	0.1%	-	-	0.2%	93.7%	6.2%	0%	-	-	17.9%	0%	82.1%	0%	-	-	18.2%	18.2%	63.6%	0%	-	-	-
% Total	2.8%	48.7%	0%	0.1%	**51.6%**	-	0.1%	42.0%	2.8%	0%	**44.8%**	-	0.5%	0%	2.3%	0%	**2.8%**	-	0.1%	0.1%	0.5%	0%	**0.8%**	-	-
PHF	0.556	0.833		-	0.250	**0.861**	-	0.250	0.922	0.696		-	**0.910**	-	0.583		-	0.533		-	**0.574**	-	0.250	0.500	0.438		-	**0.550**	-	0.907
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%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	40	682	0	1	**723**	-	1	576	37	0	**614**	-	7	0	32	0	**39**	-	2	2	7	0	**11**	-	1387
% Lights	100%	99.4%	0%	100%	**99.4%**	-	100%	97.5%	94.9%	0%	**97.3%**	-	100%	0%	100%	0%	**100%**	-	100%	100%	100%	0%	**100%**	-	98.5%
Single-Unit Trucks	0	2	0	0	**2**	-	0	11	1	0	**12**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	14
% Single-Unit Trucks	0%	0.3%	0%	0%	**0.3%**	-	0%	1.9%	2.6%	0%	**1.9%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	1.0%
Articulated Trucks	0	1	0	0	**1**	-	0	2	1	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	4
% Articulated Trucks	0%	0.1%	0%	0%	**0.1%**	-	0%	0.3%	2.6%	0%	**0.5%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Buses	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Buses	0%	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	
% 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

207637-C Washington Street (Route 53) @ Hall... - TMC

Thu Oct 8, 2020
Full Length (10 AM-2 PM, 6 AM-10 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: 789288, Location: 42.162592, -70.864915

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

Leg	Washington Street (Route 53)							Washington Street (Route 53)							Hall Drive						
Direction	Northbound							Southbound							Eastbound						
Time	L	T	BR	R	U	**App**	Ped*	HL	L	T	R	U	**App**	Ped*	L	BL	T	R	U	**App**	Ped*
2020-10-08 6:00AM	2	180	0	2	0	**184**	0	0	4	101	1	0	**106**	0	3	0	0	6	0	**9**	0
7:00AM	14	397	0	6	0	**417**	0	0	3	225	4	0	**232**	0	9	0	6	14	0	**29**	0
8:00AM	19	539	0	7	0	**565**	0	1	4	357	9	0	**371**	0	10	1	2	31	0	**44**	0
9:00AM	19	457	0	2	0	**478**	0	1	2	404	7	0	**414**	0	7	0	0	25	0	**32**	0
2:00PM	15	589	0	4	0	**608**	0	0	5	627	6	0	**638**	0	8	0	0	28	0	**36**	0
3:00PM	19	563	0	2	0	**584**	0	0	1	706	10	0	**717**	0	4	0	2	30	0	**36**	0
4:00PM	13	566	0	1	1	**581**	0	0	0	678	7	0	**685**	0	7	0	2	28	0	**37**	0
5:00PM	40	784	0	1	0	**825**	0	0	1	645	21	0	**667**	0	6	0	0	23	0	**29**	0
2020-10-10 10:00AM	19	454	0	3	0	**476**	0	0	3	459	0	0	**462**	1	7	0	0	26	0	**33**	1
11:00AM	13	559	0	1	0	**573**	0	0	4	603	3	0	**610**	0	3	0	0	23	0	**26**	1
12:00PM	21	583	0	4	0	**608**	0	0	2	637	9	0	**648**	0	4	0	0	19	0	**23**	0
1:00PM	21	612	0	1	0	**634**	0	0	2	690	13	0	**705**	1	6	0	0	13	0	**19**	0
Total	215	6283	0	34	1	**6533**	0	2	31	6132	90	0	**6255**	2	74	1	12	266	0	**353**	2
% Approach	3.3%	96.2%	0%	0.5%	0%	**-**	-	0%	0.5%	98.0%	1.4%	0%	**-**	-	21.0%	0.3%	3.4%	75.4%	0%	**-**	-
% Total	1.6%	47.6%	0%	0.3%	0%	**49.4%**	-	0%	0.2%	46.4%	0.7%	0%	**47.3%**	-	0.6%	0%	0.1%	2.0%	0%	**2.7%**	-
Motorcycles	1	14	0	0	0	**15**	-	0	0	16	1	0	**17**	-	0	0	0	1	0	**1**	-
% Motorcycles	0.5%	0.2%	0%	0%	0%	**0.2%**	-	0%	0%	0.3%	1.1%	0%	**0.3%**	-	0%	0%	0%	0.4%	0%	**0.3%**	-
Lights	210	6146	0	33	1	**6390**	-	2	31	5989	87	0	**6109**	-	72	1	12	256	0	**341**	-
% Lights	97.7%	97.8%	0%	97.1%	100%	**97.8%**	-	100%	100%	97.7%	96.7%	0%	**97.7%**	-	97.3%	100%	100%	96.2%	0%	**96.6%**	-
Single-Unit Trucks	3	84	0	1	0	**88**	-	0	0	98	1	0	**99**	-	0	0	0	3	0	**3**	-
% Single-Unit Trucks	1.4%	1.3%	0%	2.9%	0%	**1.3%**	-	0%	0%	1.6%	1.1%	0%	**1.6%**	-	0%	0%	0%	1.1%	0%	**0.8%**	-
Articulated Trucks	0	16	0	0	0	**16**	-	0	0	15	0	0	**15**	-	1	0	0	0	0	**1**	-
% Articulated Trucks	0%	0.3%	0%	0%	0%	**0.2%**	-	0%	0%	0.2%	0%	0%	**0.2%**	-	1.4%	0%	0%	0%	0%	**0.3%**	-
Buses	1	20	0	0	0	**21**	-	0	0	12	1	0	**13**	-	1	0	0	6	0	**7**	-
% Buses	0.5%	0.3%	0%	0%	0%	**0.3%**	-	0%	0%	0.2%	1.1%	0%	**0.2%**	-	1.4%	0%	0%	2.3%	0%	**2.0%**	-
Bicycles on Road	0	3	0	0	0	**3**	-	0	0	2	0	0	**2**	-	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%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	2	-	-	-	-	-	-	2
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	-	-	-	-	-	-	100%
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0%	-	-	-	-	-	-	0%

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

207637-C Washington Street (Route 53) @ Hall... - TMC

Thu Oct 8, 2020
Full Length (10 AM-2 PM, 6 AM-10 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: 789288, Location: 42.162592, -70.864915

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

Leg Direction	Driveway Westbound							Goodlife Driveway Southwestbound							
Time	L	T	R	HR	U	**App**	Ped*	HL	BL	BR	HR	U	**App**	Ped*	**Int**
2020-10-08 6:00AM	0	0	1	0	0	**1**	0	0	0	0	0	0	**0**	0	**300**
7:00AM	1	1	0	0	0	**2**	0	0	0	0	0	0	**0**	1	**680**
8:00AM	1	2	2	0	0	**5**	6	0	0	0	0	0	**0**	5	**985**
9:00AM	1	0	0	0	0	**1**	0	0	1	1	0	0	**2**	1	**927**
2:00PM	7	0	4	0	0	**11**	4	0	0	0	0	0	**0**	4	**1293**
3:00PM	4	2	4	0	0	**10**	0	0	2	0	0	0	**2**	1	**1349**
4:00PM	4	2	5	0	0	**11**	4	0	0	0	0	0	**0**	4	**1314**
5:00PM	6	0	1	0	0	**7**	0	0	0	0	0	0	**0**	0	**1528**
2020-10-10 10:00AM	0	0	3	0	0	**3**	1	0	0	0	0	0	**0**	1	**974**
11:00AM	4	0	2	0	0	**6**	3	0	0	0	0	0	**0**	3	**1215**
12:00PM	2	1	4	0	0	**7**	1	0	0	0	0	0	**0**	1	**1286**
1:00PM	1	1	1	0	0	**3**	3	0	0	0	0	0	**0**	3	**1361**
Total	31	9	27	0	0	**67**	22	0	3	1	0	0	**4**	24	**13212**
% Approach	46.3%	13.4%	40.3%	0%	0%	-	-	0%	75.0%	25.0%	0%	0%	-	-	-
% Total	0.2%	0.1%	0.2%	0%	0%	**0.5%**	-	0%	0%	0%	0%	0%	**0%**	-	-
Motorcycles	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	33
% Motorcycles	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	0.2%
Lights	31	9	26	0	0	**66**	-	0	3	1	0	0	**4**	-	12910
% Lights	100%	100%	96.3%	0%	0%	**98.5%**	-	0%	100%	100%	0%	0%	**100%**	-	97.7%
Single-Unit Trucks	0	0	1	0	0	**1**	-	0	0	0	0	0	**0**	-	191
% Single-Unit Trucks	0%	0%	3.7%	0%	0%	**1.5%**	-	0%	0%	0%	0%	0%	**0%**	-	1.4%
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	32
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	0.2%
Buses	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	41
% Buses	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	0.3%
Bicycles on Road	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	5
% Bicycles on Road	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	-	20	-	-	-	-	-	-	22	
% Pedestrians	-	-	-	-	-	-	90.9%	-	-	-	-	-	-	91.7%	-
Bicycles on Crosswalk	-	-	-	-	-	-	2	-	-	-	-	-	-	2	
% Bicycles on Crosswalk	-	-	-	-	-	-	9.1%	-	-	-	-	-	-	8.3%	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

207637-C Washington Street (Route 53) @ Hall... - TMC

Thu Oct 8, 2020
AM Peak (Oct 08 2020 8:15AM - 9:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 789288, Location: 42.162592, -70.864915

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

Leg Direction	Washington Street (Route 53) Northbound							Washington Street (Route 53) Southbound							Hall Drive Eastbound						
Time	L	T	BR	R	U	**App**	Ped*	HL	L	T	R	U	**App**	Ped*	L	BL	T	R	U	**App**	Ped*
2020-10-08 8:15AM	6	140	0	1	0	**147**	0	0	1	86	3	0	**90**	0	4	0	1	6	0	**11**	0
8:30AM	5	129	0	1	0	**135**	0	0	2	80	2	0	**84**	0	2	0	0	6	0	**8**	0
8:45AM	6	151	0	3	0	**160**	0	0	1	128	3	0	**132**	0	1	1	0	14	0	**16**	0
9:00AM	6	139	0	0	0	**145**	0	0	2	109	1	0	**112**	0	3	0	0	6	0	**9**	0
Total	23	559	0	5	0	**587**	0	0	6	403	9	0	**418**	0	10	1	1	32	0	**44**	0
% Approach	3.9%	95.2%	0%	0.9%	0%	**-**	-	0%	1.4%	96.4%	2.2%	0%	**-**	-	22.7%	2.3%	2.3%	72.7%	0%	**-**	-
% Total	2.2%	53.1%	0%	0.5%	0%	**55.8%**	-	0%	0.6%	38.3%	0.9%	0%	**39.7%**	-	1.0%	0.1%	0.1%	3.0%	0%	**4.2%**	-
PHF	0.958	0.925	-	0.417	-	**0.917**	-	-	0.750	0.787	0.750	-	**0.792**	-	0.625	0.250	0.250	0.571	-	**0.688**	-
Motorcycles	1	0	0	0	0	**1**	-	0	0	0	0	0	**0**	-	0	0	0	1	0	**1**	-
% Motorcycles	4.3%	0%	0%	0%	0%	**0.2%**	-	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	3.1%	0%	**2.3%**	-
Lights	21	535	0	5	0	**561**	-	0	6	390	8	0	**404**	-	10	1	1	29	0	**41**	-
% Lights	91.3%	95.7%	0%	100%	0%	**95.6%**	-	0%	100%	96.8%	88.9%	0%	**96.7%**	-	100%	100%	100%	90.6%	0%	**93.2%**	-
Single-Unit Trucks	0	13	0	0	0	**13**	-	0	0	8	0	0	**8**	-	0	0	0	0	0	**0**	-
% Single-Unit Trucks	0%	2.3%	0%	0%	0%	**2.2%**	-	0%	0%	2.0%	0%	0%	**1.9%**	-	0%	0%	0%	0%	0%	**0%**	-
Articulated Trucks	0	3	0	0	0	**3**	-	0	0	2	0	0	**2**	-	0	0	0	0	0	**0**	-
% Articulated Trucks	0%	0.5%	0%	0%	0%	**0.5%**	-	0%	0%	0.5%	0%	0%	**0.5%**	-	0%	0%	0%	0%	0%	**0%**	-
Buses	1	8	0	0	0	**9**	-	0	0	3	1	0	**4**	-	0	0	0	2	0	**2**	-
% Buses	4.3%	1.4%	0%	0%	0%	**1.5%**	-	0%	0%	0.7%	11.1%	0%	**1.0%**	-	0%	0%	0%	6.3%	0%	**4.5%**	-
Bicycles on Road	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%**	-
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	-	0
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

207637-C Washington Street (Route 53) @ Hall... - TMC

Thu Oct 8, 2020
AM Peak (Oct 08 2020 8:15AM - 9:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 789288, Location: 42.162592, -70.864915

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

Leg Direction	Driveway Westbound							Goodlife Driveway Southwestbound							
Time	L	T	R	HR	U	**App**	Ped*	HL	BL	BR	HR	U	**App**	Ped*	**Int**
2020-10-08 8:15AM	0	0	1	0	0	**1**	3	0	0	0	0	0	**0**	2	**249**
8:30AM	1	0	0	0	0	**1**	2	0	0	0	0	0	**0**	2	**228**
8:45AM	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	**308**
9:00AM	0	0	0	0	0	**0**	0	0	0	1	0	0	**1**	0	**267**
Total	1	0	1	0	0	**2**	5	0	0	1	0	0	**1**	4	**1052**
% Approach	50.0%	0%	50.0%	0%	0%	**-**	-	0%	0%	100%	0%	0%	**-**	-	-
% Total	0.1%	0%	0.1%	0%	0%	**0.2%**	-	0%	0%	0.1%	0%	0%	**0.1%**	-	-
PHF	0.250	-	0.250	-	-	**0.500**	-	-	-	0.250	-	-	**0.250**	-	0.854
Motorcycles	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	2
% Motorcycles	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	0.2%
Lights	1	0	1	0	0	**2**	-	0	0	1	0	0	**1**	-	1009
% Lights	100%	0%	100%	0%	0%	**100%**	-	0%	0%	100%	0%	0%	**100%**	-	95.9%
Single-Unit Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	21
% Single-Unit Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	2.0%
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	5
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	0.5%
Buses	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	15
% Buses	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-	1.4%
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	-	-	-	-	-	-	5	-	-	-	-	-	-	4	
% Pedestrians	-	-	-	-	-	-	100%	-	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	0%	-	-	-	-	-	-	0%	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

207637-C Washington Street (Route 53) @ Hall... - TMC

Thu Oct 8, 2020
PM Peak (Oct 08 2020 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: 789288, Location: 42.162592, -70.864915

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

Leg	Washington Street (Route 53)							Washington Street (Route 53)							Hall Drive						
Direction	Northbound							Southbound							Eastbound						
Time	L	T	BR	R	U	**App**	Ped*	HL	L	T	R	U	**App**	Ped*	L	BL	T	R	U	**App**	Ped*
2020-10-08 5:00PM	5	142	0	1	0	**148**	0	0	0	199	1	0	**200**	0	1	0	0	2	0	**3**	0
5:15PM	5	216	0	0	0	**221**	0	0	1	155	5	0	**161**	0	1	0	0	5	0	**6**	0
5:30PM	1	240	0	0	0	**241**	0	0	0	155	5	0	**160**	0	4	0	0	11	0	**15**	0
5:45PM	29	186	0	0	0	**215**	0	0	0	136	10	0	**146**	0	0	0	0	5	0	**5**	0
Total	40	784	0	1	0	**825**	0	0	1	645	21	0	**667**	0	6	0	0	23	0	**29**	0
% Approach	4.8%	95.0%	0%	0.1%	0%	**-**	-	0%	0.1%	96.7%	3.1%	0%	**-**	-	20.7%	0%	0%	79.3%	0%	**-**	-
% Total	2.6%	51.3%	0%	0.1%	0%	**54.0%**	-	0%	0.1%	42.2%	1.4%	0%	**43.7%**	-	0.4%	0%	0%	1.5%	0%	**1.9%**	-
PHF	0.345	0.817	-	0.250	-	**0.856**	-	-	0.250	0.809	0.525	-	**0.833**	-	0.375	-	-	0.523	-	**0.483**	-
Motorcycles	0	0	0	0	0	**0**	-	0	0	1	0	0	**1**	-	0	0	0	0	0	**0**	-
% Motorcycles	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	0%	**0%**	-
Lights	40	782	0	1	0	**823**	-	0	1	629	21	0	**651**	-	6	0	0	23	0	**29**	-
% Lights	100%	99.7%	0%	100%	0%	**99.8%**	-	0%	100%	97.5%	100%	0%	**97.6%**	-	100%	0%	0%	100%	0%	**100%**	-
Single-Unit Trucks	0	1	0	0	0	**1**	-	0	0	10	0	0	**10**	-	0	0	0	0	0	**0**	-
% Single-Unit Trucks	0%	0.1%	0%	0%	0%	**0.1%**	-	0%	0%	1.6%	0%	0%	**1.5%**	-	0%	0%	0%	0%	0%	**0%**	-
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	4	0	0	**4**	-	0	0	0	0	0	**0**	-
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0.6%	0%	0%	**0.6%**	-	0%	0%	0%	0%	0%	**0%**	-
Buses	0	1	0	0	0	**1**	-	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-
% Buses	0%	0.1%	0%	0%	0%	**0.1%**	-	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**0%**	-
Bicycles on Road	0	0	0	0	0	**0**	-	0	0	1	0	0	**1**	-	0	0	0	0	0	**0**	-
% Bicycles on Road	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0.2%	0%	0%	**0.1%**	-	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. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

207637-C Washington Street (Route 53) @ Hall... - TMC

Thu Oct 8, 2020
PM Peak (Oct 08 2020 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: 789288, Location: 42.162592, -70.864915

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

Leg Direction	Driveway Westbound							Goodlife Driveway Southwestbound							
Time	L	T	R	HR	U	**App**	Ped*	HL	BL	BR	HR	U	**App**	Ped*	**Int**
2020-10-08 5:00PM	1	0	1	0	0	**2**	0	0	0	0	0	0	**0**	0	**353**
5:15PM	5	0	0	0	0	**5**	0	0	0	0	0	0	**0**	0	**393**
5:30PM	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	**416**
5:45PM	0	0	0	0	0	**0**	0	0	0	0	0	0	**0**	0	**366**
Total	6	0	1	0	0	**7**	0	0	0	0	0	0	**0**	0	**1528**
% Approach	85.7%	0%	14.3%	0%	0%	**-**	-	0%	0%	0%	0%	0%	**-**	-	-
% Total	0.4%	0%	0.1%	0%	0%	**0.5%**	-	0%	0%	0%	0%	0%	**0%**	-	-
PHF	0.300	-	0.250	-	-	**0.350**	-	-	-	-	-	-	**-**	-	0.920
Motorcycles	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	1
% Motorcycles	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**-**	-	0.1%
Lights	6	0	1	0	0	**7**	-	0	0	0	0	0	**0**	-	1510
% Lights	100%	0%	100%	0%	0%	**100%**	-	0%	0%	0%	0%	0%	**-**	-	98.8%
Single-Unit Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	11
% Single-Unit Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**-**	-	0.7%
Articulated Trucks	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	4
% Articulated Trucks	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**-**	-	0.3%
Buses	0	0	0	0	0	**0**	-	0	0	0	0	0	**0**	-	1
% Buses	0%	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**	-	1
% Bicycles on Road	0%	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	0%	**-**	-	0.1%
Pedestrians	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	-	0	-	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Pedestrians and Bicycles on Crosswalk. BL: Bear left, BR: Bear right, HL: Hard left, HR: Hard right, L: Left, R: Right, T: Thru, U: U-Turn

207637-D Washington Street (Route 53) @ Wash... - TMC
Thu Oct 8, 2020
Full Length (6 AM-10 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: 789289, Location: 42.161817, -70.863291

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

Leg	Washington Park Drive						Brantwood Road						Washington Street (Route 53)						Washington Street (Route 53)						
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
2020-10-08 6:00AM	9	0	11	0	**20**	0	4	0	5	0	**9**	1	1	98	3	0	**102**	0	4	174	1	0	**179**	0	**310**
7:00AM	7	0	23	0	**30**	0	10	0	11	0	**21**	2	5	226	5	0	**236**	0	16	404	4	0	**424**	0	**711**
8:00AM	18	0	13	0	**31**	0	3	0	14	0	**17**	3	13	356	8	0	**377**	1	7	548	6	0	**561**	0	**986**
9:00AM	11	0	19	0	**30**	0	8	1	9	0	**18**	0	4	411	10	0	**425**	0	14	470	5	0	**489**	0	**962**
2:00PM	9	1	24	0	**34**	0	4	0	9	0	**13**	0	5	649	9	0	**663**	1	14	593	6	0	**613**	0	**1323**
3:00PM	9	0	22	0	**31**	2	7	0	7	0	**14**	0	9	700	11	0	**720**	0	16	565	12	0	**593**	0	**1358**
4:00PM	15	1	28	0	**44**	0	1	1	8	2	**12**	2	8	669	14	0	**691**	0	18	554	12	0	**584**	0	**1331**
5:00PM	17	0	25	0	**42**	0	7	0	10	0	**17**	1	9	660	14	0	**683**	0	18	804	12	0	**834**	0	**1576**
2020-10-10 10:00AM	13	0	28	0	**41**	0	9	0	4	0	**13**	1	5	469	13	0	**487**	0	6	466	7	0	**479**	0	**1020**
11:00AM	15	0	27	0	**42**	0	9	0	14	0	**23**	4	13	603	10	0	**626**	0	18	546	10	0	**574**	0	**1265**
12:00PM	11	0	28	0	**39**	0	8	1	14	0	**23**	0	17	639	12	0	**668**	0	19	584	10	0	**613**	0	**1343**
1:00PM	13	0	31	0	**44**	0	9	0	5	0	**14**	2	8	690	11	0	**709**	0	17	602	11	0	**630**	0	**1397**
Total	147	2	279	0	**428**	2	79	3	110	2	**194**	16	97	6170	120	0	**6387**	2	167	6310	96	0	**6573**	0	**13582**
% Approach	34.3%	0.5%	65.2%	0%	**-**	-	40.7%	1.5%	56.7%	1.0%	**-**	-	1.5%	96.6%	1.9%	0%	**-**	-	2.5%	96.0%	1.5%	0%	**-**	-	-
% Total	1.1%	0%	2.1%	0%	**3.2%**	-	0.6%	0%	0.8%	0%	**1.4%**	-	0.7%	45.4%	0.9%	0%	**47.0%**	-	1.2%	46.5%	0.7%	0%	**48.4%**	-	-
Motorcycles	1	0	0	0	**1**	-	0	0	0	0	**0**	-	0	16	0	0	**16**	-	2	13	0	0	**15**	-	32
% Motorcycles	0.7%	0%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0.3%	0%	0%	**0.3%**	-	1.2%	0.2%	0%	0%	**0.2%**	-	0.2%
Lights	141	1	272	0	**414**	-	78	2	107	2	**189**	-	96	6046	113	0	**6255**	-	160	6177	94	0	**6431**	-	13289
% Lights	95.9%	50.0%	97.5%	0%	**96.7%**	-	98.7%	66.7%	97.3%	100%	**97.4%**	-	99.0%	98.0%	94.2%	0%	**97.9%**	-	95.8%	97.9%	97.9%	0%	**97.8%**	-	97.8%
Single-Unit Trucks	5	1	2	0	**8**	-	1	1	2	0	**4**	-	1	81	2	0	**84**	-	3	86	2	0	**91**	-	187
% Single-Unit Trucks	3.4%	50.0%	0.7%	0%	**1.9%**	-	1.3%	33.3%	1.8%	0%	**2.1%**	-	1.0%	1.3%	1.7%	0%	**1.3%**	-	1.8%	1.4%	2.1%	0%	**1.4%**	-	1.4%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	11	0	0	**11**	-	1	15	0	0	**16**	-	27
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.2%**	-	0.6%	0.2%	0%	0%	**0.2%**	-	0.2%
Buses	0	0	5	0	**5**	-	0	0	0	0	**0**	-	0	13	5	0	**18**	-	1	18	0	0	**19**	-	42
% Buses	0%	0%	1.8%	0%	**1.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0.2%	4.2%	0%	**0.3%**	-	0.6%	0.3%	0%	0%	**0.3%**	-	0.3%
Bicycles on Road	0	0	0	0	**0**	-	0	0	1	0	**1**	-	0	3	0	0	**3**	-	0	1	0	0	**1**	-	5
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0.9%	0%	**0.5%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	2	-	-	-	-	-	13	-	-	-	-	-	2	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	81.3%	-	-	-	-	-	100%	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	18.8%	-	-	-	-	-	0%	-	-	-	-	-	-	-

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

207637-D Washington Street (Route 53) @ Wash... - TMC
Thu Oct 8, 2020
AM Peak (Oct 08 2020 8:15AM - 9:15 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 789289, Location: 42.161817, -70.863291

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

Leg	Washington Park Drive						Brantwood Road						Washington Street (Route 53)						Washington Street (Route 53)						
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
2020-10-08 8:15AM	5	0	2	0	**7**	0	1	0	1	0	**2**	0	2	83	2	0	**87**	0	2	145	4	0	**151**	0	**247**
8:30AM	6	0	3	0	**9**	0	1	0	3	0	**4**	3	5	74	2	0	**81**	0	2	129	0	0	**131**	0	**225**
8:45AM	3	0	7	0	**10**	0	1	0	6	0	**7**	0	6	132	0	0	**138**	0	2	157	1	0	**160**	0	**315**
9:00AM	1	0	7	0	**8**	0	3	0	3	0	**6**	0	2	113	2	0	**117**	0	2	138	0	0	**140**	0	**271**
Total	15	0	19	0	**34**	0	6	0	13	0	**19**	3	15	402	6	0	**423**	0	8	569	5	0	**582**	0	**1058**
% Approach	44.1%	0%	55.9%	0%	-	-	31.6%	0%	68.4%	0%	-	-	3.5%	95.0%	1.4%	0%	-	-	1.4%	97.8%	0.9%	0%	-	-	-
% Total	1.4%	0%	1.8%	0%	**3.2%**	-	0.6%	0%	1.2%	0%	**1.8%**	-	1.4%	38.0%	0.6%	0%	**40.0%**	-	0.8%	53.8%	0.5%	0%	**55.0%**	-	-
PHF	0.625	-	0.679	-	**0.850**	-	0.500	-	0.542	-	**0.679**	-	0.625	0.761	0.750	-	**0.766**	-	1.000	0.906	0.313	-	**0.909**	-	0.840
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	1	0	0	**1**	-	2
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.2%**	-	0%	0.2%	0%	0%	**0.2%**	-	0.2%
Lights	14	0	19	0	**33**	-	6	0	13	0	**19**	-	15	389	5	0	**409**	-	7	545	5	0	**557**	-	1018
% Lights	93.3%	0%	100%	0%	**97.1%**	-	100%	0%	100%	0%	**100%**	-	100%	96.8%	83.3%	0%	**96.7%**	-	87.5%	95.8%	100%	0%	**95.7%**	-	96.2%
Single-Unit Trucks	1	0	0	0	**1**	-	0	0	0	0	**0**	-	0	10	0	0	**10**	-	1	11	0	0	**12**	-	23
% Single-Unit Trucks	6.7%	0%	0%	0%	**2.9%**	-	0%	0%	0%	0%	**0%**	-	0%	2.5%	0%	0%	**2.4%**	-	12.5%	1.9%	0%	0%	**2.1%**	-	2.2%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	4	0	0	**4**	-	4
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.7%	0%	0%	**0.7%**	-	0.4%
Buses	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	2	1	0	**3**	-	0	8	0	0	**8**	-	11
% Buses	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.5%	16.7%	0%	**0.7%**	-	0%	1.4%	0%	0%	**1.4%**	-	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	-	-	-	-	-	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

