# Old Colony Bikeway

## 2009

Joe Conroy
Ryan Hipp
Erin Pacileo
Pat Ruby

Livable Engineering And Design

# Table of Contents

# List of Figures

# List of Tables

# Executive Summary

The LEAD group has completed an analysis of a proposed bicycle corridor that will provide a much needed connection between existing bicycle facilities within the City of Boston. The proposed route extends from the intersection of the University of Massachusetts (UMASS) Boston entrance and Morrissey Boulevard, continuing through the heart of Dorchester, and terminating at the intersection of Melnea Cass Boulevard and Southampton Street. Connections to existing bicycle facilities include the Neponset River Trail to the south, the Harbor Walk to the east and the South Bay Harbor Trail to the north.

Streets that will be included as part of the accommodation of bicycle facilities include: Morrissey Boulevard, Mount Vernon Street, Old Colony Avenue, Preble Street, and Southampton Street.

An inventory of existing conditions was taken throughout the corridor and subsequent traffic analysis was performed at major intersections. Intersections were analyzed based on whether there were higher than average crash rates and/or modifications were necessary to implement bicycle facilities. All intersections that had approach and/or signal timing improvements maintained or improved the intersection level-of-service (LOS).

Throughout the corridor, the selected design will implement the use of a separated bike facility (cycle track) to be incorporated with several intersection improvements. One particularly unique improvement being proposed at an intersection incorporates a modern roundabout at the existing rotary at the intersection of Old Colony Avenue and Preble Street. The proposed design drastically decreases the footprint of the intersection and creates all around safer traffic movements for roundabout approaches. These bicycle and pedestrian facilities encircle the roundabout to create shorter and safer crossings. This redesign also allows for the reclamation of approximately 9,000 square feet of accessible green space for groundwater infiltration and recharge.

The analysis allowed for the incorporation of bike facilities that have easy and safe connection throughout the corridor. The majority of the route incorporates a two-way cycle track with a minimum three foot buffer area that allows for separation between cyclists and vehicular traffic. The cycle track alternates between being raised above the road grade (i.e., at the same grade as the existing sidewalk) and at the same grade at the roadway. The buffer area incorporates the use of bollards and angled pavement markings to enforce the separation between cyclists and vehicles.

The proposed route was selected based on creating a bicycle facility that minimizes crossings while creating enough separation from vehicular and pedestrian traffic to appeal to bicycle users of all levels.

# 1.0 Background

## 1.1 Introduction

There has been a tremendous shift in the philosophy of local and state government when it comes to bicycles in the City of Boston. Previously, incorporating bicycle facilities into the overall designs of roadways was hardly considered a priority when it came to space and monetary considerations. But today, Boston is poised to be at the forefront of this philosophical shift with the incorporation of many bicycle facilities and corridors allowing for increased accessibility throughout the City. As the City increases its bicycling network, there is a critical connection which needs to be made in the Dorchester area. (Figure 1.1-A)

The creation of a bicycle corridor from the intersection of Massachusetts Avenue and Melnea Cass Boulevard to the University of Massachusetts (UMASS) Boston entrance will provide an attractive connection for all types of cyclists. These include connections to the South Bay Harbor Trail in the west and the Harbor Walk in the east. There is also a planned Harbor Walk extension which will incorporate a connection to the south with the Neponset River Greenway. There is also a hope that residents south of Boston will forgo their cars and use this new comfortable separated facility. While the main objective of this report is to address the main connection between UMASS Boston and Massachusetts Avenue and Melnea Cass Boulevard, it will also allow for numerous other bicycle facility connections throughout its route that will allow for future bicycle network expansions and also tie into several existing facilities.

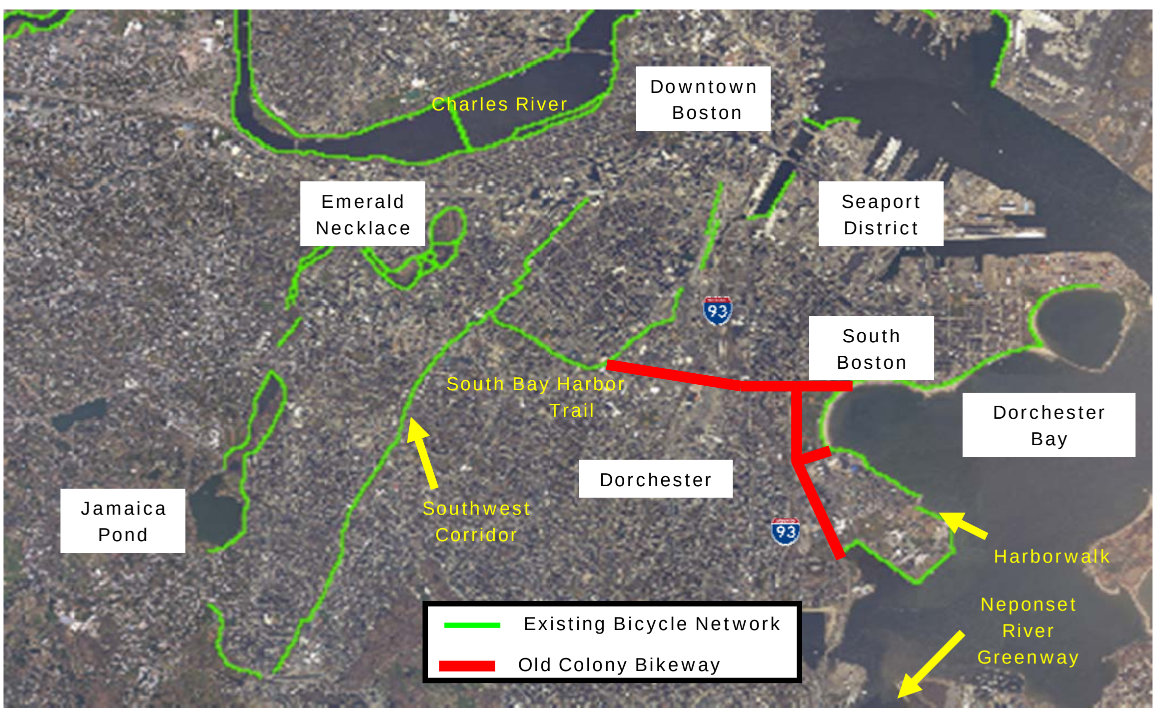



**Figure 1.1-A: Aerial View of the Area**

### *1.1.1 Purpose of Project and Objectives*

In an effort to create a critical connection between cyclists on the South Bay Harbor Trail and those on the Harbor Walk, a design has been created to integrate these facilities into a corridor from Massachusetts Avenue and Melnea Cass to UMASS Boston. The objectives of the project include the following:

- Creation of a critical link between existing bicycle facilities
- Design of a bicycle corridor to facilitate rapid and easy transportation between both ends as well as destinations within the corridor
- Design of a safe, separated and comfortable facility, for use by bicyclists of all abilities
- Significant modifications to the UMASS Boston and Morrissey Boulevard intersection to incorporate bicycle facilities and better manage traffic within the existing right of way
- Incorporation of facilities for connections to South Boston and other points of interest (e.g. UMASS Boston, MBTA Stations, South Bay Center), from proposed bicycle corridor
- Significant improvements to the traffic circle at the intersection of Preble Street, Columbia Road, and Old Colony Avenue to better manage traffic flow, incorporate anticipated bicycle traffic and increase safety.

## 1.2 Proposed Route & Study Area

The proposed route was identified as a critical link to complete the cycling network in the City of Boston. The proposed route is approximately 2.3 miles long. For 1.1 miles it is orientated in the East/West direction and the North/South for 1.2 miles, as listed below (Figure 1.2-A):

- Southampton Street (East/West)
- Preble Street (East/West)
- Old Colony Avenue (North/South)
- Mt. Vernon Street (North/South)
- Morrissey Boulevard (North/South)

In selecting a route to accommodate cyclists, the limiting factor was the crossing of Interstate 93 (I-93). Of the available crossings, Preble Street/Southampton Street gave the most acceptable alternative, with its expansive right of way and lower traffic volumes. Other considered crossings included Columbia Rd and residential roads west of

Moakley Park. These connections were unacceptable due to high traffic volumes and the use of a rotary, in the case of Columbia Road, and an indirect route in the case of the residential streets. Based on this selection the rest of the proposed route was chosen to create the most direct corridor for cyclists.

Using the proposed route, the study area was identified to include all roadways and intersections along this corridor bounded by Massachusetts Avenue and Melnea Cass Boulevard in the northwest, Old Colony Avenue and Preble Street in the northeast and UMASS Boston and Morrissey Boulevard in the south. Along this route there are many significant intersections defined by being a signalized intersection or a decision point for cyclists using the facility. Major intersections include the following:

- Southampton Street at Massachusetts Avenue
- Southampton Street at Allstate Road (South Bay Center)
- Dorchester Avenue at Preble Street/Southampton Street
- Preble Street at Old Colony Avenue
- Old Colony Avenue at Columbia Road
- Morrissey Boulevard at Mt. Vernon Street
- Morrissey Boulevard at UMASS Boston

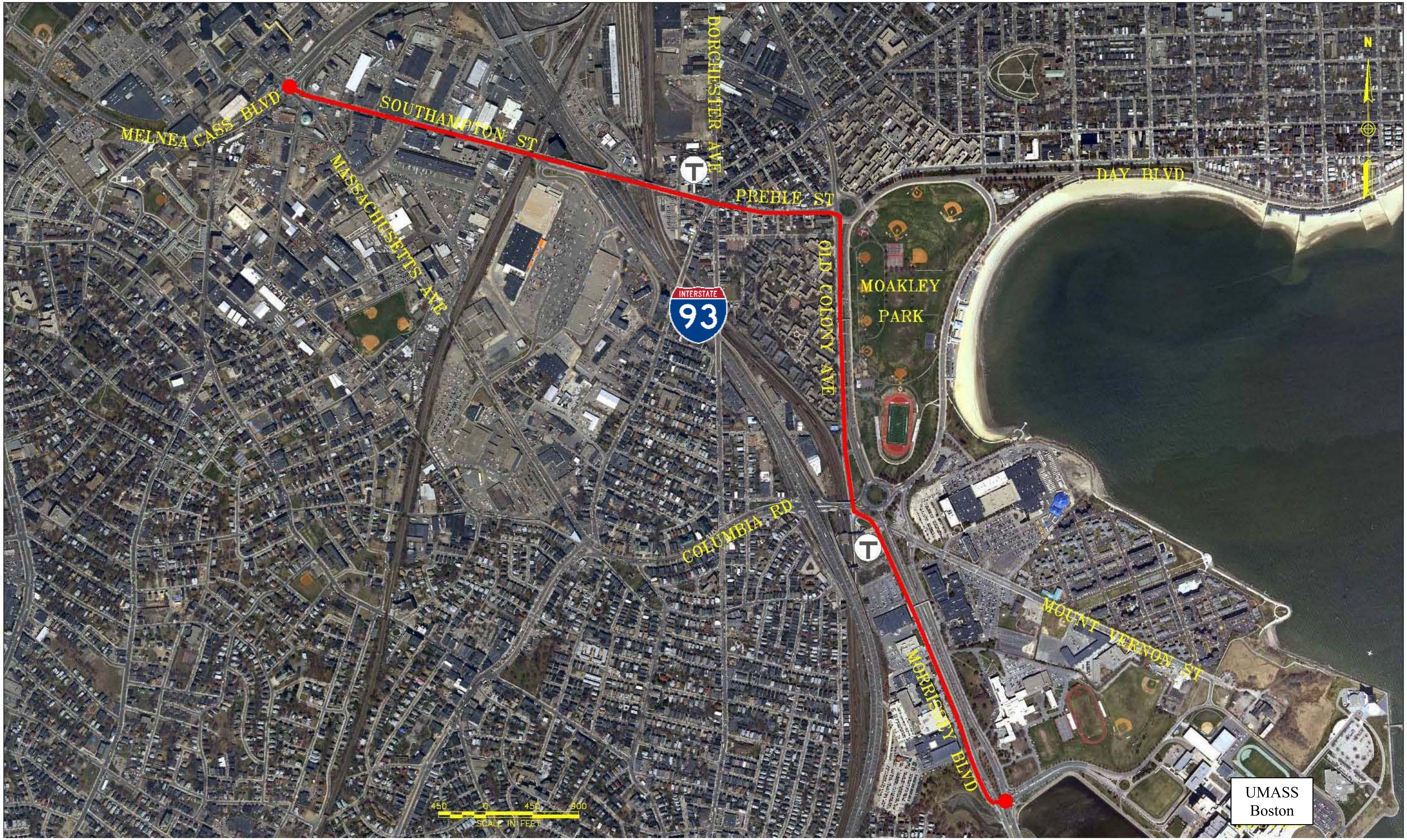



**Figure 1.2-A: Proposed Bicycle Route**

## 1.3 Report Organization

The report begins by providing some historical context to the project area. Thereafter, the report is broken up into sections by significant links of the proposed route. These significant links were chosen because each link contains similar characteristics such as roadway width and function type. These links include the following from the west to east and north to south:

- Southampton Street
- Preble Street
- Old Colony Avenue
- Morrissey Boulevard

Each section describing the major links discusses existing conditions as well as proposed modifications. The existing conditions section of the report has a broad overview of the proposed corridor. This is followed by a section detailing design elements that are common throughout the corridor. Design alternatives, which were not chosen as part of the final design, are also mentioned. Following this is a detailed description which includes proposed modifications to the existing roadways to create the bicycle corridor. The report concludes with a closing and acknowledgement sections.

## 1.4 History

Southampton Street was originally laid out in 1877 by the City of Boston under the name of Swett Street. The name was changed in 1901 to Southampton Street and is currently maintained by the City of Boston. The right of way has remained the same. Preble Street was laid out in 1879 by the City of Boston and is still maintained by Boston. It was built to create a connection between the City of Boston Back Bay and Dorchester via Old Colony Ave. Old Colony Ave was originally built as a City of Boston Street but was then transferred to the Metropolitan District Commission (MDC) which has since become the Department of Conservation and Recreation (DCR) in 1956. It was built to create an entrance for residents of Dorchester into the City of Boston. Morrissey Boulevard was constructed in the 1950's and has had some capacity improvements by way of adding lanes. It was scheduled to have a complete reconstruction in the 1990's which has yet to take place.

## 1.5 Need for Bike Route

The need for a separated bike route through this area is to provide a safe corridor for all of cyclists. A few historic connections for both tourist and permanent residents along to this route include Moakley Park, Castle Island, Bay Side Expo Center, University of Massachusetts Boston, Boston Medical Center, South Bay Center, and the City of Boston tow lot. This path also provides a necessary connection in the Boston bike path network. These connections include the Neponset River Greenway to the south and the South Bay Harbor trail to the west.

# 2.0 Existing Conditions

## 2.1 Introduction

In order to create a design for the proposed bikeway, an accurate analysis of the existing conditions was conducted. To do this, necessary traffic and field data had to be collected. These data were then analyzed at intersections along the proposed corridor. These key locations were defined by locations where roadway geometries were proposed to be changed (e.g. lane elimination). Such data includes crash data, turning movement counts, signal timings and field observations. These locations include (Figure 2.1-A):

- Southampton at Massachusetts Avenue
    - Four-legged signalized intersection

- Southampton at Allstate Road
    - Three-legged signalized intersection

- Preble Street at Old Colony Avenue
    - Rotary with four approaches

- Morrissey Boulevard at Shaw's Supermarkets
    - Three-legged signalized intersection

- Morrissey Boulevard at UMASS Boston
    - Three-legged signalized intersection


**Figure 2.1-A: Analyzed Intersections along Proposed Route**

## 2.2 Data Collection

### *2.2.1 Crash Data*

Analysis of crash data has been completed for the five previously stated intersections in the corridor. Data from the Massachusetts Highway Department (MHD) database for the most recent available years, 2004-2006 were compiled for the applicable intersections. At each intersection the crashes were stratified according to year, type, severity, weather, and time of day. (Table 2.2-A) Additionally, crash rates at each of the intersections were calculated and compared to the District 4 Average and State Average. (Appendix A). This comparison serves the purpose of observing how safely the intersection is operating in comparison with those throughout the district and the state.

This data is very important to review when proposing changes to an existing roadway or intersection. Looking at the types of crashes and the conditions surrounding them can help inform and mold a future design. The importance of incorporating crash data is found in the need to constantly improve safety on the roads and intersections.

**Table 2.2-A: Intersection Crash Summary Table**

| | Signalized Intersections | | | Unsignalized Intersections | |
|---|---|---|---|---|---|
| | Southampton/ Mass Ave | Southampton/ Allstate Rd | Morrissey Blvd/ UMASS | Old Colony/ Preble St | Southampton/ Theo GlynnWay |
| **Year** | | | | | |
| 2004 | 5 | 1 | 2 | 9 | 1 |
| 2005 | 42 | 0 | 10 | 7 | 5 |
| 2006 | 42 | 0 | 10 | 7 | 5 |
| **Total** | 89 | 1 | 22 | 23 | 11 |
| **Type** | | | | | |
| Angle | 6 | 1 | 5 | 7 | 4 |
| Rear-end | 44 | 0 | 9 | 6 | 2 |
| Head-on | 0 | 0 | 0 | 0 | 0 |
| Single Vehicle | 0 | 0 | 6 | 1 | 0 |
| Sideswipe | 19 | 0 | 2 | 7 | 3 |
| Unknown | 20 | 0 | 0 | 2 | 2 |
| **Total** | 89 | 1 | 22 | 23 | 11 |
| **Severity** | | | | | |
| Property Damage | 44 | 0 | 13 | 13 | 7 |
| Personal Injury | 21 | 1 | 9 | 7 | 2 |
| Fatality | 2 | 0 | 0 | 0 | 0 |
| Other | 22 | 0 | 0 | 3 | 2 |
| **Total** | 89 | 1 | 22 | 23 | 11 |
| **Weather** | | | | | |
| Clear | 61 | 0 | 15 | 13 | 11 |
| Cloudy | 2 | 0 | 7 | 6 | 0 |
| Rain | 16 | 1 | 0 | 3 | 0 |
| Snow | 4 | 0 | 0 | 0 | 0 |
| Ice | 0 | 0 | 0 | 0 | 0 |
| Sleet | 0 | 0 | 0 | 1 | 0 |
| Fog | 0 | 0 | 0 | 0 | 0 |
| Unknown | 6 | 0 | 0 | 0 | 0 |
| **Total** | 89 | 1 | 22 | 23 | 11 |
| **Time** | | | | | |
| 7:00 AM to 9:00 AM | 14 | 1 | 3 | 0 | 6 |
| 9:00 AM to 4:00 PM | 22 | 0 | 14 | 5 | 2 |
| 4:00 PM to 6:00 PM | 4 | 0 | 0 | 3 | 0 |
| 6:00 PM to 7:00 AM | 49 | 0 | 5 | 15 | 3 |
| **Total** | 89 | 1 | 22 | 23 | 11 |
| Crash Rate | 1.43 | 0.16 | 0.40 | 0.66 | 0.46 |
| District 4 Average | 0.88 | 0.88 | 0.88 | 0.63 | 0.63 |
| State Average | 0.87 | 0.87 | 0.87 | 0.66 | 0.66 |

Of the five analyzed intersections, two were of interest because the crash rates exceeded the state and district average. The other intersections, Southampton at Theo Glynn Way, Southampton at Allstate Road, and UMASS at Morrissey Boulevard, which were analyzed for crash data had calculated crash rates well below their respective averages. Although it is important to constantly improve safety for our roadways and intersections, analysis of these intersections was not furthered due to their satisfactory performance.

For this section of the corridor, special attention must be drawn specifically to the crash analysis conducted at Massachusetts Avenue and Melnea Cass Boulevard. In the 2004-2006 Statewide Top 200 Intersection Crash List (Appendix I), compiled by MHD, this intersection ranked the nineteenth highest. With 89 crashes over a three year period and a crash rate of 1.43 crashes per million vehicles, it is much higher than the District 4 average of 0.88 and the Statewide average of 0.87. Most significantly, 2 of these 89 crashes were of a fatal nature, strongly suggesting a redesign of this intersection is needed.

Another intersection of interest, from a crash perspective, is the intersection of Southampton Street, Dorchester Street, Boston Street, Preble Street and Dorchester Avenue. This intersection's crash rate is 0.90, which is slightly above both the District 4 average and the statewide average for signalized intersections. The most apparent reason for this slightly raised number of crashes is the odd geometry of the intersecting streets. This geometry leads to a wide variety of crashes including angle, rear-end, head-on, and sideswipe collisions.

The final intersection, where calculated crash rates were above the averages, is at the intersection of Preble Street, Old Colony Avenue and Columbia Road, known from here on as Preble Circle. This intersection currently operates as a rotary. As with many rotaries, the expansive pavement and ambiguous traffic movements create an unsafe situation which causes crashes. The crash rate of 0.66 is slightly above the District 4 average, 0.63, and is equal to that of the State average for unsignalized intersections.

### *2.2.2 Turning Movement Counts*

In order to prepare a sufficient analysis of the existing and future conditions along the corridor, traffic volumes were collected at four major intersections on the roadway (Figure 2.2-A):

- Southampton at Massachusetts Avenue
- Southampton at Allstate Road
- Preble Street at Old Colony Avenue
- Morrissey Boulevard at UMASS Boston

Turning movement counts were conducted at intersections where a geometric reconfiguration was being considered. As part of this data collection, turning movement counts were conducted at these intersections during both the AM and PM peak periods during the weekdays. (Appendix B) Also, due to the seemingly high volume of trucks and other heavy vehicles in the Southampton Street area, heavy vehicles were counted and percentages were calculated. In this area, approximately 6% of all traveling vehicles are considered heavy vehicles. This is important to point out due to the danger which they pose to pedestrians and cyclists.


**Figure 2.2-A: 2009 Traffic Volume Counts**

### *2.2.3 Signal Timings*

A final element of the data collection for this design was the collection of signal timings at the intersections where analysis was needed. These intersections are the same as listed previously. From these signal timings, phase diagrams were able to be completed and used to analyze the existing conditions along the corridor (Appendix J).

## 2.3 Analysis of Existing Conditions

With the turning movement counts and signal timings collected, an analysis of the existing conditions was completed. This analysis evaluated the existing Level of Service (LOS), capacity, and delay at each of the analyzed intersections. The analyses of these intersections were in accordance with methods established in the Highway Capacity Manual (HCM) (Table 2.3-A). The HCM defines LOS as "a qualitative measure describing operation conditions within a traffic stream, and their perception by motorists and/or passengers. It also defines capacity, "the maximum rate of flow that can reasonably be expected to pass a point on a uniform section of a lane or roadway under prevailing roadway, traffic, and control conditions." Delay can be defined as the average amount of time, in seconds, a driver is waiting at an intersection. A summary of these characteristics creates a picture of how the intersections currently operate. (Table 2.3-B) This analysis was completed using Synchro, traffic analysis software. Synchro analysis creates a realistic representation of the LOS, capacity, and delay, existing at each of the analyzed intersections (Appendix C). These analyses will be used as a basis for comparison for future improvements throughout the corridor.

**Table 2.3-A: HCM LOS and Respective Delay**

| | **Control Delay per Vehicle (seconds)** | |
|---|---|---|
| **Level Of Service** | **Signalized Intersections** | **Unsignalized Intersections** |
| A | ≤10.0 | ≤ 10.0 |
| B | 10.1 to 20.0 | 10.1 to 15.0 |
| C | 20.1 to 35.0 | 15.1 to 25.0 |
| D | 35.1 to 55.0 | 25.1 to 35.0 |
| E | 55.1 to 80.0 | 35.1 to 50.0 |
| F | > 80.1 | > 50.0 |

**Table 2.3-B: Capacity Analysis Summary - Existing Conditions**

| Location | 2009 Existing | | | |
|---|---|---|---|---|
| | Peak Hour | LOS[1] | Delay[2] | V/C[3] |
| UMASS Boston at Morrissey Boulevard | AM | D | 48.6 | >1.0 |
| | PM | F | 89.6 | >1.0 |
| Southampton Street at All State Road | AM | B | 13.6 | 0.76 |
| | PM | B | 17.4 | 0.87 |
| Massachusetts Avenue at Melnea Cass Boulevard | AM | D | 47.8 | >1.0 |
| | PM | D | 47.1 | >1.0 |
| Morrissey Boulevard at Shaw's Entrance | AM | A | 2.4 | 0.36 |
| | PM | A | 7.7 | 0.69 |

1. Level-of-Service
2. Average vehicle delay in seconds
3. Volume to Capacity Ratio

## 2.4 Southampton St

### *2.4.1 Overview of Section*

Cyclists and pedestrians, who are heading east on the South Bay Harbor Trail, have no option to continue east at the intersection of Massachusetts Avenue and Melnea Cass Boulevard. Towards the east, there is no continuation of a separated path and they are forced to merge and utilize the sidewalks. Currently, Southampton Street is a four-lane street. West of Theo Glynn Way, vehicular traffic is one way (Figure 2.4-A), and east of Theo Glynn Way the road supports two directions of travel. There are sidewalks on both sides of Southampton Street with many driveway crossings. Also, because there is no designated area for cyclists and a section of Southampton is one-way (in a westerly direction), cyclists are forced onto these crowded sidewalks or travel on the southern side of the street. This southern side of the street has many high volume driveways and intersections, which bicyclists would have to cross. (Figure 2.4-B).

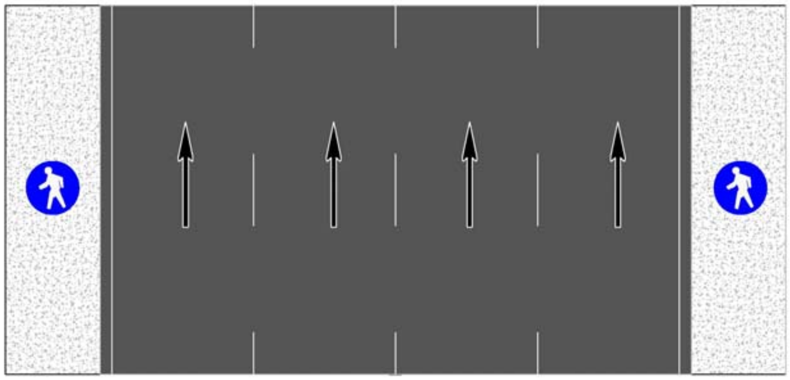


**Figure 2.4-A: Southampton Street Existing One Way Cross-Section**

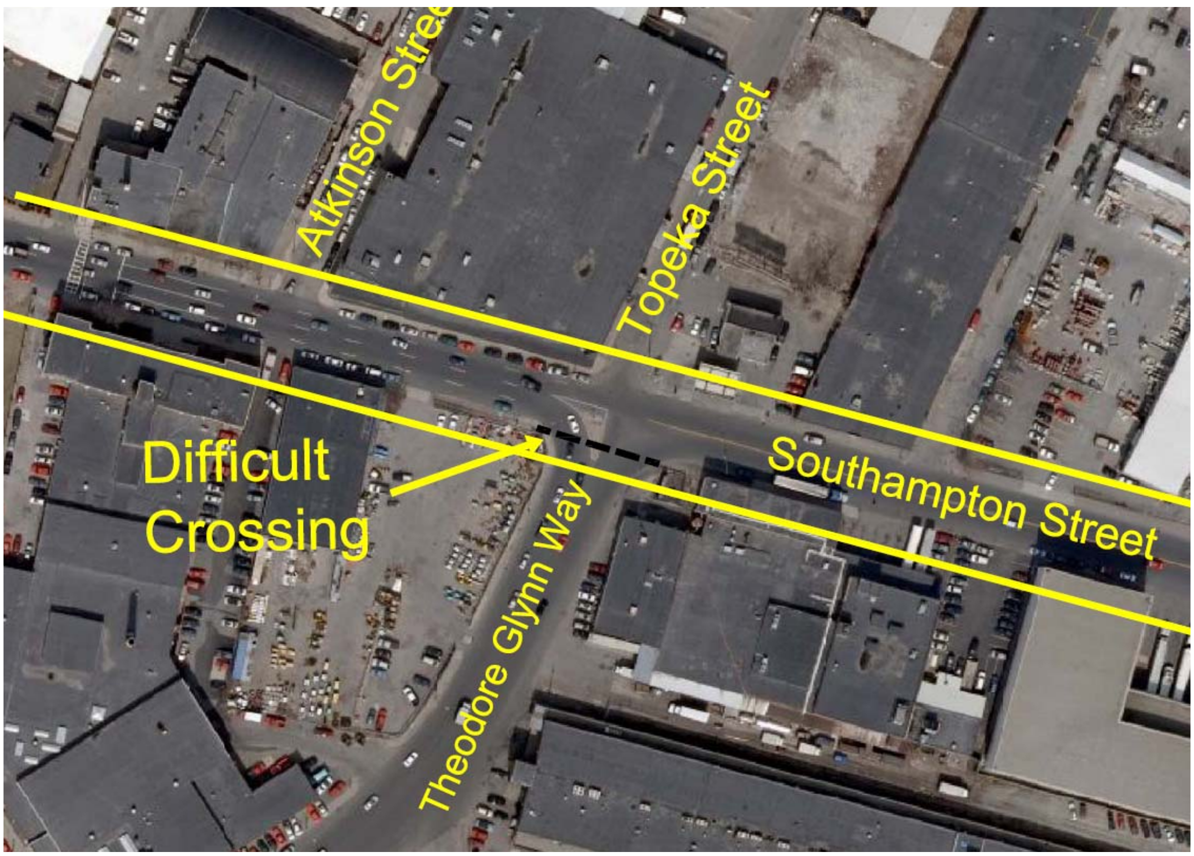



**Figure 2.4-B: Example of South Side Intersection Bicycle Crossing**

One noteworthy vehicular movement that causes queues during peak periods is the vehicular traffic heading westbound along Southampton Street who are turning left onto Melnea Cass Boulevard. Here drivers encounter limited storage space for the two left turning lanes and are unable to access the lanes without blocking traffic that is trying to head north onto Massachusetts Avenue Figure 2.4-C

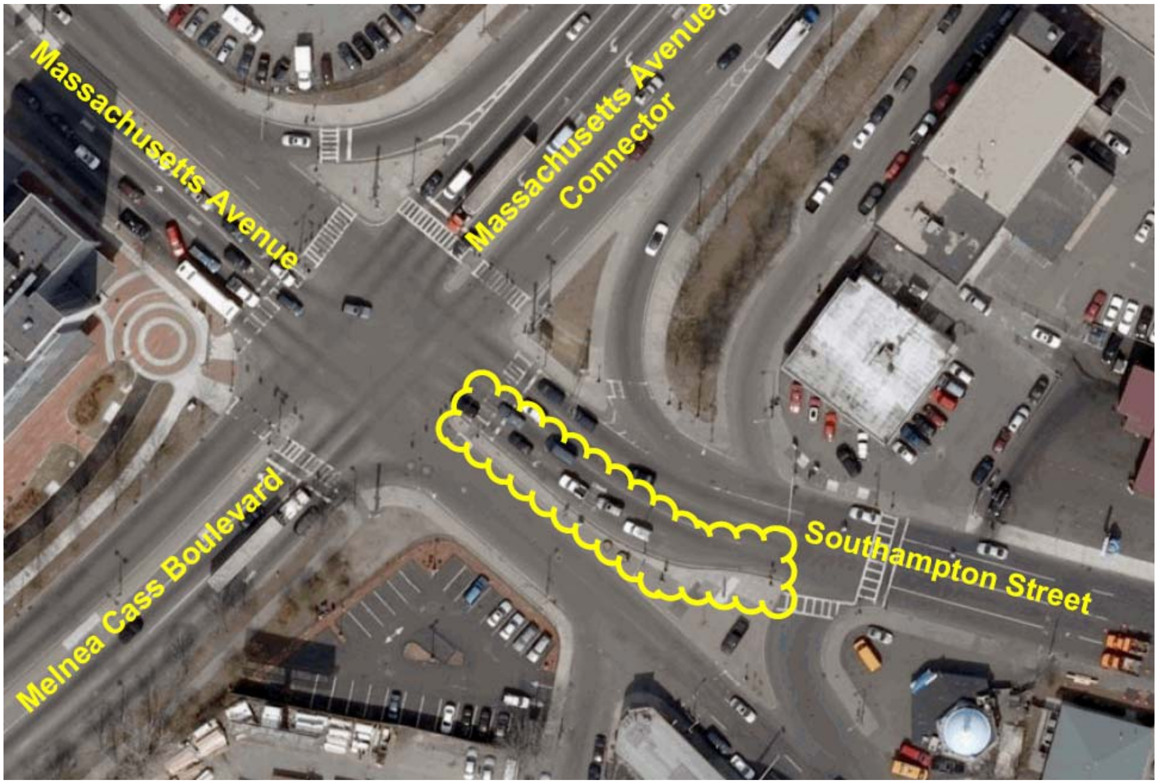



**Figure 2.4-C: Inadequate Storage Space for Left Turning Vehicles at the Intersection of Massachusetts Avenue/Melnea Cass Boulevard and Southampton Street**

Heading east on Southampton, from Melnea Cass and Massachusetts Avenue, the street switches to two-way vehicular traffic with two lanes in each direction (Figure 2.4-D). The southern side of Southampton Street serves as a very busy loading area for large vehicles at various businesses. These loading docks on the southern side create a situation where loading trucks block lanes of traffic (Figure 2.4-E). Due to the industrial nature of the area, there are many heavy vehicles that use this section of roadway, approximately 6% of all vehicles. For both cyclists and vehicles traveling eastbound, this means dangerously weaving through traffic to continue towards the east.

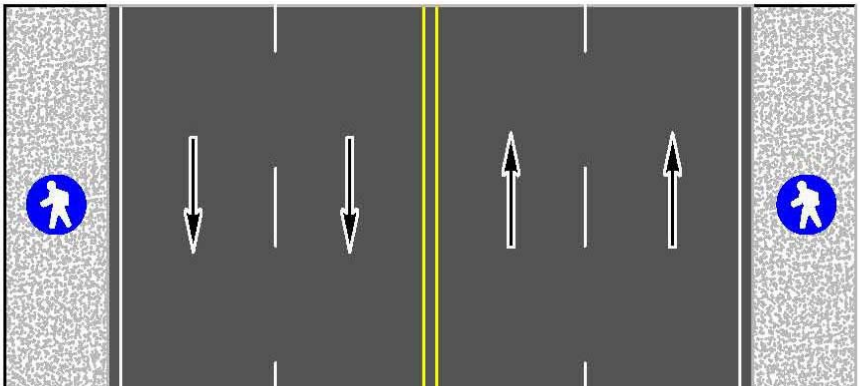


**Figure 2.4-D: Southampton Street Existing Cross Section**

**Figure 2.4-E: Inadequate Loading Bay on South Side of Southampton Street**

Continuing to the east, Southampton Street approaches Dorchester Avenue, the street again narrows as it crosses the Southeast Expressway and rail road tracks, east of Interstate 93. (Figure 2.4-F). Very narrow sidewalks force cyclists into the road to travel as they approach the Dorchester Avenue intersection. At this location there is an intersection of six legs of traffic: Dorchester Avenue, Dorchester Street, Preble Street, Boston Street, and Southampton Street. At this intersection there are two lanes in the eastbound direction on Southampton Street and one lane in the westbound direction (Figure 2.4-G).Close to the intersection there is the Massachusetts Bay Transit Authority (MBTA) Andrew Station, where waves of pedestrians leaving the facility create possible conflicts with cyclists. Crossing this intersection towards the east on the corridor brings a traveler to Preble Street.

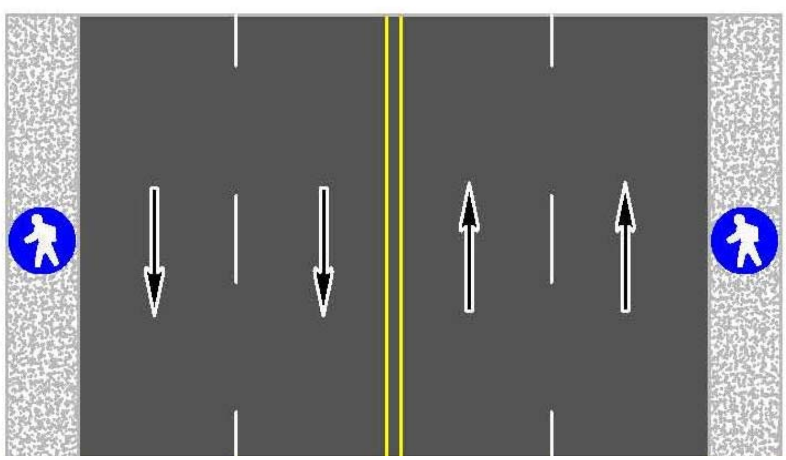


**Figure 2.4-F: Southampton Street Existing Cross – Section Crossing I-93**


**Figure 2.4-G: Southampton Street St Approach to Dorchester Avenue Intersection**

## 2.5 Preble Street

### *2.5.1 Overview of Section*

Preble Street, east of the Dorchester Avenue and Southampton Street intersection, is a two-lane, two-way roadway with parallel parking on both the north and the south side (Figure 2.5-A) It is a wide street that functions as a connector road but is very residential. Cyclists leaving the Dorchester Avenue intersection, much like Southampton Street, are forced to either ride with traffic or on the sidewalks. Both present challenges with parking on both sides of street and a heavier pedestrian presence than on Southampton Street. As cyclists come to the eastern end of Preble Street, they are faced with the task of traversing a very large rotary regardless of their destination (Figure 2.5-B).

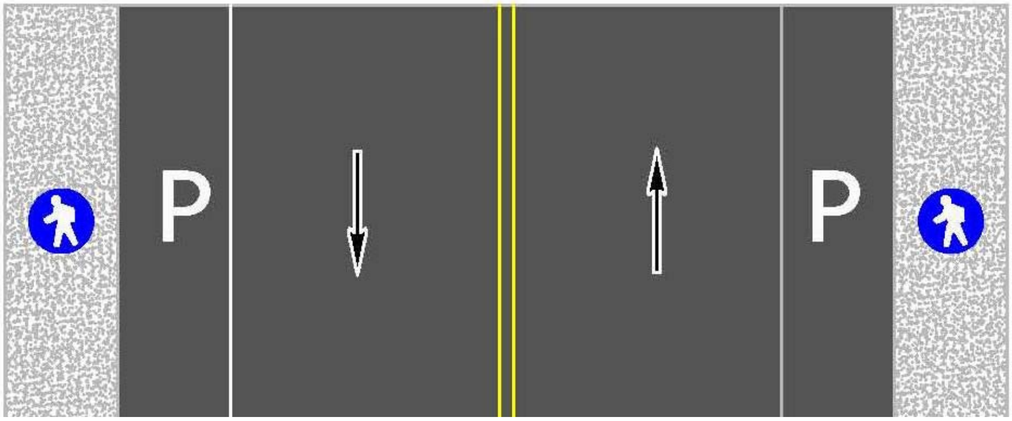



**Figure 2.5-A: Preble Street Existing Cross Section**


**Figure 2.5-B: Example of Rotary Approach at Preble Street and Old Colony Avenue**

This rotary is the intersection of Preble Street, Old Colony Avenue and Columbia Road, and is the northern boundary of the final two sections of the corridor (Figure 2.5-C). The rotary in its current condition provides several "straight-shots", where drivers can travel at rates of speed through the rotary that are higher than desirable. Desirable speeds would consist of speeds that are low (15-25 mph) and consistent with other modern roundabouts. These high speeds also make it very difficult for pedestrians and cyclists to cross. There is also a high volume of traffic that travels north and south on Old Colony

Avenue. Between these high volumes and high speeds, there is less opportunity for drivers heading eastbound on Preble Street to enter the circulating traffic volume.

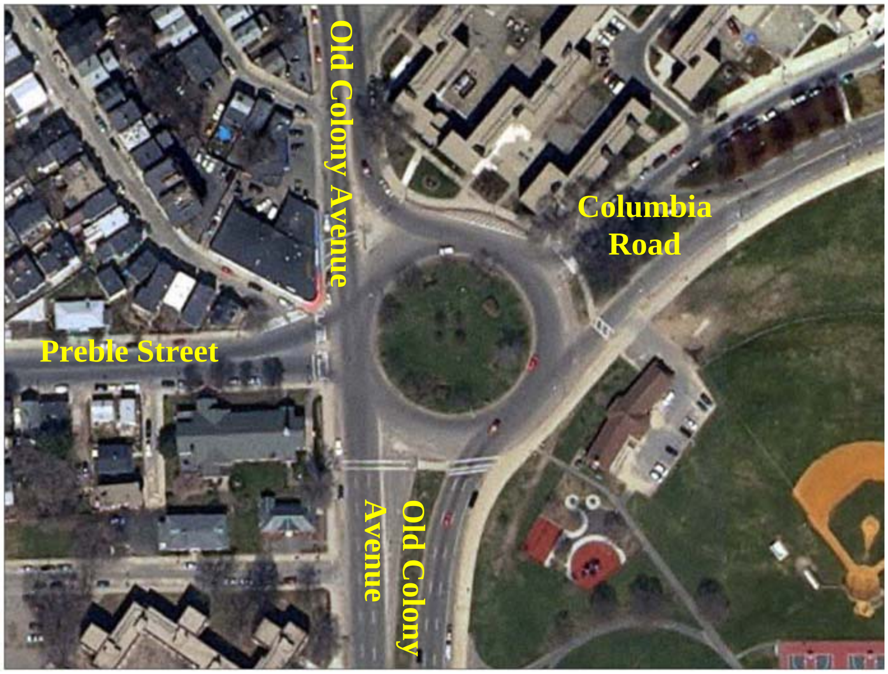



**Figure 2.5-C: Aerial View of Existing Preble Circle**

## 2.6 Old Colony Avenue

### *2.6.1 Overview of Section*

Travelling south of the rotary, there is Old Colony Avenue. This avenue has ample space to accommodate vehicles, cyclists and pedestrians safely due to the wide existing right-of-way (approximately 148’). Old Colony Avenue is an expansive thoroughfare with wide sidewalks, parking on both sides, and six lanes of traffic that is divided by a large median (Figure 2.6-A). The three lanes in each direction create a situation where there are under utilized lanes for the extent of the roadway. On the eastern side of Old Colony Avenue is Joseph Moakley Park.

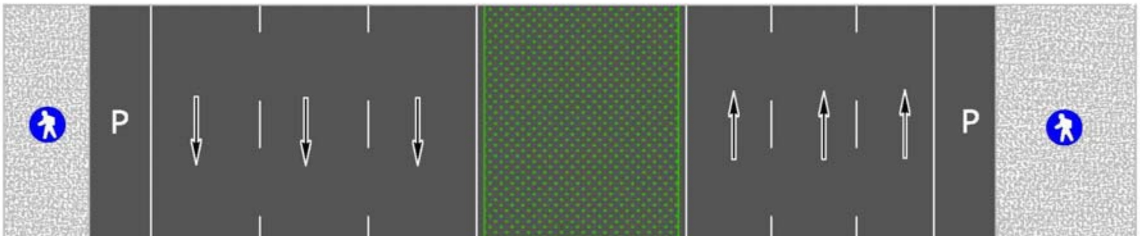



**Figure 2.6-A: Old Colony Avenue - Existing Cross Section**

There are several bus stops along the route that service the #5 & #16 MBTA bus lines. The presence of these bus routes makes it more challenging to integrate bicycle facilities. Old Colony Avenue also has one pedestrian bridge approximately 1000 feet south of the rotary, which connects the residential complex west of Old Colony Avenue to the Joseph Moakley park on the east. This bridge allows pedestrians to cross the large number of travel lanes on a separated path, although it is rarely used. Several pedestrian crossings also compliment this pedestrian bridge throughout, several of which have their own signal to expedite pedestrian crossings.

Continuing south on Old Colony Avenue, the roadway splits. Old Colony Avenue continues south, west of Columbia Road. Columbia Road continues to the east and connects with Kosciuszko Circle, an intersection of William J. Day Boulevard and Morrissey Boulevard. Old Colony then changes names and becomes Mount Vernon Street as it continues south under Columbia Road. It then ends at the MBTA JFK/UMASS Subway Redline Stop (Figure 2.6-B). This brief section of Mount Vernon Street contains a single lane of traffic in each direction with sidewalks on both sides of the street. Cyclists, pedestrians, and drivers all have ample room to maneuver as needed in a safe manner with limited potential conflicts.

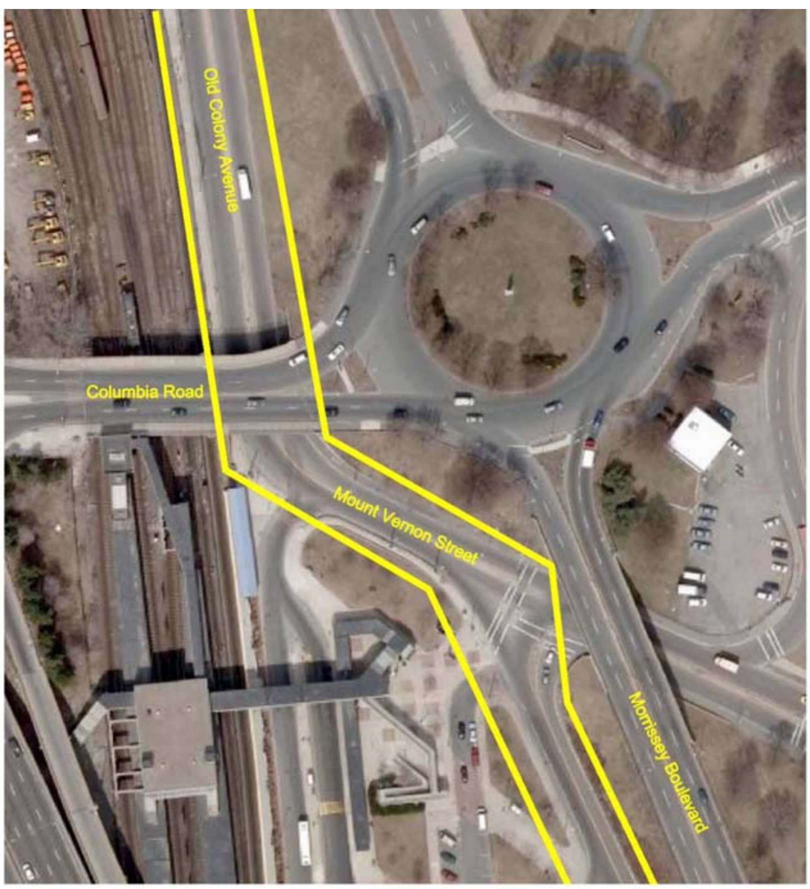



**Figure 2.6-B: Columbia Road/Mt. Vernon Street at Kosciuszko Circle Bypass**

## 2.7 Morrissey Boulevard

### *2.7.1 Overview of Section*

Morrissey Boulevard is another expansive roadway with a large right of way and at its widest it has seven lanes (4 through and 3 left turning) in the southbound direction and six lanes (4 through and 2 on a carriage road) traveling northbound (Figure 2.7-A). The area also contains narrow sidewalks on either side of the roadway that are available for pedestrian use. A carriage lane exists on the northbound side of Morrissey Boulevard, from south of Mount Vernon Street to UMASS Boston, to allow for access to several business' and Boston College high school without impeding on the main flow of traffic.

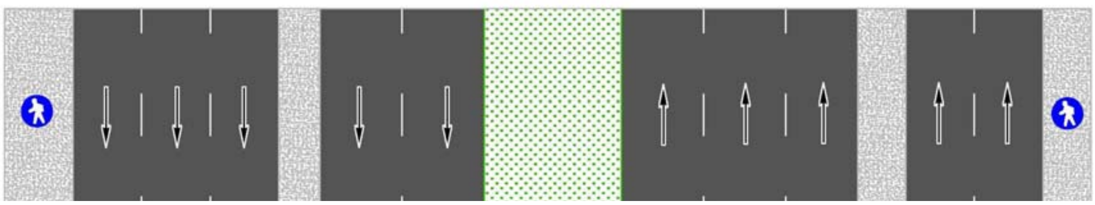


**Figure 2.7-A: Morrissey Boulevard Existing Cross Section**

At the northern end of Morrissey Boulevard, in front of the JFK/UMASS MBTA station, there is a median separated road which services the MBTA Station, Shaw's Supermarket, small offices buildings, and the Boston Globe. This section of roadway has two southbound lanes and a single northbound lane that continues until the end of the Shaw's Supermarket building, after which drivers can only travel southbound (Figure 2.7-B). These lanes continue south all the way to the intersection of UMASS Boston and Morrissey Boulevard, where they turn into three left turning lanes and one through lane.

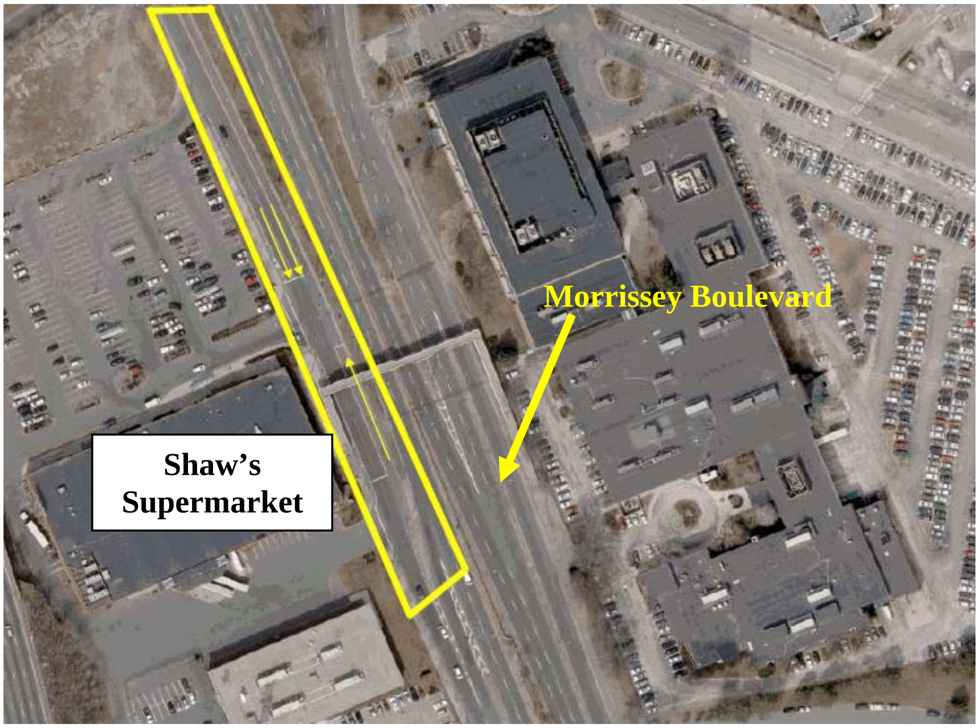



**Figure 2.7-B: Two-Way North Section of Morrissey Boulevard**

This intersection is a conventional signalized intersection with the exception of the southbound approach. The southbound approach consists of a total of seven lanes, four through lanes and three left turn lanes. The irregular characteristics are three of the through lanes are to the left of the left turn lanes and there is one through lane to the right of the left turn lanes.

# 3.0 Future Conditions: Alternatives Considered

## 3.1 Introduction to the Designs

As part of the design process, a large variety of design options were explored. These designs are outlined below with descriptions as to why they were unacceptable as a final design choice. The main focus of the objectives was to provide a safe and comfortable bicycle facility for all types of users. These characteristics require adequate separation and space to allow all users to maneuver easily and safely along the corridor. For these reasons, many of the alternatives were rejected and not followed through to the final design. Some other objectives, which these alternatives did not achieve, include minimal roadway crossings, available right of way, and cost.

## 3.2 Design Alternatives Considered

### *3.2.1 Southampton Street (Melnea Cass Boulevard to Allstate Road)*

Alternatives considered for this section of the proposed route:

- Alternative A: Add Bike Lane in Each Direction
- Alternative B: Cycle Track, South Side of Southampton Street

**Alternative A:** Add Bike Lane in Each Direction

Alternative A would incorporate four foot bike lanes in each direction to better accommodate cyclists along Southampton Street (Figure 3.2-A**)**. This would involve the reduction of lane widths along this section of Southampton Street, while maintaining the same number of lanes.

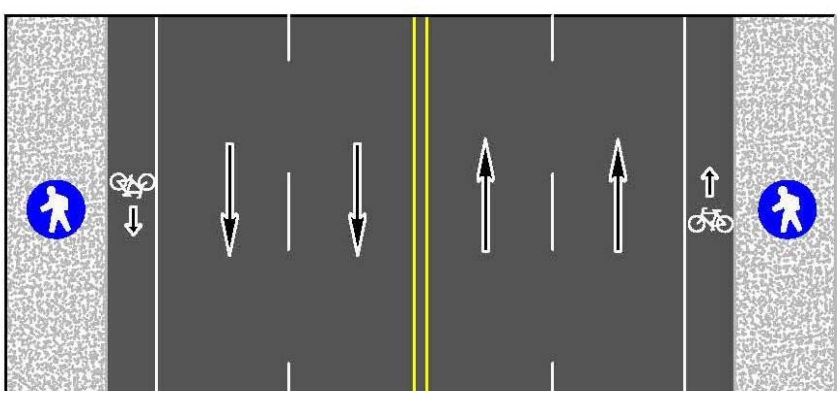


**Figure 3.2-A: Southampton Street Alternative A Cross Section**

**Viability**

While this alternative is feasible, it is in conflict with the main objectives of the project. This type of facility does not provide the necessary separation from vehicles, which would create a safe and comfortable cycling area. Due to the age of the buildings on the south side, modern trucks are unable to fit entirely on the property while making deliveries (Figure 2.4-E). The bike lane on the south side of the roadway would have a high potential for conflicts with heavy vehicles making deliveries to buildings on this side of the street. They are often found blocking one or even two lanes of traffic while parked. This essentially renders the bike lane on the south side useless.

**Alternative B:** Cycle Track, South Side of Southampton Street

This alternative would involve the implementation of a cycle track on the south side of the street (Figure 3.2-B). A cycle track is a bike facility which follows the direction of the roadway, but has physical separation from travelling motor vehicles. This cycle track would be two-way allowing bicycle traffic to travel in both directions. This cycle track would need the elimination of a lane or the narrowing of lanes to obtain the necessary right of way.

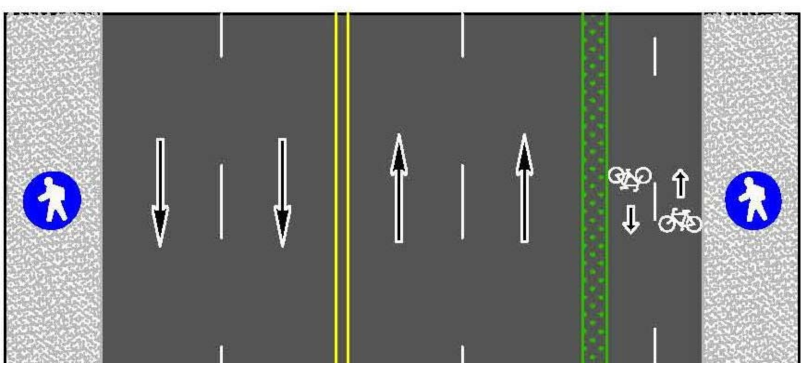


**Figure 3.2-B: Southampton Street Alternative B Cross Section**

**Viability**

While feasible, this alternative has a high potential for conflicts with many heavy vehicles that utilize the south side of Southampton Street. This cycle track would also create an awkward and unsafe crossing at the intersections of Melnea Cass Boulevard and Massachusetts Avenue & Southampton Street and Theodore Glynn Way. This crossing at Theodore Glynn Way would be an unsafe crossing due to the large number of travel lanes and lack of a traffic signal.