207637-D Washington Street (Route 53) @ Wash... - TMC

Thu Oct 8, 2020
PM Peak (Oct 08 2020 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: 789289, Location: 42.161817, -70.863291

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

Leg / Direction	Washington Park Drive Northbound						Brantwood Road Southbound						Washington Street (Route 53) Eastbound						Washington Street (Route 53) 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
2020-10-08 5:00PM	4	0	6	0	**10**	0	1	0	2	0	**3**	1	2	199	4	0	**205**	0	6	139	2	0	**147**	0	**365**
5:15PM	8	0	10	0	**18**	0	5	0	4	0	**9**	0	2	157	6	0	**165**	0	2	215	3	0	**220**	0	**412**
5:30PM	3	0	4	0	**7**	0	0	0	0	0	**0**	0	3	164	1	0	**168**	0	7	237	5	0	**249**	0	**424**
5:45PM	2	0	5	0	**7**	0	1	0	4	0	**5**	0	2	140	3	0	**145**	0	3	213	2	0	**218**	0	**375**
Total	17	0	25	0	**42**	0	7	0	10	0	**17**	1	9	660	14	0	**683**	0	18	804	12	0	**834**	0	**1576**
% Approach	40.5%	0%	59.5%	0%	-	-	41.2%	0%	58.8%	0%	-	-	1.3%	96.6%	2.0%	0%	-	-	2.2%	96.4%	1.4%	0%	-	-	-
% Total	1.1%	0%	1.6%	0%	**2.7%**	-	0.4%	0%	0.6%	0%	**1.1%**	-	0.6%	41.9%	0.9%	0%	**43.3%**	-	1.1%	51.0%	0.8%	0%	**52.9%**	-	-
PHF	0.531	-	0.625	-	**0.583**	-	0.350	-	0.625	-	**0.472**	-	0.750	0.828	0.583	-	**0.832**	-	0.643	0.848	0.600	-	**0.837**	-	0.931
Motorcycles	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	1
% Motorcycles	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	17	0	25	0	**42**	-	7	0	10	0	**17**	-	9	648	14	0	**671**	-	18	803	12	0	**833**	-	1563
% Lights	100%	0%	100%	0%	**100%**	-	100%	0%	100%	0%	**100%**	-	100%	98.2%	100%	0%	**98.2%**	-	100%	99.9%	100%	0%	**99.9%**	-	99.2%
Single-Unit Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	9	0	0	**9**	-	0	1	0	0	**1**	-	10
% Single-Unit Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	1.4%	0%	0%	**1.3%**	-	0%	0.1%	0%	0%	**0.1%**	-	0.6%
Articulated Trucks	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Buses	0	0	0	0	**0**	-	0	0	0	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%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
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%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0.1%
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

207637-EWashington Street (Route 53) @ Jaco... - TMC
Thu Oct 8, 2020
Full Length (6 AM-10 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: 789290, Location: 42.159485, -70.853803

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

Leg / Direction	Washington Street (Route 53) Northbound						Washington Street (Route 53) Southbound						Stop & Shop Driveway Eastbound						Jacobs Trail 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
2020-10-08 6:00AM	21	196	1	0	**218**	0	1	110	8	0	**119**	0	8	0	4	0	**12**	0	10	0	5	0	**15**	0	**364**
7:00AM	26	447	8	0	**481**	0	4	252	14	0	**270**	0	16	1	18	0	**35**	0	13	3	11	0	**27**	0	**813**
8:00AM	33	625	11	0	**669**	3	12	357	25	0	**394**	0	31	4	31	0	**66**	1	21	5	9	0	**35**	4	**1164**
9:00AM	34	529	8	0	**571**	0	2	430	36	0	**468**	0	28	0	35	0	**63**	1	13	1	7	0	**21**	2	**1123**
2:00PM	65	608	19	0	**692**	2	6	661	72	0	**739**	0	53	3	81	0	**137**	0	17	2	10	0	**29**	0	**1597**
3:00PM	66	609	22	0	**697**	1	5	723	71	0	**799**	0	63	4	78	0	**145**	1	11	5	10	0	**26**	1	**1667**
4:00PM	79	607	17	0	**703**	1	7	717	91	0	**815**	0	64	5	96	0	**165**	1	14	3	9	0	**26**	1	**1709**
5:00PM	56	850	18	0	**924**	0	11	670	76	0	**757**	0	48	2	61	0	**111**	0	7	3	6	0	**16**	0	**1808**
2020-10-10 10:00AM	70	490	14	0	**574**	0	9	496	49	0	**554**	0	50	4	51	0	**105**	0	14	4	6	0	**24**	1	**1257**
11:00AM	67	580	13	0	**660**	0	13	607	72	0	**692**	0	50	4	63	0	**117**	0	24	4	11	0	**39**	8	**1508**
12:00PM	69	593	19	0	**681**	2	11	683	44	0	**738**	0	49	7	81	0	**137**	0	16	2	13	0	**31**	3	**1587**
1:00PM	67	625	16	0	**708**	1	7	711	63	0	**781**	0	51	4	54	0	**109**	0	14	5	12	0	**31**	0	**1629**
Total	653	6759	166	0	**7578**	10	88	6417	621	0	**7126**	0	511	38	653	0	**1202**	4	174	37	109	0	**320**	20	**16226**
% Approach	8.6%	89.2%	2.2%	0%	**-**	-	1.2%	90.1%	8.7%	0%	**-**	-	42.5%	3.2%	54.3%	0%	**-**	-	54.4%	11.6%	34.1%	0%	**-**	-	-
% Total	4.0%	41.7%	1.0%	0%	**46.7%**	-	0.5%	39.5%	3.8%	0%	**43.9%**	-	3.1%	0.2%	4.0%	0%	**7.4%**	-	1.1%	0.2%	0.7%	0%	**2.0%**	-	-
Motorcycles	0	10	0	0	**10**	-	0	12	0	0	**12**	-	1	0	0	0	**1**	-	0	1	0	0	**1**	-	24
% Motorcycles	0%	0.1%	0%	0%	**0.1%**	-	0%	0.2%	0%	0%	**0.2%**	-	0.2%	0%	0%	0%	**0.1%**	-	0%	2.7%	0%	0%	**0.3%**	-	0.1%
Lights	644	6633	162	0	**7439**	-	84	6292	615	0	**6991**	-	501	38	644	0	**1183**	-	171	36	102	0	**309**	-	15922
% Lights	98.6%	98.1%	97.6%	0%	**98.2%**	-	95.5%	98.1%	99.0%	0%	**98.1%**	-	98.0%	100%	98.6%	0%	**98.4%**	-	98.3%	97.3%	93.6%	0%	**96.6%**	-	98.1%
Single-Unit Trucks	8	79	4	0	**91**	-	4	76	3	0	**83**	-	8	0	7	0	**15**	-	3	0	5	0	**8**	-	197
% Single-Unit Trucks	1.2%	1.2%	2.4%	0%	**1.2%**	-	4.5%	1.2%	0.5%	0%	**1.2%**	-	1.6%	0%	1.1%	0%	**1.2%**	-	1.7%	0%	4.6%	0%	**2.5%**	-	1.2%
Articulated Trucks	1	15	0	0	**16**	-	0	12	3	0	**15**	-	1	0	2	0	**3**	-	0	0	0	0	**0**	-	34
% Articulated Trucks	0.2%	0.2%	0%	0%	**0.2%**	-	0%	0.2%	0.5%	0%	**0.2%**	-	0.2%	0%	0.3%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Buses	0	19	0	0	**19**	-	0	21	0	0	**21**	-	0	0	0	0	**0**	-	0	0	2	0	**2**	-	42
% Buses	0%	0.3%	0%	0%	**0.3%**	-	0%	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	1.8%	0%	**0.6%**	-	0.3%
Bicycles on Road	0	3	0	0	**3**	-	0	4	0	0	**4**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	7
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	10	-	-	-	-	-	0	-	-	-	-	-	3	-	-	-	-	-	16	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	75.0%	-	-	-	-	-	80.0%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	4	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	25.0%	-	-	-	-	-	20.0%	-

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

207637-E Washington Street (Route 53) @ Jaco... - TMC

Thu Oct 8, 2020
AM Peak (Oct 08 2020 8:45AM - 9:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 789290, Location: 42.159485, -70.853803

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						Stop & Shop Driveway						Jacobs Trail						
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
2020-10-08 8:45AM	9	181	4	0	**194**	0	6	125	5	0	**136**	0	10	1	9	0	**20**	0	2	0	4	0	**6**	1	**356**
9:00AM	13	148	0	0	**161**	0	1	108	10	0	**119**	0	9	0	11	0	**20**	0	6	0	2	0	**8**	0	**308**
9:15AM	6	121	1	0	**128**	0	0	111	8	0	**119**	0	8	0	7	0	**15**	0	3	0	3	0	**6**	0	**268**
9:30AM	6	136	5	0	**147**	0	0	107	7	0	**114**	0	8	0	12	0	**20**	0	3	0	2	0	**5**	2	**286**
Total	34	586	10	0	**630**	0	7	451	30	0	**488**	0	35	1	39	0	**75**	0	14	0	11	0	**25**	3	**1218**
% Approach	5.4%	93.0%	1.6%	0%	**-**	-	1.4%	92.4%	6.1%	0%	**-**	-	46.7%	1.3%	52.0%	0%	**-**	-	56.0%	0%	44.0%	0%	**-**	-	**-**
% Total	2.8%	48.1%	0.8%	0%	**51.7%**	-	0.6%	37.0%	2.5%	0%	**40.1%**	-	2.9%	0.1%	3.2%	0%	**6.2%**	-	1.1%	0%	0.9%	0%	**2.1%**	-	**-**
PHF	0.654	0.809	0.500	-	**0.812**	-	0.292	0.900	0.750	-	**0.895**	-	0.875	0.250	0.813	-	**0.938**	-	0.583	-	0.688	-	**0.781**	-	0.855
Motorcycles	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Motorcycles	0%	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Lights	33	562	10	0	**605**	-	7	428	30	0	**465**	-	32	1	38	0	**71**	-	14	0	10	0	**24**	-	1165
% Lights	97.1%	95.9%	100%	0%	**96.0%**	-	100%	94.9%	100%	0%	**95.3%**	-	91.4%	100%	97.4%	0%	**94.7%**	-	100%	0%	90.9%	0%	**96.0%**	-	95.6%
Single-Unit Trucks	1	17	0	0	**18**	-	0	17	0	0	**17**	-	3	0	1	0	**4**	-	0	0	1	0	**1**	-	40
% Single-Unit Trucks	2.9%	2.9%	0%	0%	**2.9%**	-	0%	3.8%	0%	0%	**3.5%**	-	8.6%	0%	2.6%	0%	**5.3%**	-	0%	0%	9.1%	0%	**4.0%**	-	3.3%
Articulated Trucks	0	6	0	0	**6**	-	0	2	0	0	**2**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	8
% Articulated Trucks	0%	1.0%	0%	0%	**1.0%**	-	0%	0.4%	0%	0%	**0.4%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.7%
Buses	0	0	0	0	**0**	-	0	3	0	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Buses	0%	0%	0%	0%	**0%**	-	0%	0.7%	0%	0%	**0.6%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Bicycles on Road	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	
% 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

207637-E Washington Street (Route 53) @ Jaco... - TMC

Thu Oct 8, 2020

PM Peak (Oct 08 2020 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: 789290, Location: 42.159485, -70.853803

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						Stop & Shop Driveway						Jacobs Trail						
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
2020-10-08 5:00PM	5	144	3	0	**152**	0	3	199	24	0	**226**	0	11	0	16	0	**27**	0	2	0	1	0	**3**	0	**408**
5:15PM	15	229	8	0	**252**	0	1	172	16	0	**189**	0	10	1	13	0	**24**	0	2	1	0	0	**3**	0	**468**
5:30PM	17	252	5	0	**274**	0	4	157	17	0	**178**	0	16	0	14	0	**30**	0	2	1	3	0	**6**	0	**488**
5:45PM	19	225	2	0	**246**	0	3	142	19	0	**164**	0	11	1	18	0	**30**	0	1	1	2	0	**4**	0	**444**
Total	56	850	18	0	**924**	0	11	670	76	0	**757**	0	48	2	61	0	**111**	0	7	3	6	0	**16**	0	**1808**
% Approach	6.1%	92.0%	1.9%	0%	-	-	1.5%	88.5%	10.0%	0%	-	-	43.2%	1.8%	55.0%	0%	-	-	43.8%	18.8%	37.5%	0%	-	-	-
% Total	3.1%	47.0%	1.0%	0%	**51.1%**	-	0.6%	37.1%	4.2%	0%	**41.9%**	-	2.7%	0.1%	3.4%	0%	**6.1%**	-	0.4%	0.2%	0.3%	0%	**0.9%**	-	-
PHF	0.737	0.843	0.563		**0.843**	-	0.688	0.839	0.792		**0.835**	-	0.750	0.500	0.847		**0.925**	-	0.875	0.750	0.500		**0.667**	-	0.927
Motorcycles	0	0	0	0	**0**	-	0	0	0	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%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Lights	56	849	18	0	**923**	-	10	656	75	0	**741**	-	48	2	60	0	**110**	-	7	3	6	0	**16**	-	1790
% Lights	100%	99.9%	100%	0%	**99.9%**	-	90.9%	97.9%	98.7%	0%	**97.9%**	-	100%	100%	98.4%	0%	**99.1%**	-	100%	100%	100%	0%	**100%**	-	99.0%
Single-Unit Trucks	0	1	0	0	**1**	-	1	11	0	0	**12**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	13
% Single-Unit Trucks	0%	0.1%	0%	0%	**0.1%**	-	9.1%	1.6%	0%	0%	**1.6%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.7%
Articulated Trucks	0	0	0	0	**0**	-	0	0	1	0	**1**	-	0	0	1	0	**1**	-	0	0	0	0	**0**	-	2
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0%	1.3%	0%	**0.1%**	-	0%	0%	1.6%	0%	**0.9%**	-	0%	0%	0%	0%	**0%**	-	0.1%
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%	0.1%	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	2	0	0	**2**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	2
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0.3%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

207637-F Washington Street (Route 53) @ Assi... - TMC
Thu Oct 8, 2020
Full Length (10 AM-2 PM, 6 AM-10 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: 789291, Location: 42.157695, -70.851389

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						Driveway						Assinippi Avenue						
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
2020-10-08 6:00AM	1	179	15	1	**196**	0	41	82	0	0	**123**	0	0	0	0	0	**0**	0	1	0	37	0	**38**	0	**357**
7:00AM	3	369	16	0	**388**	0	85	192	3	0	**280**	0	0	1	1	0	**2**	0	3	2	111	0	**116**	0	**786**
8:00AM	4	492	21	0	**517**	0	88	319	0	0	**407**	0	3	3	3	0	**9**	0	10	2	179	0	**191**	1	**1124**
9:00AM	9	435	25	0	**469**	0	92	372	11	0	**475**	0	4	6	8	0	**18**	1	6	4	141	0	**151**	3	**1113**
2:00PM	3	515	18	1	**537**	1	186	573	4	0	**763**	0	0	0	9	0	**9**	1	7	0	193	0	**200**	4	**1509**
3:00PM	8	524	13	0	**545**	0	196	600	4	0	**800**	0	2	0	14	0	**16**	0	10	0	166	0	**176**	0	**1537**
4:00PM	6	501	11	0	**518**	0	196	631	6	0	**833**	0	1	2	8	1	**12**	0	6	0	197	0	**203**	0	**1566**
5:00PM	4	777	10	0	**791**	0	193	559	2	0	**754**	0	0	1	8	0	**9**	0	4	0	167	0	**171**	0	**1725**
2020-10-10 10:00AM	5	439	24	0	**468**	0	117	446	4	0	**567**	0	3	3	8	0	**14**	0	10	1	137	0	**148**	0	**1197**
11:00AM	6	488	22	0	**516**	0	141	570	3	0	**714**	0	5	1	3	2	**11**	1	10	0	175	0	**185**	0	**1426**
12:00PM	3	531	21	0	**555**	0	171	606	3	0	**780**	0	1	1	6	0	**8**	0	13	0	156	0	**169**	3	**1512**
1:00PM	7	561	18	0	**586**	0	157	650	2	0	**809**	0	3	0	14	0	**17**	0	7	1	149	0	**157**	0	**1569**
Total	59	5811	214	2	**6086**	1	1663	5600	42	0	**7305**	0	22	18	82	3	**125**	3	87	10	1808	0	**1905**	11	**15421**
% Approach	1.0%	95.5%	3.5%	0%	**-**	-	22.8%	76.7%	0.6%	0%	**-**	-	17.6%	14.4%	65.6%	2.4%	**-**	-	4.6%	0.5%	94.9%	0%	**-**	-	-
% Total	0.4%	37.7%	1.4%	0%	**39.5%**	-	10.8%	36.3%	0.3%	0%	**47.4%**	-	0.1%	0.1%	0.5%	0%	**0.8%**	-	0.6%	0.1%	11.7%	0%	**12.4%**	-	-
Motorcycles	0	13	1	0	**14**	-	0	16	0	0	**16**	-	0	0	0	0	**0**	-	0	0	2	0	**2**	-	32
% Motorcycles	0%	0.2%	0.5%	0%	**0.2%**	-	0%	0.3%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.1%	0%	**0.1%**	-	0.2%
Lights	53	5714	211	2	**5980**	-	1638	5485	41	0	**7164**	-	22	17	73	3	**115**	-	86	9	1757	0	**1852**	-	15111
% Lights	89.8%	98.3%	98.6%	100%	**98.3%**	-	98.5%	97.9%	97.6%	0%	**98.1%**	-	100%	94.4%	89.0%	100%	**92.0%**	-	98.9%	90.0%	97.2%	0%	**97.2%**	-	98.0%
Single-Unit Trucks	6	66	2	0	**74**	-	11	79	1	0	**91**	-	0	1	9	0	**10**	-	1	1	28	0	**30**	-	205
% Single-Unit Trucks	10.2%	1.1%	0.9%	0%	**1.2%**	-	0.7%	1.4%	2.4%	0%	**1.2%**	-	0%	5.6%	11.0%	0%	**8.0%**	-	1.1%	10.0%	1.5%	0%	**1.6%**	-	1.3%
Articulated Trucks	0	12	0	0	**12**	-	2	10	0	0	**12**	-	0	0	0	0	**0**	-	0	0	3	0	**3**	-	27
% Articulated Trucks	0%	0.2%	0%	0%	**0.2%**	-	0.1%	0.2%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.2%	0%	**0.2%**	-	0.2%
Buses	0	4	0	0	**4**	-	12	8	0	0	**20**	-	0	0	0	0	**0**	-	0	0	16	0	**16**	-	40
% Buses	0%	0.1%	0%	0%	**0.1%**	-	0.7%	0.1%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.9%	0%	**0.8%**	-	0.3%
Bicycles on Road	0	2	0	0	**2**	-	0	2	0	0	**2**	-	0	0	0	0	**0**	-	0	0	2	0	**2**	-	6
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.1%	0%	**0.1%**	-	0%
Pedestrians	-	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	9	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	66.7%	-	-	-	-	-	81.8%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-	-	-	-	2	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	33.3%	-	-	-	-	-	18.2%	-

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

207637-F Washington Street (Route 53) @ Assi... - TMC

Thu Oct 8, 2020
AM Peak (Oct 08 2020 8:45AM - 9:45 AM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 789291, Location: 42.157695, -70.851389

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						Driveway						Assinippi Avenue						
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
2020-10-08 8:45AM	2	124	6	0	**132**	0	35	106	0	0	**141**	0	0	0	1	0	**1**	0	2	0	59	0	**61**	0	**335**
9:00AM	2	120	9	0	**131**	0	30	94	2	0	**126**	0	2	0	1	0	**3**	0	0	2	44	0	**46**	1	**306**
9:15AM	5	97	3	0	**105**	0	21	97	2	0	**120**	0	1	3	1	0	**5**	0	2	1	33	0	**36**	1	**266**
9:30AM	2	111	8	0	**121**	0	30	88	4	0	**122**	0	0	3	4	0	**7**	0	1	1	35	0	**37**	1	**287**
Total	11	452	26	0	**489**	0	116	385	8	0	**509**	0	3	6	7	0	**16**	0	5	4	171	0	**180**	3	**1194**
% Approach	2.2%	92.4%	5.3%	0%	**-**	-	22.8%	75.6%	1.6%	0%	**-**	-	18.8%	37.5%	43.8%	0%	**-**	-	2.8%	2.2%	95.0%	0%	**-**	-	**-**
% Total	0.9%	37.9%	2.2%	0%	**41.0%**	-	9.7%	32.2%	0.7%	0%	**42.6%**	-	0.3%	0.5%	0.6%	0%	**1.3%**	-	0.4%	0.3%	14.3%	0%	**15.1%**	-	**-**
PHF	0.550	0.911	0.722	-	**0.926**	-	0.829	0.908	0.500	-	**0.902**	-	0.375	0.500	0.438	-	**0.571**	-	0.625	0.500	0.720	-	**0.734**	-	0.890
Motorcycles	0	1	0	0	**1**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	2
% Motorcycles	0%	0.2%	0%	0%	**0.2%**	-	0%	0.3%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Lights	10	429	25	0	**464**	-	115	363	8	0	**486**	-	3	5	6	0	**14**	-	5	3	168	0	**176**	-	1140
% Lights	90.9%	94.9%	96.2%	0%	**94.9%**	-	99.1%	94.3%	100%	0%	**95.5%**	-	100%	83.3%	85.7%	0%	**87.5%**	-	100%	75.0%	98.2%	0%	**97.8%**	-	95.5%
Single-Unit Trucks	1	15	1	0	**17**	-	1	14	0	0	**15**	-	0	1	1	0	**2**	-	0	1	2	0	**3**	-	37
% Single-Unit Trucks	9.1%	3.3%	3.8%	0%	**3.5%**	-	0.9%	3.6%	0%	0%	**2.9%**	-	0%	16.7%	14.3%	0%	**12.5%**	-	0%	25.0%	1.2%	0%	**1.7%**	-	3.1%
Articulated Trucks	0	7	0	0	**7**	-	0	4	0	0	**4**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	11
% Articulated Trucks	0%	1.5%	0%	0%	**1.4%**	-	0%	1.0%	0%	0%	**0.8%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.9%
Buses	0	0	0	0	**0**	-	0	3	0	0	**3**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	3
% Buses	0%	0%	0%	0%	**0%**	-	0%	0.8%	0%	0%	**0.6%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.3%
Bicycles on Road	0	0	0	0	**0**	-	0	0	0	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%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0.6%	0%	**0.6%**	-	0.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	
% 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

207637-F Washington Street (Route 53) @ Assi... - TMC

Thu Oct 8, 2020

PM Peak (Oct 08 2020 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: 789291, Location: 42.157695, -70.851389

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

Leg	Washington Street (Route 53)						Washington Street (Route 53)						Driveway						Assinippi Avenue						
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**
2020-10-08 5:00PM	1	111	3	0	**115**	0	50	169	1	0	**220**	0	0	1	4	0	**5**	0	0	0	42	0	**42**	0	**382**
5:15PM	1	227	1	0	**229**	0	46	147	0	0	**193**	0	0	0	1	0	**1**	0	2	0	38	0	**40**	0	**463**
5:30PM	0	238	2	0	**240**	0	48	124	1	0	**173**	0	0	0	0	0	**0**	0	0	0	42	0	**42**	0	**455**
5:45PM	2	201	4	0	**207**	0	49	119	0	0	**168**	0	0	0	3	0	**3**	0	2	0	45	0	**47**	0	**425**
Total	4	777	10	0	**791**	0	193	559	2	0	**754**	0	0	1	8	0	**9**	0	4	0	167	0	**171**	0	**1725**
% Approach	0.5%	98.2%	1.3%	0%	-	-	25.6%	74.1%	0.3%	0%	-	-	0%	11.1%	88.9%	0%	-	-	2.3%	0%	97.7%	0%	-	-	-
% Total	0.2%	45.0%	0.6%	0%	**45.9%**	-	11.2%	32.4%	0.1%	0%	**43.7%**	-	0%	0.1%	0.5%	0%	**0.5%**	-	0.2%	0%	9.7%	0%	**9.9%**	-	-
PHF	0.500	0.816	0.625	-	**0.824**	-	0.965	0.825	0.500	-	**0.856**	-	-	0.250	0.500	-	**0.450**	-	0.500	-	0.928	-	**0.910**	-	0.931
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	4	773	10	0	**787**	-	193	546	2	0	**741**	-	0	1	8	0	**9**	-	4	0	167	0	**171**	-	1708
% Lights	100%	99.5%	100%	0%	**99.5%**	-	100%	97.7%	100%	0%	**98.3%**	-	0%	100%	100%	0%	**100%**	-	100%	0%	100%	0%	**100%**	-	99.0%
Single-Unit Trucks	0	3	0	0	**3**	-	0	10	0	0	**10**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	13
% Single-Unit Trucks	0%	0.4%	0%	0%	**0.4%**	-	0%	1.8%	0%	0%	**1.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.8%
Articulated Trucks	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Articulated Trucks	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Buses	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Buses	0%	0.1%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Bicycles on Road	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	0	0	0	0	**0**	-	1
% Bicycles on Road	0%	0%	0%	0%	**0%**	-	0%	0.2%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%
Pedestrians	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

APPENDIX F

Turning Movement Counts
Route 53 at Pond Street in Norwell
September 26, 2019

TM-1 (Route 53 @ Route 228) TMC - TMC
Thu Sep 26, 2019
Full Length (6 AM-9 AM, 3 PM-6 PM, 11 AM-2 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 699165, Location: 42.174643, -70.884978, Site Code: 197188