### *3.2.2 Southampton St (Allstate Road to Dorchester Avenue)*

Alternatives considered for this section of the proposed route:

- Alternative A: Extend Sidewalk and Add Sharrows

**Alternative A:** Extend Sidewalk and Add Sharrows

Alternative A included extending the existing sidewalk to give pedestrians more room to maneuver while crossing narrow sections of Southampton Street. This would allow pedestrians, such as those leaving the MBTA's Andrew Station, to move more easily to points west such as the South Bay Center. Facilities for bicycles included the addition of Sharrows to the outermost lane in both directions (Figure 3.2-C). This would mean that cyclists would share the road with any vehicle traveling along this section of Southampton Street.

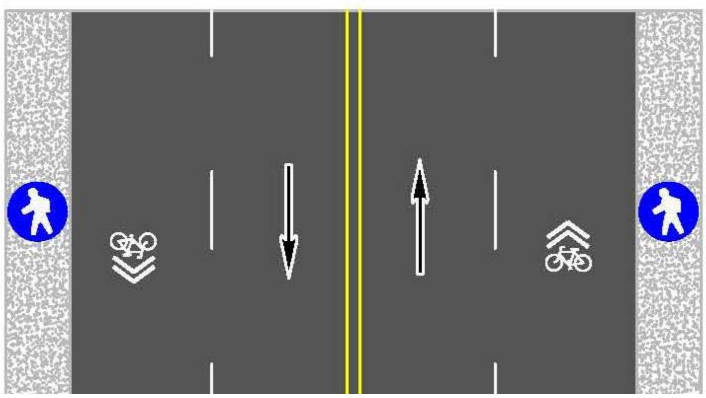


**Figure 3.2-C: Southampton Street (Narrow Section) Alternative A Cross Section**

### Viability

Although this option addresses the needs of the pedestrians, it does not adequately address the needs of the cyclist. By placing cyclists in the roadway, they will be forced to negotiate for space with heavy vehicles and fast moving traffic. This would leave this section of the bike facility usable to only the most advanced riders. Since all of the other sections (e.g., Old Colony Avenue and Morrissey Boulevard) have space to provide more separated bike facilities, this alternative would also not be cohesive with the remaining sections of the proposed bike facility.

### *3.2.3 Preble Street*

Alternatives considered for this section of the proposed route:

- Alternative A: Wide Bike Lane in Each Direction
- Alternative B: Bike Lane between Sidewalk and Parking
- Alternative C: Sidewalk Extension with Bike Lanes

**Alternative A:** Wide Bike Lane in Each Direction

In this option, the existing wide travel lanes are reduced in both directions and a bike lane in each direction would be incorporated between the travel lanes and parking (Figure 3.2-D). The wide bike lanes allow for bicycle users to move within the marked lane to avoid any potential conflicts without having to travel directly in the travel lane. Parking would be maintained.

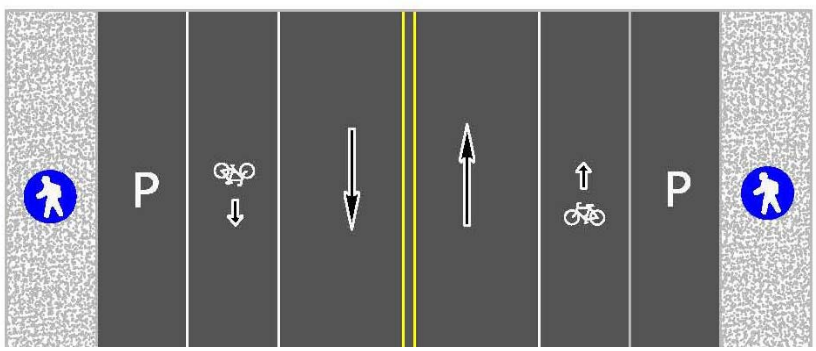



**Figure 3.2-D: Preble Street Alternative A Cross Section**

**Viability**

This option creates ample space for cyclists; however, the facilities in the road do not make it appealing to users of all levels. Also, by having a wide lane next to traffic with little separation offers limited protection from drivers who decide to use the bike lane to their advantage. Having this configuration also creates problems when connecting to other sections of the path at Dorchester Avenue and also at the Old Colony Avenue rotary.

**Alternative B:** Bike Lane between Sidewalk and Parking

Alternative B moves the single bike lane between the existing sidewalk and the parked cars (Figure 3.2-E**)**. This allows for more protection for the users of the bike lanes from moving vehicles, but does not provide protection from parked cars. There are also many driveways due to the residential nature of the street.

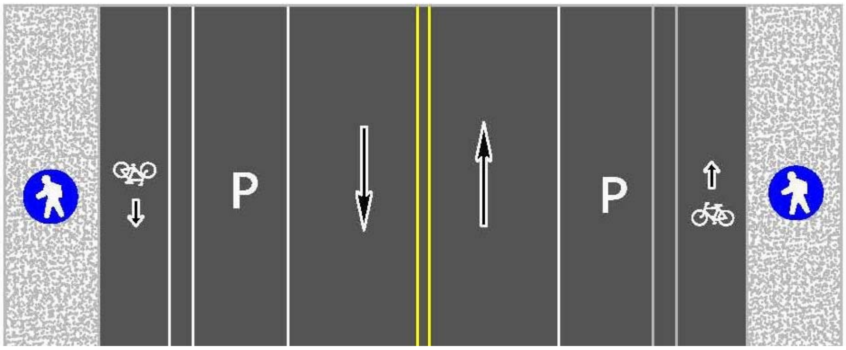



**Figure 3.2-E: Preble Street Alternative B Cross Section**

## Viability

Although this alternative offers much more protection for path users from vehicles in the travel lanes, it does not offer much protection from people accessing parked cars and blocking the cycle track. Another consideration for this section is the number of driveways that are present. With the large number of driveways trying to access Preble Street, there are many cars pulling out to check for a break in traffic. By having the parked cars beyond the cycle track, this creates a situation where the car will need to pull forward in order to view traffic on Preble Street. This means that drivers pulling out would be blocking the cycle track and making cyclists wait for the car to vacate. Given the number potential conflicts this option is undesirable.

**Alternative C:** Sidewalk Extension with Bike Lanes

Alternative C addresses the residential nature of the street and incorporating the needs of pedestrians while also considering bike facilities (Figure 3.2-F**)**. This alternative would extend the sidewalk on both sides to allow for increased space for pedestrians. At the same time, parking would be maintained and located next to the extended sidewalk. Two bike lanes would be added between the vehicular travel lanes and the parked cars.

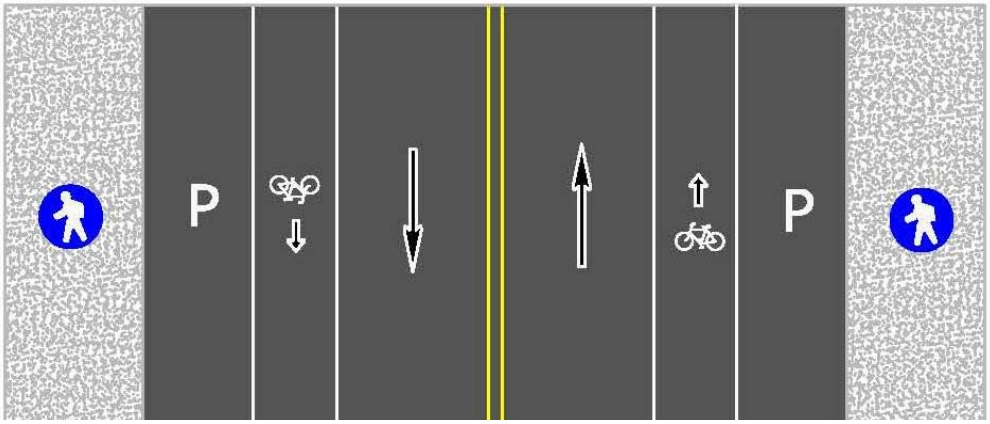



**Figure 3.2-F: Preble Street Alternative C Cross Section**

**Viability**

Similar to Alternative B, having two one way bike lanes on either side of the street provides challenges when cyclists try to connect to other sections of the path. Also, it would require several street crossings, which creates potential conflicts between cyclists and drivers. Although this option provides space for pedestrians, having bike lanes in the street makes the path uncomfortable for lower level users, such as children. This alternative also does not provide sufficient space for cyclists to avoid potential conflicts with the parked cars to their right and would force them further into the vehicular travel lane at times.

### *3.2.4 Old Colony Avenue*

Alternatives considered for this section of the proposed route:

- Alternative A.1 & A.2: Cycle Track on Western Side
- Alternative B: Bike Lane on Western Side and Shared Use Path on Eastern Side
- Alternative C.1 & C.2: Angled Parking on SB Side with Path on NB

**Alternative A.1 & A.2:** Cycle Track on Western Side

Two similar alternatives were considered for this section of the proposed route that both are able to fit within the existing roadway width.

- Alternative A.1 would reduce the lane widths on the west side of Old Colony Avenue and add a two-way shared use path, located on the wide existing sidewalk along Moakley Park (Figure 3.2-G).
- Alternative A.2 would be similar to Alternative A.1 except move the 2-way cycle track on the west side of Old Colony Avenue would be on the other side of the parked cars on the southbound side (Figure 3.2-H).

These alternatives kept the number of travel lanes and parking spaces the same. Old Colony Avenue also is the route for MBTA bus lines creating potential conflicts with cycling facilities.

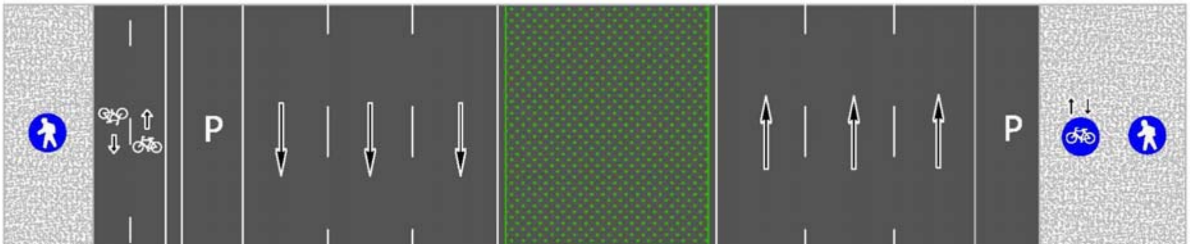



**Figure 3.2-G: Old Colony Avenue Alternative A.1 Cross Section**

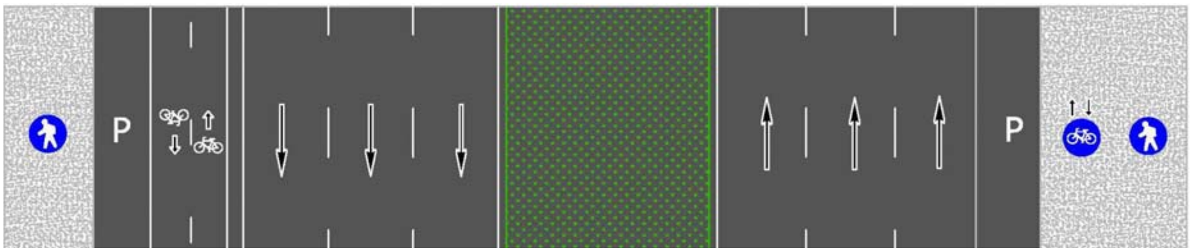



**Figure 3.2-H: Old Colony Avenue Alternative A.2 Cross Section**

## Viability

These alternatives, although able to completely fit within the existing roadway width, were not chosen because they did not fulfill the stated objectives. The buffer zone between the cycle track and the parked cars does not provide adequate space to prevent conflicts with people entering and exiting their vehicles. This is especially true due to the proximity to the park; people entering and exiting their vehicles will need a prolonged period of time and additional space than is available in this alternative. Alternative A.2 moves cyclists closer to the roadway, which does not appeal to all levels of riders.

**Alternative B:** Bike Lane on Western Side and Shared Use Path on Eastern Side

In Alternative B, a wide single bike lane is utilized on the southbound side of the roadway next to the travel lanes and a single bike lane is incorporated in the northbound side on the existing sidewalk (Figure 3.2-I). To accommodate the bike lane on the southbound side, the lane widths would be reduced and the northbound travel lanes are left untouched. The number of travel lanes and parking would be maintained with this alternative.

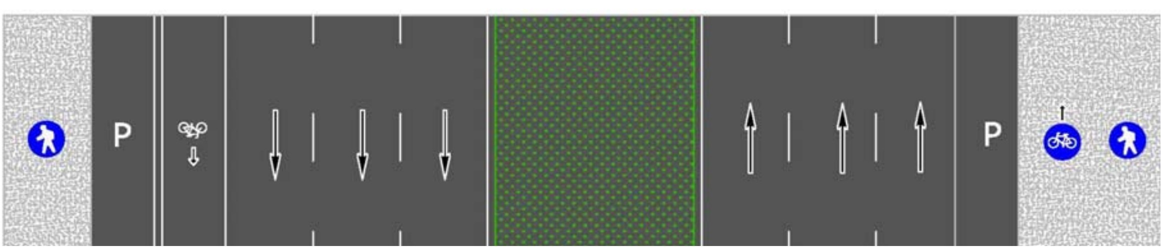



**Figure 3.2-I: Old Colony Avenue Alternative B Cross Section**

**Viability**

This option allows for cyclists to move in the same direction as the flow of traffic, creating some comfort for more advanced users. But similar to earlier alternatives, this might not be appealing to all levels of users. Also, this alternative does little to protect cyclists from the parked cars and any potential conflicts that they may encounter.

**Alternative C.1 & C.2:** Angled Parking on SB Side with Path on NB

Two similar alternatives were considered for this section of roadway that explore the use of angled parking to maintain the number of parking spaces, but move all of the parking to one side of the roadway (Figure 3.2-J & Figure 3.2-K**)**.

- In Alternative C.1, angled parking would fit into the existing curb on the southbound side while still allowing for three travel lanes in both directions. Moving all of the parking to the southbound side creates an opportunity on the northbound side. A two-way cycle track on an extended sidewalk could be used in place of the parking as seen in Alternative C.1.
- In Alternative C.2, one lane is eliminated in both directions. The extra space would be used for cyclists on a single bike lane headed south on the western side and a two-way cycle track on the eastern side. Back in angled parking would be provided, to create greater visibility for exiting vehicles.

By utilizing angled parking, the total number of parking spaces is maintained with this plan. Additional space creates the opportunity for additional green space.

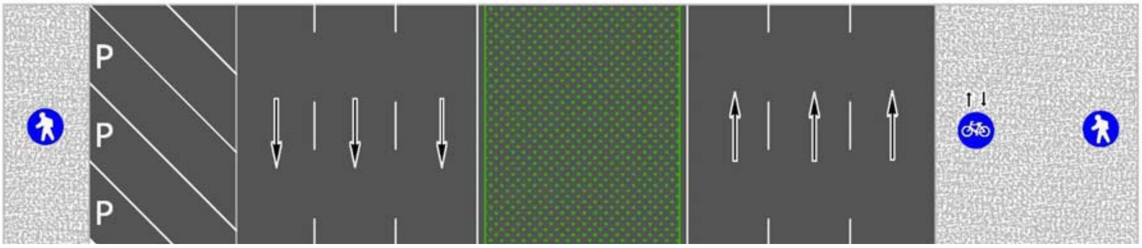



**Figure 3.2-J: Old Colony Avenue Alternative C.1 Cross Section with Extended Sidewalk**

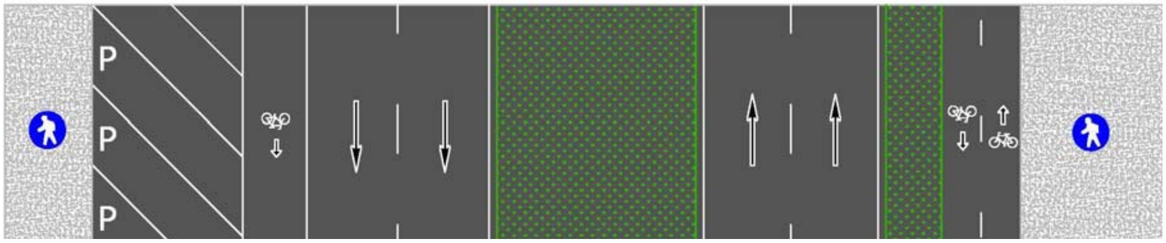



**Figure 3.2-K: Old Colony Avenue Alternative C.2 Cross Section with Separated Cycle Track**

### Viability

These options, although feasible (i.e., maintaining the number of travel lanes and parking spaces) creates several concerns. The main concern is that Moakley Park is located on the eastern side of the roadway. With the position of the parking, park users would be forced to park their vehicles on one side of the roadway and then cross, creating a greater number of crossing pedestrians and potential conflicts between pedestrians and vehicles. Another concern is with the enforcement of back-in-only angled parking. There is the possibility that drivers will ignore the back-in-only regulations. This creates an unsafe situation for people trying to back their cars onto Old Colony Avenue after parking. Also, this alternative does not allow for easy connection with other sections of the proposed path: it would require additional street crossings (e.g., crossing the intersection at Columbia Rd on the southern end of Old Colony Avenue). This leads to additional conflicts between cyclists and motorists, decreasing the level of comfort and increasing delay experienced by the cyclists.

### *3.2.5 Morrissey Boulevard*

Alternatives considered for this section of the proposed route:

- Alternative A: Cycle Track on Both Sides of Roadway

**Alternative A:** Cycle Track on Both Sides of Roadway

In this alternative, a new carriage road would be constructed on the southbound side to mimic the one that exists on the northbound side (Figure 3.2-L). This would increase the number of southbound lanes to three. In the carriage lane, there would be one vehicular travel lane next to a two-way cycle track. On the northbound side, the situation would be the same with a carriage road and two-way cycle track. The existing northbound carriage lane would be reduced to one travel lane and the added area would be allotted to the two-way cycle track to better accommodate users traveling to and from South Boston.

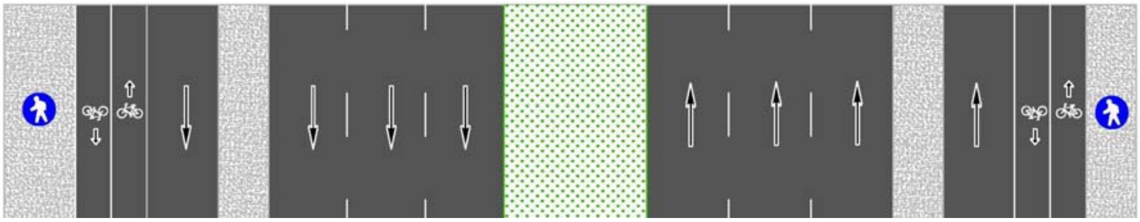


**Figure 3.2-L: Morrissey Boulevard Alternative A Cross Section**

## Viability

Although this option would provide ample separation from the main travel lanes, it proves difficult for connections of the 2-way cycle track on the northbound side of the Morrissey Boulevard. It was determined that it was not safe to connect two way cycling traffic that is crossing Mount Vernon Street.

# 4.0 Future Conditions: Design Elements

## 4.1 Introduction

The intent of this section is to provide a basic understanding of concepts that are going to be employed throughout the proposed corridor. The items mentioned in this section are necessary at multiple locations and will be identified in plans but will not necessarily be discussed in detail under the individual sections.

## 4.2 Cycle Track, Cycle Track Pavement Markings & Separation

### *4.2.1 Cycle Tracks*

Cycle tracks, widely used throughout countries such as the Netherlands, are separated bicycle ways (Figure 4.2-A). The separation is from both vehicular and pedestrian traffic through the use of visual and physical separations (e.g., paint and curbing). Due to their separation and protection from other modes of transportation, they were chosen and implanted for the entire design corridor. A cycle track was utilized for this design because it allowed for bicycle movements in two directions while minimizing the necessary width required for the bicycle facilities. Below is the range of width which the cycle track will vary between along the corridor.

Minimum Width: 8’

Maximum Width: 12’

For sections where the right of way is constrained, the cycle track will not narrow to less than 8’, to allow for a minimum level of comfort for cyclists that would be passing each other. Similarly, for areas where there is a large amount of space, the cycle track will not be greater than 12’.

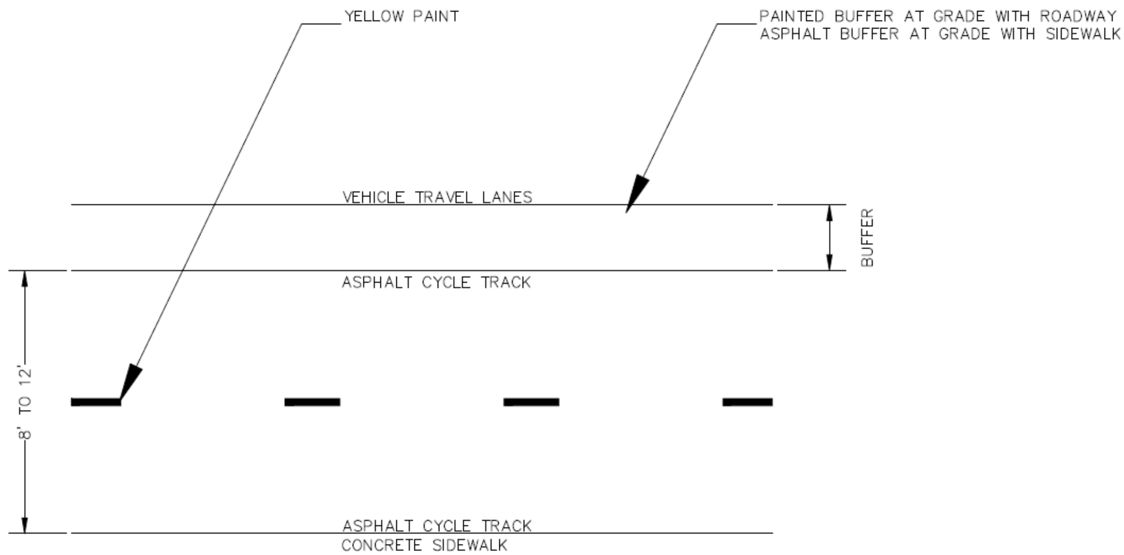



**Figure 4.2-A: Typical Cycle Track Configuration**

### *4.2.2 Pedestrian and Cyclist Separation*

Where there are no grade separations between pedestrians and cyclists, it is recommended that separation indicators be installed and incorporated into the proposed design. Two elements of the design will delineate the pedestrian area from the bicycle area. The first of these is a change in material. The pedestrian sidewalk will be concrete, while the cycle track will be paved with asphalt. Additionally, the asphalt will be formed over a concrete base to avoid movement of the flexible material over the years.

The cycle track shall also be properly marked to indicate two-way bicycle traffic. This will be indicated by a dashed yellow line, down the center of the cycle track for the length of the cycle track. In addition to the center line, bicycle legends will be added at intersections to emphasize the intended direction of travel (Figure 5.2B).

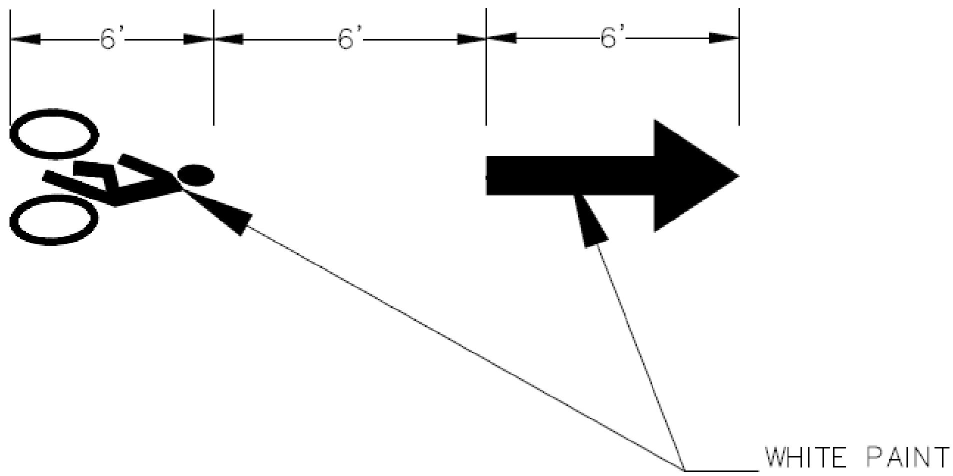



**Figure 4.2-B: Typical Bicycle Legends to be Used on Cycle Track at Intersections**

## 4.3 Bus Stops

Bus stops will be maintained to include all existing signage, markings, and waiting structures. These facilities will be moved or replaced at the edge of all new curbing. Bus stops located on roadways where the cycle track is at grade with the roadway, a bulb out will be used (Figure 4.3-A). This bulb out allows pedestrians to cross the cycle track, wait, and board the bus without a change in grade, aiding those who may have difficulties boarding the buses. Bus stop locations and typical details are included in the plans.

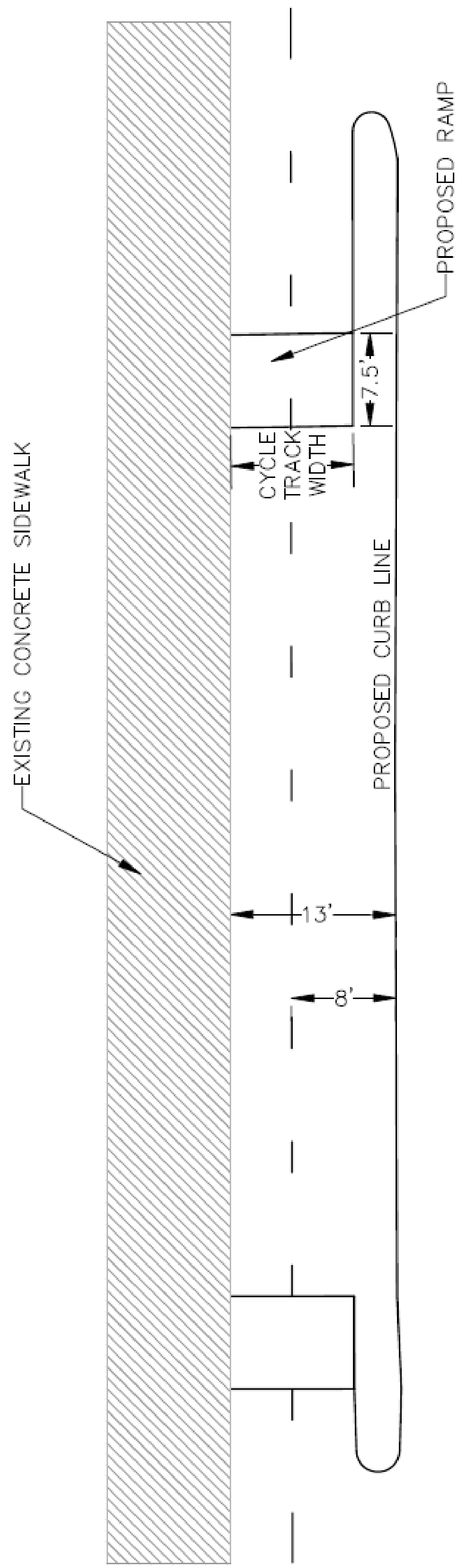



**Figure 4.3-A: Typical Cycle Track Configuration at Bus Stop Locations**

## 4.4 Catch Basins, Fire Hydrants & Trees

All catch basins and fire hydrants are to be moved to the edge of any extended sidewalks to facilitate the necessary drainage and ease of use for emergency personnel**.** Trees and shrubbery are to be removed at locations where they will impede on the proposed facilities and there is no evident method for avoiding them. Otherwise, they are to be preserved wherever possible.

Catch basins and fire hydrants that need to be moved will be called out in the proposal and included in the cost estimate. Tree removal has been estimated but not called out in the proposal.

## 4.5 Intersection Approaches

At all driveways and intersections, cyclists and pedestrians will have separate crossings, discussed further in Section 4.9. In many locations, identified on the plans, existing pedestrian ramps will be maintained. However, in locations where this is not possible, alternative ramp design was applied. This design includes the lowering of the entire sidewalk and bicycling facility, until they are at grade with the roadway. This design facilitates the crossings of all users by spreading the waiting area and point of exit and entrance onto the facilities. Generally, despite ability, all users utilize the ramps at crossings. The proposed design will avoid this bottle neck and allow users more comfort and an easier crossing.

An important aspect of this design is to deter drivers from encroaching on this at grade waiting area for those crossing. Two methods of keeping vehicles from intruding upon this area will be used. The first is a change in material. The newly lowered area shall be made of concrete. This change in material provides a visual barrier delineating the difference in space. A second delineation between the two areas will be bollards placed at the change in material, providing a physical barrier between vehicles, and the pedestrians and cyclists. The bollards will deter cars but allow free movement of pedestrians and cyclists.

## 4.6 Signage

### *4.6.1 Destination Signage*

Because the proposed corridor route is over two miles in length, there is an opportunity to direct facility users to the numerous attractions located along the route. The final designs of these signs will be completed by others, but a list and potential location are to be included in the proposal. Below is a list of potential sites to call attention to:

- South Boston
- UMASS Boston
- MBTA Andrew Station

- MBTA JFK/UMASS Station
- South Bay Center
- Bayside Exposition Center
- Moakley Park
- South Bay Harbor Trail [Existing Path]
- Neponset River Greenway [Existing Path]

Distances and travel times for these locations and others have been calculated for the use of destination sign design (Appendix G).

#### *4.6.2 Beginning/End of Path*

At the two biggest intersections (Southampton Street at Melnea Cass Boulevard & UMASS Boston at Morrissey Boulevard) along the proposed route, it is recommended that signage be included to indicate to potential path users where they are able to enter the corridor.

### 4.7 Vehicular Signage/Markings

Additional signage and pavement markings will be necessary for vehicular traffic at several locations on the corridor to address limited sight lines and other safety concerns. One particular area where this will be necessary is at the rotary at the intersection of Preble Street and Old Colony Avenue. At this location, typical signage for roundabouts (Section 6.0) will need to be included. This includes yield signs and yield line pavement markings, also known as shark's teeth. At locations where sightlines are limited, warning signs will be installed on side streets to indicate to drivers that they are approaching a bicycle path.

### 4.8 Cycle Track Buffer Area

Along the majority of the proposed route, where ever a cycle track is to be located at grade with the roadway, significant separation between vehicles and cyclists is required to create a sense of comfort for users of the proposed bike facilities. The buffer will include the use of planters near residential areas and bollards elsewhere to enforce separation. These planters would be placed in the allotted buffer, in sections where the buffer is greater than four feet. These planters include small plants and other flowers that are intended to help beautify a section of roadway (Figure 4.8-A). Where the buffer is less than this, the use of paint and bollards will be implemented. The paint will consist of a solid white line delineating the edge of the buffer zone with angled hatching (Figure 4.8-A). The spacing of the bollards and planters shall be at 25 feet. The exception to this is in buffer zones which are shorter than 25 feet shall the divider (bollard or planter) at each end of the areas.

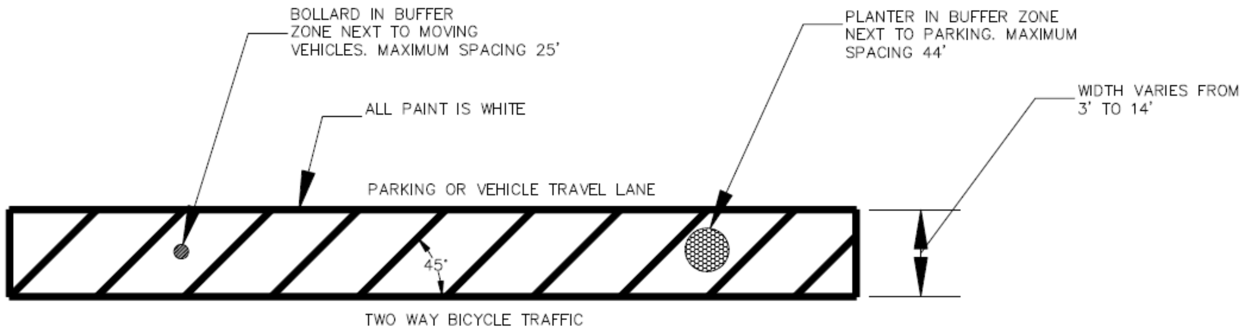



**Figure 4.8-A: Typical Buffer Area at Grade with Roadway**

## 4.9 Crossings

All pedestrian crosswalks will be 10' wide ladder crosswalks (Figure 4.9-A). A cyclist crossing area will be located adjacent to the pedestrian crossings. The width of the cycle crossing varies and will be consistent with the width of the cycle track at the location of the crossings (Figure 4.9-B). The bicycle crossing markings are inspired by those commonly used in the Netherlands. Each crossing will have a border along its limits to identify the path's continuation to cyclists, pedestrians and drivers.

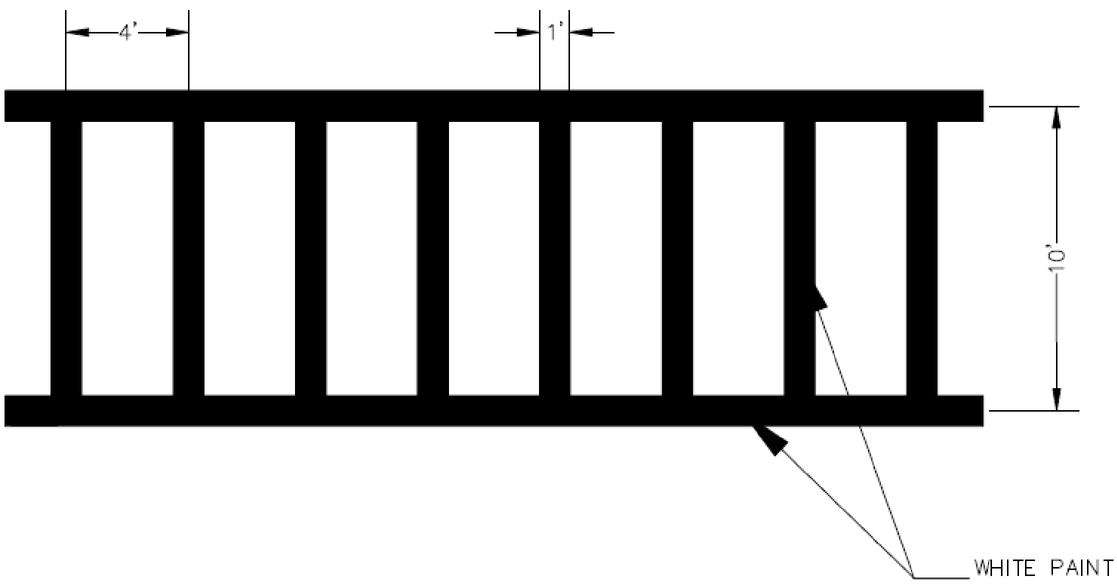



**Figure 4.9-A: Typical Pedestrian Crosswalk**

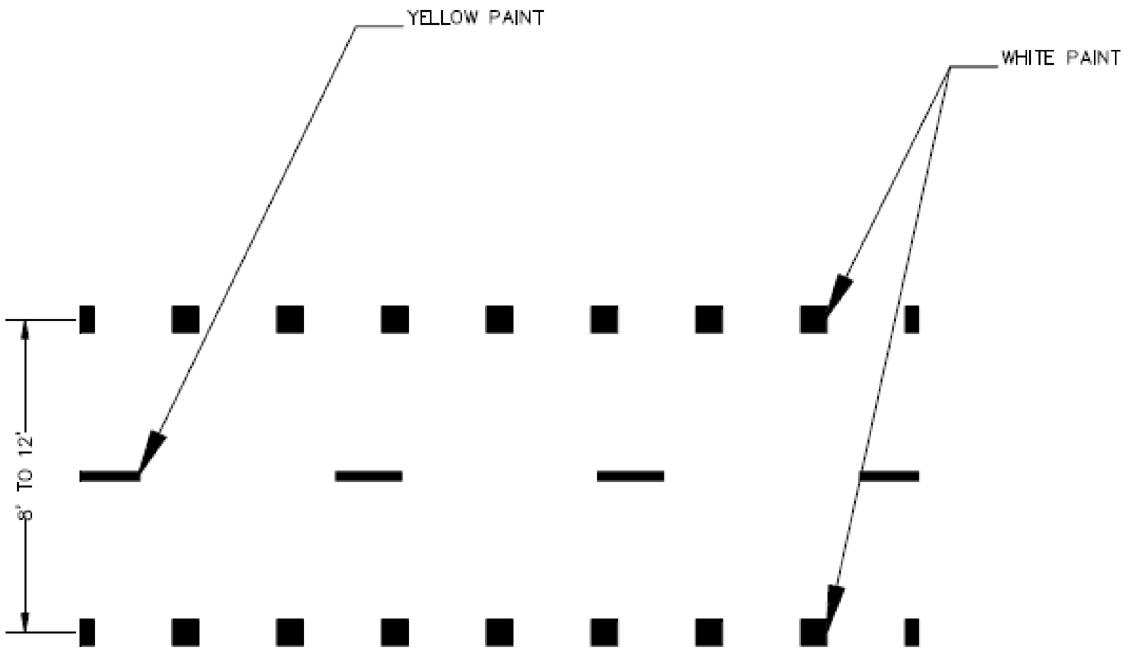



**Figure 4.9-B: Typical Cycle Track Crossing**

# 5.0 Future Conditions: No Build 2014

## 5.1 Introduction to Future Conditions

The future conditions section of the report focuses on adjusting the traffic flows and Level-of-Service at the analyzed intersections to what they are expected to become by 2014. By utilizing the average daily traffic (ADT) values provided by the MHD data base, a growth rate of 1.8% per year was calculated. This growth rate was applied to each of the collected turning movement counts to anticipate conservative traffic volumes for the year 2014.

## 5.2 Growth Analysis and Level-of-Service

After growing the existing volumes to the estimated volumes of the year 2014, analyses were run on the same intersections as the existing analysis with the new volumes (Appendix D). The purpose of this analysis is to compare a baseline (existing) to the future designs (proposed). Similar to the existing conditions analysis a summary of the LOS, capacity and delay at each intersection, gives an impression of how the corridor operates as a whole (Table 5.2-A).

**Table 5.2-A: Capacity Analysis Summary - No Build - 2014**

| Location | 2014 No Build | | | |
|---|---|---|---|---|
| | Peak Hour | LOS[1] | Delay[2] | V/C[3] |
| UMASS Boston at Morrissey Boulevard | AM | E | 75 | >1.0 |
| | PM | F | 98.8 | >1.0 |
| Southampton Street at All State Road | AM | B | 15 | 0.85 |
| | PM | B | 17.8 | 0.88 |
| Massachusetts Avenue at Melnea Cass Boulevard | AM | E | 59.6 | >1.0 |
| | PM | E | 58.0 | >1.0 |
| Morrissey Boulevard at Shaw's Entrance | AM | A | 2.5 | 0.39 |
| | PM | A | 8 | 0.71 |

1. Level-of-Service
2. Average vehicle delay in seconds
3. Volume to Capacity Ratio

n/a Not Applicable

# 6.0 Future Conditions: Selected Design

## 6.1 Introduction to the Selected Design

The selected design section of the report details the chosen design for the length of the corridor. Several improvements have been proposed for pedestrians, cyclists, and vehicles along the proposed route. Many of these improvements have been outlined in Section 5.0. This section will present the locations and integration of the noted improvements throughout the corridor. The description will begin at the intersection of Melnea Cass Boulevard and Massachusetts Avenue, continue east down Southampton Street until Preble Circle, and then will continue south to Old Colony Avenue and Morrissey Boulevard, ending at the intersection of Morrissey Boulevard and UMASS Boston.

## 6.2 Southampton Street (Melnea Cass Boulevard to Allstate Road)

### *6.2.1 Overview of Selected Design*

Currently, Southampton Street is a four-lane roadway, including a one-way section, between Theodore Glynn Way until Massachusetts Avenue. The selected design includes a two-way cycle track on the north side of Southampton Street. As specified below, the cycle track will be either grade separated or at grade with the roadway with a buffer depending on the available space and the proximity to bus stops.

### *6.2.2 Massachusetts Avenue Intersection Improvements*

The improvements at this major intersection involve a reconfiguration of the Southampton Street approach (Figure 6.2-A). The proposed design would utilize a section of the existing island that is located on the south side of Southampton Street and extend the storage lane length of the far left turning lane an additional 130’. This will allow more storage for left turning vehicles to eliminate wasted green time for drivers which are too far back in the queue to utilize it. This added lane length will also aide in decreasing the queue length for the entire approach. This is especially necessary because the existing channelized right turn lane’s storage will be eliminated. The right most lane will be eliminated for the transition of the beginning of the proposed cycle track on the north side of Southampton Street.

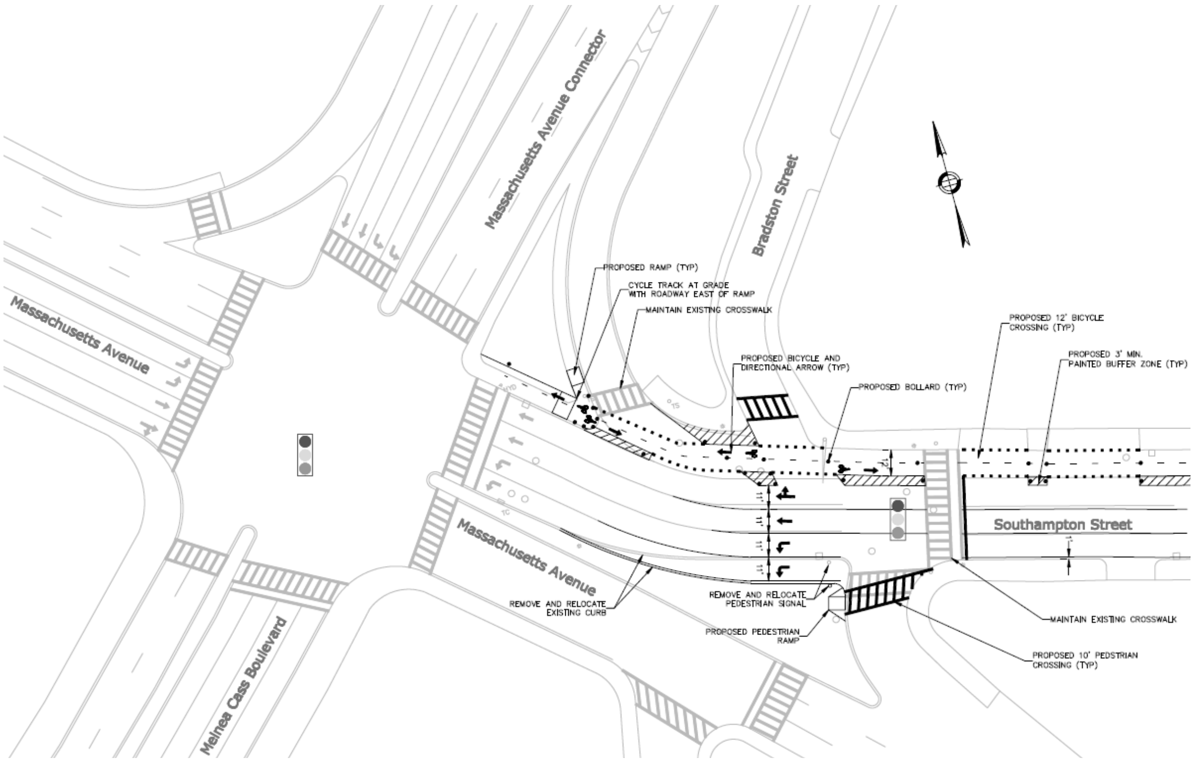



**Figure 6.2-A: Proposed Massachusetts Ave. and Melnea Cass Boulevard Intersection Improvements**

Since the proposed design will be altering the configuration of the Southampton approach to the intersection analysis of the proposed conditions is necessary. Similar to the existing conditions, anticipated traffic volumes of the year 2014 have been analyzed with the proposed reconfiguration (Appendix E). The proposed design also modifies the existing signal timings to better manage the expected traffic and maintain the existing LOS (Table 6.2-A).

**Table 6.2-A: Massachusetts Avenue Intersection Capacity Analysis Summary**

| Approach | | 2014 No Build | | | 2014 Build | | |
|---|---|---|---|---|---|---|---|
| | | LOS[1] | Delay[2] | V/C[3] | LOS[1] | Delay[2] | V/C[3] |
| Melnea Cass Boulevard | AM | F | 104.4 | >1.0 | E | 73.5 | >1.0 |
| | PM | E | 64.3 | >1.0 | E | 63.5 | >1.0 |
| Massachusetts Avenue Connector | AM | C | 27.0 | 0.87 | C | 26.4 | 0.87 |
| | PM | C | 26.7 | 0.88 | D | 51.6 | >1.0 |
| Southampton Street | AM | E | 71.9 | >1.0 | D | 54.2 | >1.0 |
| | PM | C | 33.4 | 0.87 | D | 38.8 | 0.91 |
| Massachusetts Avenue Eastbound | AM | D | 42.0 | 0.62 | D | 45.8 | 0.81 |
| | PM | F | 113.6 | >1.0 | D | 51.2 | 0.95 |
| Overall Intersection | AM | E | 59.6 | >1.0 | D | 47.7 | >1.0 |
| | PM | E | 58.0 | >1.0 | D | 51.4 | >1.0 |

1. Level-of-Service
2. Average vehicle delay in seconds
3. Volume to Capacity Ratio (max)

The comparison between existing LOS, capacity, and delay for each approach of the intersection and the proposed (Table 6.2-A) clearly shows how the new signal timings and configuration improve conditions. The proposed design provides a slight improvement for many approaches. The other movements, which have not improved, are maintained at the existing LOS.

### *6.2.3 Roadway Improvements*

Continuing east from the Massachusetts Avenue intersection, this portion of Southampton Street includes the elimination of one westbound travel lane. The elimination of a vehicular travel lane allows for the incorporation of improved pedestrian and bicycle facilities (Figure 6.2-B & Figure 6.2-C). Justification for removal of one travel lane is described later in this section. Beginning on the north side of the right of way, there will be the pedestrian area, which on average is 10 feet and is adjacent to buildings and property lines. The pedestrians will utilize the existing sidewalk. Continuing toward the center of the cross-section is a two-way cycle, as described in Section 5.0. The cycle track is going to be at grade with the existing roadway and will be separated by a minimum three foot wide buffer. Within this buffer are flexible bollards which provide physical separation from opposing vehicular traffic. Next to the proposed buffer is a one foot off set, three 11 foot vehicular travel lanes, followed by another one foot offset and the existing sidewalk on the southern side of Southampton Street.

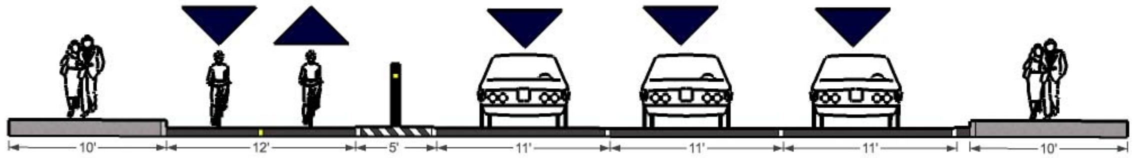
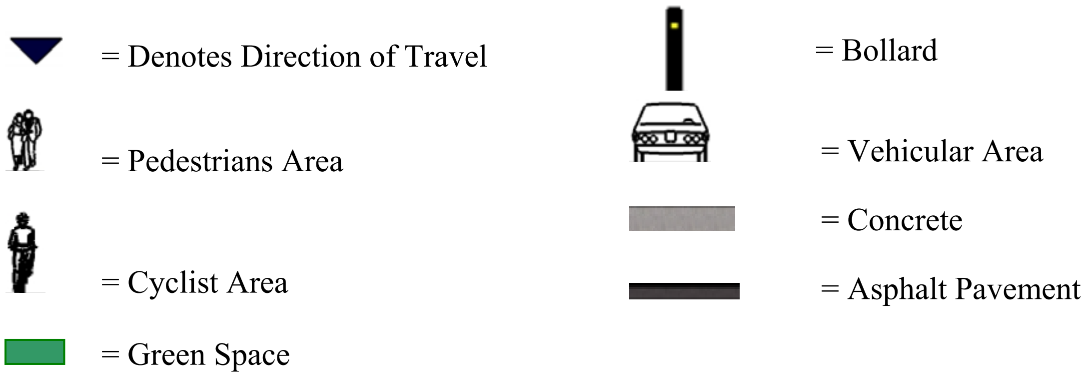



**Figure 6.2-B: Southampton Street Selected Design Cross Section for One-Way**



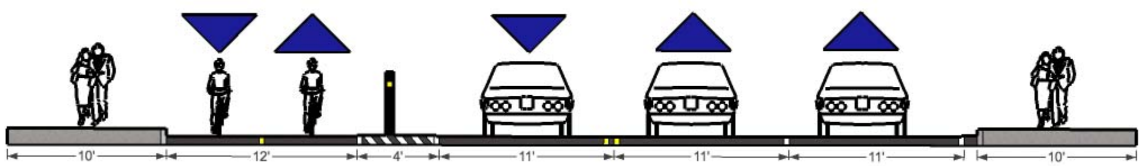




**Figure 6.2-C: Southampton Street Selected Design 3-Lane 2-Way Cross Section**

In a few sections of this portion of roadway, identified in the plans, the cycle track narrows from 12 feet to 10 feet wide and the pedestrian area to 6 feet in width to accommodate bus stops. At these locations the cycle track is brought to grade with the sidewalk. This is to allow easy crossing and loading for those who may have difficulties boarding the buses.

As the roadway approaches the South Bay Center intersection, at Allstate Road, there is a transition from a single westbound lane to two westbound lanes. During this transition the cycle track is brought up to the same grade as the sidewalk. The grade transition, for the cyclists, provides sufficient space and separation due to the limited space with the second westbound travel lane. This lane elimination is unable to be carried through the intersection with Allstate Road due to queuing restrictions in the westbound movement during the AM peak period. The two lanes are continued at the western side of the intersection in order to properly store vehicles which pass through the signal. This is important because if there were an obstruction further west of the intersection, the vehicles passing through the intersection on a green signal are clear of the intersection while being stopped.

In order to justify the elimination of a lane, it must be shown that vehicle operations can continue to function at an acceptable level. A single lane of traffic can generally process 1800 vehicles per hour, and some estimate with Boston drivers it can be as high as 2100 vehicles per hour. This being said traffic heading westbound during the AM peak hour (the highest measured traffic volume) contained 948 vehicles. This is far below the 1800 vehicles per hour it is able to process (Figure 6.2-D). Lane capacity in urban areas is determined by the amount of green time given during a signalized cycle. However between the intersection of Allstate Road and Massachusetts Avenue there are no signals, clearly showing that lane elimination is a viable design option.

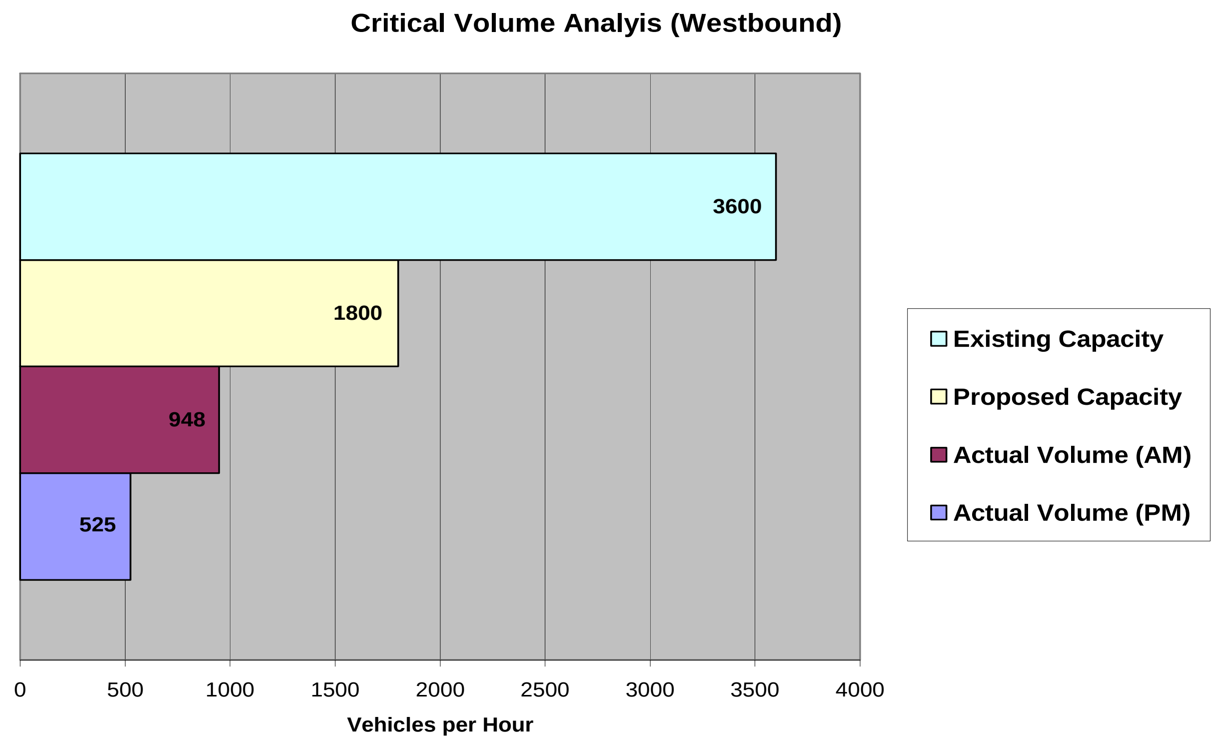



**Figure 6.2-D: Critical Volume Analysis for Westbound traffic along Southampton Street between South Bay Center and Melnea Cass Boulevard**

The westbound travel lane was also chosen to be eliminated because of a loading dock facilities located on the south side of the roadway near New Market Square. Because of the location of the building, there is inadequate space to allow for trucks to pull into the loading dock. This creates a situation where large trucks often block roadway traffic (2 lanes in some cases). The constant blocking of large sections of the roadway eliminated the possibility of locating any bicycle facilities on the south side of the roadway.

Locating the cycle track on the north side of the road provides the safest cycling facilities for this area. This location avoids the continuous conflict with the trucks utilizing the loading docks on the south side of Southampton Street. The separation between cyclists and heavy vehicles is extremely important when designing a safe bicycle facility. The north side cycle track maximizes this separation in this industrial and heavy vehicle saturated area. This cycle track location also eliminated an awkward and potentially dangerous connection at Massachusetts Avenue and Melnea Cass Boulevard. A south side cycle track would have ended/began in a median refuge next to left turning traffic from Southampton Street. This would leave cyclists stranded and unable to easily join traffic, connect to the South Bay Harbor Trail or continue on the sidewalk. The north side track creates an easy transition with the use of existing intersection facilities.

## 6.3 Southampton Street (Allstate Road to Dorchester Avenue)

### *6.3.1 Allstate Road Intersection Improvements*

At this point in the corridor, the proposed two-way cycle track is still located on the north side of Southampton Street, continuing through the Allstate Road intersection. The cycle track is at grade with the pedestrian facilities. This was achieved through narrowing each of the four travel lanes. As mentioned before, lane elimination was not a design option for this intersection, especially in the west bound direction. This is so because of the long queues which build up and interfere with traffic signals east of Allstate Road. Syncrho analysis of the 2014 conditions confirms the impossibility. Therefore, the general configuration of the intersection remained the same and was analyzed with the expected 2014 traffic volumes (Appendix D). A comparison between the existing conditions and proposed show that operations will continue to operate at an acceptable LOS in the future (Table 6.3-A). Modifications to the signal timings were also completed in order to accommodate bicycle and pedestrian crossings, through the implementation of an all pedestrian phase.