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

Leg	Main Street (Route 228)						Washington Street (Route 53)						Pond Street (Route 228)						Whiting Street (Route 53)						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2019-09-26 6:00AM	30	155	57	0	**242**	0	143	641	94	0	**878**	0	63	283	115	0	**461**	0	36	111	28	0	**175**	0	**1756**
7:00AM	73	290	171	0	**534**	0	242	742	155	0	**1139**	1	60	395	153	0	**608**	1	98	294	77	0	**469**	0	**2750**
8:00AM	81	334	261	0	**676**	0	219	707	186	0	**1112**	0	118	344	130	0	**592**	0	132	395	53	0	**580**	0	**2960**
3:00PM	86	460	276	0	**822**	1	228	564	190	0	**982**	3	301	343	186	0	**830**	0	167	708	82	0	**957**	0	**3591**
4:00PM	58	485	306	0	**849**	0	225	534	192	0	**951**	0	344	337	210	0	**891**	0	133	755	73	0	**961**	0	**3652**
5:00PM	56	452	260	0	**768**	0	290	574	182	0	**1046**	0	275	374	205	0	**854**	0	161	794	104	0	**1059**	0	**3727**
2019-09-28 11:00AM	93	348	180	0	**621**	0	214	653	208	0	**1075**	1	223	395	229	0	**847**	3	154	620	100	0	**874**	0	**3417**
12:00PM	84	425	224	0	**733**	1	238	792	190	0	**1220**	1	198	370	238	1	**807**	4	168	626	96	0	**890**	1	**3650**
1:00PM	88	341	204	0	**633**	0	214	812	185	0	**1211**	0	211	348	230	0	**789**	1	140	637	79	0	**856**	0	**3489**
Total	649	3290	1939	0	**5878**	2	2013	6019	1582	0	**9614**	6	1793	3189	1696	1	**6679**	9	1189	4940	692	0	**6821**	1	**28992**
% Approach	11.0%	56.0%	33.0%	0%	**-**	-	20.9%	62.6%	16.5%	0%	**-**	-	26.8%	47.7%	25.4%	0%	**-**	-	17.4%	72.4%	10.1%	0%	**-**	-	**-**
% Total	2.2%	11.3%	6.7%	0%	**20.3%**	-	6.9%	20.8%	5.5%	0%	**33.2%**	-	6.2%	11.0%	5.8%	0%	**23.0%**	-	4.1%	17.0%	2.4%	0%	**23.5%**	-	**-**
Motorcycles	5	9	7	0	**21**	-	1	8	3	0	**12**	-	5	13	4	0	**22**	-	6	17	1	0	**24**	-	79
% Motorcycles	0.8%	0.3%	0.4%	0%	**0.4%**	-	0%	0.1%	0.2%	0%	**0.1%**	-	0.3%	0.4%	0.2%	0%	**0.3%**	-	0.5%	0.3%	0.1%	0%	**0.4%**	-	0.3%
Lights	622	3186	1902	0	**5710**	-	1981	5953	1554	0	**9488**	-	1740	3056	1663	1	**6460**	-	1168	4875	665	0	**6708**	-	28366
% Lights	95.8%	96.8%	98.1%	0%	**97.1%**	-	98.4%	98.9%	98.2%	0%	**98.7%**	-	97.0%	95.8%	98.1%	100%	**96.7%**	-	98.2%	98.7%	96.1%	0%	**98.3%**	-	97.8%
Single-Unit Trucks	8	65	22	0	**95**	-	20	48	21	0	**89**	-	42	75	25	0	**142**	-	13	42	12	0	**67**	-	393
% Single-Unit Trucks	1.2%	2.0%	1.1%	0%	**1.6%**	-	1.0%	0.8%	1.3%	0%	**0.9%**	-	2.3%	2.4%	1.5%	0%	**2.1%**	-	1.1%	0.9%	1.7%	0%	**1.0%**	-	1.4%
Articulated Trucks	6	23	3	0	**32**	-	6	6	4	0	**16**	-	5	37	3	0	**45**	-	2	4	7	0	**13**	-	106
% Articulated Trucks	0.9%	0.7%	0.2%	0%	**0.5%**	-	0.3%	0.1%	0.3%	0%	**0.2%**	-	0.3%	1.2%	0.2%	0%	**0.7%**	-	0.2%	0.1%	1.0%	0%	**0.2%**	-	0.4%
Buses	7	6	5	0	**18**	-	4	4	0	0	**8**	-	0	7	1	0	**8**	-	0	2	7	0	**9**	-	43
% Buses	1.1%	0.2%	0.3%	0%	**0.3%**	-	0.2%	0.1%	0%	0%	**0.1%**	-	0%	0.2%	0.1%	0%	**0.1%**	-	0%	0%	1.0%	0%	**0.1%**	-	0.1%
Bicycles on Road	1	1	0	0	**2**	-	1	0	0	0	**1**	-	1	1	0	0	**2**	-	0	0	0	0	**0**	-	5
% Bicycles on Road	0.2%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0.1%	0%	0%	0%	**0%**	-	0%	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	-	2	-	-	-	-	-	6	-	-	-	-	-	9	-	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-

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

TM-1 (Route 53 @ Route 228) TMC - TMC
Thu Sep 26, 2019
AM Peak (Sep 26 2019 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: 699165, Location: 42.174643, -70.884978, Site Code: 197188

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

Leg / Direction	Main Street (Route 228) Southbound						Washington Street (Route 53) Westbound						Pond Street (Route 228) Northbound						Whiting Street (Route 53) Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2019-09-26 7:45AM	11	79	57	0	**147**	0	49	177	50	0	**276**	0	19	91	47	0	**157**	0	28	112	11	0	**151**	0	**731**
8:00AM	15	84	74	0	**173**	0	49	184	53	0	**286**	0	35	85	40	0	**160**	0	25	109	11	0	**145**	0	**764**
8:15AM	14	84	55	0	**153**	0	70	177	39	0	**286**	0	22	87	31	0	**140**	0	39	94	18	0	**151**	0	**730**
8:30AM	23	82	58	0	**163**	0	49	191	46	0	**286**	0	29	88	26	0	**143**	0	33	98	14	0	**145**	0	**737**
Total	63	329	244	0	**636**	0	217	729	188	0	**1134**	0	105	351	144	0	**600**	0	125	413	54	0	**592**	0	**2962**
% Approach	9.9%	51.7%	38.4%	0%	**-**	-	19.1%	64.3%	16.6%	0%	**-**	-	17.5%	58.5%	24.0%	0%	**-**	-	21.1%	69.8%	9.1%	0%	**-**	-	-
% Total	2.1%	11.1%	8.2%	0%	**21.5%**	-	7.3%	24.6%	6.3%	0%	**38.3%**	-	3.5%	11.9%	4.9%	0%	**20.3%**	-	4.2%	13.9%	1.8%	0%	**20.0%**	-	-
PHF	0.685	0.979	0.824	-	**0.919**	-	0.775	0.954	0.887	-	**0.991**	-	0.750	0.964	0.766	-	**0.938**	-	0.801	0.922	0.750	-	**0.980**	-	0.969
Motorcycles	0	0	0	0	**0**	-	1	1	0	0	**2**	-	0	1	0	0	**1**	-	0	2	0	0	**2**	-	5
% Motorcycles	0%	0%	0%	0%	**0%**	-	0.5%	0.1%	0%	0%	**0.2%**	-	0%	0.3%	0%	0%	**0.2%**	-	0%	0.5%	0%	0%	**0.3%**	-	0.2%
Lights	60	314	241	0	**615**	-	203	717	182	0	**1102**	-	90	314	137	0	**541**	-	124	397	50	0	**571**	-	2829
% Lights	95.2%	95.4%	98.8%	0%	**96.7%**	-	93.5%	98.4%	96.8%	0%	**97.2%**	-	85.7%	89.5%	95.1%	0%	**90.2%**	-	99.2%	96.1%	92.6%	0%	**96.5%**	-	95.5%
Single-Unit Trucks	1	9	2	0	**12**	-	10	9	5	0	**24**	-	12	26	7	0	**45**	-	1	11	2	0	**14**	-	95
% Single-Unit Trucks	1.6%	2.7%	0.8%	0%	**1.9%**	-	4.6%	1.2%	2.7%	0%	**2.1%**	-	11.4%	7.4%	4.9%	0%	**7.5%**	-	0.8%	2.7%	3.7%	0%	**2.4%**	-	3.2%
Articulated Trucks	1	4	0	0	**5**	-	1	2	1	0	**4**	-	3	10	0	0	**13**	-	0	3	1	0	**4**	-	26
% Articulated Trucks	1.6%	1.2%	0%	0%	**0.8%**	-	0.5%	0.3%	0.5%	0%	**0.4%**	-	2.9%	2.8%	0%	0%	**2.2%**	-	0%	0.7%	1.9%	0%	**0.7%**	-	0.9%
Buses	1	2	1	0	**4**	-	2	0	0	0	**2**	-	0	0	0	0	**0**	-	0	0	1	0	**1**	-	7
% Buses	1.6%	0.6%	0.4%	0%	**0.6%**	-	0.9%	0%	0%	0%	**0.2%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	1.9%	0%	**0.2%**	-	0.2%
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	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

TM-1 (Route 53 @ Route 228) TMC - TMC
Thu Sep 26, 2019
PM Peak (Sep 26 2019 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: 699165, Location: 42.174643, -70.884978, Site Code: 197188

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

Leg / Direction	Main Street (Route 228) Southbound						Washington Street (Route 53) Westbound						Pond Street (Route 228) Northbound						Whiting Street (Route 53) Eastbound						
Time	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	R	T	L	U	**App**	Ped*	**Int**
2019-09-26 4:45PM	12	112	80	0	**204**	0	60	135	46	0	**241**	0	93	85	52	0	**230**	0	42	208	21	0	**271**	0	**946**
5:00PM	14	111	51	0	**176**	0	78	162	44	0	**284**	0	81	98	54	0	**233**	0	47	215	20	0	**282**	0	**975**
5:15PM	15	121	63	0	**199**	0	58	144	44	0	**246**	0	70	91	51	0	**212**	0	34	191	30	0	**255**	0	**912**
5:30PM	12	92	71	0	**175**	0	80	155	49	0	**284**	0	46	87	53	0	**186**	0	37	201	29	0	**267**	0	**912**
Total	53	436	265	0	**754**	0	276	596	183	0	**1055**	0	290	361	210	0	**861**	0	160	815	100	0	**1075**	0	**3745**
% Approach	7.0%	57.8%	35.1%	0%	**-**	-	26.2%	56.5%	17.3%	0%	**-**	-	33.7%	41.9%	24.4%	0%	**-**	-	14.9%	75.8%	9.3%	0%	**-**	-	-
% Total	1.4%	11.6%	7.1%	0%	**20.1%**	-	7.4%	15.9%	4.9%	0%	**28.2%**	-	7.7%	9.6%	5.6%	0%	**23.0%**	-	4.3%	21.8%	2.7%	0%	**28.7%**	-	-
PHF	0.883	0.901	0.828	-	**0.924**	-	0.863	0.920	0.934	-	**0.929**	-	0.780	0.921	0.972	-	**0.924**	-	0.851	0.948	0.833	-	**0.953**	-	0.960
Motorcycles	1	0	0	0	**1**	-	0	2	1	0	**3**	-	0	1	0	0	**1**	-	1	2	1	0	**4**	-	9
% Motorcycles	1.9%	0%	0%	0%	**0.1%**	-	0%	0.3%	0.5%	0%	**0.3%**	-	0%	0.3%	0%	0%	**0.1%**	-	0.6%	0.2%	1.0%	0%	**0.4%**	-	0.2%
Lights	51	425	262	0	**738**	-	272	590	179	0	**1041**	-	290	359	207	0	**856**	-	159	807	97	0	**1063**	-	3698
% Lights	96.2%	97.5%	98.9%	0%	**97.9%**	-	98.6%	99.0%	97.8%	0%	**98.7%**	-	100%	99.4%	98.6%	0%	**99.4%**	-	99.4%	99.0%	97.0%	0%	**98.9%**	-	98.7%
Single-Unit Trucks	1	4	1	0	**6**	-	2	4	3	0	**9**	-	0	0	3	0	**3**	-	0	6	1	0	**7**	-	25
% Single-Unit Trucks	1.9%	0.9%	0.4%	0%	**0.8%**	-	0.7%	0.7%	1.6%	0%	**0.9%**	-	0%	0%	1.4%	0%	**0.3%**	-	0%	0.7%	1.0%	0%	**0.7%**	-	0.7%
Articulated Trucks	0	5	1	0	**6**	-	1	0	0	0	**1**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	8
% Articulated Trucks	0%	1.1%	0.4%	0%	**0.8%**	-	0.4%	0%	0%	0%	**0.1%**	-	0%	0.3%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Buses	0	2	1	0	**3**	-	1	0	0	0	**1**	-	0	0	0	0	**0**	-	0	0	1	0	**1**	-	5
% Buses	0%	0.5%	0.4%	0%	**0.4%**	-	0.4%	0%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0%	0%	1.0%	0%	**0.1%**	-	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	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

TM-1 (Route 53 @ Route 228) TMC - TMC
Sat Sep 28, 2019
Midday Peak (WKND) (Sep 28 2019 11:45AM - 12:45 PM)
All Classes (Motorcycles, Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 699165, Location: 42.174643, -70.884978, Site Code: 197188

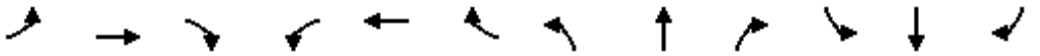
Provided by: Precision Data Industries, LLC (PDI)
46 Morton Street,
Framingham, MA, MA, 01702, US

Leg	Main Street (Route 228)						Washington Street (Route 53)						Pond Street (Route 228)						Whiting Street (Route 53)						
Direction	Southbound						Westbound						Northbound						Eastbound						
Time	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	R	T	L	U	App	Ped*	Int
2019-09-28 11:45AM	26	92	36	0	**154**	0	55	196	61	0	**312**	1	54	103	55	0	**212**	3	46	167	31	0	**244**	0	**922**
12:00PM	24	116	52	0	**192**	1	63	213	58	0	**334**	0	66	87	55	0	**208**	2	41	165	27	0	**233**	1	**967**
12:15PM	23	120	57	0	**200**	0	60	193	50	0	**303**	1	45	94	58	0	**197**	1	38	164	28	0	**230**	0	**930**
12:30PM	22	96	47	0	**165**	0	55	197	33	0	**285**	0	52	103	68	0	**223**	1	41	142	20	0	**203**	0	**876**
Total	95	424	192	0	**711**	1	233	799	202	0	**1234**	2	217	387	236	0	**840**	7	166	638	106	0	**910**	1	**3695**
% Approach	13.4%	59.6%	27.0%	0%	-	-	18.9%	64.7%	16.4%	0%	-	-	25.8%	46.1%	28.1%	0%	-	-	18.2%	70.1%	11.6%	0%	-	-	-
% Total	2.6%	11.5%	5.2%	0%	**19.2%**	-	6.3%	21.6%	5.5%	0%	**33.4%**	-	5.9%	10.5%	6.4%	0%	**22.7%**	-	4.5%	17.3%	2.9%	0%	**24.6%**	-	-
PHF	0.913	0.883	0.842	-	**0.889**	-	0.925	0.938	0.828	-	**0.924**	-	0.822	0.939	0.868	-	**0.942**	-	0.902	0.955	0.855	-	**0.932**	-	0.955
Motorcycles	2	2	1	0	**5**	-	0	1	0	0	**1**	-	2	2	2	0	**6**	-	1	2	0	0	**3**	-	15
% Motorcycles	2.1%	0.5%	0.5%	0%	**0.7%**	-	0%	0.1%	0%	0%	**0.1%**	-	0.9%	0.5%	0.8%	0%	**0.7%**	-	0.6%	0.3%	0%	0%	**0.3%**	-	0.4%
Lights	91	413	188	0	**692**	-	233	795	199	0	**1227**	-	214	382	233	0	**829**	-	164	633	106	0	**903**	-	3651
% Lights	95.8%	97.4%	97.9%	0%	**97.3%**	-	100%	99.5%	98.5%	0%	**99.4%**	-	98.6%	98.7%	98.7%	0%	**98.7%**	-	98.8%	99.2%	100%	0%	**99.2%**	-	98.8%
Single-Unit Trucks	0	5	1	0	**6**	-	0	3	3	0	**6**	-	1	1	1	0	**3**	-	1	3	0	0	**4**	-	19
% Single-Unit Trucks	0%	1.2%	0.5%	0%	**0.8%**	-	0%	0.4%	1.5%	0%	**0.5%**	-	0.5%	0.3%	0.4%	0%	**0.4%**	-	0.6%	0.5%	0%	0%	**0.4%**	-	0.5%
Articulated Trucks	1	3	2	0	**6**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	7
% Articulated Trucks	1.1%	0.7%	1.0%	0%	**0.8%**	-	0%	0%	0%	0%	**0%**	-	0%	0.3%	0%	0%	**0.1%**	-	0%	0%	0%	0%	**0%**	-	0.2%
Buses	1	1	0	0	**2**	-	0	0	0	0	**0**	-	0	1	0	0	**1**	-	0	0	0	0	**0**	-	3
% Buses	1.1%	0.2%	0%	0%	**0.3%**	-	0%	0%	0%	0%	**0%**	-	0%	0.3%	0%	0%	**0.1%**	-	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	-	-	-	-	-	2	-	-	-	-	-	7	-	-	-	-	-	1	
% Pedestrians	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-	-	-	-	-	100%	-
Bicycles on Crosswalk	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	
% Bicycles on Crosswalk	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-

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

APPENDIX G

Intersection Capacity Analyses
Weekday AM Peak Hour
Estimated Base Year (2020) Scenarios



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	413	125	188	729	217	144	351	105	244	329	63
Future Volume (vph)	54	413	125	188	729	217	144	351	105	244	329	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	200		0	150		200	250		250
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1787	3344	0	1703	3437	0	1583	1727	1538	1736	3404	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1787	3344	0	1703	3437	0	1583	1727	1538	1736	3404	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			43				131		20	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1282			608			885			701	
Travel Time (s)		25.0			11.8			13.4			10.6	
Peak Hour Factor	0.98	0.98	0.98	0.99	0.99	0.99	0.94	0.94	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	8%	6%	1%	3%	14%	10%	5%	4%	4%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	549	0	190	955	0	153	373	112	265	426	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases									8			
Detector Phase	1	6		5	2		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	10.0	22.5		13.0	22.5		13.0	22.0	22.0	10.0	22.0	
Total Split (s)	15.0	40.0		15.0	40.0		20.0	25.0	25.0	20.0	25.0	
Total Split (%)	15.0%	40.0%		15.0%	40.0%		20.0%	25.0%	25.0%	20.0%	25.0%	
Yellow Time (s)	4.0	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	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		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	None	None	None	None	
Act Effct Green (s)	8.0	27.3		10.1	31.9		12.9	20.2	20.2	15.1	22.4	
Actuated g/C Ratio	0.09	0.29		0.11	0.34		0.14	0.22	0.22	0.16	0.24	
v/c Ratio	0.36	0.54		1.03	0.79		0.70	1.00	0.26	0.94	0.51	
Control Delay	48.6	26.6		119.0	32.4		57.0	85.4	6.0	81.8	33.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	48.6	26.6		119.0	32.4		57.0	85.4	6.0	81.8	33.8	
LOS	D	C		F	C		E	F	A	F	C	
Approach Delay		28.6			46.7			64.6			52.2	
Approach LOS		C			D			E			D	
Queue Length 50th (ft)	32	128		~130	263		89	~247	0	163	117	
Queue Length 95th (ft)	72	178		#277	350		#172	#447	34	#337	176	
Internal Link Dist (ft)		1202			528			805			621	
Turn Bay Length (ft)	150			200			150		200	250		
Base Capacity (vph)	194	1298		184	1332		258	374	436	282	837	

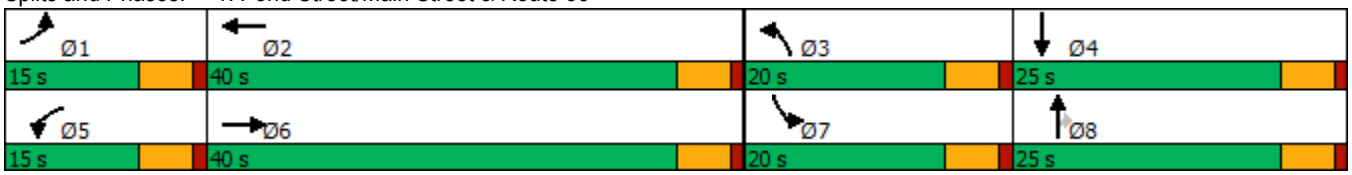
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.28	0.42		1.03	0.72		0.59	1.00	0.26	0.94	0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 92.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.03			
Intersection Signal Delay: 48.1		Intersection LOS: D	
Intersection Capacity Utilization 79.1%		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: 1: Pond Street/Main Street & Route 53



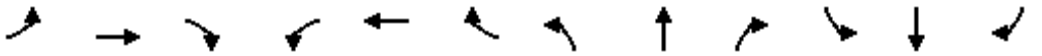
Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	745	17	14	1172	4	110
Future Vol, veh/h	745	17	14	1172	4	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	810	18	15	1274	4	120

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	828	0	2123	414
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	1304	-
Critical Hdwy	-	-	4.13	-	6.63	6.93
Critical Hdwy Stg 1	-	-	-	-	5.83	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.219	-	3.519	3.319
Pot Cap-1 Maneuver	-	-	801	-	49	588
Stage 1	-	-	-	-	395	-
Stage 2	-	-	-	-	253	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	801	-	48	588
Mov Cap-2 Maneuver	-	-	-	-	160	-
Stage 1	-	-	-	-	395	-
Stage 2	-	-	-	-	248	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	160	588	-	-	801	-
HCM Lane V/C Ratio	0.027	0.203	-	-	0.019	-
HCM Control Delay (s)	28.1	12.7	-	-	9.6	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.8	-	-	0.1	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	196	471	158	21	557	53	249	96	26	88	134	515
Future Volume (vph)	196	471	158	21	557	53	249	96	26	88	134	515
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	150		150	200		0	350		350
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	25			150			150			150		
Satd. Flow (prot)	1736	1827	1553	1736	3426	0	1770	1795	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.351			0.671		
Satd. Flow (perm)	1736	1827	1506	1727	3426	0	654	1795	0	1245	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			172		9			13				569
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		663			1258			1174			873	
Travel Time (s)		15.1			28.6			26.7			19.8	
Confl. Peds. (#/hr)			4	4					1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.85	0.85	0.85
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	213	512	172	23	663	0	274	134	0	104	158	606
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6				4			8		8
Detector Phase	1	6	6	5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	25.0	25.0	8.0	25.0		9.0	10.0		10.0	10.0	10.0
Total Split (s)	20.0	30.0	30.0	20.0	30.0		15.0	30.0		15.0	15.0	15.0
Total Split (%)	19.4%	29.1%	29.1%	19.4%	29.1%		14.6%	29.1%		14.6%	14.6%	14.6%
Yellow Time (s)	4.0	4.0	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		0.0	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	5.0	5.0	5.0		4.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max		None	None		None	None	None
Act Effct Green (s)	14.2	39.8	39.8	6.7	25.3		26.3	25.3		10.1	10.1	10.1
Actuated g/C Ratio	0.17	0.48	0.48	0.08	0.30		0.31	0.30		0.12	0.12	0.12
v/c Ratio	0.72	0.59	0.21	0.17	0.64		0.78	0.24		0.69	0.71	0.88
Control Delay	49.8	23.7	4.6	41.4	29.7		42.7	23.5		63.0	55.7	20.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	49.8	23.7	4.6	41.4	29.7		42.7	23.5		63.0	55.7	20.6
LOS	D	C	A	D	C		D	C		E	E	C
Approach Delay		26.3			30.1			36.4			32.1	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)	100	143	0	11	145		108	44		50	77	17
Queue Length 95th (ft)	#266	#527	48	40	281		#276	119		#155	#203	#163
Internal Link Dist (ft)		583			1178			1094			793	
Turn Bay Length (ft)	300		300	150			200			350		350

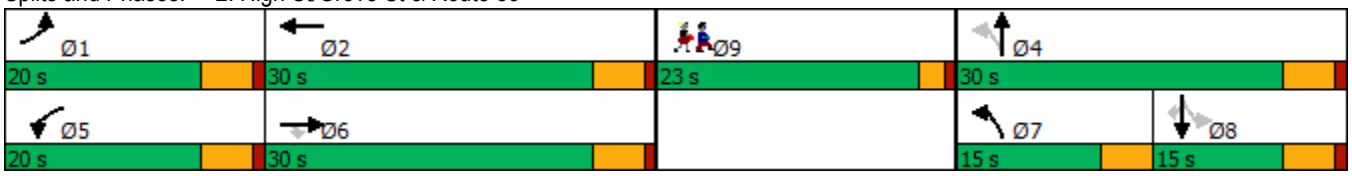
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	22%
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)	314	868	805	314	1040		353	551		150	224	691
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
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.68	0.59	0.21	0.07	0.64		0.78	0.24		0.69	0.71	0.88

Intersection Summary			
Area Type:	Other		
Cycle Length: 103			
Actuated Cycle Length: 83.7			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 30.4		Intersection LOS: C	
Intersection Capacity Utilization 74.4%		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: 2: High St/Grove St & Route 53



Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	514	24	94	579	27	80
Future Vol, veh/h	514	24	94	579	27	80
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	60	60
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	591	28	106	651	45	133

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	620	0	1469	606
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	863	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	956	-	140	495
Stage 1	-	-	-	-	543	-
Stage 2	-	-	-	-	411	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	955	-	116	495
Mov Cap-2 Maneuver	-	-	-	-	116	-
Stage 1	-	-	-	-	542	-
Stage 2	-	-	-	-	339	-

Approach	EB	WB	NE
HCM Control Delay, s	0	1.3	24.9
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	NELn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	116	495	-	-	955	-
HCM Lane V/C Ratio	0.388	0.269	-	-	0.111	-
HCM Control Delay (s)	54.5	14.9	-	-	9.2	0
HCM Lane LOS	F	B	-	-	A	A
HCM 95th %tile Q(veh)	1.6	1.1	-	-	0.4	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	516	12	30	716	6	13	3	41	2	2	2
Future Vol, veh/h	8	516	12	30	716	6	13	3	41	2	2	2
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	92	92	92	70	70	70	60	60	60
Heavy Vehicles, %	4	4	4	3	3	3	4	4	4	0	0	0
Mvmt Flow	10	645	15	33	778	7	19	4	59	3	3	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	787	0	0	660	0	0	1524	1526	653	1554	1530	784
Stage 1	-	-	-	-	-	-	673	673	-	850	850	-
Stage 2	-	-	-	-	-	-	851	853	-	704	680	-
Critical Hdwy	4.14	-	-	4.13	-	-	7.14	6.54	6.24	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.1	5.5	-
Follow-up Hdwy	2.236	-	-	2.227	-	-	3.536	4.036	3.336	3.5	4	3.3
Pot Cap-1 Maneuver	823	-	-	923	-	-	96	116	464	93	118	396
Stage 1	-	-	-	-	-	-	442	451	-	358	380	-
Stage 2	-	-	-	-	-	-	352	373	-	431	454	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	821	-	-	923	-	-	87	106	464	74	108	395
Mov Cap-2 Maneuver	-	-	-	-	-	-	87	106	-	74	108	-
Stage 1	-	-	-	-	-	-	434	442	-	350	355	-
Stage 2	-	-	-	-	-	-	324	349	-	366	445	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.1	0.4	31.8	38
HCM LOS			D	E

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	214	821	-	-	923	-	-	119
HCM Lane V/C Ratio	0.381	0.012	-	-	0.035	-	-	0.084
HCM Control Delay (s)	31.8	9.4	0	-	9	0	-	38
HCM Lane LOS	D	A	A	-	A	A	-	E
HCM 95th %tile Q(veh)	1.7	0	-	-	0.1	-	-	0.3

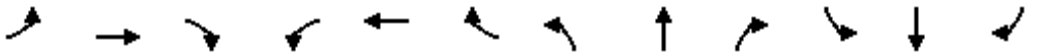
Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	19	515	8	10	728	6	19	0	24	8	0	17
Future Vol, veh/h	19	515	8	10	728	6	19	0	24	8	0	17
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	91	91	91	85	85	85	70	70	70
Heavy Vehicles, %	4	4	4	3	3	3	3	3	3	0	0	0
Mvmt Flow	24	644	10	11	800	7	22	0	28	11	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	809	0	0	654	0	0	1535	1528	651	1541	1530	806
Stage 1	-	-	-	-	-	-	697	697	-	828	828	-
Stage 2	-	-	-	-	-	-	838	831	-	713	702	-
Critical Hdwy	4.14	-	-	4.13	-	-	7.13	6.53	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.1	5.5	-
Follow-up Hdwy	2.236	-	-	2.227	-	-	3.527	4.027	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	808	-	-	928	-	-	94	117	467	95	118	385
Stage 1	-	-	-	-	-	-	430	441	-	368	389	-
Stage 2	-	-	-	-	-	-	359	383	-	426	443	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	806	-	-	928	-	-	83	109	466	84	110	384
Mov Cap-2 Maneuver	-	-	-	-	-	-	83	109	-	84	110	-
Stage 1	-	-	-	-	-	-	410	420	-	350	380	-
Stage 2	-	-	-	-	-	-	329	374	-	381	422	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	39.7	30.1
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	153	806	-	-	928	-	-	179
HCM Lane V/C Ratio	0.331	0.029	-	-	0.012	-	-	0.2
HCM Control Delay (s)	39.7	9.6	0	-	8.9	0	-	30.1
HCM Lane LOS	E	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	1.3	0.1	-	-	0	-	-	0.7



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	586	39	44	762	13	46	2	51	18	2	14
Future Volume (vph)	10	586	39	44	762	13	46	2	51	18	2	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	150			25			25			25		
Satd. Flow (prot)	1736	3440	0	1752	1840	0	1719	1521	0	0	1683	0
Flt Permitted	0.950			0.388			0.728				0.805	
Satd. Flow (perm)	1728	3440	0	716	1840	0	1317	1521	0	0	1386	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			1			57			18	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1093			907			396			538	
Travel Time (s)		24.8			20.6			9.0			12.2	
Confl. Peds. (#/hr)	3					3			2	2		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.80
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	5%	5%	5%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	694	0	49	861	0	51	59	0	0	44	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			3			7	
Permitted Phases				2			3			7		
Detector Phase	1	6		5	2		3	3		7	7	
Switch Phase												
Minimum Initial (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	10.0		8.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	15.0	45.0		15.0	45.0		15.0	15.0		15.0	15.0	
Total Split (%)	15.6%	46.9%		15.6%	46.9%		15.6%	15.6%		15.6%	15.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Max		None	Max		None	None		None	None	
Act Effct Green (s)	6.2	45.9		50.3	50.2		7.9	7.9			7.9	
Actuated g/C Ratio	0.09	0.66		0.72	0.72		0.11	0.11			0.11	
v/c Ratio	0.07	0.31		0.08	0.65		0.34	0.27			0.26	
Control Delay	35.9	9.7		9.2	14.7		39.0	14.3			26.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	35.9	9.7		9.2	14.7		39.0	14.3			26.7	
LOS	D	A		A	B		D	B			C	
Approach Delay		10.1			14.4			25.8			26.7	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	4	70		4	135		20	1			10	
Queue Length 95th (ft)	23	198		38	#815		66	37			41	
Internal Link Dist (ft)		1013			827			316			458	
Turn Bay Length (ft)	200			150								

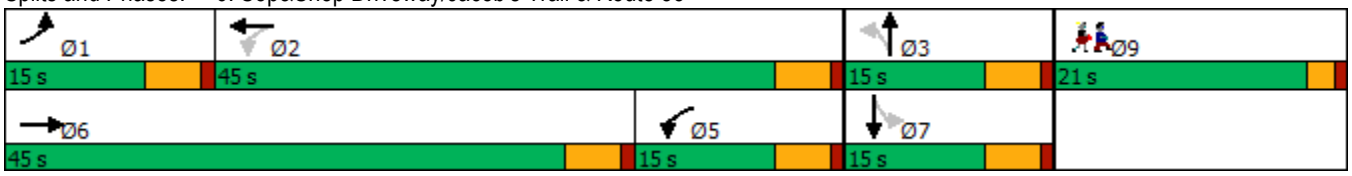
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	22%
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)	256	2266		703	1324		194	273			220	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.04	0.31		0.07	0.65		0.26	0.22			0.20	

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 69.7			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.65			
Intersection Signal Delay: 13.7		Intersection LOS: B	
Intersection Capacity Utilization 57.9%		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: 6: Sop&Shop Driveway/Jacob's Trail & Route 53



Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	148	493	10	14	579	33	4	8	9	6	5	219
Future Vol, veh/h	148	493	10	14	579	33	4	8	9	6	5	219
Conflicting Peds, #/hr	3	0	0	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	75
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	80	80	80	80	80	80
Heavy Vehicles, %	4	4	4	5	5	5	5	5	5	2	2	2
Mvmt Flow	164	548	11	16	643	37	5	10	11	8	6	274

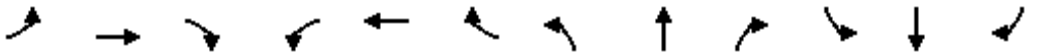
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	683	0	0	559	0	0	1579	1597	280	1304	1584	665
Stage 1	-	-	-	-	-	-	882	882	-	697	697	-
Stage 2	-	-	-	-	-	-	697	715	-	607	887	-
Critical Hdwy	4.16	-	-	4.175	-	-	7.375	6.575	6.975	7.33	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.575	5.575	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.175	5.575	-	6.53	5.53	-
Follow-up Hdwy	2.238	-	-	2.2475	-	-	3.5475	4.0475	3.3475	3.519	4.019	3.319
Pot Cap-1 Maneuver	897	-	-	992	-	-	79	104	710	127	108	459
Stage 1	-	-	-	-	-	-	303	358	-	431	442	-
Stage 2	-	-	-	-	-	-	424	428	-	451	361	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	894	-	-	992	-	-	23	74	710	88	77	458
Mov Cap-2 Maneuver	-	-	-	-	-	-	23	74	-	88	77	-
Stage 1	-	-	-	-	-	-	222	262	-	315	429	-
Stage 2	-	-	-	-	-	-	164	416	-	313	265	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.9	0.2	82.8	25.5
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	71	894	-	-	992	-	-	83	458
HCM Lane V/C Ratio	0.37	0.184	-	-	0.016	-	-	0.166	0.598
HCM Control Delay (s)	82.8	9.9	0.8	-	8.7	0	-	56.8	23.9
HCM Lane LOS	F	A	A	-	A	A	-	F	C
HCM 95th %tile Q(veh)	1.4	0.7	-	-	0	-	-	0.6	3.8

APPENDIX H

Intersection Capacity Analyses
Weekday PM Peak Hour
Estimated Base Year (2020) Scenarios



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	815	160	183	596	276	210	361	290	265	436	53
Future Volume (vph)	100	815	160	183	596	276	210	361	290	265	436	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	200		0	150		250	250		250
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3491	0	1770	3396	0	1787	1900	1615	1787	3452	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3491	0	1770	3396	0	1787	1900	1615	1787	3452	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			72				244		10	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1282			602			877			701	
Travel Time (s)		25.0			11.7			13.3			10.6	
Peak Hour Factor	0.95	0.95	0.95	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	0%	2%	1%	2%	1%	0%	0%	1%	3%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	1026	0	197	938	0	228	392	315	288	532	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases									8			
Detector Phase	1	6		5	2		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	1.0	5.0		1.0	5.0		1.0	5.0	5.0	1.0	1.0	
Minimum Split (s)	6.0	23.0		11.0	23.0		10.0	23.0	23.0	10.0	23.0	
Total Split (s)	15.0	40.0		15.0	40.0		30.0	25.0	25.0	30.0	25.0	
Total Split (%)	13.6%	36.4%		13.6%	36.4%		27.3%	22.7%	22.7%	27.3%	22.7%	
Yellow Time (s)	4.0	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	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		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	None	None	None	None	
Act Effct Green (s)	9.4	33.6		10.0	34.2		18.4	20.1	20.1	20.9	22.5	
Actuated g/C Ratio	0.09	0.32		0.10	0.33		0.18	0.19	0.19	0.20	0.21	
v/c Ratio	0.66	0.90		1.17	0.81		0.73	1.08	0.62	0.81	0.71	
Control Delay	68.0	45.8		164.4	36.8		54.7	111.3	16.5	58.3	44.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	68.0	45.8		164.4	36.8		54.7	111.3	16.5	58.3	44.5	
LOS	E	D		F	D		D	F	B	E	D	
Approach Delay		47.9			59.0			65.6			49.3	
Approach LOS		D			E			E			D	
Queue Length 50th (ft)	71	344		~165	288		150	~309	42	188	175	
Queue Length 95th (ft)	#148	#484		#318	382		224	#512	138	286	#273	
Internal Link Dist (ft)		1202			522			797			621	
Turn Bay Length (ft)	150			200			150		250	250		
Base Capacity (vph)	169	1186		169	1187		428	364	507	428	751	

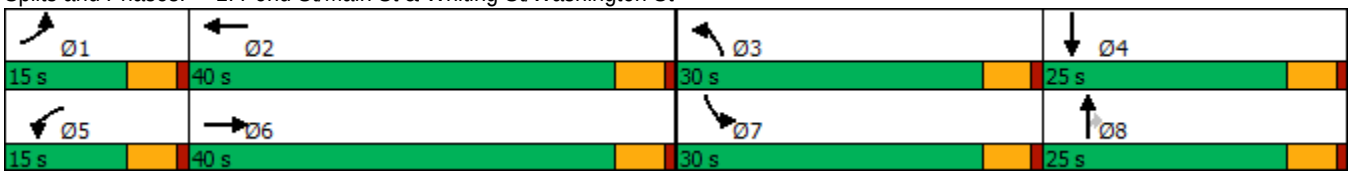
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.62	0.87		1.17	0.79		0.53	1.08	0.62	0.67	0.71	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 104.7			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.17			
Intersection Signal Delay: 55.4		Intersection LOS: E	
Intersection Capacity Utilization 88.1%		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: Pond St/Main St & Whiting St/Washington St



Intersection	
Int Delay, s/veh	2.6

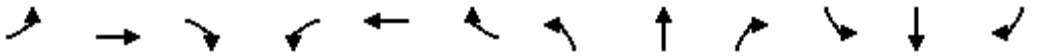
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1323	44	86	1029	18	171
Future Vol, veh/h	1323	44	86	1029	18	171
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1470	49	96	1143	20	190

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1519	0	2830	760
Stage 1	-	-	-	-	1495	-
Stage 2	-	-	-	-	1335	-
Critical Hdwy	-	-	4.13	-	6.63	6.93
Critical Hdwy Stg 1	-	-	-	-	5.83	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.219	-	3.519	3.319
Pot Cap-1 Maneuver	-	-	437	-	~ 16	349
Stage 1	-	-	-	-	173	-
Stage 2	-	-	-	-	245	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	437	-	~ 12	349
Mov Cap-2 Maneuver	-	-	-	-	88	-
Stage 1	-	-	-	-	173	-
Stage 2	-	-	-	-	191	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	29.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	88	349	-	-	437	-
HCM Lane V/C Ratio	0.227	0.544	-	-	0.219	-
HCM Control Delay (s)	57.6	27	-	-	15.5	-
HCM Lane LOS	F	D	-	-	C	-
HCM 95th %tile Q(veh)	0.8	3.1	-	-	0.8	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	389	652	274	24	572	76	231	102	38	85	76	307
Future Volume (vph)	389	652	274	24	572	76	231	102	38	85	76	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	150		150	200		0	350		350
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	25			150			150			150		
Satd. Flow (prot)	1770	1863	1583	1770	3476	0	1770	1786	0	1787	1881	1599
Flt Permitted	0.950			0.950			0.540			0.663		
Satd. Flow (perm)	1770	1863	1583	1770	3476	0	1006	1786	0	1247	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			211		11			15				320
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		933			1262			1358			807	
Travel Time (s)		21.2			28.7			30.9			18.3	
Peak Hour Factor	0.96	0.96	0.96	0.93	0.93	0.93	0.95	0.95	0.95	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	405	679	285	26	697	0	243	147	0	89	79	320
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6				4			8		8
Detector Phase	1	6	6	5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	25.0	25.0	10.0	25.0		9.0	10.0		10.0	10.0	10.0
Total Split (s)	20.0	40.0	40.0	20.0	40.0		15.0	45.0		30.0	30.0	30.0
Total Split (%)	15.6%	31.3%	31.3%	15.6%	31.3%		11.7%	35.2%		23.4%	23.4%	23.4%
Yellow Time (s)	4.0	4.0	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		0.0	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	5.0	5.0	5.0		4.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max		None	None		None	None	None
Act Effct Green (s)	15.3	51.0	51.0	7.1	35.6		29.2	28.2		13.0	13.0	13.0
Actuated g/C Ratio	0.16	0.52	0.52	0.07	0.36		0.30	0.29		0.13	0.13	0.13
v/c Ratio	1.47	0.70	0.31	0.20	0.55		0.63	0.28		0.54	0.32	0.65
Control Delay	262.6	27.2	7.4	50.7	28.5		37.3	26.6		53.3	42.9	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	262.6	27.2	7.4	50.7	28.5		37.3	26.6		53.3	42.9	11.7
LOS	F	C	A	D	C		D	C		D	D	B
Approach Delay		92.7			29.3			33.2			24.3	
Approach LOS		F			C			C			C	
Queue Length 50th (ft)	~323	236	17	15	162		114	58		49	42	0
Queue Length 95th (ft)	#706	#873	119	51	334		240	139		119	103	83
Internal Link Dist (ft)		853			1182			1278			727	
Turn Bay Length (ft)	300		300	150			200			350		350
Base Capacity (vph)	275	971	926	275	1270		387	750		323	488	652

Lane Group	Ø9
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)	
Peak Hour 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)	23.0
Total Split (s)	23.0
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)	

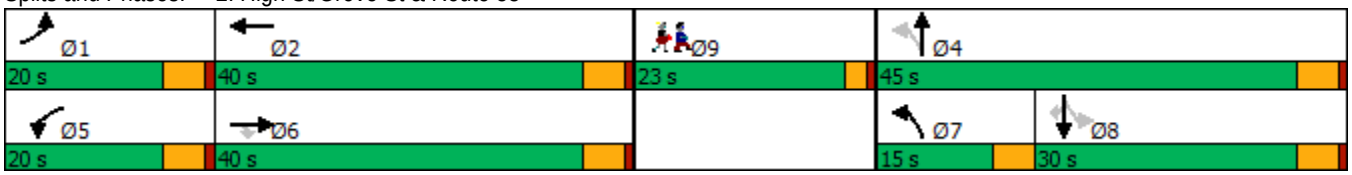
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	1.47	0.70	0.31	0.09	0.55		0.63	0.20		0.28	0.16	0.49

Intersection Summary			
Area Type:	Other		
Cycle Length: 128			
Actuated Cycle Length: 97.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.47			
Intersection Signal Delay: 58.2		Intersection LOS: E	
Intersection Capacity Utilization 72.6%		ICU Level of Service C	
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: 2: High St/Grove St & Route 53



Intersection	
Int Delay, s/veh	2.8

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	720	40	45	616	20	80
Future Vol, veh/h	720	40	45	616	20	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	90	90	60	60
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	783	43	50	684	33	133

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	826	0	1589	805
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	784	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	809	-	120	386
Stage 1	-	-	-	-	443	-
Stage 2	-	-	-	-	453	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	809	-	108	386
Mov Cap-2 Maneuver	-	-	-	-	108	-
Stage 1	-	-	-	-	443	-
Stage 2	-	-	-	-	408	-

Approach	EB	WB	NE
HCM Control Delay, s	0	0.7	25.9
HCM LOS			D

Minor Lane/Major Mvmt	NELn1	NELn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	108	386	-	-	809	-
HCM Lane V/C Ratio	0.309	0.345	-	-	0.062	-
HCM Control Delay (s)	52.6	19.2	-	-	9.7	0
HCM Lane LOS	F	C	-	-	A	A
HCM 95th %tile Q(veh)	1.2	1.5	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	771	22	42	715	1	6	0	24	2	0	2
Future Vol, veh/h	1	771	22	42	715	1	6	0	24	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	88	88	88	60	60	60	50	50	50
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	1	857	24	48	813	1	10	0	40	4	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	814	0	0	881	0	0	1783	1781	869	1801	1793	814
Stage 1	-	-	-	-	-	-	871	871	-	910	910	-
Stage 2	-	-	-	-	-	-	912	910	-	891	883	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	813	-	-	772	-	-	64	83	354	62	82	381
Stage 1	-	-	-	-	-	-	349	371	-	332	356	-
Stage 2	-	-	-	-	-	-	331	356	-	340	367	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	813	-	-	772	-	-	58	73	354	50	73	381
Mov Cap-2 Maneuver	-	-	-	-	-	-	58	73	-	50	73	-
Stage 1	-	-	-	-	-	-	348	370	-	331	316	-
Stage 2	-	-	-	-	-	-	291	316	-	301	366	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	0.6	33.6	50
HCM LOS			D	F

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	175	813	-	-	772	-	-	88
HCM Lane V/C Ratio	0.286	0.001	-	-	0.062	-	-	0.091
HCM Control Delay (s)	33.6	9.4	0	-	10	0	-	50
HCM Lane LOS	D	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	1.1	0	-	-	0.2	-	-	0.3

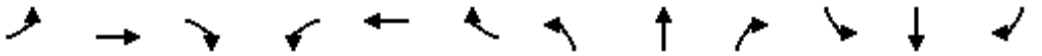
Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	9	786	15	19	736	12	18	0	26	7	0	10
Future Vol, veh/h	9	786	15	19	736	12	18	0	26	7	0	10
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	80	80	80	60	60	60
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	10	873	17	21	818	13	23	0	33	12	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	832	0	0	890	0	0	1777	1776	885	1789	1778	826
Stage 1	-	-	-	-	-	-	902	902	-	868	868	-
Stage 2	-	-	-	-	-	-	875	874	-	921	910	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	801	-	-	766	-	-	65	84	347	64	83	375
Stage 1	-	-	-	-	-	-	335	359	-	350	372	-
Stage 2	-	-	-	-	-	-	347	370	-	327	356	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	800	-	-	766	-	-	59	78	346	54	77	375
Mov Cap-2 Maneuver	-	-	-	-	-	-	59	78	-	54	77	-
Stage 1	-	-	-	-	-	-	327	350	-	341	353	-
Stage 2	-	-	-	-	-	-	315	351	-	288	347	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	61.3	49.3
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	116	800	-	-	766	-	-	109
HCM Lane V/C Ratio	0.474	0.013	-	-	0.028	-	-	0.26
HCM Control Delay (s)	61.3	9.6	0	-	9.8	0	-	49.3
HCM Lane LOS	F	A	A	-	A	A	-	E
HCM 95th %tile Q(veh)	2.1	0	-	-	0.1	-	-	1



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	824	80	90	793	20	75	5	95	10	5	10
Future Volume (vph)	30	824	80	90	793	20	75	5	95	10	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	150			25			25			25		
Satd. Flow (prot)	1770	3493	0	1787	1874	0	1805	1630	0	0	1761	0
Flt Permitted	0.950			0.254			0.734				0.820	
Satd. Flow (perm)	1770	3493	0	478	1874	0	1395	1630	0	0	1474	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			2			106			14	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1093			907			368			415	
Travel Time (s)		24.8			20.6			8.4			9.4	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.90	0.90	0.90	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	1051	0	105	945	0	83	112	0	0	35	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			3			7	
Permitted Phases				2			3			7		
Detector Phase	1	6		5	2		3	3		7	7	
Switch Phase												
Minimum Initial (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	10.0		8.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	15.0	45.0		15.0	45.0		15.0	15.0		15.0	15.0	
Total Split (%)	15.6%	46.9%		15.6%	46.9%		15.6%	15.6%		15.6%	15.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Max		None	Max		None	None		None	None	
Act Effct Green (s)	7.2	43.9		46.7	48.3		8.9	8.9			8.8	
Actuated g/C Ratio	0.10	0.62		0.66	0.69		0.13	0.13			0.12	
v/c Ratio	0.19	0.48		0.24	0.74		0.47	0.38			0.18	
Control Delay	36.8	13.1		15.1	19.6		43.3	13.1			26.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	36.8	13.1		15.1	19.6		43.3	13.1			26.0	
LOS	D	B		B	B		D	B			C	
Approach Delay		13.9			19.2			25.9			26.0	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	14	132		11	181		34	2			8	
Queue Length 95th (ft)	48	322		69	#882		#108	53			30	
Internal Link Dist (ft)		1013			827			288			335	
Turn Bay Length (ft)	200			150								
Base Capacity (vph)	265	2182		528	1284		209	335			233	

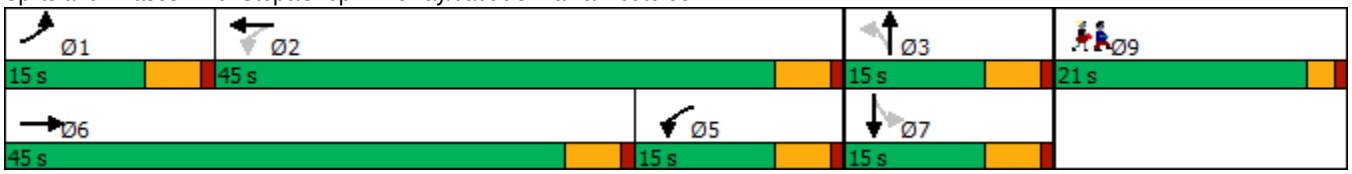
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour 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)	21.0
Total Split (s)	21.0
Total Split (%)	22%
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)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.13	0.48		0.20	0.74		0.40	0.33			0.15	

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 70.5			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 67.7%		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: 6: Stop&Shop Driveway/Jacob's Trail & Route 53



Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	205	713	2	4	704	11	0	2	8	5	0	180
Future Vol, veh/h	205	713	2	4	704	11	0	2	8	5	0	180
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	75
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	86	86	86	50	50	50	90	90	90
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	233	810	2	5	819	13	0	4	16	6	0	200

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	832	0	0	812	0	0	2113	2119	406	1709	2114	826
Stage 1	-	-	-	-	-	-	1277	1277	-	836	836	-
Stage 2	-	-	-	-	-	-	836	842	-	873	1278	-
Critical Hdwy	4.13	-	-	4.115	-	-	7.3	6.5	6.9	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.219	-	-	2.2095	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	798	-	-	818	-	-	33	51	600	66	51	375
Stage 1	-	-	-	-	-	-	179	239	-	364	385	-
Stage 2	-	-	-	-	-	-	364	383	-	316	239	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	798	-	-	818	-	-	9	24	600	33	24	375
Mov Cap-2 Maneuver	-	-	-	-	-	-	9	24	-	33	24	-
Stage 1	-	-	-	-	-	-	84	112	-	170	381	-
Stage 2	-	-	-	-	-	-	168	379	-	139	112	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4	0.1	48.2	28.1
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	103	798	-	-	818	-	-	33	375
HCM Lane V/C Ratio	0.194	0.292	-	-	0.006	-	-	0.168	0.533
HCM Control Delay (s)	48.2	11.4	1.9	-	9.4	0	-	135	25.1
HCM Lane LOS	E	B	A	-	A	A	-	F	D
HCM 95th %tile Q(veh)	0.7	1.2	-	-	0	-	-	0.5	3

APPENDIX I

Corridor Crash Rate Worksheets

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

DISTRICT : 5

~ SEGMENT DATA ~

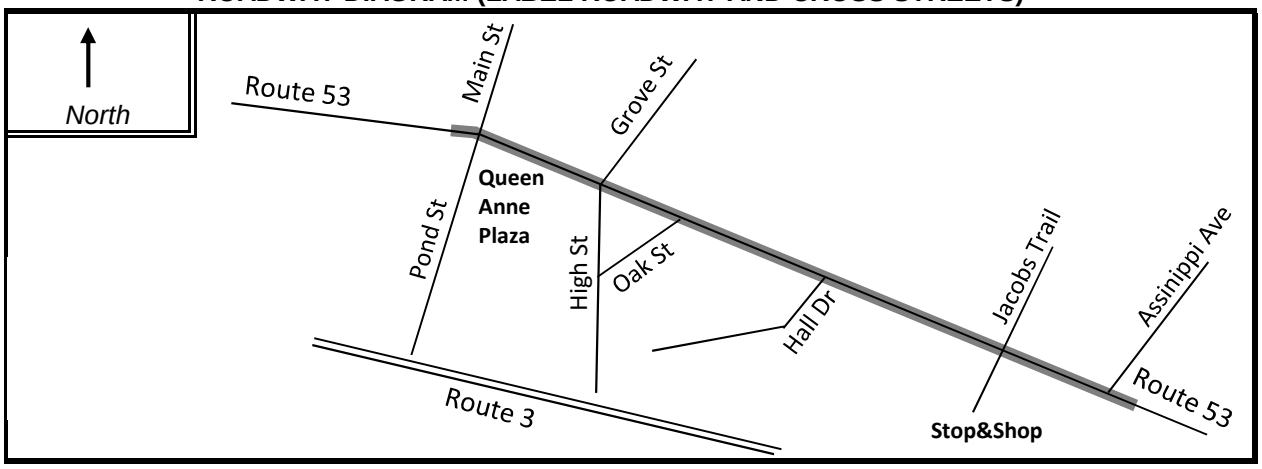
ROADWAY NAME: Route 53 Corridor in Norwell

START POINT: North of Route 228 (Main Street/Pond Street)

END POINT: South of Assinippi Avenue

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**2.24**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	17,100

TOTAL # OF CRASHES:	287	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**57.40**

CRASH RATE CALCULATION : **4.11**

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

Comments : 2017 State Average for Urban Minor Arterials = 3.49

Project Title & Date: Route 53 Corridor Study in Norwell

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

DISTRICT : 5

~ SEGMENT DATA ~

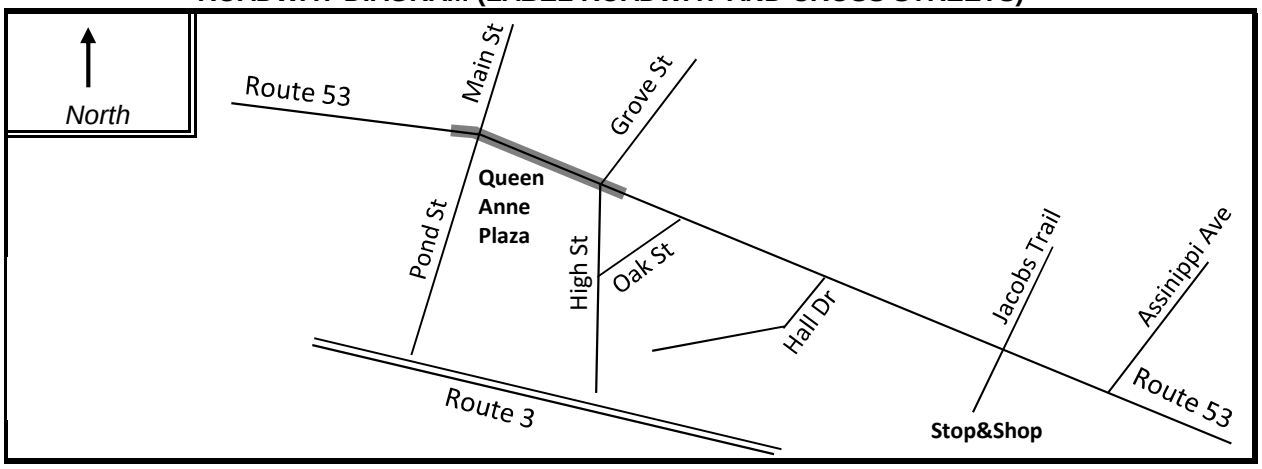
ROADWAY NAME: Route 53 Corridor Segment 1

START POINT: North of Route 228 (Main Street/Pond Street)

END POINT: South of High Street

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.49**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	22,800

TOTAL # OF CRASHES:	149	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**29.80**

CRASH RATE CALCULATION : **7.31**

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

Comments : 2017 State Average for Urban Minor Arterials = 3.49

Project Title & Date: Route 53 Corridor Study in Norwell

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

DISTRICT : 5

~ SEGMENT DATA ~

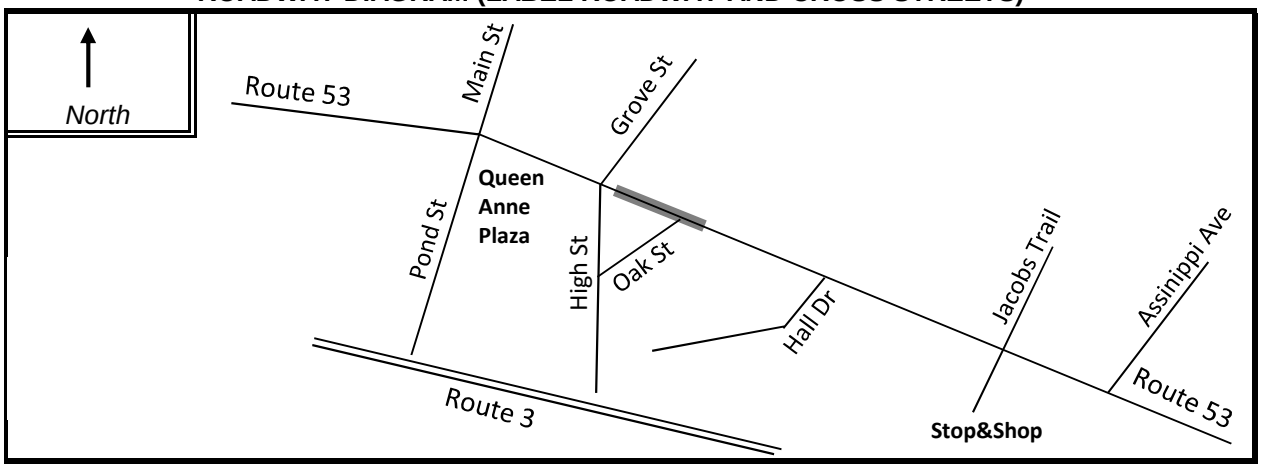
ROADWAY NAME: Route 53 Corridor Segment 2