**Table 6.3-A: Southampton Street at South Bay Center Capacity Analysis Summary**

| Approach | | 2014 No Build | | | 2014 Build | | |
|---|---|---|---|---|---|---|---|
| | | LOS[1] | Delay[2] | V/C[3] | LOS[1] | Delay[2] | V/C[3] |
| Southampton Westbound | AM | B | 12.6 | 0.85 | B | 11.5 | 0.76 |
| | PM | A | 7.9 | >1.0 | A | 4.8 | 0.49 |
| Southampton Eastbound | AM | B | 14.5 | 0.43 | C | 29.9 | 0.56 |
| | PM | C | 22.7 | >1.0 | C | 25.4 | >1.0 |
| South Bay Center | AM | C | 24.6 | 0.53 | D | 42.9 | 0.77 |
| | PM | C | 24.4 | 0.54 | D | 47.1 | 0.83 |
| Overall Intersection | AM | B | 15.0 | 0.85 | C | 21.7 | 0.77 |
| | PM | B | 17.8 | 0.88 | C | 21.0 | 0.85 |

1. Level-of-Service
2. Average vehicle delay in seconds
3. Volume to Capacity Ratio (max)

The current LOS for this intersection is B for both AM & PM peak hour. Calculating the anticipated traffic flow in 2014, the LOS of the intersection is maintained at B. The reason for the slight increase in overall delay is due to the addition of a pedestrian phase which does not exist currently. This is extremely important to allow safe crossing for a highly desired destination.

### *6.3.2 Roadway Improvements*

Continuing east on Southampton Street, the two-way cycle track remains on the north side of the road through the Allstate Road intersection to the intersection with Dorchester Avenue (Figure 6.3-A). This section of the cycle track is located on an extended sidewalk next to the pedestrian facilities. In this area, unlike when the cycle track is at grade with vehicular traffic, there will be no bollards due to the grade separation provided by the curb. The raised curb, along with the buffer for street furniture will provide an adequate separation.

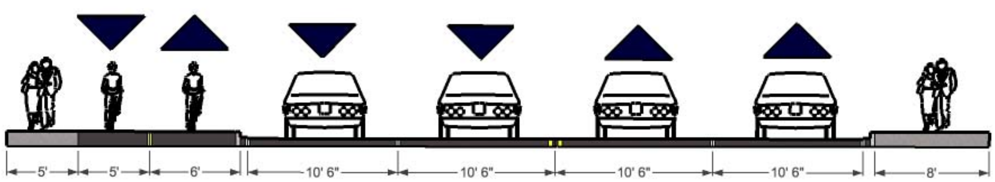



**Figure 6.3-A: Southampton Street Selected Design Cross Section at Railroad Crossing**

As the cycle track approaches the intersection of Frontage Road, it is slightly deflected to the north to properly align for the crossing at the intersection. This allows for maximum visibility between the drivers and the cyclists and pedestrians. The cycle track and pedestrian facilities are brought down to grade to make the crossing. The refuge islands will contain cuts so that the crossing can be made entirely at grade. After the crossing, the path is again raised and proceeds at grade with the sidewalk as it crosses the railroad tracks towards Dorchester Avenue.

At the intersection of Southampton Street and Dorchester Avenue, the bike facility curves towards the north. Pedestrians and bicycles cross at a new crosswalk that is being proposed as part of a separate project for improvements along Dorchester Avenue. This crossing will continue on to the cycle track on Preble Street.

## 6.4 Preble Street

### *6.4.1 Overview of Selected Design*

From the intersection with Dorchester Avenue heading east, the two-way cycle track continues on the north side of Preble Street. For the majority of this section the cycle track is located at grade with the roadway with a buffer zone separating the cycle track from the parked cars. A lane diet, or the narrowing of travel lane widths, will allot a large amount of space to implement the proposed cycling facilities.

### *6.4.2 Roadway Improvements*

The lane diet conducted on this road, created an acceptable amount of space for a new bicycling facility on the north side of Preble Street. This cycle track will be located between the existing pedestrian facilities and the new location of the on street parking (Figure 6.4-A). This location provides an easy connection to the proposed cycle track to the west of Preble Street. This easy connection creates a safe transition for cyclists to the east of Preble Street. On the west end at the proposed roundabout, Section 7.4.3, connections will not be a limiting factor in the placement of the cycle track on Preble Street.

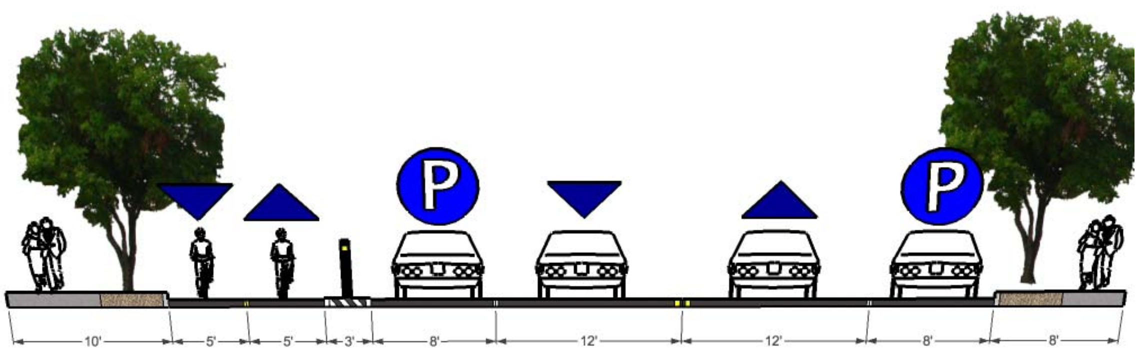



**Figure 6.4-A: Preble Street Selected Design Cross Section Looking East**

East of the Dorchester Avenue intersection the cycle track begins at grade with existing sidewalk. The cycle track is located at this grade in order to accommodate the bus stop. After the cycle track passes a bus stop, the cycle track is then brought down the grade of the existing roadway. The cycle track is continued at this grade towards the east until 100 feet west of Vinton Street. At this point the cycle track will be brought back up to sidewalk grade to accommodate another bus stop.

Despite the lane diet all movements and roadways facilities have been maintained. There is still a single lane of traffic in each direction, reduced from 19 feet to 12 feet. The narrowing of the lanes not only provides adequate space for cyclists but also implements a method of traffic calming. With a narrower travel lane drivers will be forced to travel at a lower speed. This is desirable due to the large number of residential buildings along Preble Street. Parking is maintained throughout Preble Street along both sides of the roadway. Approximately two parking spaces will be eliminated on the southern side and eastern end of the roadway to accommodate the bus stop and additional roundabout lanes.

### *6.4.3 Preble Circle Improvements*

At the eastern end of Preble Street is a rotary of the intersection of Old Colony Avenue and Columbia Road. This rotary is inadequate in terms of safety due to the expansive pavement and "straight shots" conducive to high speeds. In place of this rotary is a proposed modern roundabout (Figure 6.4-B). This will increase the safety of the intersection and will continue exemplary operations.

The inscribed diameter of the proposed roundabout is 130 feet. Beginning from the center of the roundabout is a central island, 30 feet in diameter. Surrounding this central island is 24 feet of mountable apron. This allows heavy vehicles to traverse the roundabouts with ease and safety. This apron will be made of granite rumble block pavement. This will discourage passenger cars and smaller vehicles from using this area. Surrounding the mountable apron are two 12 foot circulating travel lanes. At the outermost limits of the roundabout are the pedestrian and cycling facilities.

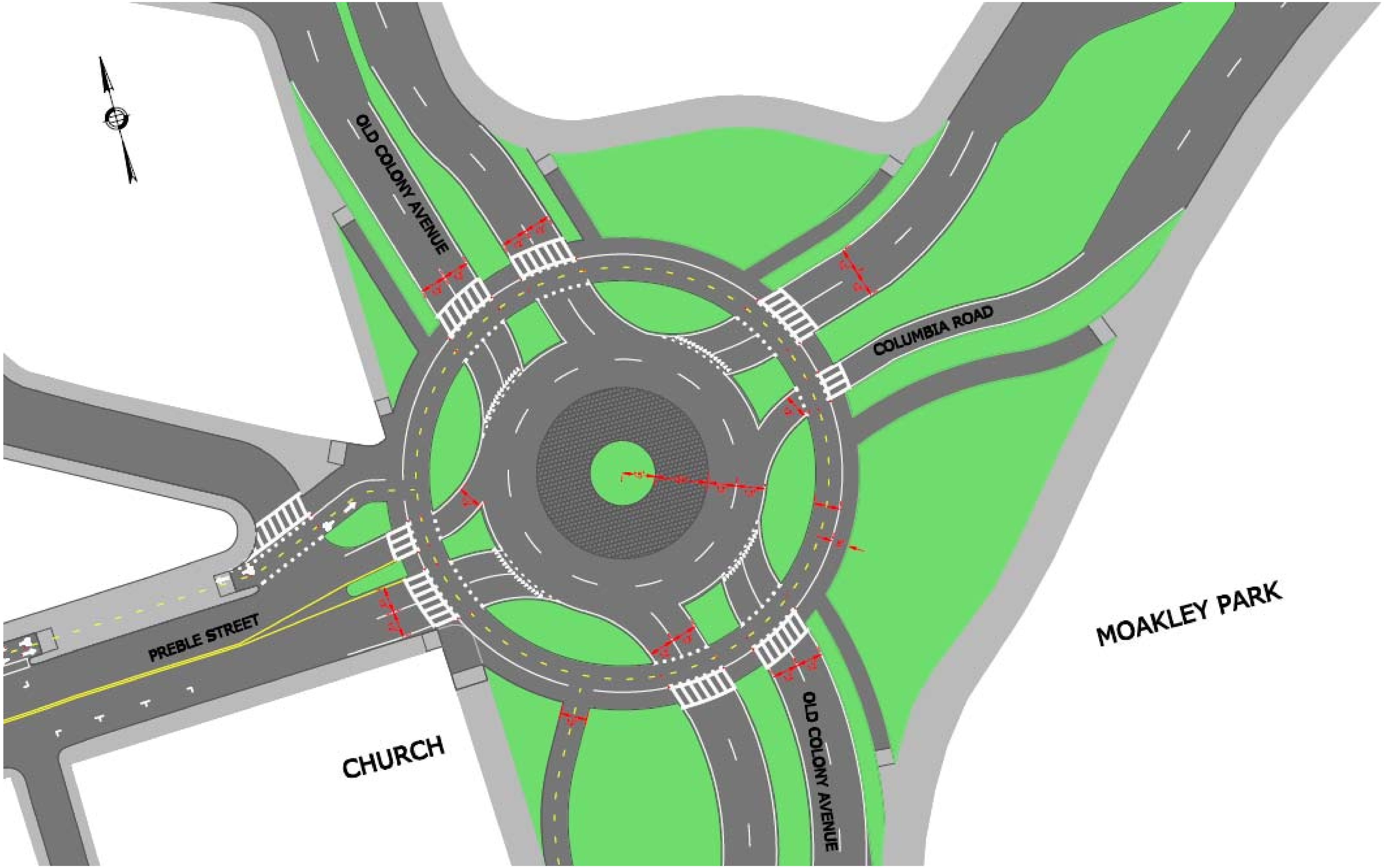



**Figure 6.4-B: Aerial View of Proposed Roundabout Improvements at Preble Circle**

These facilities are located at grade with the roadway to avoid frequent changes in grade and to add to the comfort and continuity of the facility (Figure 6.4-C). The cycle track is two-way and 12 feet wide, and the pedestrian walkway is eight feet wide. Continuing the two-way track will allow for an easy connection to the facility which continues south on Old Colony Avenue. These facilities on the outside of the roundabout also created ideal connections to points north and further east for cyclists and pedestrians. Locating the crossing at the legs of the intersections also allows for easy and short crossings through the use of refuge medians between entrances and exits. Crossings will be marked as described in Section 5.0. Bollards will be placed at each end of the roadways in order to discourage vehicles from encroaching upon the pedestrian and bicycle facilities.

The pedestrian and cycling facilities are offset 25 feet from the circulating lanes. This provides many opportunities to promote pedestrian and bicycle safety. The 25 feet allows entering vehicles to wait to enter the roundabout and not block the crossings. This same area allots exiting vehicles a sufficient amount of space to yield to a pedestrian or bicyclist without blocking the circulating traffic.

Each approach contains two lanes. The exits northbound and southbound on Old Colony Avenue each have two lanes while the exits at Preble Street and Columbia Road have one. A single exit lane is safer because it eliminates an additional conflict between exiting vehicles and circulating vehicles. It also reduces the crossing distance for pedestrians and cyclists. The reason the exits on Old Colony Avenue are not single lanes is due to the necessary capacity. The majority of exits occur on this road, and therefore a single exit lane would work efficiently enough to continue with the implementation of the roundabout. The Preble Street approach begins as a single lane and is flared to two lanes over 160 feet. This increase to two lanes is necessary to maintain an acceptable LOS for this approach. The additional lane allows for more storage and also allows two vehicles to enter in an acceptable gap instead of just one.

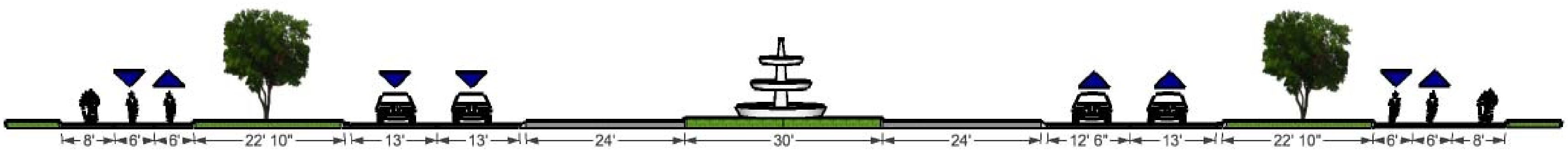



**Figure 6.4-C: Proposed Roundabout Improvements at Preble Street and Old Colony Avenue**

With the implementation of the roundabout, all of the approaches will be realigned. This alignment is necessary to deflect vehicles utilizing the intersection. The realignment will bring each approach to almost a 90 degree angle with the intersection. This deflection is the most important element of the modern roundabout. This is the element which results in the traffic calming effect and decreases the speed of approaching vehicles, circulating vehicles and exiting vehicles. This reduction in speed is very desirable for an area where vehicles, pedestrians, and cyclists will be interacting. Slower speeds will result in more acute awareness of surroundings and adequate time to react to any unordinary situation. Slower speeds will also create gaps within the circulating traffic that will allow for easier merging from approaching vehicles.

After designing all the parameters of the roundabout, analysis was conducted to anticipate the operation of the roundabout. Unfortunately, due to the unique nature of the existing rotary, analysis was unable to be completed for the existing conditions. The analysis of the proposed roundabout was completed with software called Rodel (Appendix F). The program allows the input of the various geometric parameters of the roundabout and outputs an HCM equivalent delay and LOS. This analysis was conducted for both the AM and PM peak hour (Table 6.4-A). During both peaks the roundabout performs exceptionally. The only exception is the northbound movement on Old Colony Avenue during the AM peak. This is due to the extremely high traffic volume, but still operates at an acceptable level of service.

**Table 6.4-A: Intersection of Preble Street and Old Colony Avenue Capacity Analysis Summary**

| Approach | | 2014 Build | | | | |
|---|---|---|---|---|---|---|
| | | LOS[1] | Rodel Delay[2] | Net Delay[3] | Queue[4] | Queue[5] |
| Old Colony Avenue Northbound | AM | C | 0.52 | 33.2 | 17 | 425 |
| | PM | A | 0.05 | 5.0 | 1 | 25 |
| Old Colony Avenue Southbound | AM | A | 0.07 | 6.2 | 1 | 25 |
| | PM | A | 0.05 | 5.0 | 1 | 25 |
| Preble Street | AM | B | 0.15 | 11.0 | 2 | 50 |
| | PM | A | 0.06 | 5.6 | 0 | 0 |
| Columbia Road | AM | A | 0.04 | 4.4 | 0 | 0 |
| | PM | A | 0.05 | 5.0 | 0 | 0 |

1. Level-of-Service
2. Average delay in minutes
3. Average vehicle delay in seconds
4. In vehicles
5. In feet

The final benefit of implementing a roundabout at the location of the rotary is the amount of pavement which can be "reclaimed" for green space. Although the additional green space is only approximately 9,000 square feet, due to the loss of the large center island, it is now far more accessible. The green space in the center of the old rotary was completely inaccessible due to the high speed of circulating traffic. The proposed green space will be related to the perimeter of the roundabout, for the enjoyment of the users and community.

## 6.5 Old Colony Avenue

### *6.5.1 Overview of Selected Design*

Beginning at the proposed roundabout, the cycle track continues south onto Old Colony Avenue. The selected design along Old Colony Avenue involves the continuation of the two-way cycle track on the west side of the roadway. This was achieved, again through a lane diet and also lane elimination. The placement of the cycle track on the west side provides connection benefits at the southern end of Old Colony Avenue. Included in the proposed design of the cycling facilities are roadway improvements to the northbound traffic movements in order to create a comprehensive design for the roadway.

### *6.5.2 Roadway Improvements*

The selected design along Old Colony Avenue involves the continuation of the two-way cycle track on the west side of the roadway. The additional space for the cycle track was achieved through the elimination of a travel lane (Figure 6.5-A). As mentioned previously, a single travel can process about 1800 vehicles per hour. Critical link volumes of 1110 & 1290 vehicles per hour during the peak AM & PM hour clearly show the underutilization of the lanes and justify the elimination of one (Figure 6.5-B) In addition to the elimination of a lane, the travel lanes have been narrowed from 14 feet each to 12. This also acts as a traffic calming measure, ultimately decreasing vehicular speeds. A travel lane on the northbound movement will also be eliminated for the same reason. The extra space can be used at the discretion of the community and other decision makers. There is abundant opportunity to utilize the space in a way that will benefit all users.

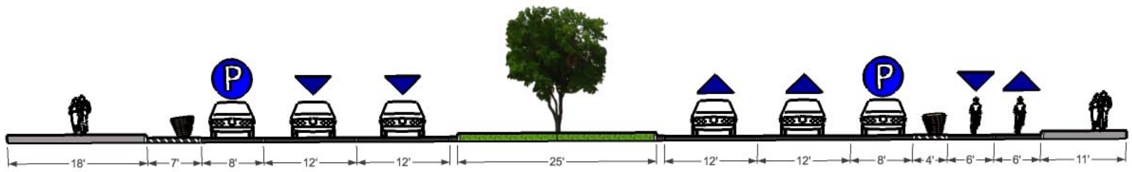



**Figure 6.5-A: Old Colony Avenue Selected Design Cross Section Looking South Wide Section**

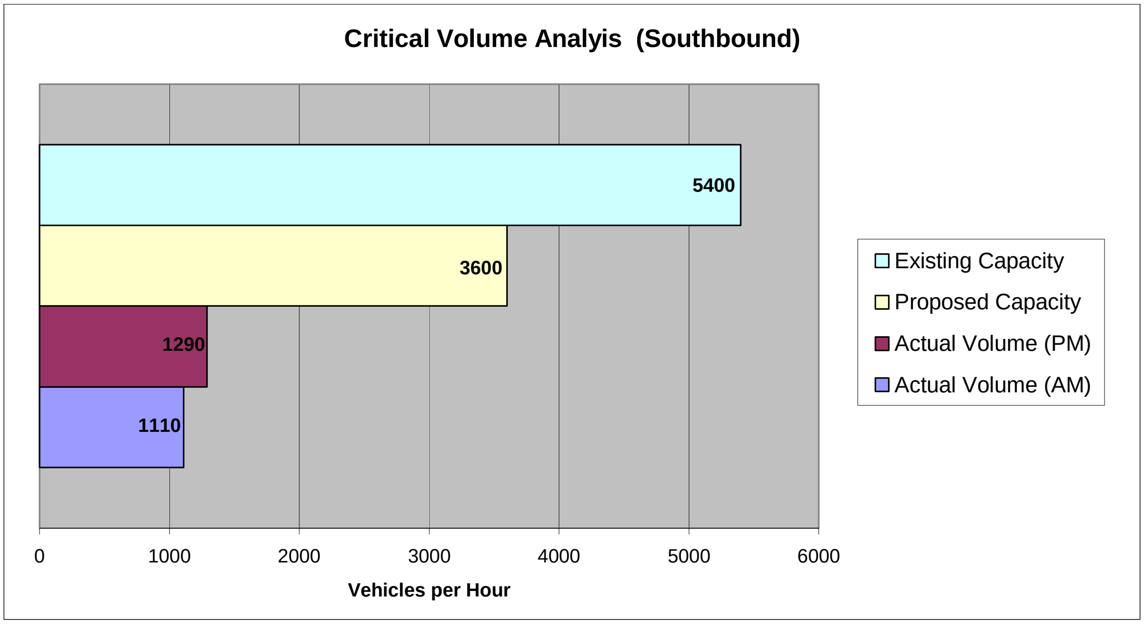



**Figure 6.5-B: Critical Volume Analysis for Old Colony Avenue Proposed Modifications**

The allotted space on the west side will be used for the two-way cycle track and buffer zone. The cycle track will be 12 feet wide and will be at grade with the roadway. Pavement markings and intersection applications are as outlined in Section 5.0. Pedestrians are to utilize the existing 11 foot sidewalk at the western most edge of the right of way. At the locations of the bus stops, the sidewalk will be extended to the edge of the roadway to allow for easy access on and off the bus.

The cycle track will be bounded by the sidewalk on the west side and a buffer zone on the east side. This buffer zone will be implemented in concurrence with Section 5.0. In this section of roadway the delineation between the cycle track and parking will be the use of planters in the buffer. These planters provide vertical separation and also beautify the area, which is important because of the residential nature on this side of the roadway. This buffer also provides ample space for drivers and passengers to enter and exit their vehicles without impeding the cycle track. All on street parking will be maintained on both sides of the roadway.

Continuing south, at the split of Old Colony Avenue and Columbia Road, the bicycle facility continues to the southwest and utilizes an existing road which bypasses the Kosciuszko Circle (Figure 6.5-C). This roadway approaches the MBTA JFK/UMASS subway station. The facility continues to be a 12 foot wide two-way cycle track at grade with the roadway with a large buffer. The location of MBTA station justifies the western location of the cycle track. Eliminating the crossing of the intersection achieves the goal of maintaining a safe bicycle facility, due to the elimination of conflict with vehicles.

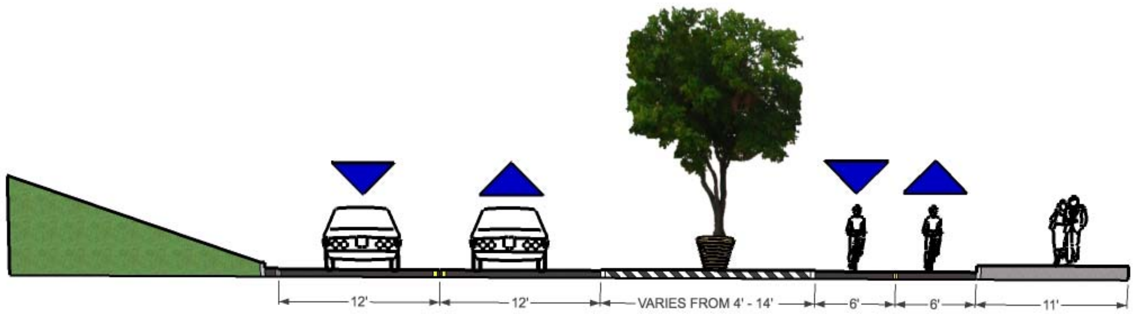



**Figure 6.5-C: Old Colony Avenue Selected Design Cross Section at Roadway Split**

At the MBTA JFK/UMASS station the cycle track is transitioned to be at grade with the sidewalk. This is necessary due to the narrow right of way at this particular location. Despite the narrow cross-section a separate bicycle facility and pedestrian facility will be separately maintained.

## 6.6 Morrissey Boulevard

### *6.6.1 Overview of Selected Design*

At the MBTA JFK/UMASS station the proposed design continues on an extended curb from along Mount Vernon Street and heads towards the south along the entrance to Morrissey Boulevard. The proposed cycle track will be located on the west side of Morrissey Boulevard down to the intersection with UMass Boston. This end point creates opportunity for future connection to the Neponset River Trail.

### *6.6.2 Roadway Improvements (Southbound Side)*

The two-way cycle track continues south on the western edge of Morrissey Boulevard. This location allows for easy connection to the northern section of the corridor on Old Colony Avenue (Figure 6.6-A). It also creates a comfortable setting for pedestrian and cyclists, being located away from heavy, high speed traffic volumes. Although this western location is not ideal for the connection into UMASS Boston, a proposed intersection reconfiguration will safely integrate a crossing for cyclists.

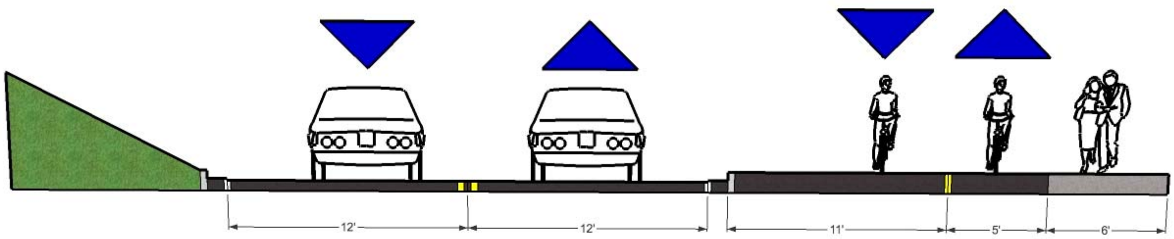



**Figure 6.6-A: Cross-Section at Two-Way Morrissey Boulevard**

For the length of Morrissey Boulevard, the cycle track will be at grade with the sidewalk. Necessary ramps and crossings will be implemented in coordination with Section 4.0, to allow safe and easy crossing of driveways. Locating the cycle track at grade with the sidewalk creates a more comfortable and separated environment for cyclists. This grade separation is particularly desirable in the northern section of Morrissey Boulevard, where there is only room for the minimum buffer between bicycle and vehicular traffic. South of the existing two way portion of the western section of Morrissey Boulevard there is an acceptable amount of space to implement a tree belt between the cycle track and travel lanes. This separation creates a more park-like feel improving the aesthetics of the path.

To obtain this additional space for bicycle and vehicle separation a southbound travel lane was eliminated and the existing travel lanes were narrowed (Figure 6.6-B). In addition to the removal and reduction of the travel lanes, the existing median separating the two southbound movements will be removed. South of the two-way section of Morrissey Boulevard there will be four lanes and undivided southbound traffic. This will allow vehicles from the western two section and vehicles traveling southbound from the rotary at Kosciuszko Circle. This allows ample space for vehicles to align themselves into the appropriate lanes for the movements on the UMass Boston intersection. The maximum section of the proposed southbound side of Morrissey Boulevard, there are four lanes of southbound moving vehicles.

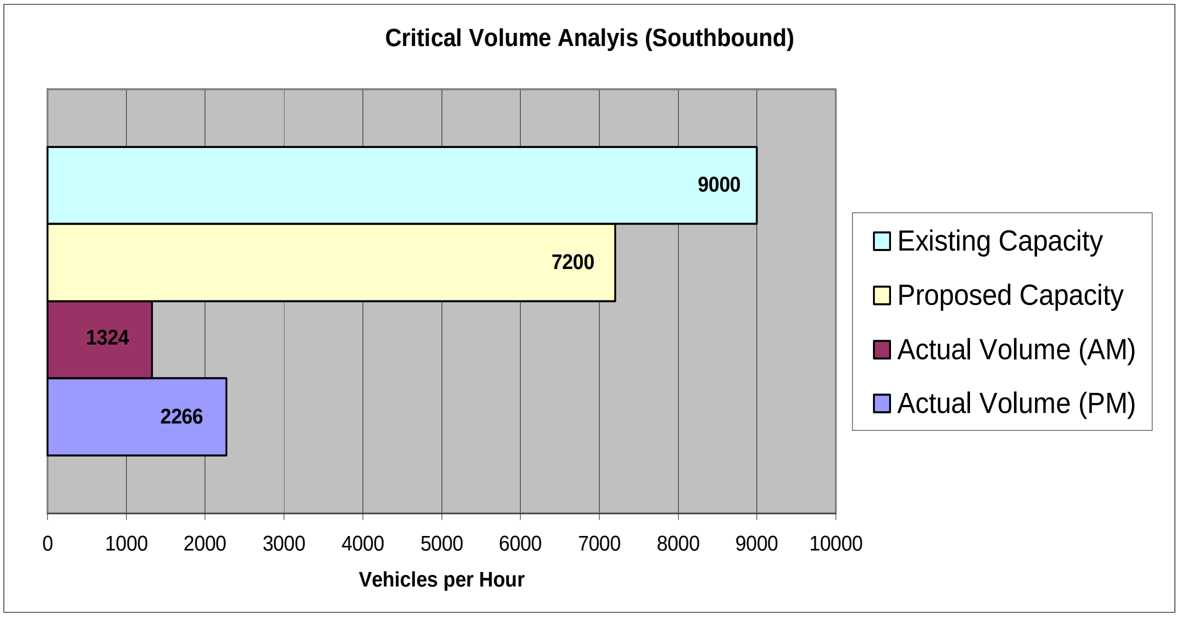



**Figure 6.6-B: Critical Volume Analysis for Morrissey Boulevard Southbound**

Since this section of roadway is governed by traffic signals, Syncrho analysis was conducted to determine the operations of the proposed roadways and intersection. Sections 6.6.3 and 6.6.5, describe the reconfiguration and analysis for the two signalized intersections on Morrissey Boulevard at Shaw's Supermarket and UMass Boston. There is a third signal located on this section of the roadway which is located at the middle driveway of the Boston Globe. The proposed design eliminates this signal. This signal is currently used to allow delivery trucks and vehicles to exit the Boston Globe Driveways. However, this signal is unnecessary due to the fact that only right turns are allowed onto Morrissey Boulevard and southbound traffic, in the AM, is not significant enough to hinder these exiting vehicles.