START POINT: South of High Street

END POINT: South of Oak Street

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.33**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	14,650

TOTAL # OF CRASHES:	29	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**5.80**

CRASH RATE CALCULATION : **3.29**

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

Comments : 2017 State Average for Urban Minor Arterials = 3.49

Project Title & Date: Route 53 Corridor Study in Norwell

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

DISTRICT : 5

~ SEGMENT DATA ~

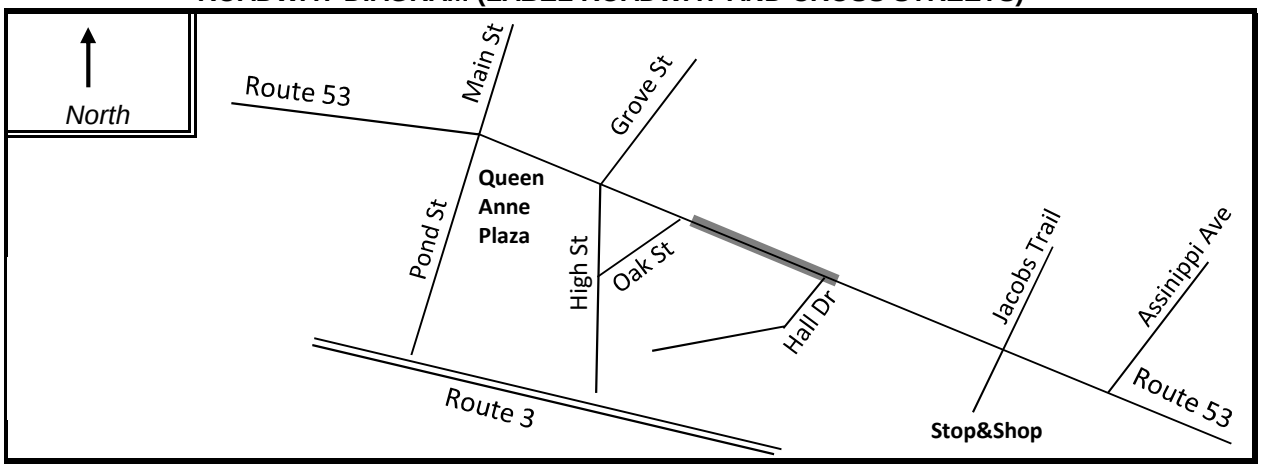
ROADWAY NAME: Route 53 Corridor Segment 3

START POINT: South of Oak Street

END POINT: South of Hull Drive

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.62**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	15,000

TOTAL # OF CRASHES:	24	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**4.80**

CRASH RATE CALCULATION : **1.41**

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

Comments : 2017 State Average for Urban Minor Arterials = 3.49

Project Title & Date: Route 53 Corridor Study in Norwell

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

DISTRICT : 5

~ SEGMENT DATA ~

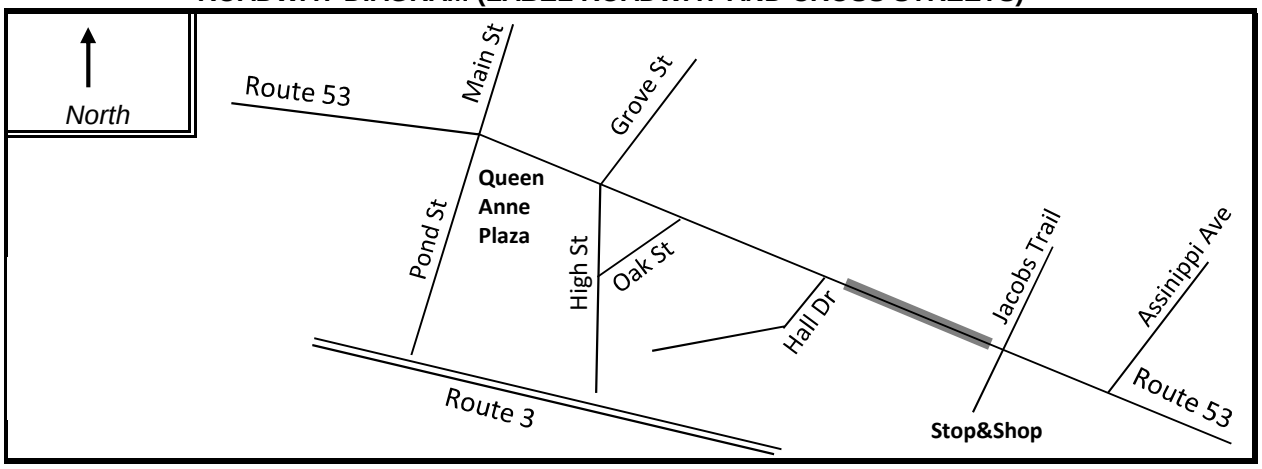
ROADWAY NAME: Route 53 Corridor Segment 4

START POINT: South of Hull Drive

END POINT: North of Jacobs Drive and Stop & Shop Driveway

FUNCTIONAL CLASSIFICATION OF ROADWAY: Urban Minor Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.52**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	15,850

TOTAL # OF CRASHES:	52	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**10.40**

CRASH RATE CALCULATION : **3.46**

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

Comments : 2017 State Average for Urban Minor Arterials = 3.49

Project Title & Date: Route 53 Corridor Study in Norwell

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

DISTRICT : 5

~ SEGMENT DATA ~

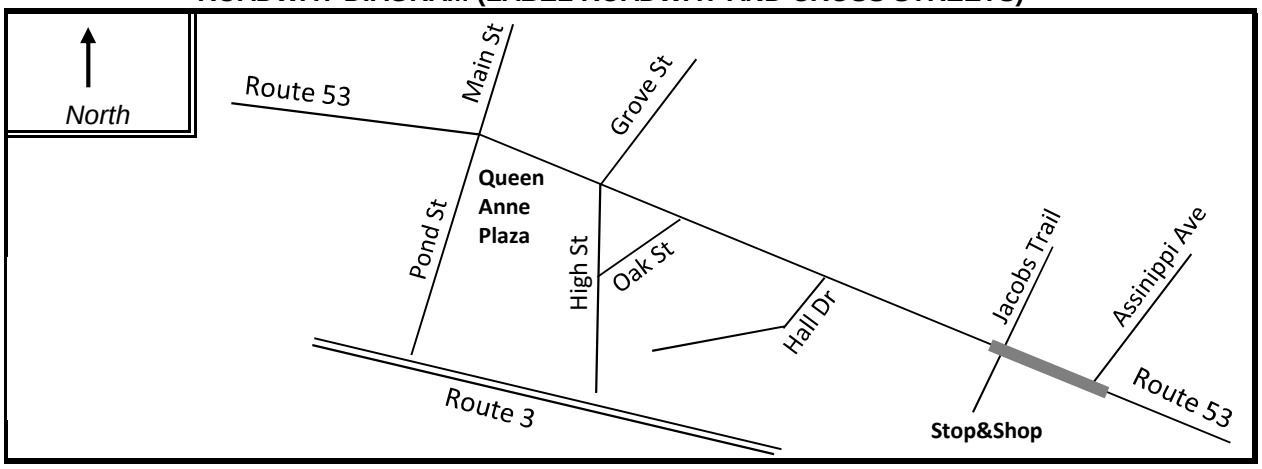
ROADWAY NAME: Route 53 Corridor Segment 5

START POINT: North of Jacobs Drive and Stop & Shop Driveway

END POINT: South of Assinippi Avenue

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**):	17,300

TOTAL # OF CRASHES:	33	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**6.60**

CRASH RATE CALCULATION : **3.73**

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

Comments : 2017 State Average for Urban Minor Arterials = 3.49

Project Title & Date: Route 53 Corridor Study in Norwell

APPENDIX J

Intersection Crash Rate Worksheets

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Norwell | COUNT DATE : 2020 Estimated

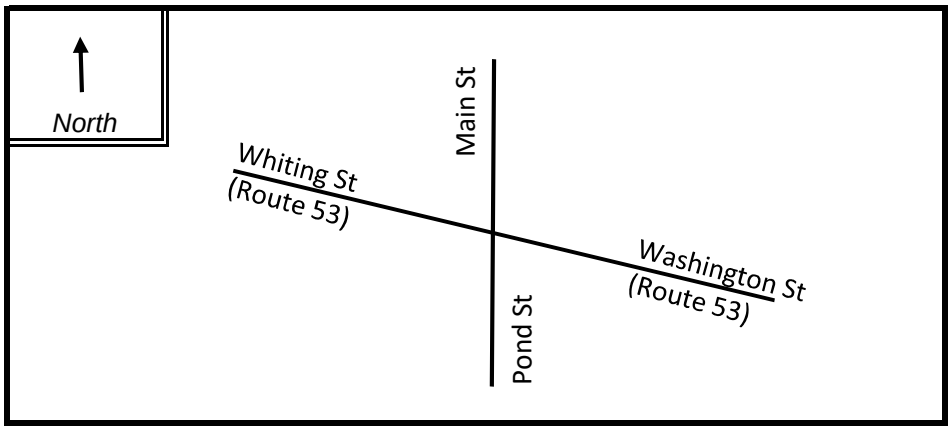
DISTRICT : 5 | UNSIGNALIZED : | SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Route 53 (Washington Street/Whiting Street in Hingham)

MINOR STREET(S) : Route 228 (Pond Street/Main Street in Hingham)

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) :	834	1,096	695	861		**3,486**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **38,733**

TOTAL # OF CRASHES : 58 | # OF YEARS : 5 | AVERAGE # OF CRASHES PER YEAR (**A**) : **11.60**

CRASH RATE CALCULATION : **0.94**

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

Comments : 2017 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.75

Project Title & Date: Route 53 Corridor Study in Norwell

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

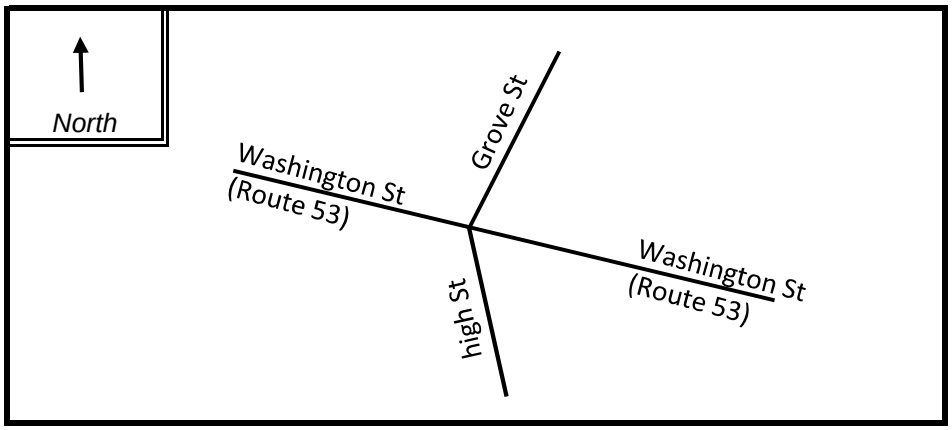
DISTRICT : 5 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Route 53 (Washington Street)

MINOR STREET(S) : High Street/Grove 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) :	1,070	652	603	371		**2,695**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **29,944**

TOTAL # OF CRASHES : 46 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **9.20**

CRASH RATE CALCULATION : **0.97** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2017 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.75

Project Title & Date: Route 53 Corridor Study in Norwell

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

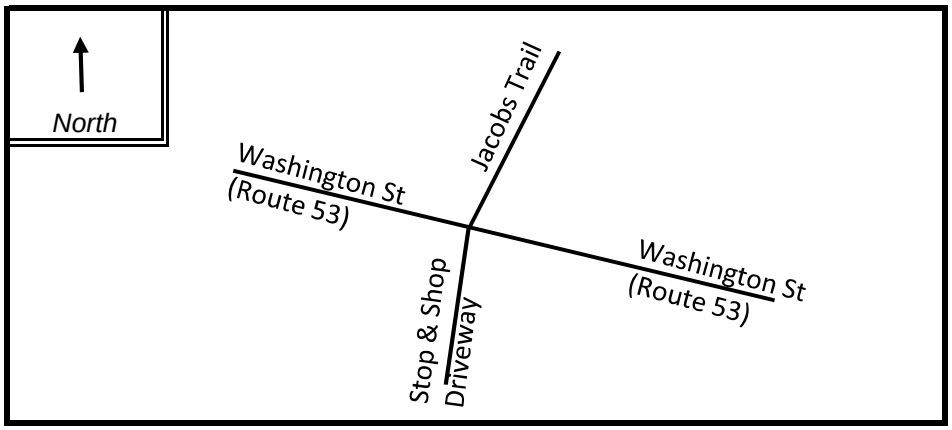
DISTRICT : 5 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Route 53 (Washington Street)

MINOR STREET(S) : Jacobs Trail/Stop & Shop Driveway

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) :	784	860	29	137		**1,810**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **20,106**

TOTAL # OF CRASHES : 16 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **3.20**

CRASH RATE CALCULATION : **0.50** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2017 Average Crash Rate for MassDOT District 5 Signalized Intersections = 0.75

Project Title & Date: Route 53 Corridor Study in Norwell

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Norwell COUNT DATE : 2020 Estimated

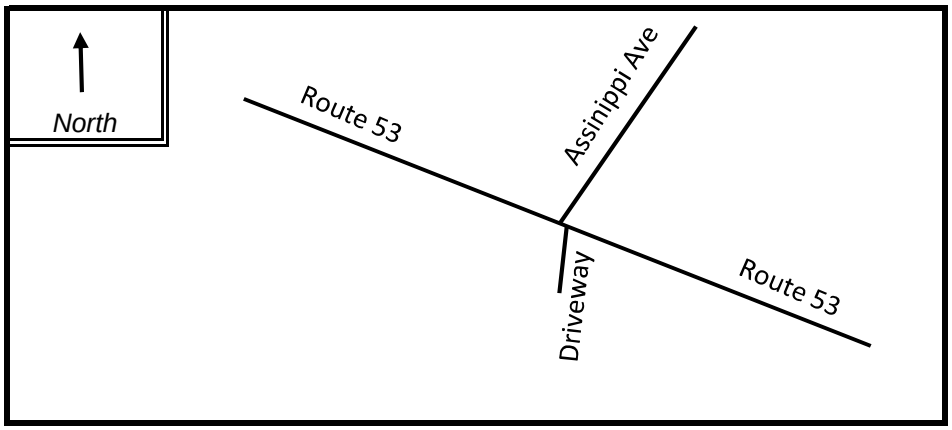
DISTRICT : 5 UNSIGNALIZED : X SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Route 53 (Washington Street)

MINOR STREET(S) : Assinippi Avenue/Driveway

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) :	786	672	206	15		**1,678**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **18,644**

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

CRASH RATE CALCULATION : **0.47** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : 2017 Average Crash Rate for MassDOT District 5 Unsignalized Intersections = 0.57

Project Title & Date: Route 53 Corridor Study in Norwell

APPENDIX K

Collision Diagrams and Crash Look-Up Tables
Nine Contiguous Segments in the Study Corridor

SYMBOLS

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

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 K-1
Collision Diagram: Route 53 at Pond Street and Main Street
Norwell Police Crash Reports 2015–19 and MassDOT Crash Data 2013–17 (Hingham)

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-1

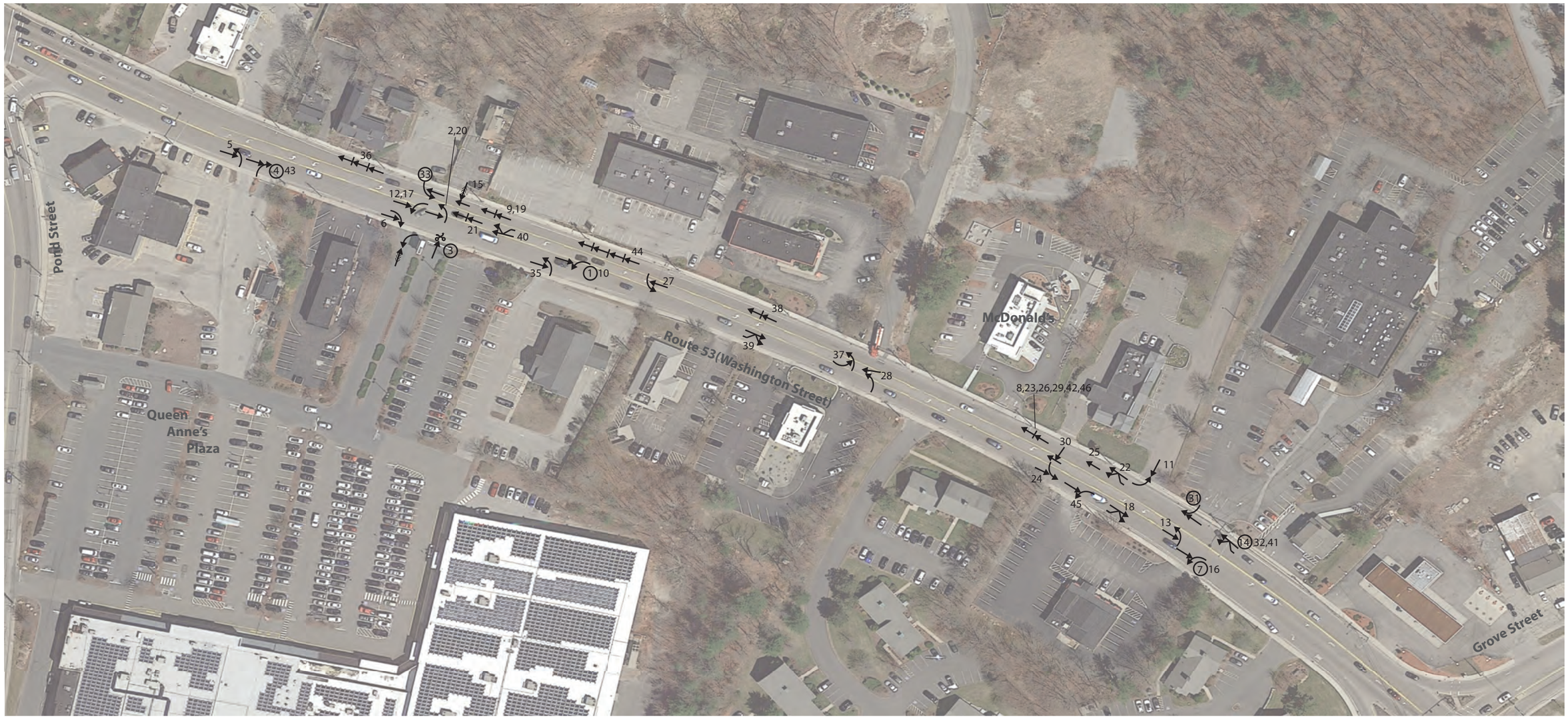
Summary of Crashes: Route 53 at Main Street and Pond Street

Norwell Police Crash Reports 2015–19 and MassDOT Crash Data 2013–17 (Hingham)

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	2/13/2015	Friday	21:19	PDO	Rear-end	Dry	Dark - lighted roadway	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Fatigued/asleep
2	3/14/2015	Saturday	10:41	PDO	Angle	Wet	Daylight	Rain	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	No improper driving
3	6/9/2015	Tuesday	17:09	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
4	7/22/2015	Wednesday	12:12	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
5	10/5/2015	Monday	9:02	PDO	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
6	1/28/2016	Thursday	21:55	PDO	Angle	Dry	Dark - lighted roadway	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
7	3/24/2016	Thursday	13:06	Non Fatal Injury	Sideswipe, same direction	Dry	Daylight	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
8	4/13/2016	Wednesday	7:08	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Glare
9	5/11/2016	Wednesday	17:09	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Inattention
10	6/9/2016	Thursday	9:33	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
11	8/13/2016	Saturday	16:08	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
12	11/1/2016	Tuesday	9:56	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Distracted
13	1/15/2017	Sunday	12:33	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
14	1/18/2017	Wednesday	11:59	PDO	Sideswipe, same direction	Wet	Daylight	Rain	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
15	1/20/2017	Friday	12:20	PDO	Sideswipe, same direction	Dry	Daylight	Cloudy	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failure to keep in proper lane or running off road
16	2/17/2017	Friday	18:58	PDO	Rear-end	Ice	Daylight	Snow	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
17	4/30/2017	Sunday	15:13	PDO	Sideswipe, same direction	Wet	Daylight	Rain	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
18	5/6/2017	Saturday	11:34	PDO	Sideswipe, opposite direction	Wet	Daylight	Rain	Unknown	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
19	10/23/2017	Monday	11:56	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
20	11/10/2017	Friday	7:56	PDO	Rear-end	Dry	Daylight	Clear	Turning right	Turning right	Collision with motor vehicle in transport	No improper driving
21	11/16/2017	Thursday	14:48	Non Fatal Injury	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
22	12/18/2017	Monday	7:33	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
23	4/3/2018	Tuesday	11:50	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
24	5/25/2018	Friday	11:14	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Other improper action
25	5/31/2018	Thursday	13:45	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
26	8/5/2018	Sunday	22:03	PDO	Rear-end	Dry	Dark - lighted roadway	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Distracted
27	8/18/2018	Saturday	15:46	PDO	Angle	Wet	Daylight	Rain	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Made an improper turn
28	11/14/2018	Wednesday	14:33	PDO	Head on	Dry	Daylight	Clear	Travelling straight ahead		Collision with pedestrian	No improper driving
29	12/11/2018	Tuesday	13:11	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
30	2/17/2019	Sunday	14:18	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Changing lanes	Collision with motor vehicle in transport	Failure to keep in proper lane or running off road
31	3/5/2019	Tuesday	11:17	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Changing lanes	Collision with motor vehicle in transport	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc
32	4/6/2019	Saturday	19:38	Non Fatal Injury	Front to reat	Dry	Daylight	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Distracted
33	5/12/2019	Sunday	17:07	PDO	Head on	Wet	Dusk	Rain	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	No improper driving
34	9/21/2019	Saturday	7:34	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Glare
35	2/2/2013	Saturday	21:39	PDO	Angle	Dry	Dark - lighted roadway	Clear/Cloudy	Turning right	Travelling straight ahead	Collision with motor vehicle in traffic	Made an improper turn
36	2/5/2013	Tuesday	7:56	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Other improper action
37	5/16/2013	Thursday	15:14	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Travelling straight ahead	Collision with motor vehicle in traffic	Followed too closely
38	7/6/2013	Saturday	12:14	PDO	Angle	Dry	Daylight	Clear	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in traffic	Failed to yield right of way
39	6/23/2014	Monday	10:02	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in traffic	Made an improper turn
40	8/15/2014	Friday	9:49	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Turning left	Turning left	Collision with motor vehicle in traffic	Inattention
41	10/17/2014	Friday	14:29	PDO	Rear-end	Dry	Daylight	Clear/Clear	Turning left	Turning left	Collision with motor vehicle in traffic	Followed too closely
42	5/6/2015	Wednesday	16:38	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in traffic	Disregarded traffic signs, signals, road markings
43	6/15/2015	Monday	17:52	PDO	Rear-end	Wet	Daylight	Cloudy/Rain	Travelling straight ahead	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Followed too closely
44	7/21/2015	Tuesday	15:01	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Changing lanes	Travelling straight ahead	Collision with motor vehicle in traffic	Failed to yield right of way
45	11/12/2015	Thursday	15:48	PDO	Sideswipe, same direction	Wet	Dusk	Cloudy/Rain	Travelling straight ahead	Turning left	Collision with motor vehicle in traffic	Unknown
46	12/23/2015	Wednesday	18:58	PDO	Rear-end	Wet	Dark - lighted roadway	Rain	Travelling straight ahead	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Followed too closely
47	1/24/2016	Sunday	11:34	PDO	Rear-end	Wet	Daylight	Clear	Travelling straight ahead	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Followed too closely
48	4/27/2016	Wednesday	15:24	PDO	Rear-end	Dry	Daylight	Clear/Clear	Slowing or stopped in traffic	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Distracted
49	5/8/2016	Sunday	17:14	PDO	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead		Collision with fixed object (wall, building, tunnel, etc.)	Other improper action
50	5/8/2016	Sunday	17:57	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Other improper action
51	5/11/2016	Wednesday	17:09	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Inattention
52	6/16/2016	Thursday	13:33	Not Reported	Rear-end	Dry	Daylight	Clear	Parked	Backing	Collision with motor vehicle in traffic	Unknown
53	1/18/2017	Wednesday	20:14	PDO	Angle	Wet	Dark - lighted roadway	Cloudy/Rain	Turning right	Travelling straight ahead	Collision with motor vehicle in traffic	Failed to yield right of way
54	3/21/2017	Tuesday	8:47	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Other improper action
55	4/7/2017	Friday	13:45	PDO	Rear-end	Dry	Daylight	Cloudy	Travelling straight ahead	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Followed too closely
56	5/11/2017	Thursday	12:21	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in traffic	Inattention
57	6/3/2017	Saturday	20:02	PDO	Angle	Wet	Dusk	Cloudy/Rain	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in traffic	Failed to yield right of way
58	6/9/2017	Friday	10:34	PDO	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead		Collision with fixed object (wall, building, tunnel, etc.)	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner

Note: The intersection is located on the border between Norwell and Hingham. The recent five-year crashes are from two data sources. Norwell police crash reports 2015–19 were used for the crashes occurred in Norwell (Crash Numbers 1 to 34) and MassDOT crash data 2013–17 were used for the crashes occurred in Hingham (Crash Numbers 35 to 58).

PDO = Property Damage Only



SYMBOLS

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

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 K-2
Collision Diagram: Route 53 between Pond Street and High Street
Norwell Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-2
Summary of Crashes: Route 53 between Pond Street and High Street
Norwell Police Crash Reports 2015–19

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	1/15/2015	Thursday	10:33	Non Fatal Injury	Angle	Wet	Daylight	Snow	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Inattention
2	2/12/2015	Thursday	12:50	PDO	Unknown	Unknown	Unknown	Unknown	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
3	6/8/2015	Monday	16:38	Non Fatal Injury	Single vehicle crash	Dry	Daylight	Clear	Entering traffic lane		Collision with cyclist	No improper driving
4	8/15/2015	Saturday	11:05	Non Fatal Injury	Sideswipe, same direction	Dry	Daylight	Clear	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
5	10/10/2015	Saturday	14:07	PDO	Angle	Dry	Daylight	Clear	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
6	10/20/2015	Tuesday	9:05	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
7	8/21/2015	Friday	15:52	Non Fatal Injury	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
8	11/22/2015	Sunday	10:55	PDO	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
9	12/18/2015	Friday	17:57	PDO	Rear-end	Wet	Dark - lighted roadway	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
10	9/14/2016	Wednesday	15:28	PDO	Sideswipe, opposite direction	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	No improper driving
11	10/30/2016	Sunday	19:21	PDO	Head on	Wet	Dark - lighted roadway	Rain	Turning left	Turning left	Collision with motor vehicle in transport	No improper driving
12	11/22/2016	Tuesday	9:37	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
13	12/24/2016	Saturday	10:24	PDO	Angle	Wet	Daylight	Rain	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
14	1/6/2017	Friday	11:26	Non Fatal Injury	Sideswipe, same direction	Wet	Daylight	Cloudy	Travelling straight ahead	Changing lanes	Collision with motor vehicle in transport	No improper driving
15	1/6/2017	Friday	12:05	PDO	Angle	Wet	Daylight	Cloudy	Backing	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
16	1/26/2017	Thursday	16:39	PDO	Angle	Wet	Dusk	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Visibility obstructed
17	4/7/2017	Friday	15:28	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Made an improper turn
18	5/3/2017	Wednesday	19:41	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
19	7/6/2017	Thursday	11:19	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
20	8/24/2017	Thursday	11:54	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
21	9/11/2017	Monday	15:28	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
22	10/24/2017	Tuesday	8:43	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Turning right	Collision with motor vehicle in transport	Unknown
23	10/27/2017	Friday	12:07	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Unknown
24	12/22/2017	Friday	11:19	PDO	Angle	Dry	Daylight	Cloudy	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Other improper action
25	1/23/2018	Tuesday	16:11	PDO	Single vehicle crash	Wet	Daylight	Rain	Travelling straight ahead		Collision with animal-deer	No improper driving
26	2/14/2018	Wednesday	16:25	PDO	Rear-end	Dry	Daylight	Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
27	2/16/2018	Friday	8:53	PDO	Angle	Wet	Daylight	Cloudy	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Made an improper turn
28	3/1/2018	Thursday	21:54	PDO	Angle	Dry	Dark - lighted roadway	Clear	Changing lanes	Turning left	Collision with motor vehicle in transport	Failed to yield right of way
29	5/24/2018	Thursday	11:04	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
30	6/21/2018	Thursday	12:14	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failure to keep in proper lane or running off road
31	7/23/2018	Monday	14:15	Non Fatal Injury	Sideswipe, same direction	Dry	Daylight	Clear	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Visibility obstructed
32	8/18/2018	Saturday	11:36	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
33	9/18/2018	Tuesday	12:29	Non Fatal Injury	Sideswipe, opposite direction	Wet	Daylight	Rain	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
34	10/3/2018	Wednesday	17:03	PDO	Angle	Dry	Daylight	Clear	Turning right	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
35	11/16/2018	Friday	9:45	PDO	Sideswipe, opposite direction	Wet	Daylight	Rain	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Failed to yield right of way
36	4/18/2019	Thursday	16:02	PDO	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
37	4/22/2019	Monday	17:16	PDO	Angle	Wet	Daylight	Cloudy	Turning left	Turning left	Collision with motor vehicle in transport	No improper driving
38	4/27/2019	Saturday	13:14	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Distracted
39	5/9/2019	Thursday	12:40	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
40	5/30/2019	Thursday	13:19	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Overtaking/passing	Turning left	Collision with motor vehicle in transport	Disregarded traffic signs, signals, road markings
41	7/17/2019	Wednesday	12:40	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
42	7/17/2019	Wednesday	14:10	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
43	7/30/2019	Tuesday	10:16	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way
44	9/21/2019	Saturday	10:30	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
45	10/1/2019	Tuesday	15:24	PDO	Unknown	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failure to keep in proper lane or running off road
46	11/23/2019	Saturday	13:07	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown

Note: PDO = Property Damage Only

SYMBOLS

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

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 K-3
Collision Diagram: Route 53 at High Street and Grove Street
Norwell Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-3
Summary of Crashes: Route 53 at High Street and Grove Street
Norwell Police Crash Reports 2015–19

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	1/21/2015	Wednesday	20:14	PDO	Rear-end	Dry	Dark - lighted roadway	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
2	2/25/2015	Wednesday	13:39	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Turning right	Collision with motor vehicle in transport	No improper driving
3	3/13/2015	Friday	7:47	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Other improper action
4	3/17/2015	Tuesday	11:29	Non Fatal Injury	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Turning right	Collision with motor vehicle in transport	No improper driving
5	3/29/2015	Sunday	19:37	PDO	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Failed to yield right of way
6	6/12/2015	Friday	13:24	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
7	7/8/2015	Wednesday	11:42	Non Fatal Injury	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
8	11/2/2015	Monday	14:59	Non Fatal Injury	Rear-end	Dry	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
9	11/21/2015	Saturday	13:29	PDO	Sideswipe, opposite direction	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Operating defective equipment
10	12/4/2015	Friday	17:01	PDO	Angle	Dry	Dark - lighted roadway	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
11	3/26/2016	Saturday	13:28	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
12	6/28/2016	Tuesday	16:54	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
13	7/8/2016	Friday	12:31	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Other improper action
14	7/21/2016	Thursday	15:30	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
15	9/6/2016	Tuesday	11:01	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
16	9/16/2016	Friday	16:32	PDO	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
17	10/24/2016	Monday	15:42	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
18	10/28/2016	Friday	13:35	Non Fatal Injury	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Parked	Collision with motor vehicle in transport	Unknown
19	10/30/2016	Sunday	18:28	PDO	Rear-end	Wet	Dark - lighted roadway	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
20	11/4/2016	Friday	16:41	PDO	Head on	Dry	Daylight	Clear	Turning left	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
21	11/8/2016	Tuesday	16:10	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
22	2/7/2017	Tuesday	9:19	PDO	Angle	Wet	Daylight	Snow	Turning right	Making U-turn	Collision with motor vehicle in transport	No improper driving
23	4/30/2017	Sunday	17:44	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Visibility obstructed
24	6/8/2017	Thursday	8:17	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
25	7/24/2017	Monday	15:04	PDO	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Inattention
26	8/1/2017	Tuesday	13:57	Non Fatal Injury	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
27	8/1/2017	Tuesday	14:45	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
28	8/15/2017	Tuesday	13:34	PDO	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
29	11/26/2017	Sunday	10:52	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Unknown
30	12/5/2017	Tuesday	12:02	Non Fatal Injury	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
31	1/5/2018	Friday	15:19	Non Fatal Injury	Rear-end	Snow	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Distracted
32	3/29/2018	Thursday	11:59	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Other improper action
33	5/5/2018	Saturday	13:15	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
34	5/18/2018	Friday	9:59	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
35	7/20/2018	Friday	14:36	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Visibility obstructed
36	10/17/2018	Wednesday	15:41	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
37	12/5/2018	Wednesday	7:40	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
38	12/11/2018	Tuesday	17:53	Non Fatal Injury	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner
39	1/23/2019	Wednesday	9:20	PDO	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
40	3/30/2019	Saturday	14:43	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
41	4/3/2019	Wednesday	14:30	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
42	9/5/2019	Thursday	19:02	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Unknown
43	9/25/2019	Wednesday	12:26	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
44	12/5/2019	Thursday	15:13	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Unknown
45	12/12/2019	Thursday	7:59	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Entering traffic lane	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way

Note: PDO = Property Damage Only

SYMBOLS

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

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 K-4
Collision Diagram: Route 53 between High Street and Oak Street
Norwell Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-4
Summary of Crashes: Route 53 between High Street and Oak Street
Norwell Police Crash Reports 2015–19

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	2/12/2015	Thursday	21:41	PDO	Angle	Slush	Dark - lighted roadway	Snow	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Visibility obstructed
2	2/16/2015	Monday	16:57	Non Fatal Injury	Angle	Slush	Daylight	Cloudy	Other	Travelling straight ahead	Collision with motor vehicle in transport	Driving too fast for conditions
3	4/12/2015	Sunday	21:10	PDO	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Travelling straight ahead		Collision with utility pole	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner
4	6/7/2015	Sunday	12:55	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
5	10/31/2015	Saturday	21:36	Non Fatal Injury	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Parked	Collision with parked motor vehicle	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner
6	11/13/2015	Friday	8:42	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
7	12/19/2015	Saturday	12:15	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
8	2/4/2016	Thursday	16:20	PDO	Sideswipe, opposite direction	Dry	Dusk	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
9	8/10/2016	Wednesday	14:11	PDO	Head on	Wet	Daylight	Rain	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
10	9/13/2016	Tuesday	8:16	PDO	Single vehicle crash	Dry	Daylight	Clear	Turning right		Collision with light pole or other post/support	Inattention
11	1/24/2017	Tuesday	17:25	PDO	Rear-end	Wet	Dark - lighted roadway	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
12	3/17/2017	Friday	14:37	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
13	5/24/2017	Wednesday	17:18	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
14	7/12/2017	Wednesday	11:59	PDO	Single vehicle crash	Wet	Daylight	Rain	Entering traffic lane		Collision with utility pole	Unknown
15	9/11/2017	Monday	10:31	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
16	9/16/2017	Saturday	6:51	PDO	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Distracted
17	11/22/2017	Wednesday	14:06	PDO	Angle	Wet	Daylight	Rain	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	No improper driving
18	1/22/2018	Monday	1:04	Non Fatal Injury	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Travelling straight ahead		Collision with utility pole	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner
19	6/17/2018	Sunday	11:48	PDO	Sideswipe, opposite direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
20	8/15/2018	Wednesday	8:55	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Failed to yield right of way
21	8/19/2018	Sunday	14:48	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
22	9/20/2018	Thursday	14:43	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way
23	11/30/2018	Friday	16:58	PDO	Rear-end	Dry	Dark - lighted roadway	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Distracted
24	3/18/2019	Monday	17:50	PDO	Rear-end	Dry	Daylight	Clear	Turning left	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
25	4/29/2019	Monday	7:59	Non Fatal Injury	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with utility pole	Unknown
26	6/20/2019	Thursday	14:36	PDO	Angle	Wet	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Unknown
27	6/28/2019	Friday	17:03	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failure to keep in proper lane or running off road
28	10/5/2019	Saturday	13:51	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Unknown
29	10/10/2019	Thursday	18:01	Non Fatal Injury	Angle	Dry	Dusk	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Unknown

Note: PDO = Property Damage Only

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 K-5
Collision Diagram: Route 53 between Oak Street and Hall Drive
Norwell Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-5
Summary of Crashes: Route 53 between Oak Street and Hall Drive
Norwell Police Crash Reports 2015–19

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	3/27/2015	Friday	16:13	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Made an improper turn
2	1/6/2016	Wednesday	18:14	PDO	Rear-end	Dry	Dark - lighted roadway	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
3	2/26/2016	Friday	15:08	Non Fatal Injury	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
4	3/19/2016	Saturday	21:18	PDO	Head on	Dry	Dark - roadway not lighted	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Made an improper turn
5	5/23/2016	Monday	20:37	PDO	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Travelling straight ahead		Collision with animal-deer	No improper driving
6	9/1/2016	Thursday	12:00	Non Fatal Injury	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
7	9/19/2016	Monday	16:42	PDO	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
8	11/12/2016	Saturday	13:19	Non Fatal Injury	Head on	Dry	Daylight	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	No improper driving
9	11/29/2016	Tuesday	14:21	PDO	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
10	1/26/2017	Thursday	16:42	PDO	Angle	Wet	Daylight	Rain	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
11	2/18/2017	Saturday	20:14	Non Fatal Injury	Rear-end	Dry	Dusk	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Illness
12	4/18/2017	Tuesday	13:02	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Other improper action
13	5/5/2017	Friday	14:59	PDO	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
14	9/16/2017	Saturday	11:59	PDO	Single vehicle crash	Dry	Daylight	Cloudy	Travelling straight ahead		Collision with animal-deer	No improper driving
15	9/26/2017	Tuesday	11:30	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
16	10/12/2017	Thursday	7:08	PDO	Rear-end	Wet	Daylight	Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
17	11/9/2018	Friday	9:51	PDO	Rear-end	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
18	5/28/2019	Tuesday	19:59	PDO	Single vehicle crash	Wet	Dark - lighted roadway	Rain	Travelling straight ahead	Travelling straight ahead	Collision with animal-deer	Unknown
19	12/4/2019	Wednesday	15:46	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	No improper driving

Note: PDO = Property Damage Only

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 K-6
Collision Diagram: Route 53 between Hall Drive and Jacobs Trail (Section 1)
Norwell Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-6
Summary of Crashes: Route 53 between Hall Drive and Jacobs Trail (Sec. 1)
Norwell Police Crash Reports 2015–19

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	1/3/2015	Saturday	16:58	Non Fatal Injury	Rear-end	Snow	Dark - roadway not lighted	Snow	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	Inattention
2	4/21/2015	Tuesday	14:16	PDO	Angle	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
3	5/9/2015	Saturday	11:55	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
4	8/1/2015	Saturday	14:28	PDO	Rear-end	Wet	Daylight	Cloudy	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
5	9/10/2015	Thursday	12:13	PDO	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
6	10/31/2015	Saturday	10:36	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
7	12/10/2015	Thursday	23:11	PDO	Rear-end	Wet	Dark - roadway not lighted	Fog, smog, smoke	Unknown	Slowing or stopped	Collision with motor vehicle in transport	Unknown
8	6/12/2016	Sunday	11:25	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
9	7/25/2016	Monday	12:23	PDO	Angle	Dry	Daylight	Clear	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
10	8/13/2016	Saturday	7:51	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
11	9/16/2016	Friday	22:43	Non Fatal Injury	Single vehicle crash	Dry	Dark - lighted roadway	Cloudy	Travelling straight ahead		Other	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner
12	10/1/2016	Saturday	13:37	PDO	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	No improper driving
13	10/8/2016	Saturday	12:30	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
14	10/31/2016	Monday	15:54	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
15	12/29/2016	Thursday	14:04	PDO	Rear-end	Wet	Daylight	Rain	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
16	3/28/2017	Tuesday	11:38	Non Fatal Injury	Rear-end	Dry	Daylight	Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
17	11/12/2017	Sunday	10:38	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
18	12/5/2017	Tuesday	16:42	PDO	Single vehicle crash	Wet	Dark - lighted roadway	Cloudy	Travelling straight ahead		Collision with animal-deer	No improper driving
19	12/22/2017	Friday	11:07	PDO	Unknown	Dry	Daylight	Clear	Backing	Parked	Collision with motor vehicle in transport	Unknown
20	1/14/2018	Sunday	13:48	PDO	Single vehicle crash	Dry	Daylight	Cloudy	Travelling straight ahead		Collision with animal-deer	No improper driving
21	3/23/2018	Friday	12:30	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
22	9/13/2018	Thursday	16:10	Non Fatal Injury	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way
23	9/25/2018	Tuesday	17:38	PDO	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
24	11/23/2018	Friday	14:13	Non Fatal Injury	Sideswipe, opposite direction	Dry	Daylight	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
25	12/11/2018	Tuesday	17:30	Non Fatal Injury	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way
26	1/14/2019	Monday	18:27	Non Fatal Injury	Single vehicle crash	Dry	Dark - lighted roadway	Cloudy	Travelling straight ahead		Collision with animal-deer	No improper driving
27	1/20/2019	Sunday	11:18	PDO	Sideswipe, same direction	Wet	Daylight	Snow	Turning left	Overtaking/passing	Collision with motor vehicle in transport	Disregarded traffic signs, signals, road markings
28	3/17/2019	Sunday	12:48	PDO	Angle	Dry	Daylight	Clear	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
29	4/21/2019	Sunday	13:13	PDO	Front to rear	Wet	Daylight	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
30	6/15/2019	Saturday	17:03	PDO	Angle	Dry	Daylight	Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Distracted
31	7/25/2019	Thursday	15:37	PDO	Angle	Dry	Daylight	Clear	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
32	11/7/2019	Thursday	14:55	PDO	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving

Note: PDO = Property Damage Only

SYMBOLS

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

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 K-7
Collision Diagram: Route 53 between Hall Drive and Jacobs Trail (Section 2)
Norwell Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-7
Summary of Crashes: Route 53 between Hall Drive and Jacobs Trail (Sec. 2)
Norwell Police Crash Reports 2015–19

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	3/18/2015	Wednesday	9:09	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
2	4/19/2015	Sunday	9:11	PDO	Sideswipe, opposite direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
3	7/14/2015	Tuesday	11:22	Non Fatal Injury	Angle	Wet	Daylight	Rain	Entering traffic lane	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
4	12/22/2015	Tuesday	14:27	Non Fatal Injury	Rear-end	Wet	Daylight	Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Followed too closely
5	1/8/2016	Friday	16:45	PDO	Rear-end	Sand, mud, dirt, oil, gravel	Dark - lighted roadway	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
6	2/5/2016	Friday	12:26	PDO	Angle	Snow	Daylight	Snow	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
7	4/29/2016	Friday	15:38	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
8	5/2/2016	Monday	15:43	PDO	Sideswipe, opposite direction	Unknown	Daylight	Cloudy	Turning left	Slowing or stopped	Collision with motor vehicle in transport	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner
9	6/19/2016	Sunday	23:25	PDO	Single vehicle crash	Dry	Dark - lighted roadway	Clear	Travelling straight ahead		Collision with animal-deer	Unknown
10	8/10/2016	Wednesday	12:48	PDO	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
11	11/22/2016	Tuesday	18:06	PDO	Rear-end	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Unknown
12	12/19/2016	Monday	16:29	PDO	Rear-end	Dry	Dusk	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
13	2/13/2017	Monday	16:36	PDO	Rear-end	Wet	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
14	10/23/2017	Monday	15:15	PDO	Sideswipe, opposite direction	Dry	Daylight	Clear	Turning left	Unknown	Collision with motor vehicle in transport	Unknown
15	12/23/2017	Saturday	10:32	PDO	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
16	4/20/2018	Friday	12:17	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
17	6/21/2018	Thursday	13:15	PDO	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead		Collision with other fixed object (wall, building, tunnel)	Unknown
18	7/21/2018	Saturday	12:09	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Parked	Collision with parked motor vehicle	Unknown
19	9/25/2018	Tuesday	15:59	PDO	Rear-end	Wet	Daylight	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc
20	11/14/2018	Wednesday	13:08	PDO	Single vehicle crash	Dry	Daylight	Clear	Travelling straight ahead		Collision with median barrier	Unknown
21	3/1/2019	Friday	9:51	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Inattention
22	4/10/2019	Wednesday	15:27	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way
23	5/22/2019	Wednesday	15:08	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Followed too closely
24	7/3/2017	Monday	8:57	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
25	7/16/2017	Sunday	16:17	Non Fatal Injury	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way

Note: PDO = Property Damage Only

SYMBOLS

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

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 K-8
Collision Diagram: Route 53 at Jacobs Trail and Stop & Shop Driveway
Norwell Police Crash Reports 2015–19

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-8
Summary of Crashes: Route 53 at Jacobs Trail and Stop & Shop Driveway
Norwell Police Crash Reports 2015–19

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	1/22/2015	Thursday	17:46	PDO	Angle	Dry	Dark - roadway not lighted	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Failed to yield right of way
2	7/10/2015	Friday	11:04	PDO	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
3	7/26/2015	Sunday	11:34	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
4	12/2/2015	Wednesday	10:04	PDO	Angle	Wet	Daylight	Rain	Travelling straight ahead	Turning right	Collision with motor vehicle in transport	Other improper action
5	4/27/2016	Wednesday	7:42	Non Fatal Injury	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
6	10/29/2016	Saturday	18:24	Non Fatal Injury	Head on	Dry	Dark - lighted roadway	Clear	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
7	11/7/2016	Monday	18:09	PDO	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in transport	Visibility obstructed
8	11/25/2016	Friday	16:57	PDO	Sideswipe, same direction	Wet	Dark - lighted roadway	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
9	1/24/2017	Tuesday	18:13	PDO	Sideswipe, same direction	Wet	Dark - lighted roadway	Rain	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	No improper driving
10	2/12/2018	Monday	17:50	PDO	Angle	Dry	Dark - lighted roadway	Clear	Travelling straight ahead	Unknown	Collision with motor vehicle in transport	No improper driving
11	4/23/2018	Monday	18:12	PDO	Sideswipe, same direction	Dry	Daylight	Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Failure to keep in proper lane or running off road
12	11/3/2018	Saturday	16:30	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Operating vehicle in erratic, rackless, careless, negligent or aggressive manner
13	2/21/2019	Thursday	18:45	PDO	Front to rear	Dry	Dark - lighted roadway	Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Failed to yield right of way
14	4/20/2019	Saturday	11:55	PDO	Angle	Other	Daylight	Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in transport	Other improper action
15	11/11/2019	Monday	15:10	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Distracted
16	11/21/2019	Thursday	13:10	PDO	Angle	Dry	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in transport	Failed to yield right of way

Note: PDO = Property Damage Only

SYMBOLS

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

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 K-9
Collision Diagram: Route 53 between Jacobs Trail and Assinippi Avenue
Norwell Police Crash Reports 2015–19 and MassDOT Crash Data 2013–17 (Hanover)

Addressing Safety, Mobility, and Access on Subregional Priority Roadways

Table K-9
Summary of Crashes: Route 53 between Jacobs Trail and Assinippi Avenue
Norwell Police Crash Reports 2015–19 and MassDOT Crash Data 2013–17 (Hanover)

Index	Crash Date	Day	Time	Crash Severity	Manner of Collision	Road Surface Condition	Ambient Light Condition	Weather Condition	Vehicle Action Veh #1	Vehicle Action Veh #2	Most Harmful Event	Driver Contribution
1	8/22/2015	Saturday	15:58	Non Fatal Injury	Rear-end	Dry	Daylight	Cloudy	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Inattention
2	8/10/2016	Wednesday	9:39	PDO	Rear-end	Dry	Daylight	Clear	Entering traffic lane	Entering traffic lane	Collision with motor vehicle in transport	No improper driving
3	10/9/2017	Monday	13:38	PDO	Rear-end	Wet	Daylight	Rain	Turning left	Travelling straight ahead	Collision with motor vehicle in transport	Unknown
4	12/29/2017	Friday	8:56	PDO	Rear-end	Dry	Daylight	Cloudy	Turning right	Slowing or stopped	Collision with motor vehicle in transport	No improper driving
5	1/30/2019	Wednesday	11:32	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped	Travelling straight ahead	Collision with motor vehicle in transport	Distracted
6	2/9/2019	Saturday	10:55	PDO	Single vehicle crash	Dry	Daylight	Clear	Slowing or stopped		Collision with pedestrian	Unknown
7	6/3/2019	Monday	12:01	PDO	Rear-end	Dry	Daylight	Clear	Travelling straight ahead	Slowing or stopped	Collision with motor vehicle in transport	Other improper action
8	2/12/2014	Wednesday	16:23	PDO	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Travelling straight ahead	Collision with motor vehicle in traffic	Inattention
9	8/14/2014	Thursday	10:32	Non Fatal Injury	Rear-end	Dry	Daylight	Clear	Slowing or stopped in traffic	Travelling straight ahead	Collision with motor vehicle in traffic	Inattention
10	11/6/2014	Thursday	15:05	Non Fatal Injury	Rear-end	Wet	Daylight	Rain/Cloudy	Slowing or stopped in traffic	Slowing or stopped in traffic	Collision with motor vehicle in traffic	Other improper action
11	4/1/2015	Wednesday	7:45	PDO	Angle	Dry	Daylight	Clear/Clear	Travelling straight ahead	Turning left	Collision with motor vehicle in traffic	Inattention
12	11/28/2015	Saturday	14:23	Non Fatal Injury	Rear-end	Wet	Daylight	Rain/Cloudy	Slowing or stopped in traffic	Travelling straight ahead	Collision with motor vehicle in traffic	Driving too fast for conditions
13	9/27/2016	Tuesday	11:20	Not Reported	Angle	Wet	Daylight	Clear	Travelling straight ahead	Entering traffic lane	Collision with motor vehicle in traffic	Unknown
14	2/10/2017	Friday	7:35	PDO	Rear-end	Snow	Daylight	Clear/Clear	Travelling straight ahead	Slowing or stopped in traffic	Collision with motor vehicle in traffic	No improper driving
15	2/23/2017	Thursday	18:06	Non Fatal Injury	Angle	Dry	Dark - lighted roadway	Clear/Clear	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in traffic	Failed to yield right of way
16	10/30/2017	Monday	7:05	PDO	Sideswipe, same direction	Wet	Daylight	Rain/Cloudy	Travelling straight ahead	Travelling straight ahead	Collision with motor vehicle in traffic	Unknown
17	12/19/2017	Tuesday	6:22	Non Fatal Injury	Sideswipe, opposite direction	Unknown	Dawn	Unknown/Unknown	Travelling straight ahead	Turning left	Collision with motor vehicle in traffic	Failed to yield right of way

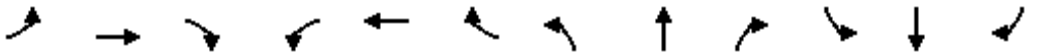
Note: This segment includes the intersection of Route 53 and Assinippi Avenue. The intersection is located on the border between Norwell and Hanover. The recent five-year crashes are from two data sources.

Norwell police crash reports 2015–19 were used for the crashes occurred in Norwell (Crash Numbers 1 to 7) and MassDOT crash data 2013–17 were used for the crashes occurred in Hanover (Crash Numbers 8 to 17).