### *6.6.3 Shaw's Driveway Improvements*

The selected design eliminates a southbound lane in the two-way section on the western side of Morrissey Boulevard (Figure 6.6-C). To justify the elimination of this lane, Synchro analysis was conducted to prove that roadway and intersection operations will continue to operate unhindered (Table 6.6-A & Figure 6.6-D). As is evident by the comparison between the proposed design and the no build conditions of 2014, the operations will be completely unaffected, Levels of Service of A for every movement.

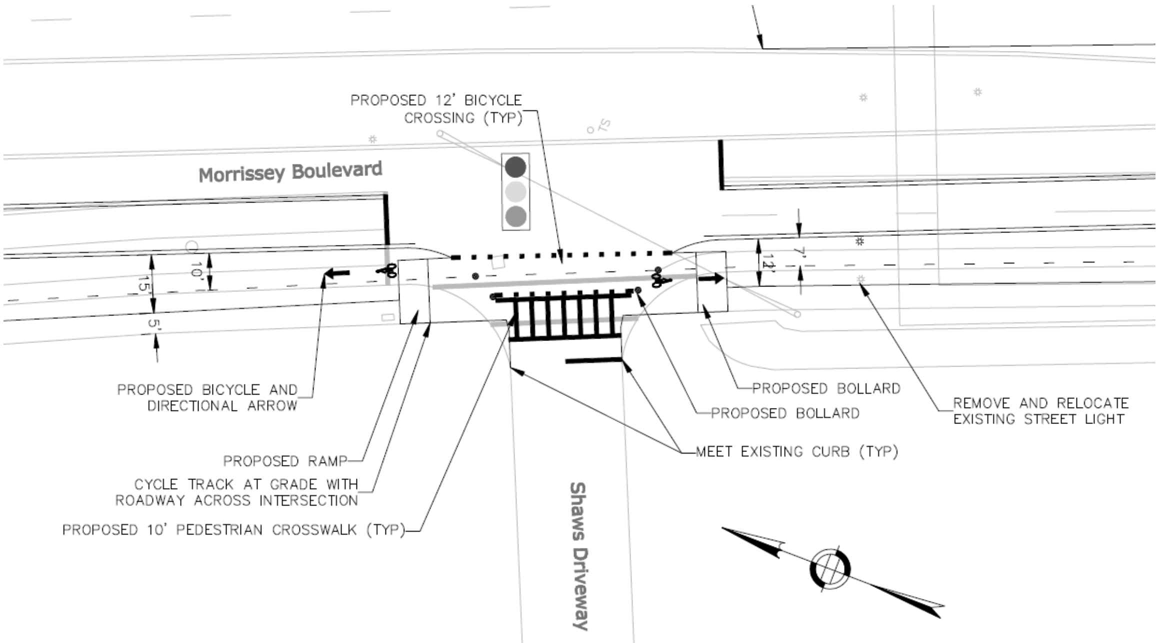



**Figure 6.6-C: Proposed Shaw's/Morrissey Boulevard Intersection Improvements**

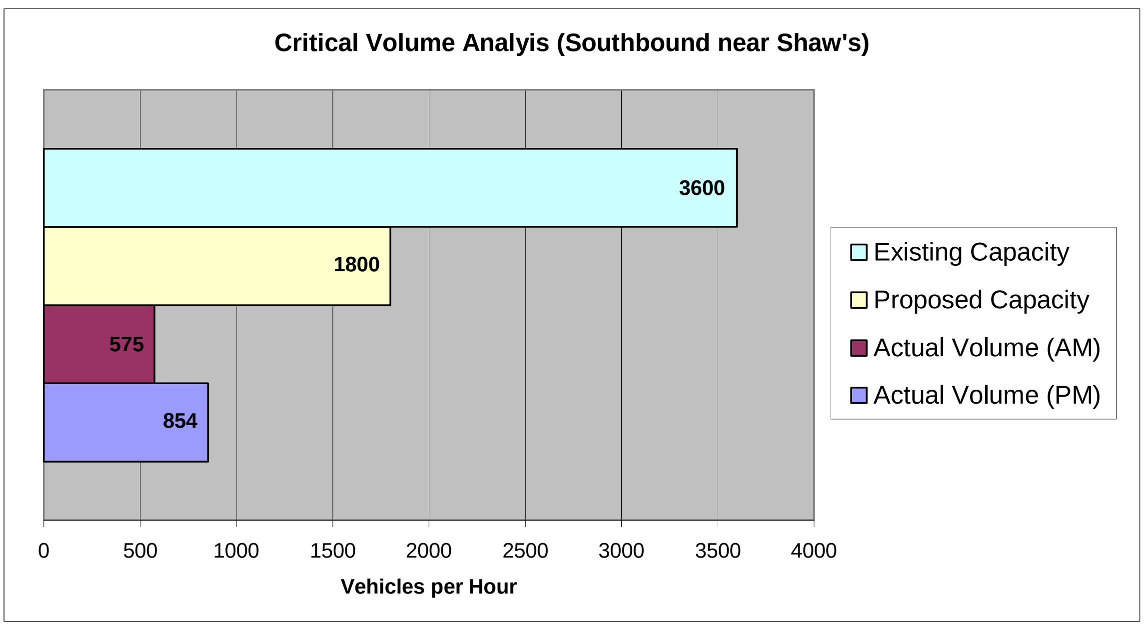



**Figure 6.6-D: Critical Volume Analysis for Western Entrance Ramp to Morrissey Boulevard near Shaw's Supermarkets**

**Table 6.6-A: Synchro Capacity Analysis Summary at Shaw's and Morrissey Boulevard Intersection**

| Approach | | 2014 No Build | | | 2014 Build | | |
|---|---|---|---|---|---|---|---|
| | | LOS[1] | Delay[2] | V/C[3] | LOS[1] | Delay[2] | V/C[3] |
| Morrissey Boulevard SB | AM | A | 0.9 | 0.22 | A | 2.1 | 0.43 |
| | PM | A | 3.4 | 0.36 | A | 9.9 | 0.71 |
| Morrissey Boulevard NB | AM | A | 1.2 | 0.00 | A | 2.0 | 0.00 |
| | PM | A | 2.9 | 0.02 | A | 3.2 | 0.02 |
| Shaw's Driveway EB | AM | C | 27.1 | 0.39 | A | 9.2 | 0.28 |
| | PM | D | 35.6 | 0.71 | B | 13.2 | 0.58 |
| Overall Intersection | AM | A | 2.5 | 0.39 | A | 2.5 | 0.43 |
| | PM | A | 8.0 | 0.71 | B | 10.2 | 0.71 |

1. Level-of-Service
2. Average vehicle delay in seconds
3. Volume to Capacity Ratio
(max)

### *6.6.4 Roadway Improvements (Northbound Side)*

Along the northbound side of Morrissey Boulevard, the selected design incorporates a single bike lane in the carriage road (Figure 6.6-E). This modification takes the two lane access road on the eastern side of Morrissey Boulevard and creates a single vehicular travel a lane and a generous bike lane. The intent of this bike lane is to allow for a more direct path for cyclists that intend to travel to points east of Moakley Park or to destinations in South Boston. The bike lane starts along the access road at UMASS Boston and continues north to the intersection of Morrissey Boulevard and Mount Vernon Street. At this point cyclists are expected to either join vehicular traffic or cross with pedestrians and utilize existing crosswalks/sidewalks for the remainder of their journey.

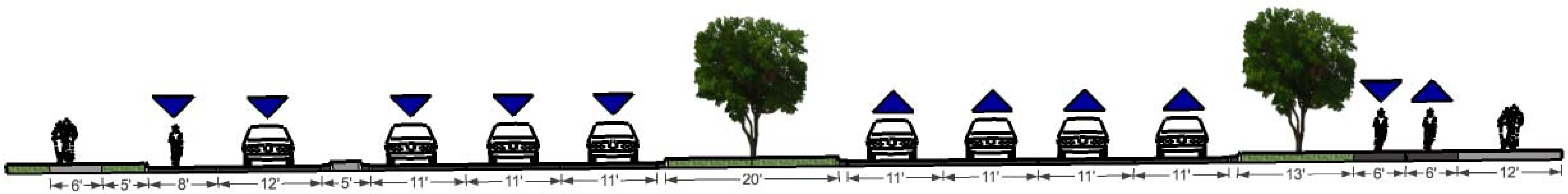



**Figure 6.6-E: Morrissey Boulevard Cross- Section**

### *6.6.5 UMASS Boston Intersection Improvements*

The selected design incorporates significant changes at the Morrissey Boulevard and UMASS Boston intersection (Figure 6.6-F). The current configuration locates left turning vehicles to the right of through traffic movement, separated by a small median. The selected design eliminates the intermediate median along the south side of the roadway to create a more traditional intersection with the through traffic to the right of the left turning vehicles. This reconfiguration eliminates one through lane, which was used to incorporate the cycle track and green areas.

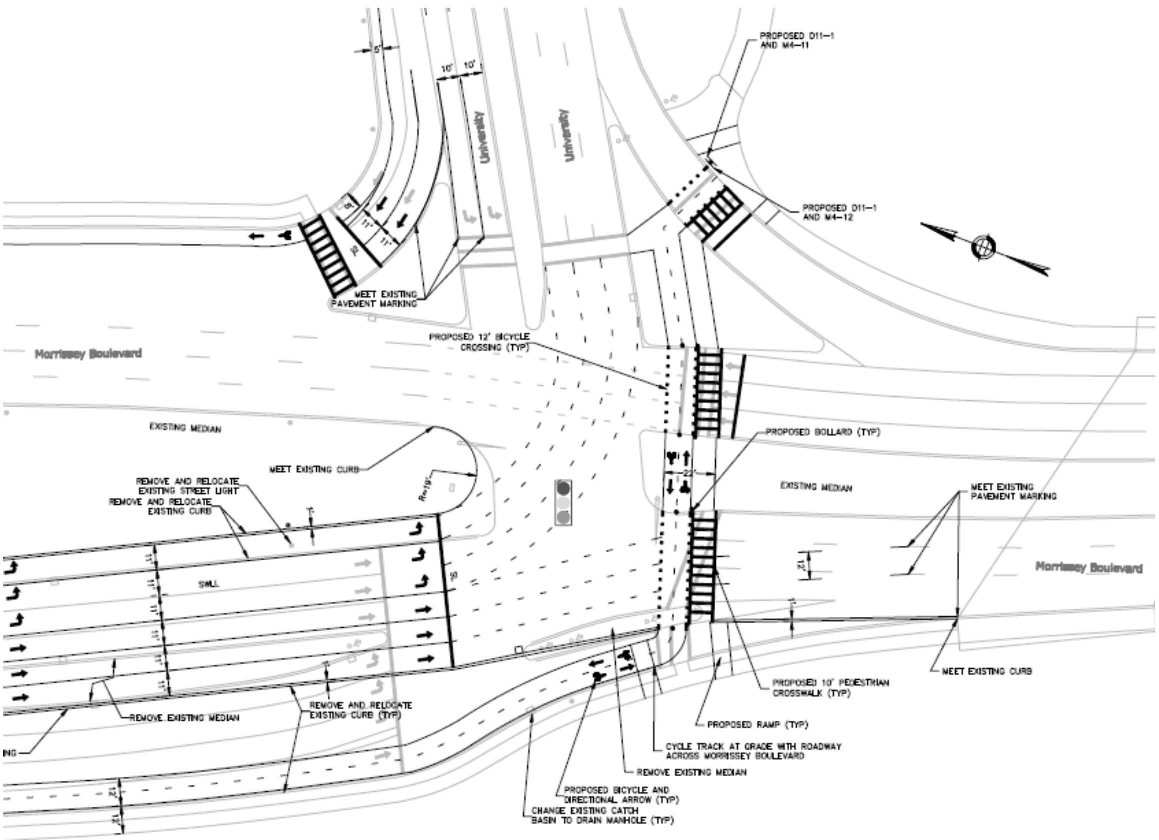



**Figure 6.6-F: Proposed UMass Boston Intersection Improvements**

The lane assignments for the southbound traffic include the preservation of three left turning lanes and three through lanes, all 11 feet wide. The selected design cuts into the existing median for one of the storage lanes for left turning vehicles. Additional lane assignment markings have also been included for southbound vehicles to better coordinate lane assignments as they properly align themselves north of the intersection.

The other approaches of this intersection remain fairly untouched. On the southern side of the intersection, the medians are the only items being altered. The crossings will be maintained at grade through the medians for both pedestrians and bicyclists. The crossing has also been streamlined to entice all users to utilize the selected the design.

To ensure that this selected design will not negatively affect the operations of the intersection, a Synchro analysis was conducted and summarized (Table 6.6-B). The selected design shows the improved LOS for both the AM and PM peak hour for the year 2014. As congestion in this area becomes more of a problem it is important to maintain operations, especially at intersections such as this.

**Table 6.6-B: Synchro Analysis Capacity Summary**

| Approach | | 2014 No Build | | | 2014 Build | | |
|---|---|---|---|---|---|---|---|
| | | LOS[1] | Delay[2] | V/C[3] | LOS[1] | Delay[2] | V/C[3] |
| Morrissey Boulevard SB | AM | D | 47.5 | >1.0 | C | 32.6 | 0.98 |
| | PM | F | 150.6 | >1.0 | C | 25.6 | 0.79 |
| Morrissey Boulevard NB | AM | F | 83.1 | >1.0 | C | 33.1 | >1.0 |
| | PM | B | 18.3 | 0.33 | B | 16.3 | .62 |
| University of Massachusetts WB | AM | D | 44.5 | 0.13 | D | 43.7 | .80 |
| | PM | C | 21.2 | 0.28 | B | 15.6 | .71 |
| Overall Intersection | AM | E | 75.0 | >1.0 | C | 33.6 | >1.0 |
| | PM | F | 98.8 | >1.0 | C | 21.4 | 0.79 |

1. Level-of-Service
2. Average vehicle delay in seconds
3. Volume to Capacity Ratio (max)

# 7.0 Cost Estimate

The cost estimate detailed in Table 6.6-A is based off of plans generated by Livable Engineering And Design. A detailed breakdown of the cost estimate is included in Appendix H. Item numbers and descriptions were compiled from the 1988 Standard Specification for Highways and Bridges and unit prices were taken from the weighted bid averages located in the Massachusetts Highway Department website. 10% of the estimated cost is added to the calculated total to account for associated engineering costs.

**Table 6.6-A: Selected Design Cost Estimate Break Down**

| Item # | Description | Units | Quantity | Unit Price | Total Price |
|---|---|---|---|---|---|
| 103 | TREE REMOVED - DIAMETER UNDER 24 INCHES | EA | 14 | $900.00 | $12,600.00 |
| 106.12 | BRIDGE CURB REMOVED AND RESET | FT | 250 | $18.00 | $4,500.00 |
| 120 | EARTH EXCAVATION | CY | 2470 | $28.00 | $69,170.37 |
| 125 | TOPSOIL EXCAVATED AND STACKED | CY | 471 | $20.00 | $9,420.00 |
| 127 | CONCRETE EXCAVATION | CY | 1019 | $275.00 | $280,352.31 |
| 129 | ASPHALT PAVEMENT EXCAVATION BY COLD PLANER | SY | 106926 | $5.00 | $534,627.78 |
| 129.6 | BRIDGE PAVEMENT EXCAVATION | SY | 1390 | $10.00 | $13,900.00 |
| 141 | CLASS A TRENCH EXCAVATION | CY | 150 | $35.00 | $5,250.00 |
| 151 | GRAVEL BORROW | CY | 2946 | $34.81 | $102,547.68 |
| 170 | FINE GRADING AND COMPACTING | SY | 3177 | $4.00 | $12,706.15 |
| 180.1 | HEALTH AND SAFETY PLAN | LS | 1 | $5,000.00 | $5,000.00 |
| 180.2 | IMPLEMENTATION OF HEALTH AND SAFETY PLAN | HR | 80 | $82.00 | $6,560.00 |
| 180.3 | PERSONNEL PROTECTION LEVEL C UPGRADE | HR | 40 | $25.00 | $1,000.00 |
| 202 | MANHOLE | EA | 15 | $3,000.00 | $45,000.00 |
| 220 | MANHOLE ADJUSTED | EA | 8 | $278.00 | $2,224.00 |
| 220.3 | DRAINAGE STRUCTURE CHANGE IN TYPE | EA | 15 | $750.00 | $11,250.00 |
| 221 | FRAME AND COVER | EA | 15 | $560.00 | $8,400.00 |
| 222 | FRAME AND GRATE | EA | 15 | $600.00 | $9,000.00 |
| 223 | FRAME AND GRATE (OR COVER) REMOVED AND RESET | EA | 15 | $300.00 | $4,500.00 |
| 376.2 | HYDRANT - REMOVED AND RESET | EA | 2 | $2,000.00 | $4,000.00 |
| 402 | DENSE GRADED CRUSHED STONE FOR SUB-BASE | CY | 1588 | $54.00 | $85,766.52 |
| 460 | HOT MIX ASPHALT | TON | 8982 | $96.00 | $862,247.68 |
| 460.1 | HOT MIX ASPHALT DENSE BINDER | TON | 3202 | $80.00 | $256,156.01 |
| 464 | BITUMEN FOR TACK COAT | GAL | 5346 | $5.00 | $26,731.39 |
| 482.3 | SAWING ASPHALT PAVEMENT | FT | 2265 | $2.50 | $5,662.50 |
| 485 | GRANITE RUMBLE BLOCK PAVEMENT | SY | 452 | $195.00 | $88,140.00 |
| 504 | GRANITE CURB TYPE VA4 | FT | 4400 | $32.00 | $140,800.00 |
| 510 | GRANITE EDGING TYPE SA | FT | 245 | $35.00 | $8,575.00 |
| 580.1 | CURB REMOVED, RELOCATED AND RESET | FT | 5240 | $34.00 | $178,160.00 |
| 701 | CEMENT CONCRETE SIDEWALK | SY | 13257 | $55.00 | $729,116.67 |
| 701.2 | CEMENT CONCRETE WHEELCHAIR RAMP | SY | 1817 | $80.00 | $145,395.56 |
| 707.8 | STEEL BOLLARD | EA | 300 | $935.00 | $280,500.00 |
| 707.9 | REMOVABLE PLANTERS | EA | 200 | $1,000.00 | $200,000.00 |
| 740 | ENGINEERS FIELD OFFICE AND EQUIPMENT (TYPE A) | MO | 24 | $2,500.00 | $60,000.00 |
| 748 | MOBILIZATION | LS | 1 | $80,000.00 | $80,000.00 |
| 751 | LOAM BORROW | CY | 4200 | $40.00 | $167,994.44 |
| 765 | SEEDING | SY | 6720 | $2.00 | $13,439.56 |
| 831.1 | ROADSIDE GUIDE SIGN (FR) 25 SF & UNDER-ALUM.PANEL(TYPE A) | SF | 254 | $25.00 | $6,350.00 |
| 864.04 | PAVEMENT ARROWS AND LEGENDS REFL. WHITE (THERMOPLASTIC) | SF | 700 | $4.00 | $2,800.00 |
| 866.04 | 4 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) | FT | 50447 | $0.75 | $37,835.59 |
| 866.12 | 12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) | FT | 50447 | $1.50 | $75,671.18 |
| 867.04 | 4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) | FT | 28905 | $0.75 | $21,678.75 |
| 874 | STREET NAME SIGN WITH POST | EA | 92 | $150.00 | $13,800.00 |
| 901.3 | 4000 PSI, 1.5 IN., 565 CEMENT CONCRETE FOR POST FOUNDATION | CY | 46 | $288.50 | $13,271.00 |
| 999.001 | TRAFFIC POLICE AND FLAGMEN | AL | 1 | $600,000.00 | $600,000.00 |
| | | | | **Total** | **$5,242,100.13** |
| | | | | **Total w/ 10%** | **$5,766,310.14** |

# 8.0 Acknowledgments

The compilation of this report would not have been possible without the continued support of professors Peter Furth & Dan Dulaski. We would like to thank the City of Boston for providing the CAD files that were the basis of our design and the Massachusetts Highway Department for providing essential data for this project. A few others we would like to thank for their input throughout include: Nicole Freedman, Boston’s Bicycle Planner, and the various other participants that contributed during our client presentations.

### 8.1 References

"Standard Specifications for Highways and Bridges - 1988 English Edition". Massachusetts Highway Department. 3/15/09 <http://www.mhd.state.ma.us/default.asp?pgid=content/88specs&sid=about>

"Weighted Bid Prices". Massachusetts Highway Department. 3/15/09 <http://www.mhd.state.ma.us/PE/WeightedAverageCriteria.aspx>

"Top 200 High Crash Intersection locations 2004-2006". Massachusetts Highway Department. 3/15/09.<http://www.mhd.state.ma.us/default.asp?pgid=content/traffic/crashLocations&sid=about>

# Appendix A – Crash Data

MassHighway

# INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Boston, Massachusetts

COUNT DATE :

DISTRICT : 4

UNSIGNALIZED :

SIGNALIZED : X

## ~ INTERSECTION DATA ~

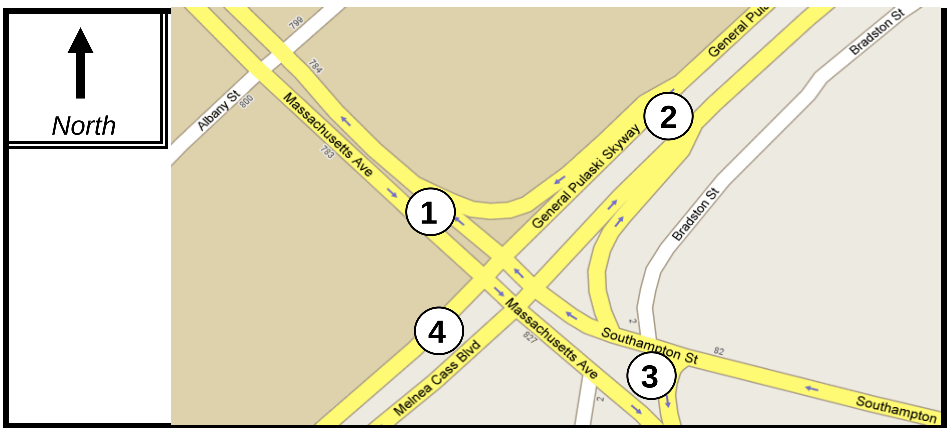
MAJOR STREET : Massachusetts Aveune

MINOR STREET(S) : Melnea Cass Boulevard

Southampton Street

General Pulaski Skyway

**INTERSECTION DIAGRAM (Label Approaches)**




**PEAK HOUR VOLUMES**

| APPROACH : | 1 | 2 | 3 | 4 | 5 | Total Peak Hourly Approach Volume |
|---|---|---|---|---|---|---|
| DIRECTION : | SB | WB | NB | EB | | |
| PEAK HOURLY VOLUMES (AM/PM) : | 780 | 1,953 | 1,675 | 1,280 | | **5,688** |

" K " FACTOR : **0.100**

INTERSECTION ADT ( **V** ) = TOTAL DAILY APPROACH VOLUME : **56,880**

TOTAL # OF CRASHES : 89

# OF YEARS : 3

AVERAGE # OF CRASHES PER YEAR ( **A** ) : **29.67**

**CRASH RATE CALCULATION :** **1.43**

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

Project Title & Date: Old Colony Bikeway

# MassHighway

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Boston, Massachusetts  COUNT DATE : Feb-09

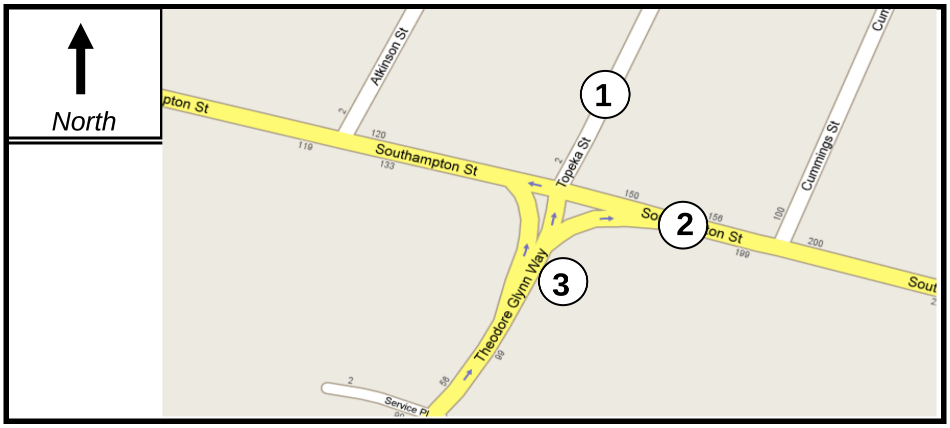
DISTRICT : 4  UNSIGNALIZED : X  SIGNALIZED :

### ~ INTERSECTION DATA ~

MAJOR STREET : Southampton Street

MINOR STREET(S) : Theodore Glynn Way

**INTERSECTION DIAGRAM**




**PEAK HOUR VOLUMES**

| APPROACH : | 1 | 2 | 3 | 4 | 5 | Total Peak Hourly Approach Volume |
|---|---|---|---|---|---|---|
| DIRECTION : | SB | WB | NB | | | |
| PEAK HOURLY VOLUMES (AM) : | 77 | 778 | 1,334 | | | 2,189 |

" K " FACTOR : **0.100**  INTERSECTION ADT ( **V** ) = TOTAL DAILY APPROACH VOLUME : **21,890**

TOTAL # OF CRASHES : 11  # OF YEARS : 3  AVERAGE # OF CRASHES PER YEAR ( **A** ) : **3.67**

**CRASH RATE CALCULATION :** **0.46**  RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Project Title & Date: Old Colony Bikeway

# MassHighway

# INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Boston, Massachusetts    COUNT DATE : ______

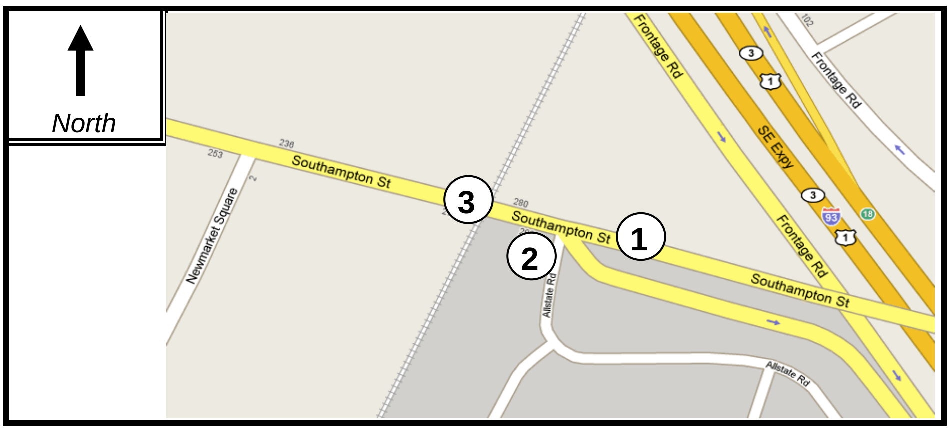
DISTRICT : 4    UNSIGNALIZED : [ ]    SIGNALIZED : [ X ]