PDO = Property Damage Only

APPENDIX L

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
Signal Retiming Scenarios (2020 Estimated Volumes)



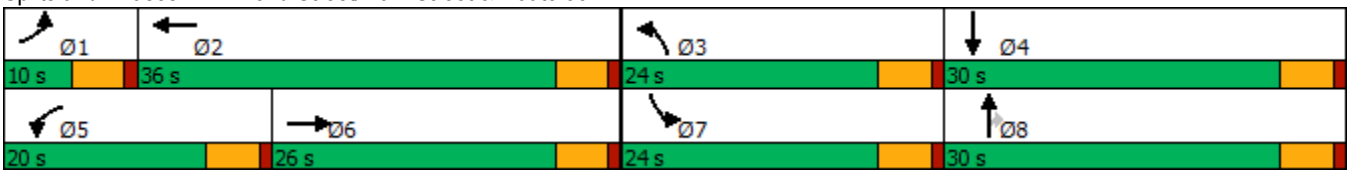
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	413	125	188	729	217	144	351	105	244	329	63
Future Volume (vph)	54	413	125	188	729	217	144	351	105	244	329	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	200		0	150		200	250		250
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1787	3344	0	1703	3437	0	1583	1727	1538	1736	3404	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1787	3344	0	1703	3437	0	1583	1727	1538	1736	3404	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36			40				185		21	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1282			608			885			701	
Travel Time (s)		25.0			11.8			13.4			10.6	
Peak Hour Factor	0.98	0.98	0.98	0.99	0.99	0.99	0.94	0.94	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	8%	6%	1%	3%	14%	10%	5%	4%	4%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	549	0	190	955	0	153	373	112	265	426	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases									8			
Detector Phase	1	6		5	2		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	10.0	22.5		13.0	22.5		13.0	22.0	22.0	10.0	22.0	
Total Split (s)	10.0	26.0		20.0	36.0		24.0	30.0	30.0	24.0	30.0	
Total Split (%)	10.0%	26.0%		20.0%	36.0%		24.0%	30.0%	30.0%	24.0%	30.0%	
Yellow Time (s)	4.0	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	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		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	None	None	None	None	
Act Effct Green (s)	5.1	19.4		13.7	30.6		14.2	23.2	23.2	17.4	26.5	
Actuated g/C Ratio	0.05	0.21		0.15	0.33		0.15	0.25	0.25	0.18	0.28	
v/c Ratio	0.57	0.77		0.77	0.83		0.65	0.88	0.22	0.83	0.44	
Control Delay	70.4	41.5		61.1	37.2		51.6	57.9	1.4	60.2	29.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	70.4	41.5		61.1	37.2		51.6	57.9	1.4	60.2	29.2	
LOS	E	D		E	D		D	E	A	E	C	
Approach Delay		44.1			41.1			46.5			41.1	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	35	162		117	290		93	228	0	163	109	
Queue Length 95th (ft)	#94	224		#221	#403		153	#390	4	#291	164	
Internal Link Dist (ft)		1202			528			805			621	
Turn Bay Length (ft)	150			200			150		200	250		
Base Capacity (vph)	96	792		276	1179		325	466	551	356	1012	

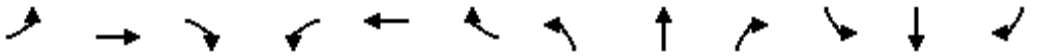
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.57	0.69		0.69	0.81		0.47	0.80	0.20	0.74	0.42	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 94.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 42.8		Intersection LOS: D	
Intersection Capacity Utilization 79.1%		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: Pond Street/Main Street & Route 53





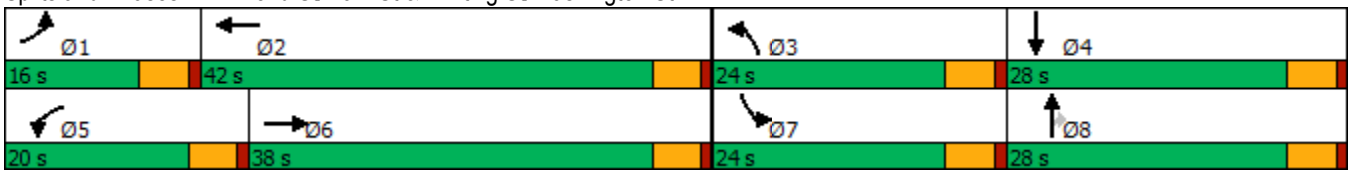
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	815	160	183	596	276	210	361	290	265	436	53
Future Volume (vph)	100	815	160	183	596	276	210	361	290	265	436	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	200		0	150		250	250		250
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3491	0	1770	3396	0	1787	1900	1615	1787	3452	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3491	0	1770	3396	0	1787	1900	1615	1787	3452	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			74				238		11	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1282			602			877			701	
Travel Time (s)		25.0			11.7			13.3			10.6	
Peak Hour Factor	0.95	0.95	0.95	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	0%	2%	1%	2%	1%	0%	0%	1%	3%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	1026	0	197	938	0	228	392	315	288	532	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases									8			
Detector Phase	1	6		5	2		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	1.0	5.0		1.0	5.0		1.0	5.0	5.0	1.0	1.0	
Minimum Split (s)	6.0	23.0		11.0	23.0		10.0	23.0	23.0	10.0	23.0	
Total Split (s)	16.0	38.0		20.0	42.0		24.0	28.0	28.0	24.0	28.0	
Total Split (%)	14.5%	34.5%		18.2%	38.2%		21.8%	25.5%	25.5%	21.8%	25.5%	
Yellow Time (s)	4.0	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	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		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	None	None	None	None	
Act Effct Green (s)	10.0	33.0		14.4	37.4		17.3	23.0	23.0	18.9	24.6	
Actuated g/C Ratio	0.09	0.30		0.13	0.34		0.16	0.21	0.21	0.17	0.23	
v/c Ratio	0.65	0.96		0.85	0.78		0.81	0.98	0.60	0.94	0.68	
Control Delay	66.6	56.9		76.7	35.0		66.2	84.7	15.7	82.7	43.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	66.6	56.9		76.7	35.0		66.2	84.7	15.7	82.7	43.6	
LOS	E	E		E	D		E	F	B	F	D	
Approach Delay		57.8			42.3			56.9			57.3	
Approach LOS		E			D			E			E	
Queue Length 50th (ft)	72	368		137	290		154	278	46	203	182	
Queue Length 95th (ft)	#136	#510		#258	370		#263	#473	137	#366	243	
Internal Link Dist (ft)		1202			522			797			621	
Turn Bay Length (ft)	150			200			150		250	250		
Base Capacity (vph)	178	1068		242	1209		310	399	527	310	784	

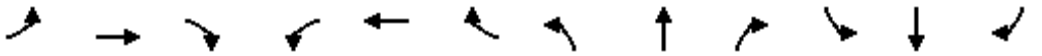
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.59	0.96		0.81	0.78		0.74	0.98	0.60	0.93	0.68	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 109.3			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 53.1		Intersection LOS: D	
Intersection Capacity Utilization 88.1%		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: Pond St/Main St & Whiting St/Washington St





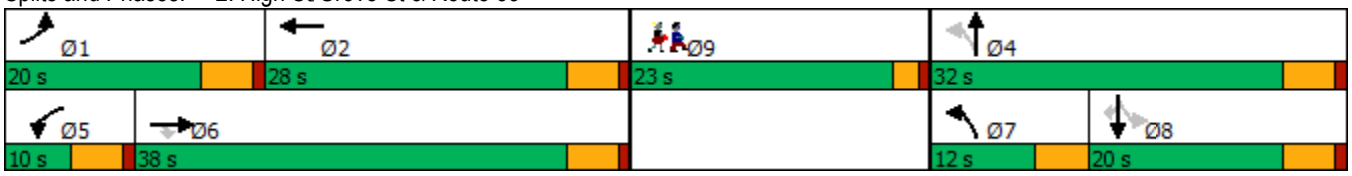
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	196	471	158	21	557	53	249	96	26	88	134	515
Future Volume (vph)	196	471	158	21	557	53	249	96	26	88	134	515
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	150		150	200		0	350		350
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	25			150			150			150		
Satd. Flow (prot)	1736	1827	1553	1736	3426	0	1770	1795	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.423			0.671		
Satd. Flow (perm)	1736	1827	1506	1727	3426	0	788	1795	0	1246	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			172		9			13				563
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		663			1258			1174			873	
Travel Time (s)		15.1			28.6			26.7			19.8	
Confl. Peds. (#/hr)			4	4					1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.85	0.85	0.85
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	213	512	172	23	663	0	274	134	0	104	158	606
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6				4			8		8
Detector Phase	1	6	6	5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	25.0	25.0	8.0	25.0		9.0	10.0		10.0	10.0	10.0
Total Split (s)	20.0	38.0	38.0	10.0	28.0		12.0	32.0		20.0	20.0	20.0
Total Split (%)	19.4%	36.9%	36.9%	9.7%	27.2%		11.7%	31.1%		19.4%	19.4%	19.4%
Yellow Time (s)	4.0	4.0	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		0.0	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	5.0	5.0	5.0		4.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max		None	None		None	None	None
Act Effct Green (s)	14.1	39.0	39.0	5.1	23.4		26.3	25.3		13.1	13.1	13.1
Actuated g/C Ratio	0.17	0.48	0.48	0.06	0.29		0.32	0.31		0.16	0.16	0.16
v/c Ratio	0.71	0.59	0.21	0.21	0.67		0.78	0.24		0.52	0.53	0.83
Control Delay	48.4	23.2	4.4	45.9	31.5		42.4	22.2		44.0	40.4	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	48.4	23.2	4.4	45.9	31.5		42.4	22.2		44.0	40.4	16.5
LOS	D	C	A	D	C		D	C		D	D	B
Approach Delay		25.6			32.0			35.7			24.1	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)	99	152	0	11	150		104	42		47	71	18
Queue Length 95th (ft)	#266	#504	47	42	#313		#328	115		114	155	#128
Internal Link Dist (ft)		583			1178			1094			793	
Turn Bay Length (ft)	300		300	150			200			350		350

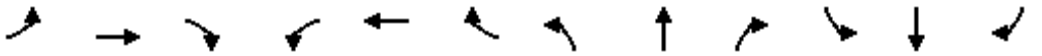
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	22%
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)	323	871	808	107	987		351	611		232	347	753
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
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.66	0.59	0.21	0.21	0.67		0.78	0.22		0.45	0.46	0.80

Intersection Summary			
Area Type:	Other		
Cycle Length: 103			
Actuated Cycle Length: 81.7			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 28.1		Intersection LOS: C	
Intersection Capacity Utilization 74.4%		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: 2: High St/Grove St & Route 53





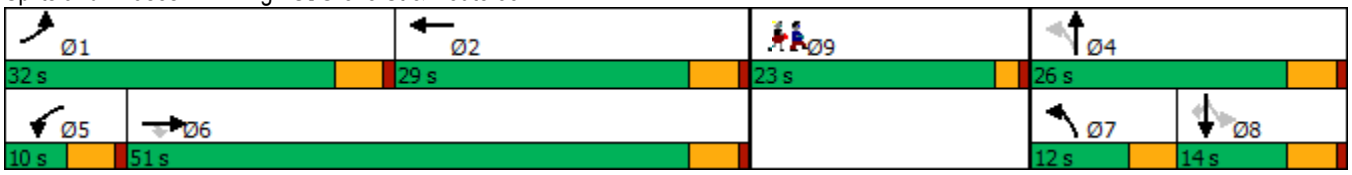
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	389	652	274	24	572	76	231	102	38	85	76	307
Future Volume (vph)	389	652	274	24	572	76	231	102	38	85	76	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	150		150	200		0	350		350
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	25			150			150			150		
Satd. Flow (prot)	1770	1863	1583	1770	3476	0	1770	1786	0	1787	1881	1599
Flt Permitted	0.950			0.950			0.490			0.663		
Satd. Flow (perm)	1770	1863	1583	1770	3476	0	913	1786	0	1247	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			285		12			15				320
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		933			1262			1358			807	
Travel Time (s)		21.2			28.7			30.9			18.3	
Peak Hour Factor	0.96	0.96	0.96	0.93	0.93	0.93	0.95	0.95	0.95	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	405	679	285	26	697	0	243	147	0	89	79	320
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6				4			8		8
Detector Phase	1	6	6	5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	25.0	25.0	10.0	25.0		9.0	10.0		10.0	10.0	10.0
Total Split (s)	32.0	51.0	51.0	10.0	29.0		12.0	26.0		14.0	14.0	14.0
Total Split (%)	29.1%	46.4%	46.4%	9.1%	26.4%		10.9%	23.6%		12.7%	12.7%	12.7%
Yellow Time (s)	4.0	4.0	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		0.0	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	5.0	5.0	5.0		4.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max		None	None		None	None	None
Act Effct Green (s)	25.5	51.2	51.2	5.1	24.3		22.3	21.3		9.1	9.1	9.1
Actuated g/C Ratio	0.28	0.57	0.57	0.06	0.27		0.25	0.24		0.10	0.10	0.10
v/c Ratio	0.81	0.64	0.28	0.26	0.74		0.80	0.34		0.71	0.42	0.71
Control Delay	45.2	20.0	2.9	51.3	36.5		53.7	30.4		71.8	48.2	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.2	20.0	2.9	51.3	36.5		53.7	30.4		71.8	48.2	15.0
LOS	D	C	A	D	D		D	C		E	D	B
Approach Delay		23.9			37.0			44.9			30.8	
Approach LOS		C			D			D			C	
Queue Length 50th (ft)	197	186	0	14	178		116	59		48	41	0
Queue Length 95th (ft)	#468	#652	50	48	#359		#337	145		#161	105	#110
Internal Link Dist (ft)		853			1182			1278			727	
Turn Bay Length (ft)	300		300	150			200			350		350
Base Capacity (vph)	537	1059	1022	99	946		302	433		126	190	449

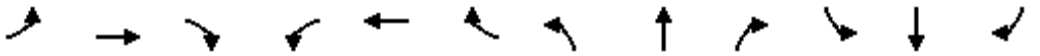
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour 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)	23.0
Total Split (s)	23.0
Total Split (%)	21%
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)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
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
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.75	0.64	0.28	0.26	0.74		0.80	0.34		0.71	0.42	0.71

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 90			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 31.0		Intersection LOS: C	
Intersection Capacity Utilization 72.6%		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: High St/Grove St & Route 53





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	586	39	44	762	13	46	2	51	18	2	14
Future Volume (vph)	10	586	39	44	762	13	46	2	51	18	2	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	150			25			25			25		
Satd. Flow (prot)	1736	3440	0	1752	1840	0	1719	1521	0	0	1683	0
Flt Permitted	0.950			0.354			0.728				0.805	
Satd. Flow (perm)	1720	3440	0	653	1840	0	1317	1521	0	0	1386	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			1			57			18	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1093			907			396			538	
Travel Time (s)		24.8			20.6			9.0			12.2	
Confl. Peds. (#/hr)	3					3			2	2		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.80
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	5%	5%	5%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	694	0	49	861	0	51	59	0	0	44	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			3			7	
Permitted Phases				2			3			7		
Detector Phase	1	6		5	2		3	3		7	7	
Switch Phase												
Minimum Initial (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	10.0		8.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	10.0	50.0		10.0	50.0		15.0	15.0		15.0	15.0	
Total Split (%)	10.4%	52.1%		10.4%	52.1%		15.6%	15.6%		15.6%	15.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Max		None	Max		None	None		None	None	
Act Effct Green (s)	5.1	50.6		54.3	54.7		8.0	8.0			8.0	
Actuated g/C Ratio	0.07	0.68		0.73	0.74		0.11	0.11			0.11	
v/c Ratio	0.09	0.29		0.09	0.63		0.36	0.28			0.27	
Control Delay	40.1	8.6		5.7	13.4		41.6	14.8			28.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	40.1	8.6		5.7	13.4		41.6	14.8			28.0	
LOS	D	A		A	B		D	B			C	
Approach Delay		9.1			13.0			27.3			28.0	
Approach LOS		A			B			C			C	
Queue Length 50th (ft)	5	69		4	137		22	1			11	
Queue Length 95th (ft)	24	187		28	#784		67	38			42	
Internal Link Dist (ft)		1013			827			316			458	
Turn Bay Length (ft)	200			150								

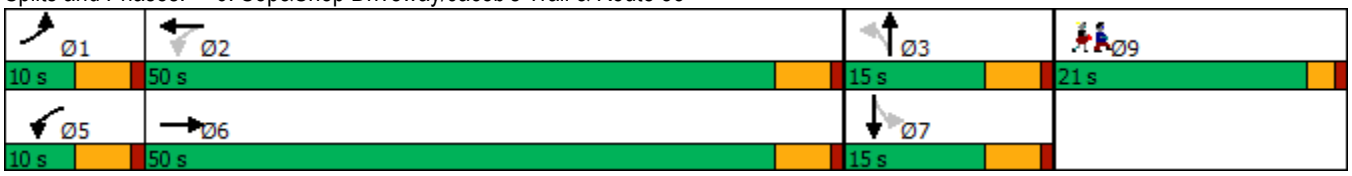
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	22%
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)	

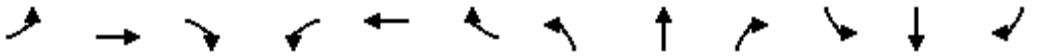
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	119	2353		554	1357		181	259			206	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.09	0.29		0.09	0.63		0.28	0.23			0.21	

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 74.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 12.7		Intersection LOS: B	
Intersection Capacity Utilization 57.9%		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: 6: Sop&Shop Driveway/Jacob's Trail & Route 53





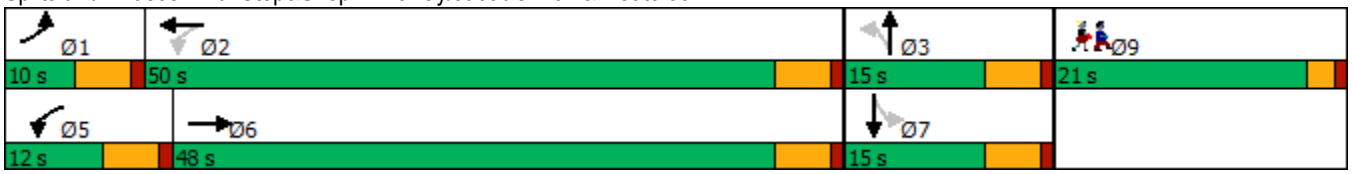
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	824	80	90	793	20	75	5	95	10	5	10
Future Volume (vph)	30	824	80	90	793	20	75	5	95	10	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	150			25			25			25		
Satd. Flow (prot)	1770	3493	0	1787	1874	0	1805	1630	0	0	1761	0
Flt Permitted	0.950			0.196			0.734				0.837	
Satd. Flow (perm)	1770	3493	0	369	1874	0	1395	1630	0	0	1504	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			2			106			14	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1093			907			368			415	
Travel Time (s)		24.8			20.6			8.4			9.4	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.90	0.90	0.90	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	35	1051	0	105	945	0	83	112	0	0	35	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			3			7	
Permitted Phases				2			3			7		
Detector Phase	1	6		5	2		3	3		7	7	
Switch Phase												
Minimum Initial (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	10.0		8.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	10.0	48.0		12.0	50.0		15.0	15.0		15.0	15.0	
Total Split (%)	10.4%	50.0%		12.5%	52.1%		15.6%	15.6%		15.6%	15.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Max		None	Max		None	None		None	None	
Act Effct Green (s)	5.1	44.4		52.5	50.0		8.9	8.9			8.9	
Actuated g/C Ratio	0.07	0.58		0.69	0.66		0.12	0.12			0.12	
v/c Ratio	0.29	0.51		0.28	0.77		0.51	0.40			0.19	
Control Delay	44.7	12.8		7.2	18.7		46.6	13.5			26.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	44.7	12.8		7.2	18.7		46.6	13.5			26.7	
LOS	D	B		A	B		D	B			C	
Approach Delay		13.8			17.5			27.6			26.7	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	16	140		11	184		36	3			9	
Queue Length 95th (ft)	51	304		48	#822		#109	54			31	
Internal Link Dist (ft)		1013			827			288			335	
Turn Bay Length (ft)	200			150								
Base Capacity (vph)	119	2046		388	1233		187	310			214	

Lane Group	Ø9
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)	
Peak Hour 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)	21.0
Total Split (s)	21.0
Total Split (%)	22%
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)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.29	0.51		0.27	0.77		0.44	0.36			0.16	

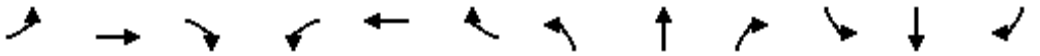
Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 76			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 16.8		Intersection LOS: B	
Intersection Capacity Utilization 67.7%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 6: Stop&Shop Driveway/Jacob's Trail & Route 53



APPENDIX M

Intersection Capacity Analyses
Weekday AM/PM Peak Hour
Proposed Long-Term Improvements under 2030 Traffic Conditions

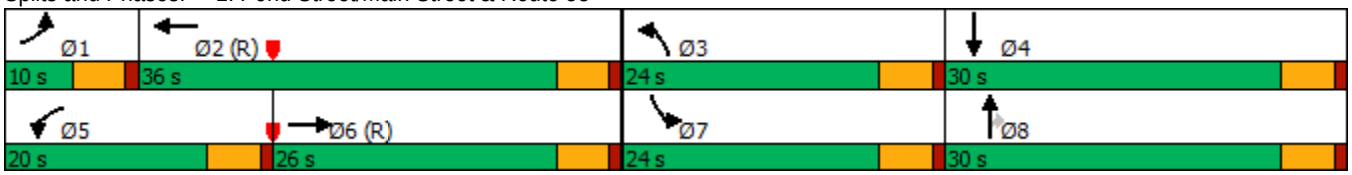


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	421	136	203	744	221	153	374	112	249	356	64
Future Volume (vph)	55	421	136	203	744	221	153	374	112	249	356	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	200		0	150		200	250		250
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1787	3336	0	1703	3437	0	1583	1727	1538	1736	3406	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1787	3336	0	1703	3437	0	1583	1727	1538	1736	3406	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			40				185		19	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1282			608			885			701	
Travel Time (s)		25.0			11.8			13.4			10.6	
Peak Hour Factor	0.98	0.98	0.98	0.99	0.99	0.99	0.94	0.94	0.94	0.92	0.92	0.92
Growth Factor	101%	101%	101%	101%	101%	101%	101%	101%	101%	101%	101%	101%
Heavy Vehicles (%)	1%	3%	8%	6%	1%	3%	14%	10%	5%	4%	4%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	574	0	207	984	0	164	402	120	273	461	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases									8			
Detector Phase	1	6		5	2		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Minimum Split (s)	10.0	22.5		13.0	22.5		13.0	22.0	22.0	10.0	22.0	
Total Split (s)	10.0	26.0		20.0	36.0		24.0	30.0	30.0	24.0	30.0	
Total Split (%)	10.0%	26.0%		20.0%	36.0%		24.0%	30.0%	30.0%	24.0%	30.0%	
Yellow Time (s)	4.0	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	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	5.2	22.8		14.4	34.2		15.0	24.6	24.6	18.2	27.8	
Actuated g/C Ratio	0.05	0.23		0.14	0.34		0.15	0.25	0.25	0.18	0.28	
v/c Ratio	0.62	0.73		0.84	0.82		0.69	0.95	0.23	0.87	0.48	
Control Delay	75.8	40.2		71.0	36.9		55.0	70.4	1.9	66.6	31.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	75.8	40.2		71.0	36.9		55.0	70.4	1.9	66.6	31.2	
LOS	E	D		E	D		D	E	A	E	C	
Approach Delay		43.4			42.8			54.7			44.4	
Approach LOS		D			D			D			D	
Queue Length 50th (ft)	36	171		129	303		100	251	0	169	122	
Queue Length 95th (ft)	#99	234		#249	#425		163	#432	10	#303	179	
Internal Link Dist (ft)		1202			528			805			621	
Turn Bay Length (ft)	150			200			150		200	250		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	92	789		255	1201		300	431	523	329	959	
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	0.73		0.81	0.82		0.55	0.93	0.23	0.83	0.48	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 45.8		Intersection LOS: D	
Intersection Capacity Utilization 81.7%		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: Pond Street/Main Street & Route 53



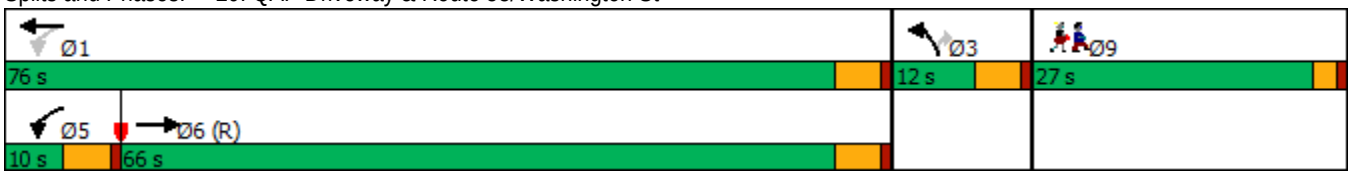
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	745	17	14	1172	4	110	
Future Volume (vph)	745	17	14	1172	4	110	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	100		0	0	
Storage Lanes		0	1		1	1	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3529	0	1770	1863	1770	1583	
Flt Permitted			0.293		0.950		
Satd. Flow (perm)	3529	0	546	1863	1770	1583	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	3					123	
Link Speed (mph)	30			30	30		
Link Distance (ft)	608			654	266		
Travel Time (s)	13.8			14.9	6.0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Growth Factor	103%	103%	103%	103%	103%	103%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	853	0	16	1312	4	123	
Turn Type	NA		pm+pt	NA	Prot	Perm	
Protected Phases	6		5	1	3		9
Permitted Phases			1			3	
Detector Phase	6		5	1	3	3	
Switch Phase							
Minimum Initial (s)	5.0		3.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		10.0	25.0	10.0	10.0	27.0
Total Split (s)	66.0		10.0	76.0	12.0	12.0	27.0
Total Split (%)	57.4%		8.7%	66.1%	10.4%	10.4%	23%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	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	C-Max		None	None	Min	Min	None
Act Effct Green (s)	89.3		93.5	93.5	6.1	6.1	
Actuated g/C Ratio	0.78		0.81	0.81	0.05	0.05	
v/c Ratio	0.31		0.03	0.87	0.04	0.61	
Control Delay	6.5		4.9	17.4	52.0	23.1	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	6.5		4.9	17.4	52.0	23.1	
LOS	A		A	B	D	C	
Approach Delay	6.5			17.3	24.0		
Approach LOS	A			B	C		
Queue Length 50th (ft)	39		1	299	3	0	
Queue Length 95th (ft)	247		13	#1397	14	60	
Internal Link Dist (ft)	528			574	186		
Turn Bay Length (ft)			100				
Base Capacity (vph)	2741		501	1513	107	211	

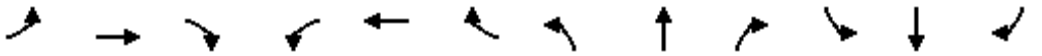
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Starvation Cap Reductn	0		0	0	0	0	
Spillback Cap Reductn	0		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.31		0.03	0.87	0.04	0.58	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 0 (0%), Referenced to phase 2: and 6:EBT, Start of Green			
Natural Cycle: 130			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 13.7		Intersection LOS: B	
Intersection Capacity Utilization 76.0%		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: 29: QAP Driveway & Route 53/Washington St





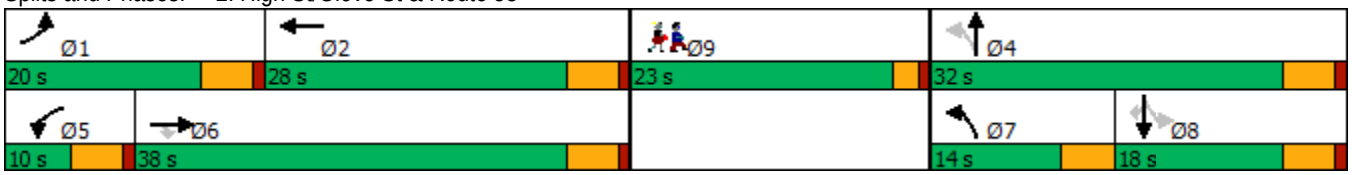
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	196	471	158	21	557	53	249	96	26	88	134	515
Future Volume (vph)	196	471	158	21	557	53	249	96	26	88	134	515
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	150		150	200		0	350		350
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	25			150			150			150		
Satd. Flow (prot)	1736	1827	1553	1736	3426	0	1770	1795	0	1770	1863	1583
Flt Permitted	0.950			0.950			0.401			0.669		
Satd. Flow (perm)	1736	1827	1506	1727	3426	0	747	1795	0	1242	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			177		9			13				548
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		663			1258			1174			873	
Travel Time (s)		15.1			28.6			26.7			19.8	
Confl. Peds. (#/hr)			4	4					1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.91	0.91	0.91	0.85	0.85	0.85
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	219	527	177	24	683	0	282	138	0	107	162	624
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6				4			8		8
Detector Phase	1	6	6	5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	25.0	25.0	8.0	25.0		9.0	10.0		10.0	10.0	10.0
Total Split (s)	20.0	38.0	38.0	10.0	28.0		14.0	32.0		18.0	18.0	18.0
Total Split (%)	19.4%	36.9%	36.9%	9.7%	27.2%		13.6%	31.1%		17.5%	17.5%	17.5%
Yellow Time (s)	4.0	4.0	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		0.0	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	5.0	5.0	5.0		4.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max		None	None		None	None	None
Act Effct Green (s)	14.4	39.1	39.1	5.1	23.3		28.0	27.0		12.8	12.8	12.8
Actuated g/C Ratio	0.17	0.47	0.47	0.06	0.28		0.33	0.32		0.15	0.15	0.15
v/c Ratio	0.73	0.62	0.22	0.23	0.71		0.76	0.23		0.56	0.57	0.88
Control Delay	50.3	24.3	4.4	46.6	33.3		39.5	22.1		48.2	43.7	22.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	50.3	24.3	4.4	46.6	33.3		39.5	22.1		48.2	43.7	22.1
LOS	D	C	A	D	C		D	C		D	D	C
Approach Delay		26.7			33.7			33.7			29.1	
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	103	159	0	12	156		107	44		50	75	34
Queue Length 95th (ft)	#276	#526	47	43	#329		#334	118		#136	#173	#206
Internal Link Dist (ft)		583			1178			1094			793	

Lane Group	Ø9
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	
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)	23.0
Total Split (s)	23.0
Total Split (%)	22%
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)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	300		300	150			200			350		350
Base Capacity (vph)	315	853	797	105	960		373	595		195	293	711
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
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.70	0.62	0.22	0.23	0.71		0.76	0.23		0.55	0.55	0.88

Intersection Summary			
Area Type:	Other		
Cycle Length: 103			
Actuated Cycle Length: 83.6			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 30.1		Intersection LOS: C	
Intersection Capacity Utilization 76.3%		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: 2: High St/Glove St & Route 53



Intersection	
Int Delay, s/veh	3.6

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	514	24	94	579	27	80
Future Vol, veh/h	514	24	94	579	27	80
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	89	89	60	60
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	609	28	109	670	46	137

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	638	0	1512	624
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	888	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	941	-	131	484
Stage 1	-	-	-	-	532	-
Stage 2	-	-	-	-	400	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	940	-	116	484
Mov Cap-2 Maneuver	-	-	-	-	116	-
Stage 1	-	-	-	-	531	-
Stage 2	-	-	-	-	354	-

Approach	EB	WB	NE
HCM Control Delay, s	0	1.3	25.5
HCM LOS			D

Minor Lane/Major Mvmt	NELn1	NELn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	116	484	-	-	940	-
HCM Lane V/C Ratio	0.4	0.284	-	-	0.116	-
HCM Control Delay (s)	55.3	15.4	-	-	9.3	-
HCM Lane LOS	F	C	-	-	A	-
HCM 95th %tile Q(veh)	1.7	1.2	-	-	0.4	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	8	516	12	30	716	6	13	3	41	2	2	2
Future Vol, veh/h	8	516	12	30	716	6	13	3	41	2	2	2
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	92	92	92	70	70	70	60	60	60
Heavy Vehicles, %	4	4	4	3	3	3	4	4	4	0	0	0
Mvmt Flow	10	664	15	34	802	7	19	4	60	3	3	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	811	0	0	679	0	0	1569	1571	672	1600	1575	808
Stage 1	-	-	-	-	-	-	692	692	-	876	876	-
Stage 2	-	-	-	-	-	-	877	879	-	724	699	-
Critical Hdwy	4.14	-	-	4.13	-	-	7.14	6.54	6.24	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.1	5.5	-
Follow-up Hdwy	2.236	-	-	2.227	-	-	3.536	4.036	3.336	3.5	4	3.3
Pot Cap-1 Maneuver	806	-	-	908	-	-	89	109	452	86	111	384
Stage 1	-	-	-	-	-	-	431	442	-	346	369	-
Stage 2	-	-	-	-	-	-	340	363	-	420	445	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	804	-	-	908	-	-	83	104	452	69	105	383
Mov Cap-2 Maneuver	-	-	-	-	-	-	83	104	-	69	105	-
Stage 1	-	-	-	-	-	-	426	437	-	341	355	-
Stage 2	-	-	-	-	-	-	321	349	-	356	440	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.1	0.4	34	40
HCM LOS			D	E

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	206	804	-	-	908	-	-	113
HCM Lane V/C Ratio	0.407	0.013	-	-	0.037	-	-	0.091
HCM Control Delay (s)	34	9.5	-	-	9.1	-	-	40
HCM Lane LOS	D	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	1.8	0	-	-	0.1	-	-	0.3

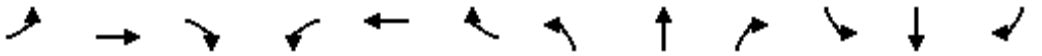
Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	515	8	10	728	6	19	0	24	8	0	17
Future Vol, veh/h	19	515	8	10	728	6	19	0	24	8	0	17
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	91	91	91	85	85	85	70	70	70
Heavy Vehicles, %	4	4	4	3	3	3	3	3	3	0	0	0
Mvmt Flow	24	663	10	11	824	7	23	0	29	12	0	25

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	833	0	0	673	0	0	1578	1571	670	1585	1573	830
Stage 1	-	-	-	-	-	-	716	716	-	852	852	-
Stage 2	-	-	-	-	-	-	862	855	-	733	721	-
Critical Hdwy	4.14	-	-	4.13	-	-	7.13	6.53	6.23	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.1	5.5	-
Follow-up Hdwy	2.236	-	-	2.227	-	-	3.527	4.027	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	791	-	-	913	-	-	88	110	455	89	111	373
Stage 1	-	-	-	-	-	-	420	433	-	357	379	-
Stage 2	-	-	-	-	-	-	348	373	-	415	435	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	789	-	-	913	-	-	79	105	454	80	106	372
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	105	-	80	106	-
Stage 1	-	-	-	-	-	-	407	420	-	346	374	-
Stage 2	-	-	-	-	-	-	321	368	-	376	422	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	42.4	31.5
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	147	789	-	-	913	-	-	172
HCM Lane V/C Ratio	0.354	0.031	-	-	0.012	-	-	0.214
HCM Control Delay (s)	42.4	9.7	-	-	9	-	-	31.5
HCM Lane LOS	E	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	1.5	0.1	-	-	0	-	-	0.8



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	586	39	44	762	13	46	2	51	18	2	14
Future Volume (vph)	10	586	39	44	762	13	46	2	51	18	2	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	150			25			25			25		
Satd. Flow (prot)	1736	3440	0	1752	1838	0	1719	1521	0	0	1683	0
Flt Permitted	0.950			0.344			0.728				0.804	
Satd. Flow (perm)	1721	3440	0	635	1838	0	1317	1521	0	0	1384	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			1			58			18	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1093			907			396			538	
Travel Time (s)		24.8			20.6			9.0			12.2	
Confl. Peds. (#/hr)	3					3			2	2		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.80
Growth Factor	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%	103%
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	5%	5%	5%	4%	4%	4%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	716	0	50	887	0	53	60	0	0	44	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			3			7	
Permitted Phases				2			3			7		
Detector Phase	1	6		5	2		3	3		7	7	
Switch Phase												
Minimum Initial (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	10.0		8.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	10.0	50.0		10.0	50.0		15.0	15.0		15.0	15.0	
Total Split (%)	10.4%	52.1%		10.4%	52.1%		15.6%	15.6%		15.6%	15.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Max		None	Max		None	None		None	None	
Act Effct Green (s)	5.1	50.6		54.2	54.6		8.0	8.0			8.0	
Actuated g/C Ratio	0.07	0.68		0.73	0.74		0.11	0.11			0.11	
v/c Ratio	0.09	0.30		0.09	0.66		0.37	0.28			0.27	
Control Delay	40.1	8.7		5.8	13.9		41.9	14.8			28.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	40.1	8.7		5.8	13.9		41.9	14.8			28.0	
LOS	D	A		A	B		D	B			C	
Approach Delay		9.2			13.5			27.5			28.0	
Approach LOS		A			B			C			C	
Queue Length 50th (ft)	5	72		4	147		23	1			11	
Queue Length 95th (ft)	24	194		28	#820		69	38			42	
Internal Link Dist (ft)		1013			827			316			458	

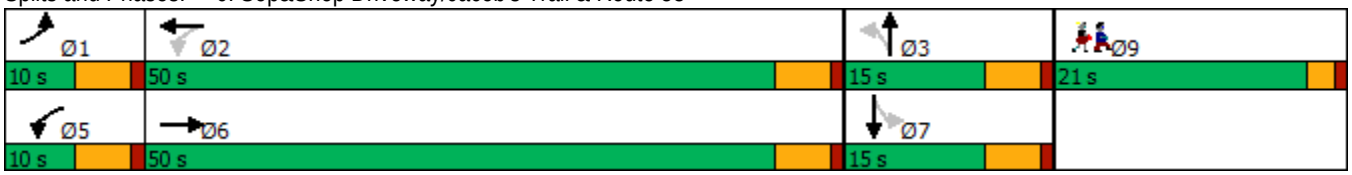
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Peak Hour Factor	
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)	1.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	22%
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)	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	200			150								
Base Capacity (vph)	119	2352		541	1354		181	260			206	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.09	0.30		0.09	0.66		0.29	0.23			0.21	

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 74.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 59.1%		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: 6: Sop&Shop Driveway/Jacob's Trail & Route 53



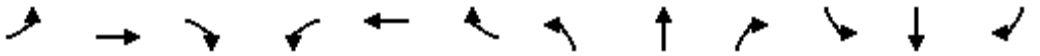
Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	148	493	10	14	579	33	4	8	9	6	5	219
Future Vol, veh/h	148	493	10	14	579	33	4	8	9	6	5	219
Conflicting Peds, #/hr	3	0	0	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	75
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	80	80	80	80	80	80
Heavy Vehicles, %	4	4	4	5	5	5	5	5	5	2	2	2
Mvmt Flow	169	564	11	16	663	38	5	10	12	8	6	282

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	704	0	0	575	0	0	1625	1644	288	1342	1630	685
Stage 1	-	-	-	-	-	-	908	908	-	717	717	-
Stage 2	-	-	-	-	-	-	717	736	-	625	913	-
Critical Hdwy	4.16	-	-	4.175	-	-	7.375	6.575	6.975	7.33	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.575	5.575	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.175	5.575	-	6.53	5.53	-
Follow-up Hdwy	2.238	-	-	2.2475	-	-	3.5475	4.0475	3.3475	3.519	4.019	3.319
Pot Cap-1 Maneuver	880	-	-	979	-	-	73	97	702	119	101	447
Stage 1	-	-	-	-	-	-	292	348	-	420	433	-
Stage 2	-	-	-	-	-	-	414	418	-	440	351	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	877	-	-	979	-	-	19	67	702	79	70	446
Mov Cap-2 Maneuver	-	-	-	-	-	-	19	67	-	79	70	-
Stage 1	-	-	-	-	-	-	209	249	-	300	420	-
Stage 2	-	-	-	-	-	-	146	405	-	297	251	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3	0.2	104.5	27.7
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	61	877	-	-	979	-	-	75	446
HCM Lane V/C Ratio	0.443	0.193	-	-	0.016	-	-	0.189	0.632
HCM Control Delay (s)	104.5	10.1	0.9	-	8.7	0	-	63.9	25.9
HCM Lane LOS	F	B	A	-	A	A	-	F	D
HCM 95th %tile Q(veh)	1.7	0.7	-	-	0.1	-	-	0.6	4.3

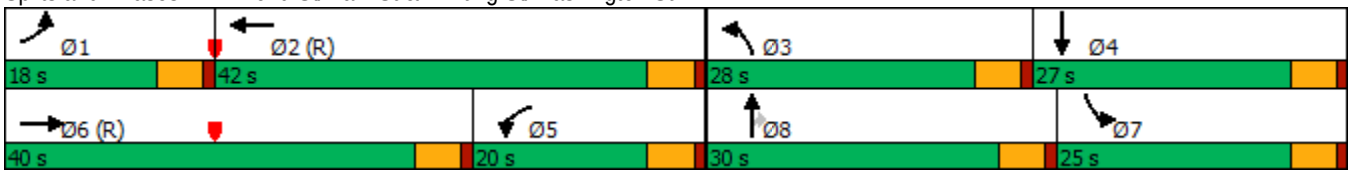


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	839	171	195	614	284	231	397	319	273	466	55
Future Volume (vph)	103	839	171	195	614	284	231	397	319	273	466	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	200		0	150		250	250		250
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1770	3491	0	1770	3396	0	1787	1900	1615	1787	3452	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3491	0	1770	3396	0	1787	1900	1615	1787	3452	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			69				295		10	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		1282			602			877			701	
Travel Time (s)		25.0			11.7			13.3			10.6	
Peak Hour Factor	0.95	0.95	0.95	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	101%	101%	101%	101%	101%	101%	101%	101%	101%	101%	101%	101%
Heavy Vehicles (%)	2%	1%	0%	2%	1%	2%	1%	0%	0%	1%	3%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	110	1074	0	212	975	0	254	436	350	300	572	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases									8			
Detector Phase	1	6		5	2		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	1.0	5.0		1.0	5.0		1.0	5.0	5.0	1.0	1.0	
Minimum Split (s)	6.0	23.0		11.0	23.0		10.0	23.0	23.0	10.0	23.0	
Total Split (s)	18.0	40.0		20.0	42.0		28.0	30.0	30.0	25.0	27.0	
Total Split (%)	15.7%	34.8%		17.4%	36.5%		24.3%	26.1%	26.1%	21.7%	23.5%	
Yellow Time (s)	4.0	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	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lead	Lead	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	11.3	35.0		15.0	38.7		20.2	25.0	25.0	20.0	24.8	
Actuated g/C Ratio	0.10	0.30		0.13	0.34		0.18	0.22	0.22	0.17	0.22	
v/c Ratio	0.63	1.00		0.92	0.82		0.81	1.06	0.60	0.97	0.76	
Control Delay	66.0	66.3		76.3	30.8		65.5	103.5	12.6	91.5	49.7	
Queue Delay	0.0	7.6		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	66.0	73.9		76.3	30.8		65.5	103.5	12.6	91.5	49.7	
LOS	E	E		E	C		E	F	B	F	D	
Approach Delay		73.2			38.9			63.6			64.1	
Approach LOS		E			D			E			E	
Queue Length 50th (ft)	79	411		157	329		180	~354	33	223	210	
Queue Length 95th (ft)	139	#564		m#268	362		#274	#553	127	#397	#304	
Internal Link Dist (ft)		1202			522			797			621	
Turn Bay Length (ft)	150			200			150		250	250		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Base Capacity (vph)	200	1077		230	1187		357	413	581	310	753	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	29		0	0		0	0	2	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.55	1.02		0.92	0.82		0.71	1.06	0.60	0.97	0.76	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green, Master Intersection			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 59.5		Intersection LOS: E	
Intersection Capacity Utilization 92.9%		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.		
m	Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 1: Pond St/Main St & Whiting St/Washington St

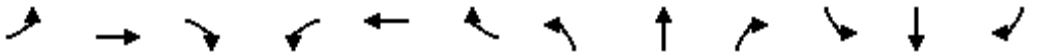


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations							
Traffic Volume (vph)	1323	44	86	1029	18	171	
Future Volume (vph)	1323	44	86	1029	18	171	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	15	12	12	
Storage Length (ft)		0	100		0	0	
Storage Lanes		0	1		1	1	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3522	0	1770	2049	1770	1583	
Flt Permitted			0.099		0.950		
Satd. Flow (perm)	3522	0	184	2049	1770	1583	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	4					198	
Link Speed (mph)	30			30	30		
Link Distance (ft)	602			376	271		
Travel Time (s)	13.7			8.5	6.2		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Growth Factor	104%	104%	104%	104%	104%	104%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	1580	0	99	1189	21	198	
Turn Type	NA		pm+pt	NA	Prot	Perm	
Protected Phases	6		5	1	3		9
Permitted Phases			1			3	
Detector Phase	6		5	1	3	3	
Switch Phase							
Minimum Initial (s)	5.0		3.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		10.0	25.0	10.0	10.0	27.0
Total Split (s)	62.0		11.0	73.0	15.0	15.0	27.0
Total Split (%)	53.9%		9.6%	63.5%	13.0%	13.0%	23%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	2.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	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	C-Max		None	C-Max	Min	Min	None
Act Effct Green (s)	80.7		92.2	92.2	7.4	7.4	
Actuated g/C Ratio	0.70		0.80	0.80	0.06	0.06	
v/c Ratio	0.64		0.42	0.72	0.18	0.69	
Control Delay	4.2		9.9	12.1	53.7	20.2	
Queue Delay	0.2		0.0	0.0	0.0	0.0	
Total Delay	4.4		9.9	12.1	53.7	20.2	
LOS	A		A	B	D	C	
Approach Delay	4.4			11.9	23.4		
Approach LOS	A			B	C		
Queue Length 50th (ft)	38		8	213	15	0	
Queue Length 95th (ft)	m228		54	#1156	40	72	
Internal Link Dist (ft)	522			296	191		
Turn Bay Length (ft)			100				

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Base Capacity (vph)	2472		237	1642	153	318	
Starvation Cap Reductn	219		0	0	0	0	
Spillback Cap Reductn	0		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.70		0.42	0.72	0.14	0.62	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 88 (77%), Referenced to phase 1:WBTL and 6:EBT, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 8.9		Intersection LOS: A	
Intersection Capacity Utilization 68.8%		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.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 29: QAP Dr. & Washington St



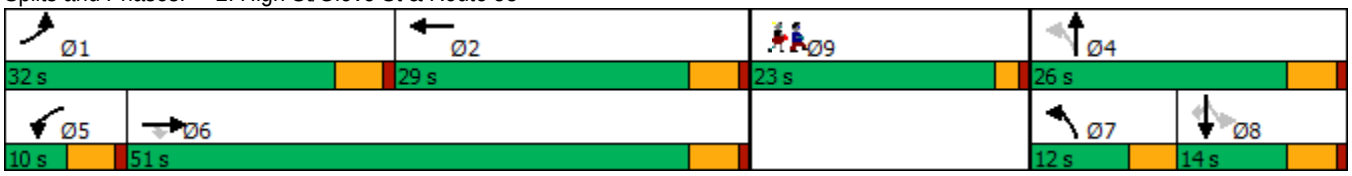
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	389	652	274	24	572	76	231	102	38	85	76	307
Future Volume (vph)	389	652	274	24	572	76	231	102	38	85	76	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		300	150		150	200		0	350		350
Storage Lanes	1		1	2		0	1		0	1		0
Taper Length (ft)	25			150			150			150		
Satd. Flow (prot)	1770	1863	1583	1770	3476	0	1770	1786	0	1787	1881	1599
Flt Permitted	0.950			0.950			0.489			0.659		
Satd. Flow (perm)	1770	1863	1583	1770	3476	0	911	1786	0	1240	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			297		12			15				333
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		933			1262			1358			807	
Travel Time (s)		21.2			28.7			30.9			18.3	
Peak Hour Factor	0.96	0.96	0.96	0.93	0.93	0.93	0.95	0.95	0.95	0.96	0.96	0.96
Growth Factor	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	421	706	297	27	725	0	253	154	0	92	82	333
Turn Type	Prot	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	
Permitted Phases			6				4			8		8
Detector Phase	1	6	6	5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	3.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	30.0	30.0	10.0	25.0		9.0	10.0		10.0	10.0	10.0
Total Split (s)	32.0	51.0	51.0	10.0	29.0		12.0	26.0		14.0	14.0	14.0
Total Split (%)	29.1%	46.4%	46.4%	9.1%	26.4%		10.9%	23.6%		12.7%	12.7%	12.7%
Yellow Time (s)	4.0	4.0	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		0.0	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	5.0	5.0	5.0		4.0	5.0		5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes			Yes	Yes	Yes
Recall Mode	None	Max	Max	None	Max		None	None		None	None	None
Act Effct Green (s)	26.6	52.1	52.1	5.0	24.2		22.2	21.2		9.1	9.1	9.1
Actuated g/C Ratio	0.29	0.57	0.57	0.05	0.27		0.24	0.23		0.10	0.10	0.10
v/c Ratio	0.81	0.66	0.29	0.28	0.78		0.85	0.36		0.74	0.44	0.73
Control Delay	45.3	20.6	2.9	51.9	38.4		59.1	31.1		76.6	49.0	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.3	20.6	2.9	51.9	38.4		59.1	31.1		76.6	49.0	15.3
LOS	D	C	A	D	D		E	C		E	D	B
Approach Delay		24.2			38.9			48.5			31.9	
Approach LOS		C			D			D			C	
Queue Length 50th (ft)	207	198	0	14	187		121	63		50	43	0
Queue Length 95th (ft)	#495	#693	51	49	#382		#354	152		#167	108	#116
Internal Link Dist (ft)		853			1182			1278			727	
Turn Bay Length (ft)	300		300	150			200			350		350

Lane Group	Ø9
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)	
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)	23.0
Total Split (s)	23.0
Total Split (%)	21%
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)	530	1067	1033	98	934		298	427		124	187	459
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
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.79	0.66	0.29	0.28	0.78		0.85	0.36		0.74	0.44	0.73

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 91			
Natural Cycle: 95			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 32.2		Intersection LOS: C	
Intersection Capacity Utilization 74.7%		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: 2: High St/Glove St & Route 53



Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	720	40	45	616	20	80
Future Vol, veh/h	720	40	45	616	20	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	75	-	0	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	90	90	60	60
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	814	45	52	712	35	139

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	859	0	1653	837
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	816	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	786	-	109	370
Stage 1	-	-	-	-	428	-
Stage 2	-	-	-	-	438	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	786	-	102	370
Mov Cap-2 Maneuver	-	-	-	-	102	-
Stage 1	-	-	-	-	428	-
Stage 2	-	-	-	-	409	-

Approach	EB	WB	NE
HCM Control Delay, s	0	0.7	27.8
HCM LOS			D

Minor Lane/Major Mvmt	NELn1	NELn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	102	370	-	-	786	-
HCM Lane V/C Ratio	0.34	0.375	-	-	0.066	-
HCM Control Delay (s)	57.5	20.4	-	-	9.9	-
HCM Lane LOS	F	C	-	-	A	-
HCM 95th %tile Q(veh)	1.3	1.7	-	-	0.2	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	1	771	22	42	715	1	6	0	24	2	0	2
Future Vol, veh/h	1	771	22	42	715	1	6	0	24	2	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	75	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	88	88	88	60	60	60	50	50	50
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	1	891	25	50	845	1	10	0	42	4	0	4

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	846	0	0	916	0	0	1854	1852	904	1873	1864	846
Stage 1	-	-	-	-	-	-	906	906	-	946	946	-
Stage 2	-	-	-	-	-	-	948	946	-	927	918	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	791	-	-	749	-	-	57	75	338	56	74	365
Stage 1	-	-	-	-	-	-	333	358	-	317	343	-
Stage 2	-	-	-	-	-	-	316	343	-	324	353	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	791	-	-	749	-	-	53	70	338	47	69	365
Mov Cap-2 Maneuver	-	-	-	-	-	-	53	70	-	47	69	-
Stage 1	-	-	-	-	-	-	333	358	-	317	320	-
Stage 2	-	-	-	-	-	-	292	320	-	284	353	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	0.6	37.1	53.1
HCM LOS			E	F

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	163	791	-	-	749	-	-	83
HCM Lane V/C Ratio	0.319	0.001	-	-	0.066	-	-	0.1
HCM Control Delay (s)	37.1	9.6	-	-	10.1	-	-	53.1
HCM Lane LOS	E	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1.3	0	-	-	0.2	-	-	0.3

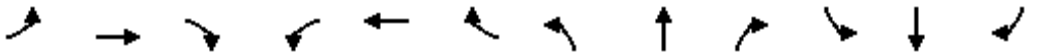
Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	786	15	19	736	12	18	0	26	7	0	10
Future Vol, veh/h	9	786	15	19	736	12	18	0	26	7	0	10
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	80	80	80	60	60	60
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	10	908	17	22	850	14	23	0	34	12	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	865	0	0	925	0	0	1847	1846	920	1859	1847	858
Stage 1	-	-	-	-	-	-	937	937	-	902	902	-
Stage 2	-	-	-	-	-	-	910	909	-	957	945	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	778	-	-	743	-	-	58	76	331	57	75	359
Stage 1	-	-	-	-	-	-	320	346	-	335	359	-
Stage 2	-	-	-	-	-	-	332	357	-	312	343	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	777	-	-	743	-	-	53	73	330	49	72	359
Mov Cap-2 Maneuver	-	-	-	-	-	-	53	73	-	49	72	-
Stage 1	-	-	-	-	-	-	316	342	-	330	348	-
Stage 2	-	-	-	-	-	-	307	346	-	276	339	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.2	74.3	55.4
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	105	777	-	-	743	-	-	100
HCM Lane V/C Ratio	0.545	0.013	-	-	0.03	-	-	0.295
HCM Control Delay (s)	74.3	9.7	-	-	10	-	-	55.4
HCM Lane LOS	F	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	2.5	0	-	-	0.1	-	-	1.1



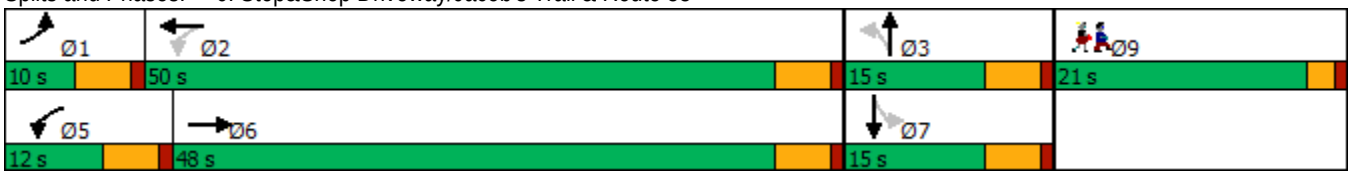
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	824	80	90	793	20	75	5	95	10	5	10
Future Volume (vph)	30	824	80	90	793	20	75	5	95	10	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	150		0	0		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	150			25			25			25		
Satd. Flow (prot)	1770	3493	0	1787	1874	0	1805	1630	0	0	1760	0
Flt Permitted	0.950			0.185			0.733				0.833	
Satd. Flow (perm)	1770	3493	0	348	1874	0	1393	1630	0	0	1496	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			2			110			15	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1093			907			368			415	
Travel Time (s)		24.8			20.6			8.4			9.4	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.90	0.90	0.90	0.70	0.70	0.70
Growth Factor	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	1093	0	109	983	0	87	116	0	0	37	0
Turn Type	Prot	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			3			7	
Permitted Phases				2			3			7		
Detector Phase	1	6		5	2		3	3		7	7	
Switch Phase												
Minimum Initial (s)	3.0	5.0		3.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	10.0		8.0	10.0		10.0	10.0		10.0	10.0	
Total Split (s)	10.0	48.0		12.0	50.0		15.0	15.0		15.0	15.0	
Total Split (%)	10.4%	50.0%		12.5%	52.1%		15.6%	15.6%		15.6%	15.6%	
Yellow Time (s)	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	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Recall Mode	None	Max		None	Max		None	None		None	None	
Act Effct Green (s)	5.1	44.4		51.8	47.9		9.0	9.0			9.0	
Actuated g/C Ratio	0.07	0.58		0.68	0.63		0.12	0.12			0.12	
v/c Ratio	0.31	0.53		0.30	0.83		0.53	0.40			0.19	
Control Delay	45.0	13.1		7.5	22.9		47.4	13.4			26.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Delay	45.0	13.1		7.5	22.9		47.4	13.4			26.4	
LOS	D	B		A	C		D	B			C	
Approach Delay		14.1			21.4			28.0			26.4	
Approach LOS		B			C			C			C	
Queue Length 50th (ft)	16	147		11	345		38	3			9	
Queue Length 95th (ft)	51	320		50	#872		#116	54			31	
Internal Link Dist (ft)		1013			827			288			335	
Turn Bay Length (ft)	200			150								

Lane Group	Ø9
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)	
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)	21.0
Total Split (s)	21.0
Total Split (%)	22%
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)	118	2045		372	1181		186	313			213	
Starvation Cap Reductn	0	0		0	0		0	0			0	
Spillback Cap Reductn	0	0		0	0		0	0			0	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.31	0.53		0.29	0.83		0.47	0.37			0.17	

Intersection Summary			
Area Type:	Other		
Cycle Length: 96			
Actuated Cycle Length: 76.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 18.7		Intersection LOS: B	
Intersection Capacity Utilization 69.8%		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: 6: Stop&Shop Driveway/Jacob's Trail & Route 53



Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	205	713	2	4	704	11	0	2	8	5	0	180
Future Vol, veh/h	205	713	2	4	704	11	0	2	8	5	0	180
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	Stop
Storage Length	-	-	-	-	-	-	-	-	-	-	-	75
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	86	86	86	50	50	50	90	90	90
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	242	843	2	5	851	13	0	4	17	6	0	208

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	864	0	0	845	0	0	2196	2202	423	1776	2197	858
Stage 1	-	-	-	-	-	-	1328	1328	-	868	868	-
Stage 2	-	-	-	-	-	-	868	874	-	908	1329	-
Critical Hdwy	4.13	-	-	4.115	-	-	7.3	6.5	6.9	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.219	-	-	2.2095	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	777	-	-	795	-	-	29	45	585	59	46	359
Stage 1	-	-	-	-	-	-	167	226	-	350	372	-
Stage 2	-	-	-	-	-	-	350	370	-	301	226	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	777	-	-	795	-	-	6	18	585	26	19	359
Mov Cap-2 Maneuver	-	-	-	-	-	-	6	18	-	26	19	-
Stage 1	-	-	-	-	-	-	69	93	-	145	368	-
Stage 2	-	-	-	-	-	-	145	366	-	115	93	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.3	0.1	65.1	32.1
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	80	777	-	-	795	-	-	26	359
HCM Lane V/C Ratio	0.26	0.312	-	-	0.006	-	-	0.222	0.579
HCM Control Delay (s)	65.1	11.7	2.2	-	9.6	0	-	179.3	28
HCM Lane LOS	F	B	A	-	A	A	-	F	D
HCM 95th %tile Q(veh)	0.9	1.3	-	-	0	-	-	0.7	3.5

APPENDIX N

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