## ~ INTERSECTION DATA ~

MAJOR STREET : Southampton Street

MINOR STREET(S) : Allstate Rd

**INTERSECTION DIAGRAM**




**PEAK HOUR VOLUMES**

| APPROACH : | 1 | 2 | 3 | 4 | 5 | Total Peak Hourly Approach Volume |
|---|---|---|---|---|---|---|
| DIRECTION : | WB | NB | EB | | | |
| PEAK HOURLY VOLUMES (AM) : | 300 | 98 | 157 | | | 555 |

" K " FACTOR : **0.100**    INTERSECTION ADT ( **V** ) = TOTAL DAILY APPROACH VOLUME : **5,550**

TOTAL # OF CRASHES : 1    # OF YEARS : 3    AVERAGE # OF CRASHES PER YEAR ( **A** ) : **0.33**

**CRASH RATE CALCULATION :** **0.16**    RATE = $\frac{(A * 1,000,000)}{(V * 365)}$

Project Title & Date: Old Colony Bikeway

**MassHighway**

# INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Boston, Massachusetts  COUNT DATE : 2006

DISTRICT : 4  UNSIGNALIZED : [ ]  SIGNALIZED : X

**~ INTERSECTION DATA ~**

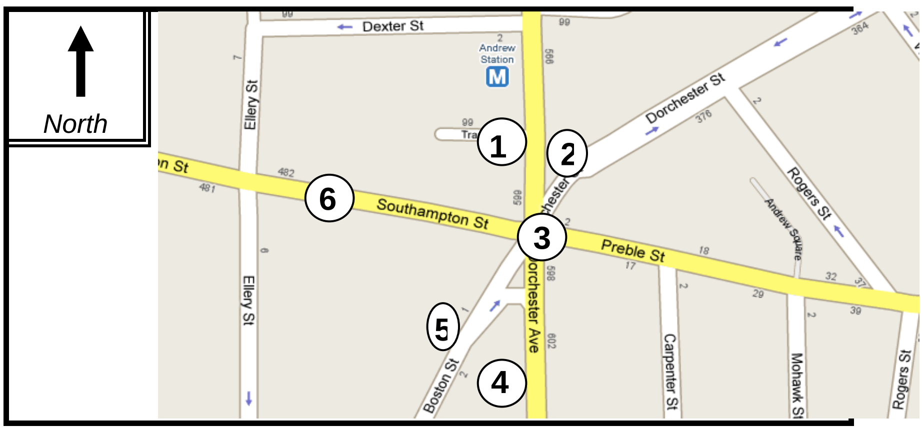
MAJOR STREET : Southampton Street

MINOR STREET(S) : Dorchester Avenue

Dorchester Street

Boston Street

**INTERSECTION DIAGRAM**




**PEAK HOUR VOLUMES**

| APPROACH : | 1 | 2 | 3 | 4 | 5 | 6 | Total Peak Hourly Approach |
|---|---|---|---|---|---|---|---|
| DIRECTION : | SB | SWB | WB | NB | NEB | EB | |
| PEAK HOURLY VOLUMES (AM/PM) : | 236 | 443 | 441 | 384 | 522 | 310 | **2,336** |

| | | | |
|---|---|---|---|
| " K " FACTOR : | **0.100** | INTERSECTION ADT ( **V** ) = TOTAL DAILY APPROACH VOLUME : | **23,360** |
| TOTAL # OF CRASHES : | 23 | # OF YEARS : 3 | AVERAGE # OF CRASHES PER YEAR ( **A** ) : **7.67** |

**CRASH RATE CALCULATION :** **0.90**  RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Project Title & Date: Old Colony Bikeway

# MassHighway

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Boston, Massachusetts        COUNT DATE : Feb-09

DISTRICT : 4        UNSIGNALIZED : X        SIGNALIZED :

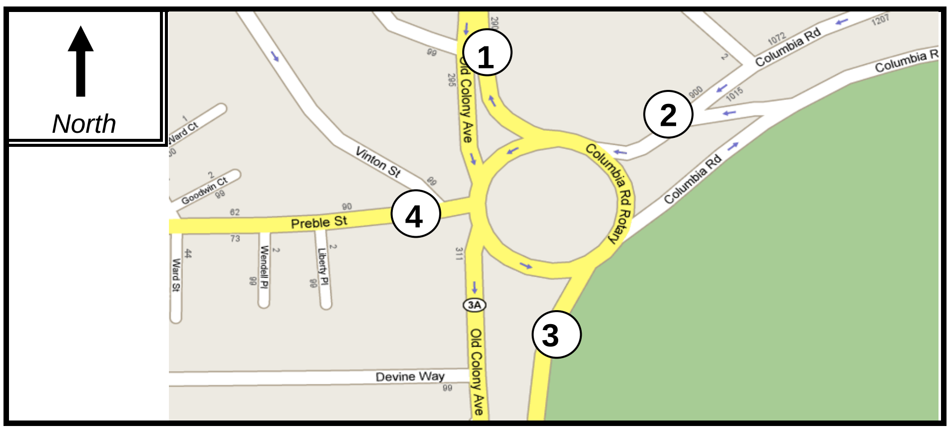
**~ INTERSECTION DATA ~**

MAJOR STREET : Old Colony Avenue

MINOR STREET(S) : Preble Street

Columbia Road

**INTERSECTION DIAGRAM**




**PEAK HOUR VOLUMES**

| APPROACH : | 1 | 2 | 3 | 4 | 5 | Total Peak Hourly Approach Volume |
|---|---|---|---|---|---|---|
| DIRECTION : | SB | WB | NB | EB | | |
| PEAK HOURLY VOLUMES (AM/PM) : | 915 | 126 | 1,980 | 180 | | 3,201 |

" K " FACTOR : **0.100**        INTERSECTION ADT ( **V** ) = TOTAL DAILY APPROACH VOLUME : **32,010**

TOTAL # OF CRASHES : 23        # OF YEARS : 3        AVERAGE # OF CRASHES PER YEAR ( **A** ) : **7.67**

**CRASH RATE CALCULATION :** **0.66**        RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Project Title & Date: Old Colony Bikeway

**MassHighway**

# INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Boston, Massachusetts  COUNT DATE : Feb-09

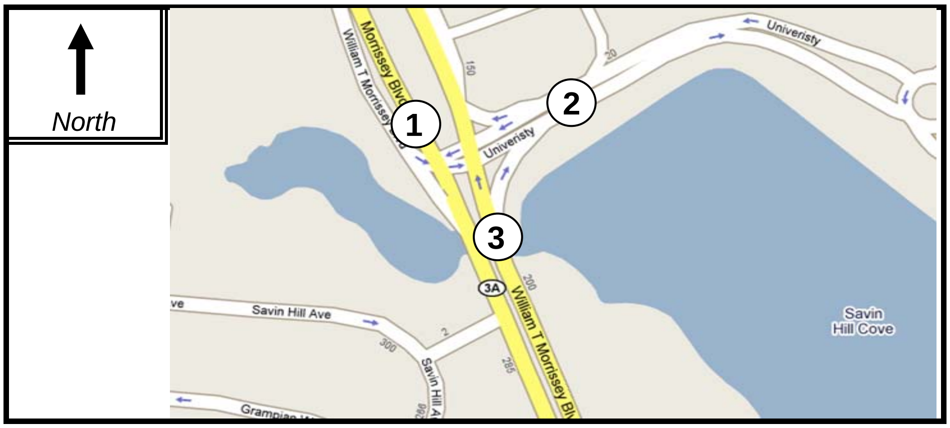
DISTRICT : 4  UNSIGNALIZED : ☐  SIGNALIZED : X

## ~ INTERSECTION DATA ~

MAJOR STREET : Morrissey Boulevard

MINOR STREET(S) : University of Massachusetts Boston

**INTERSECTION DIAGRAM**




**PEAK HOUR VOLUMES**

| APPROACH : | 1 | 2 | 3 | 4 | 5 | Total Peak Hourly Approach Volume |
|---|---|---|---|---|---|---|
| DIRECTION : | SB | WB | NB | | | |
| PEAK HOURLY VOLUMES (AM) : | 1,324 | 236 | 3,452 | | | **5,012** |

" K " FACTOR : **0.100**

INTERSECTION ADT ( **V** ) = TOTAL DAILY APPROACH VOLUME : **50,120**

TOTAL # OF CRASHES : 22

# OF YEARS : 3

AVERAGE # OF CRASHES PER YEAR ( **A** ) : **7.33**

**CRASH RATE CALCULATION :** **0.40**

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

Project Title & Date: Old Colony Bikeway

# Appendix B – Turning Movement Counts

AM Peak Hour

## Melnea Cass Boulevard and Massachusetts Avenue Traffic Volumes
**March 17, 2008**

**Mass Ave**

| Phases | 7:00 | 7:15 | 7:30 | 7:45 | 8:00 | 8:15 | 8:30 | 8:45 | Totals | PH Totals | App Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EBR | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| EBT | 91 | 97 | 83 | 115 | 97 | 92 | 97 | 95 | 381 | 401 | |
| EBL | 60 | 94 | 59 | 115 | 92 | 89 | 83 | 74 | 338 | 379 | 780 |
| WBR | 85 | 68 | 122 | 90 | 96 | 89 | 98 | 83 | 366 | 373 | |
| WBT | 157 | 198 | 188 | 196 | 194 | 214 | 207 | 198 | 813 | 811 | |
| WBL | 88 | 109 | 83 | 110 | 116 | 101 | 94 | 89 | 400 | 421 | 1605 |
| SBR | 101 | 163 | 150 | 130 | 143 | 136 | 121 | 123 | 523 | 530 | |
| SBT | 270 | 240 | 251 | 227 | 249 | 256 | 247 | 233 | 985 | 979 | |
| SBL | 91 | 95 | 103 | 115 | 108 | 98 | 123 | 102 | 431 | 444 | 1953 |
| NBR | 94 | 92 | 81 | 118 | 97 | 108 | 91 | 86 | 382 | 414 | |
| NBT | 207 | 228 | 237 | 218 | 226 | 215 | 207 | 211 | 859 | 866 | |
| NBL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1280 |
| | | | | **3211** | **3271** | **3266** | **3233** | **3180** | **3180** | | |
| | | | | 1434 | 1418 | 1398 | 1368 | 1294 | | | |

# Old Colony Bikeway

Northeastern University

CIVU768: Transportation Capstone

South Bay Center AM
Southampton @ Allstate Road
Boston, MA

File Name : SouthbayAM
Site Code : 00003241
Start Date : 3/24/2009
Page No : 1

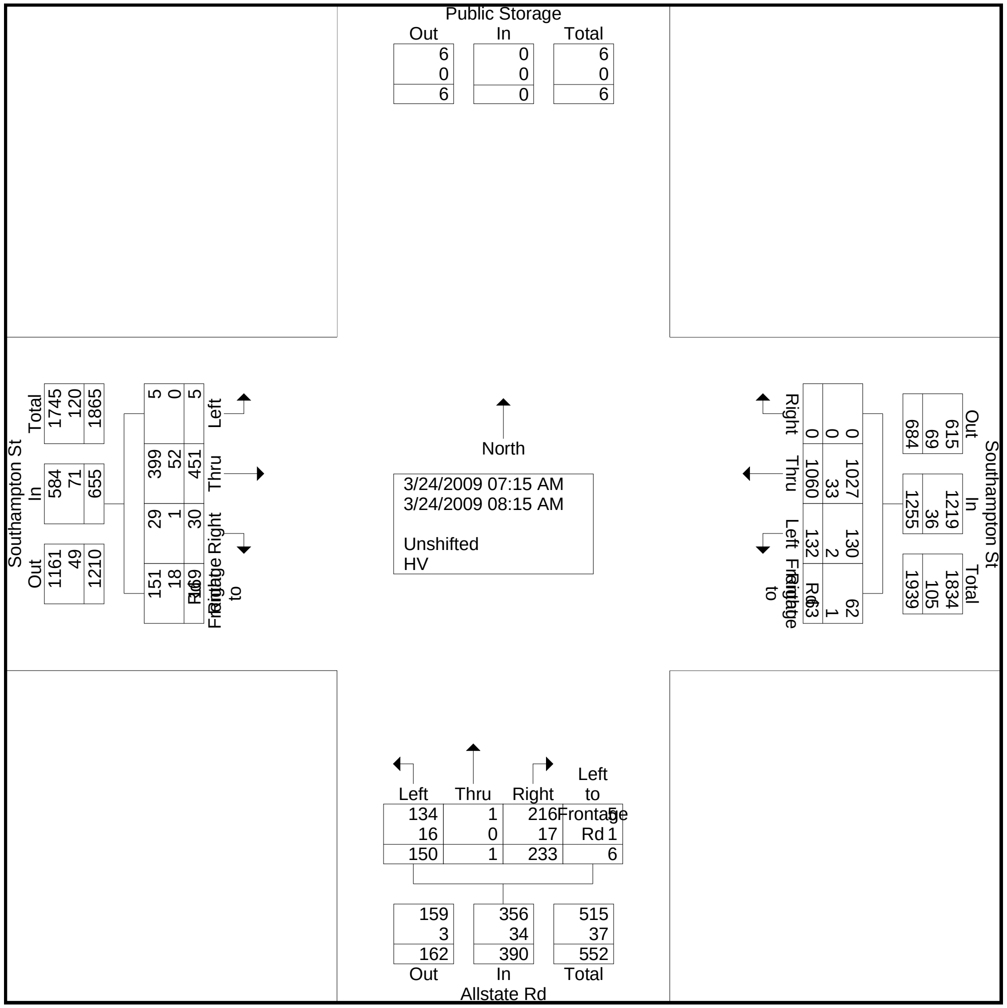
Groups Printed- Unshifted - HV

| | From North | Southampton St From East | | | | | Allstate Rd From South | | | | | Southampton St From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Right | Thru | Left | Left to Frontage Rd | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Int. Total |
| 07:15 AM | 0 | 0 | 206 | 24 | 14 | 244 | 33 | 1 | 22 | 2 | 58 | 5 | 90 | 4 | 26 | 125 | 427 |
| 07:30 AM | 0 | 0 | 210 | 20 | 8 | 238 | 41 | 0 | 30 | 1 | 72 | 7 | 98 | 0 | 28 | 133 | 443 |
| 07:45 AM | 0 | 0 | 244 | 36 | 20 | 300 | 60 | 0 | 38 | 0 | 98 | 6 | 94 | 0 | 30 | 130 | 528 |
| Total | 0 | 0 | 660 | 80 | 42 | 782 | 134 | 1 | 90 | 3 | 228 | 18 | 282 | 4 | 84 | 388 | 1398 |
| 08:00 AM | 0 | 0 | 207 | 26 | 9 | 242 | 44 | 0 | 26 | 2 | 72 | 5 | 98 | 1 | 53 | 157 | 471 |
| 08:15 AM | 0 | 0 | 193 | 26 | 12 | 231 | 55 | 0 | 34 | 1 | 90 | 7 | 71 | 0 | 32 | 110 | 431 |
| Grand Total | 0 | 0 | 1060 | 132 | 63 | 1255 | 233 | 1 | 150 | 6 | 390 | 30 | 451 | 5 | 169 | 655 | 2300 |
| Apprch % | | 0 | 84.5 | 10.5 | 5 | | 59.7 | 0.3 | 38.5 | 1.5 | | 4.6 | 68.9 | 0.8 | 25.8 | | |
| Total % | 0 | 0 | 46.1 | 5.7 | 2.7 | 54.6 | 10.1 | 0 | 6.5 | 0.3 | 17 | 1.3 | 19.6 | 0.2 | 7.3 | 28.5 | |
| Unshifted | 0 | 0 | 1027 | 130 | 62 | 1219 | 216 | 1 | 134 | 5 | 356 | 29 | 399 | 5 | 151 | 584 | 2159 |
| % Unshifted | 0 | 0 | 96.9 | 98.5 | 98.4 | 97.1 | 92.7 | 100 | 89.3 | 83.3 | 91.3 | 96.7 | 88.5 | 100 | 89.3 | 89.2 | 93.9 |
| HV | 0 | 0 | 33 | 2 | 1 | 36 | 17 | 0 | 16 | 1 | 34 | 1 | 52 | 0 | 18 | 71 | 141 |
| % HV | 0 | 0 | 3.1 | 1.5 | 1.6 | 2.9 | 7.3 | 0 | 10.7 | 16.7 | 8.7 | 3.3 | 11.5 | 0 | 10.7 | 10.8 | 6.1 |

# *Old Colony Bikeway*
Northeastern University
CIVU768: Transportation Capstone

South Bay Center AM
Southampton @ Allstate Road
Boston, MA

File Name : SouthbayAM
Site Code : 00003241
Start Date : 3/24/2009
Page No : 2



# *Old Colony Bikeway*

Northeastern University

CIVU768: Transportation Capstone

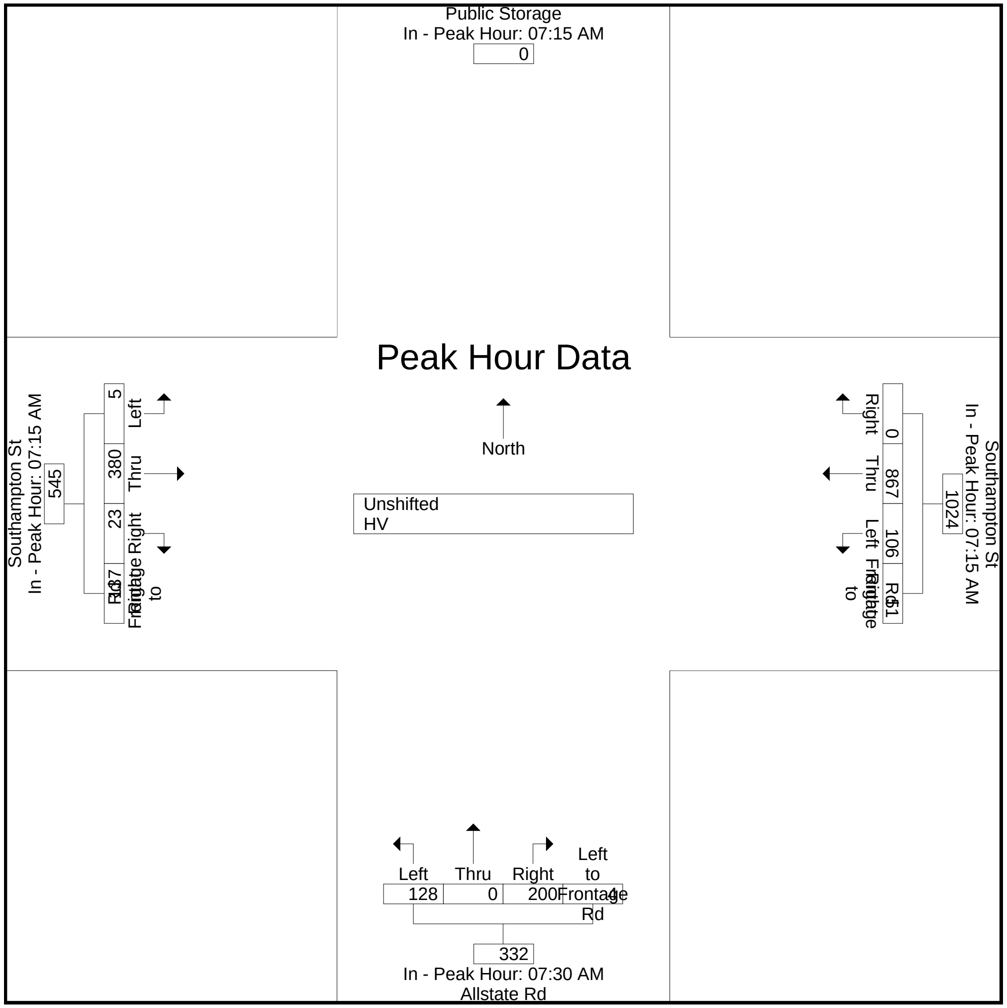
South Bay Center AM
Southampton @ Allstate Road
Boston, MA

File Name : SouthbayAM
Site Code : 00003241
Start Date : 3/24/2009


| | From North | Southampton St From East | | | | | Allstate Rd From South | | | | | Southampton St From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Right | Thru | Left | Left to Frontage Rd | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Int. Total |
| Peak Hour Analysis From 07:15 AM to 08:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Each Approach Begins at: | | | | | | | | | | | | | | | | | |
| | 07:15 AM | 07:15 AM | | | | | 07:30 AM | | | | | 07:15 AM | | | | | |
| +0 mins. | 0 | 0 | 206 | 24 | 14 | 244 | 41 | 0 | 30 | 1 | 72 | 5 | 90 | **4** | 26 | 125 | |
| +15 mins. | 0 | 0 | 210 | 20 | 8 | 238 | **60** | 0 | **38** | 0 | **98** | **7** | **98** | 0 | 28 | 133 | |
| +30 mins. | 0 | 0 | **244** | **36** | **20** | **300** | 44 | 0 | 26 | **2** | | | | | | | |
| **+45 mins.** | **0** | **0** | **207** | **26** | **9** | **242** | **55** | **0** | **34** | **1** | **90** | **5** | **98** | **1** | **53** | **157** | |
| Total Volume | 0 | 0 | 867 | 106 | 51 | 1024 | 200 | 0 | 128 | 4 | 332 | 23 | 380 | 5 | 137 | 545 | |
| % App. Total | | 0 | 84.7 | 10.4 | 5 | | 60.2 | 0 | 38.6 | 1.2 | | 4.2 | 69.7 | 0.9 | 25.1 | | |
| PHF | .000 | .000 | .888 | .736 | .638 | .853 | .833 | .000 | .842 | .500 | .847 | .821 | .969 | .313 | .646 | .868 | |

South Bay Center AM
Southampton @ Allstate Road
Boston, MA

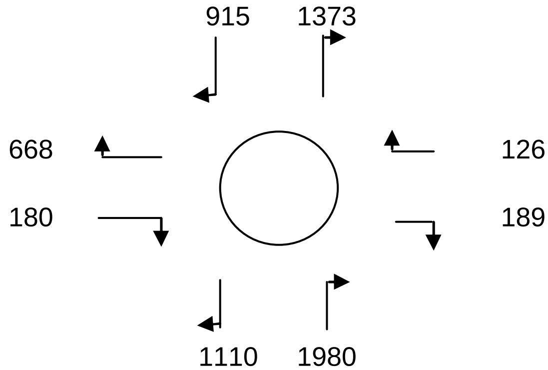
File Name : SouthbayAM
Site Code : 00003241
Start Date : 3/24/2009
Page No : 4

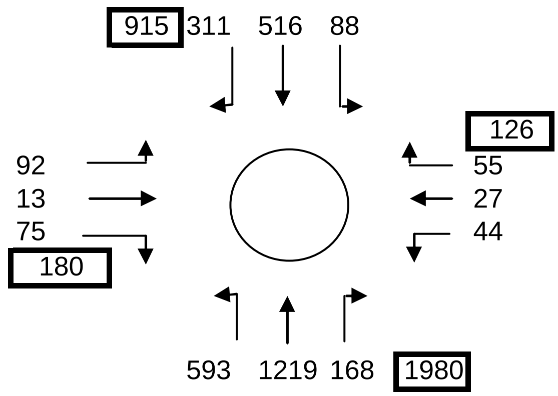


AM Preble Circle

| Old Colony N | | Columbia Rd | | Old Colony S | | Preble St | |
|---|---|---|---|---|---|---|---|
| IN | OUT | IN | OUT | IN | OUT | IN | OUT |
| 915 | 1373 | 126 | 189 | 1980 | 1110 | 180 | 668 |

| | |
|---|---|
| IN | 3201 |
| OUT | 3339 |



# Old Colony Bikeway

Northeastern University

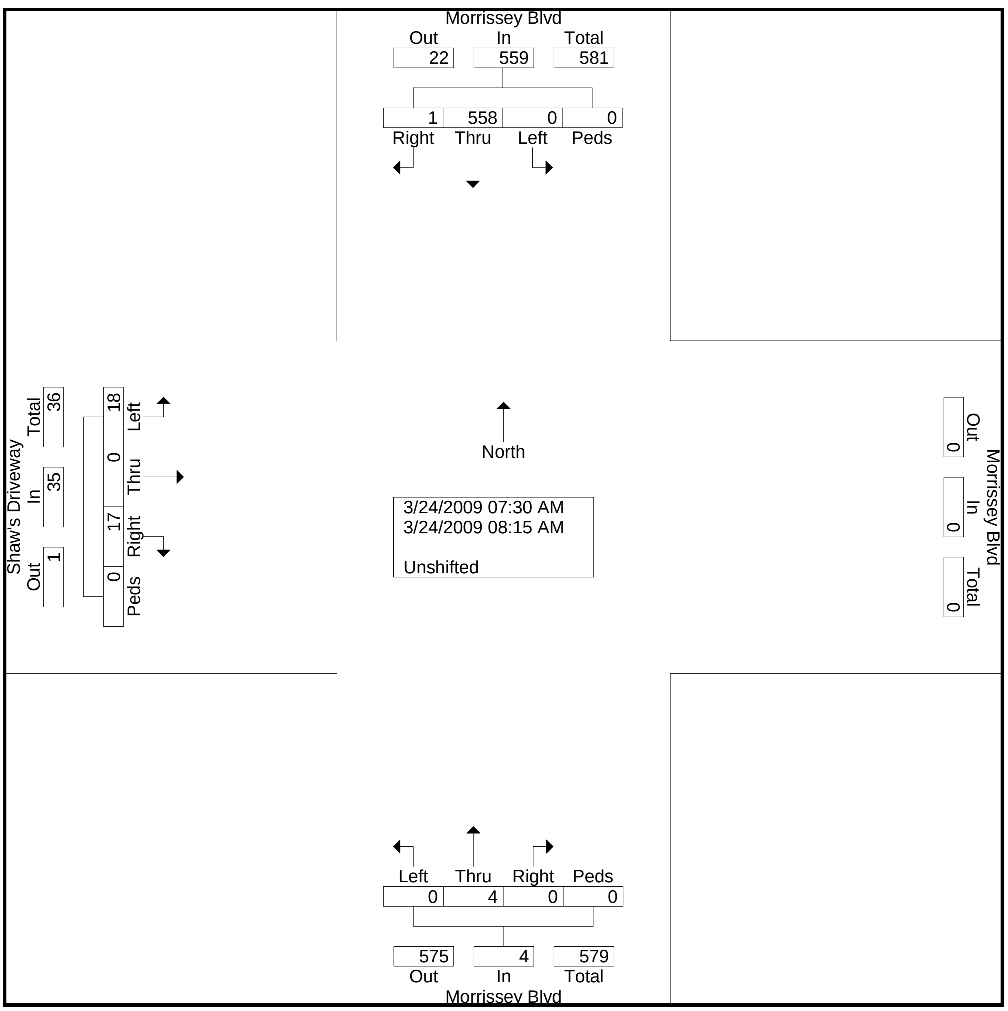
CIVU768: Transportation Capstone

Star Market AM
Boston, MA

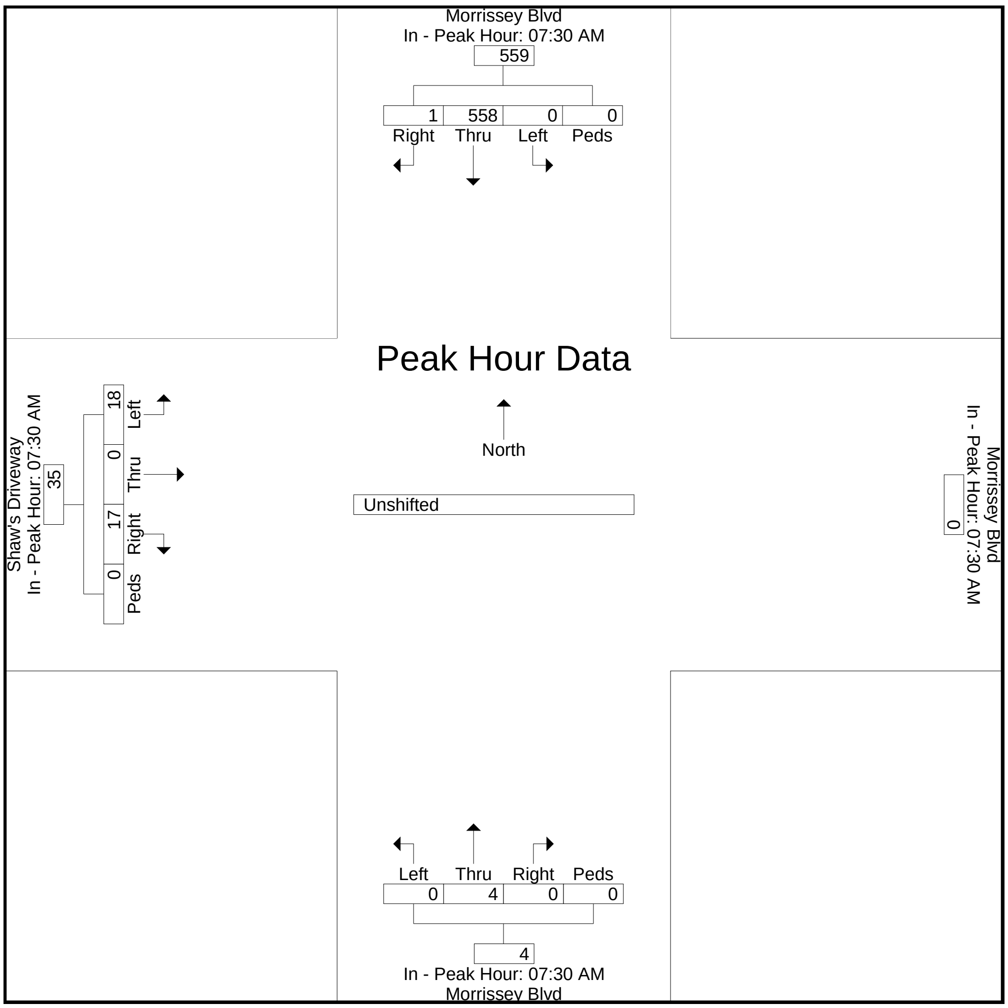
File Name : STARMA~1
Site Code : 00001221
Start Date : 3/24/2009
Page No : 1

Groups Printed- Unshifted

| | Morrissey Blvd From North | | | | | From East | Morrissey Blvd From South | | | | | Shaw's Driveway From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | Peds | App. Total | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Int. Total |
| 07:30 AM | 0 | 146 | 0 | 0 | 146 | 0 | 0 | 3 | 0 | 0 | 3 | 3 | 0 | 5 | 0 | 8 | 157 |
| 07:45 AM | 0 | 127 | 0 | 0 | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 6 | 0 | 9 | 136 |
| Total | 0 | 273 | 0 | 0 | 273 | 0 | 0 | 3 | 0 | 0 | 3 | 6 | 0 | 11 | 0 | 17 | 293 |
| | | | | | | | | | | | | | | | | | |
| 08:00 AM | 1 | 135 | 0 | 0 | 136 | 0 | 0 | 1 | 0 | 0 | 1 | 6 | 0 | 1 | 0 | 7 | 144 |
| 08:15 AM | 0 | 150 | 0 | 0 | 150 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 6 | 0 | 11 | 161 |
| Grand Total | 1 | 558 | 0 | 0 | 559 | 0 | 0 | 4 | 0 | 0 | 4 | 17 | 0 | 18 | 0 | 35 | 598 |
| Apprch % | 0.2 | 99.8 | 0 | 0 | | | 0 | 100 | 0 | 0 | | 48.6 | 0 | 51.4 | 0 | | |
| Total % | 0.2 | 93.3 | 0 | 0 | 93.5 | 0 | 0 | 0.7 | 0 | 0 | 0.7 | 2.8 | 0 | 3 | 0 | 5.9 | |



| | Morrissey Blvd From North | | | | | From East | Morrissey Blvd From South | | | | | Shaw's Driveway From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | Peds | App. Total | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Each Approach Begins at: | | | | | | | | | | | | | | | | | |
| | 07:30 AM | | | | | 07:30 AM | 07:30 AM | | | | | 07:30 AM | | | | | |
| +0 mins. | 0 | 146 | 0 | 0 | 146 | 0 | 0 | 3 | 0 | 0 | 3 | 3 | 0 | 5 | 0 | 8 | |
| +15 mins. | 0 | 127 | 0 | 0 | 127 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 6 | 0 | 9 | |
| +30 mins. | 1 | 135 | 0 | 0 | 136 | 0 | 0 | 1 | 0 | 0 | 1 | 6 | 0 | 1 | 0 | 7 | |
| +45 mins. | 0 | 150 | 0 | 0 | 150 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 6 | 0 | 11 | |
| Total Volume | 1 | 558 | 0 | 0 | 559 | 0 | 0 | 4 | 0 | 0 | 4 | 17 | 0 | 18 | 0 | 35 | |
| % App. Total | 0.2 | 99.8 | 0 | 0 | | | 0 | 100 | 0 | 0 | | 48.6 | 0 | 51.4 | 0 | | |
| PHF | .250 | .930 | .000 | .000 | .932 | .000 | .000 | .333 | .000 | .000 | .333 | .708 | .000 | .750 | .000 | .795 | |



UMASS Boston
Boston

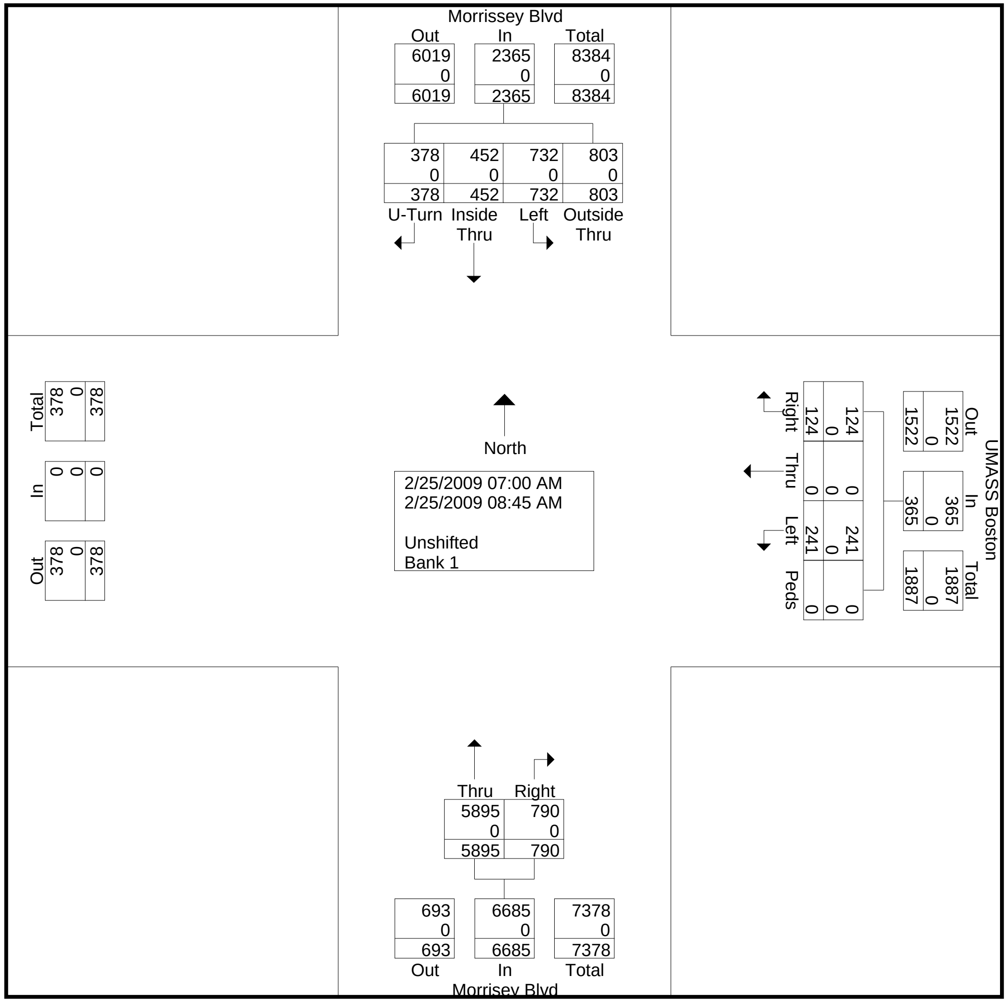
File Name : UMASS AM
Site Code : 00001111
Start Date : 2/25/2009
Page No : 1

Groups Printed- Unshifted - Bank 1

| | Morrissey Blvd From North | | | | | UMASS Boston From East | | | | | Morrisey Blvd From South | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | U-Turn | Inside Thru | Left | Outside Thru | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | App. Total | Int. Total |
| 07:00 AM | 32 | 44 | 37 | 60 | 173 | 3 | 0 | 9 | 0 | 12 | 48 | 786 | 834 | 1019 |
| 07:15 AM | 58 | 57 | 65 | 107 | 287 | 13 | 0 | 35 | 0 | 48 | 66 | 703 | 769 | 1104 |
| 07:30 AM | 80 | 68 | 88 | 116 | 352 | 18 | 0 | 32 | 0 | 50 | 92 | 776 | 868 | 1270 |
| 07:45 AM | 76 | 72 | 107 | 101 | 356 | 19 | 0 | 38 | 0 | 57 | 111 | 792 | 903 | 1316 |
| Total | 246 | 241 | 297 | 384 | 1168 | 53 | 0 | 114 | 0 | 167 | 317 | 3057 | 3374 | 4709 |
| | | | | | | | | | | | | | | |
| 08:00 AM | 64 | 49 | 106 | 112 | 331 | 28 | 0 | 55 | 0 | 83 | 97 | 713 | 810 | 1224 |
| 08:15 AM | 33 | 61 | 101 | 90 | 285 | 20 | 0 | 26 | 0 | 46 | 105 | 766 | 871 | 1202 |
| 08:30 AM | 22 | 50 | 100 | 117 | 289 | 8 | 0 | 26 | 0 | 34 | 126 | 672 | 798 | 1121 |
| 08:45 AM | 13 | 51 | 128 | 100 | 292 | 15 | 0 | 20 | 0 | 35 | 145 | 687 | 832 | 1159 |
| Total | 132 | 211 | 435 | 419 | 1197 | 71 | 0 | 127 | 0 | 198 | 473 | 2838 | 3311 | 4706 |
| | | | | | | | | | | | | | | |
| Grand Total | 378 | 452 | 732 | 803 | 2365 | 124 | 0 | 241 | 0 | 365 | 790 | 5895 | 6685 | 9415 |
| Apprch % | 16 | 19.1 | 31 | 34 | | 34 | 0 | 66 | 0 | | 11.8 | 88.2 | | |
| Total % | 4 | 4.8 | 7.8 | 8.5 | 25.1 | 1.3 | 0 | 2.6 | 0 | 3.9 | 8.4 | 62.6 | 71 | |
| Unshifted | 378 | 452 | 732 | 803 | 2365 | 124 | 0 | 241 | 0 | 365 | 790 | 5895 | 6685 | 9415 |
| % Unshifted | 100 | 100 | 100 | 100 | 100 | 100 | 0 | 100 | 0 | 100 | 100 | 100 | 100 | 100 |
| Bank 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bank 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

UMASS Boston
Boston

File Name : UMASS AM
Site Code : 00001111
Start Date : 2/25/2009
Page No : 2



UMASS Boston
Boston

File Name : UMASS AM
Site Code : 00001111
Start Date : 2/25/2009


| | Morrissey Blvd From North | | | | | UMASS Boston From East | | | | | Morrisey Blvd From South | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | U-Turn | Inside Thru | Left | Outside Thru | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | App. Total | Int. Total |
| Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 | | | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 07:30 AM | | | | | | | | | | | | | | |
| 07:30 AM | **80** | 68 | 88 | **116** | 352 | 18 | 0 | 32 | 0 | 50 | 92 | 776 | 868 | 1270 |
| 07:45 AM | 76 | **72** | **107** | 101 | **356** | 19 | 0 | 38 | 0 | 57 | **111** | **792** | **903** | **1316** |
| 08:00 AM | 64 | 49 | 106 | 112 | 331 | **28** | 0 | **55** | 0 | **83** | 97 | 713 | 810 | 1224 |
| 08:15 AM | 33 | 61 | 101 | 90 | 285 | 20 | 0 | 26 | 0 | 46 | 105 | 766 | 871 | 1202 |
| Total Volume | 253 | 250 | 402 | 419 | 1324 | 85 | 0 | 151 | 0 | 236 | 405 | 3047 | 3452 | 5012 |
| % App. Total | 19.1 | 18.9 | 30.4 | 31.6 | | 36 | 0 | 64 | 0 | | 11.7 | 88.3 | | |
| PHF | .791 | .868 | .939 | .903 | .930 | .759 | .000 | .686 | .000 | .711 | .912 | .962 | .956 | .952 |

PM Peak Hour

## Melnea Cass Boulevard and Massachusetts Avenue PM Counts

**April 9, 2008**

| | 4:00 | 4:15 | 4:30 | 4:45 | 5:00 | 5:15 | 5:30 | 5:45 | Totals | PH Totals | App Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **EBR** | 1 | 7 | 8 | 2 | 2 | 4 | 1 | 5 | 30 | 19 | |
| **EBT** | 185 | 217 | 201 | 224 | 208 | 214 | 198 | 188 | 1635 | 850 | |
| **EBL** | 142 | 122 | 158 | 161 | 146 | 151 | 137 | 126 | 1143 | 587 | 1456 |
| **WBR** | 110 | 90 | 100 | 76 | 82 | 89 | 84 | 79 | 710 | 348 | |
| **WBT** | 111 | 144 | 144 | 165 | 152 | 146 | 130 | 136 | 1128 | 605 | |
| **WBL** | 77 | 77 | 83 | 67 | 72 | 78 | 64 | 62 | 580 | 299 | 1252 |
| **SBR** | 79 | 136 | 150 | 120 | 124 | 128 | 119 | 112 | 968 | 530 | |
| **SBT** | 201 | 221 | 217 | 228 | 220 | 218 | 209 | 198 | 1712 | 886 | |
| **SBL** | 115 | 130 | 96 | 117 | 105 | 112 | 100 | 97 | 872 | 448 | 1864 |
| **NBR** | 144 | 135 | 119 | 128 | 122 | 114 | 119 | 110 | 991 | 504 | |
| **NBT** | 237 | 185 | 193 | 183 | 188 | 182 | 176 | 178 | 1522 | 749 | |
| **NBL** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1253 |
| | **1402** | **1464** | **1469** | **1471** | **1421** | **1436** | **1337** | **1291** | **11291** | | |
| | | | | 5806 | 5825 | 5797 | 5665 | 5485 | | | |

*Old Colony Bikeway*

Northeastern University

CIVU768: Transportation Capstone

South Bay Center PM
Boston, MA

File Name : SouthbayPM
Site Code : 00003242
Start Date : 3/24/2009
Page No : 1

Groups Printed- Unshifted - HV

| | From North | Southampton St From East | | | | | Allstate Rd From South | | | | | Southampton St From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | App. Total | Right | Thru | Left | Left to Frontage Rd | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Int. Total |
| 05:00 PM | 0 | 0 | 97 | 45 | 7 | 149 | 38 | 0 | 22 | 3 | 63 | 31 | 109 | 0 | 160 | 300 | 512 |
| 05:15 PM | 0 | 1 | 110 | 74 | 7 | 192 | 53 | 0 | 18 | 0 | 71 | 20 | 103 | 1 | 128 | 252 | 515 |
| 05:30 PM | 0 | 0 | 114 | 72 | 10 | 196 | 43 | 0 | 15 | 4 | 62 | 18 | 92 | 0 | 146 | 256 | 514 |
| 05:45 PM | 0 | 0 | 105 | 64 | 4 | 173 | 54 | 0 | 21 | 1 | 76 | 13 | 107 | 0 | 137 | 257 | 506 |
| Total | 0 | 1 | 426 | 255 | 28 | 710 | 188 | 0 | 76 | 8 | 272 | 82 | 411 | 1 | 571 | 1065 | 2047 |
| | | | | | | | | | | | | | | | | | |
| Grand Total | 0 | 1 | 426 | 255 | 28 | 710 | 188 | 0 | 76 | 8 | 272 | 82 | 411 | 1 | 571 | 1065 | 2047 |
| Apprch % | | 0.1 | 60 | 35.9 | 3.9 | | 69.1 | 0 | 27.9 | 2.9 | | 7.7 | 38.6 | 0.1 | 53.6 | | |
| Total % | 0 | 0 | 20.8 | 12.5 | 1.4 | 34.7 | 9.2 | 0 | 3.7 | 0.4 | 13.3 | 4 | 20.1 | 0 | 27.9 | 52 | |
| Unshifted | 0 | 1 | 409 | 248 | 27 | 685 | 175 | 0 | 71 | 8 | 254 | 77 | 401 | 1 | 568 | 1047 | 1986 |
| % Unshifted | 0 | 100 | 96 | 97.3 | 96.4 | 96.5 | 93.1 | 0 | 93.4 | 100 | 93.4 | 93.9 | 97.6 | 100 | 99.5 | 98.3 | 97 |
| HV | 0 | 0 | 17 | 7 | 1 | 25 | 13 | 0 | 5 | 0 | 18 | 5 | 10 | 0 | 3 | 18 | 61 |
| % HV | 0 | 0 | 4 | 2.7 | 3.6 | 3.5 | 6.9 | 0 | 6.6 | 0 | 6.6 | 6.1 | 2.4 | 0 | 0.5 | 1.7 | 3 |

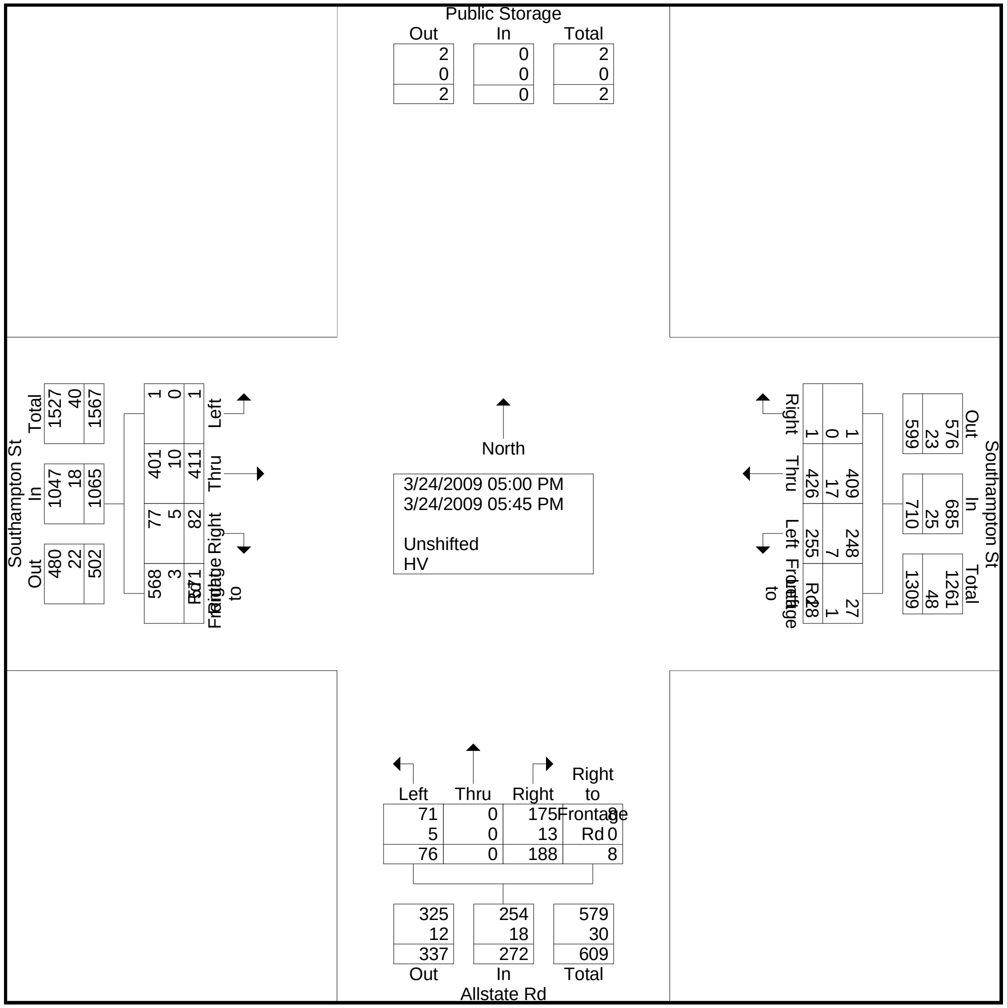
# Old Colony Bikeway

Northeastern University

CIVU768: Transportation Capstone

South Bay Center PM
Boston, MA

File Name : SouthbayPM
Site Code : 00003242
Start Date : 3/24/2009
Page No : 2



# *Old Colony Bikeway*

Northeastern University

CIVU768: Transportation Capstone

South Bay Center PM
Boston, MA

File Name : SouthbayPM
Site Code : 00003242
Start Date : 3/24/2009
Page No : 3

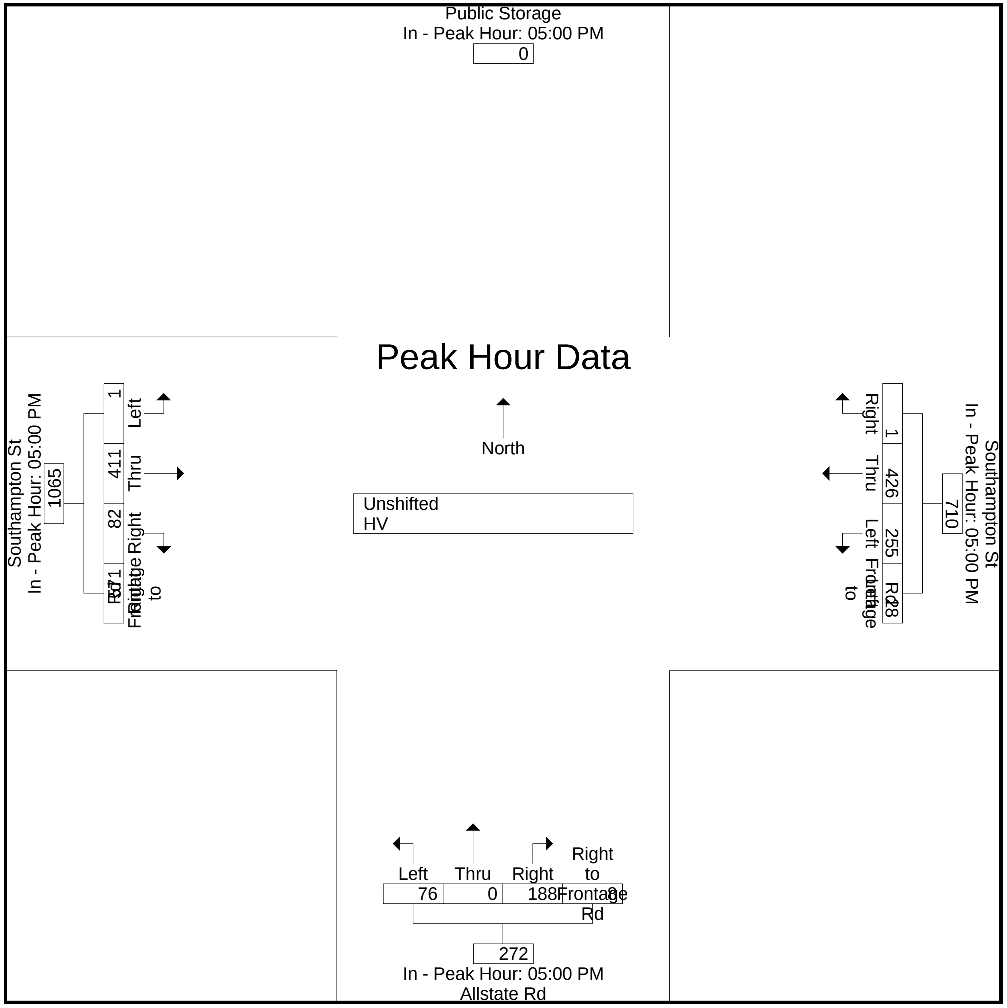
| | From North | Southampton St From East | | | | | Allstate Rd From South | | | | | Southampton St From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | App. Total | Right | Thru | Left | Left to Frontage Rd | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Right | Thru | Left | Right to Frontage Rd | App. Total | Int. Total |
| Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Each Approach Begins at: | | | | | | | | | | | | | | | | | |
| | 05:00 PM | 05:00 PM | | | | | 05:00 PM | | | | | 05:00 PM | | | | | |
| +0 mins. | 0 | 0 | 97 | 45 | 7 | 149 | 38 | 0 | **22** | 3 | 63 | **31** | **109** | 0 | **160** | **300** | |
| +15 mins. | 0 | **1** | 110 | **74** | 7 | 192 | 53 | 0 | 18 | 0 | 71 | 20 | 103 | **1** | 128 | 252 | |
| +30 mins. | 0 | 0 | **114** | 72 | **10** | **196** | 43 | 0 | 15 | **4** | | | | | | | |
| **+45 mins.** | **0** | **0** | **105** | **64** | **4** | **173** | **54** | 0 | 21 | 1 | **76** | 13 | 107 | 0 | 137 | 257 | |
| Total Volume | 0 | 1 | 426 | 255 | 28 | 710 | 188 | 0 | 76 | 8 | 272 | 82 | 411 | 1 | 571 | 1065 | |
| % App. Total | | 0.1 | 60 | 35.9 | 3.9 | | 69.1 | 0 | 27.9 | 2.9 | | 7.7 | 38.6 | 0.1 | 53.6 | | |
| PHF | .000 | .250 | .934 | .861 | .700 | .906 | .870 | .000 | .864 | .500 | .895 | .661 | .943 | .250 | .892 | .888 | |

# Old Colony Bikeway

Northeastern University
CIVU768: Transportation Capstone

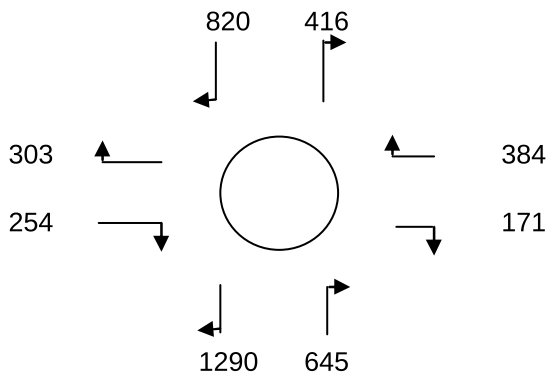
South Bay Center PM
Boston, MA

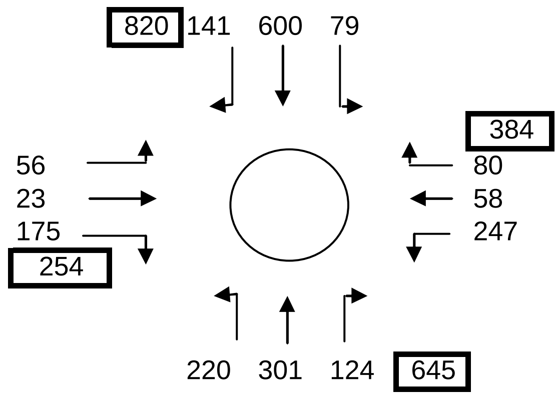
File Name : SouthbayPM
Site Code : 00003242
Start Date : 3/24/2009
Page No : 4



| PM Preble Circle | | | | | | | |
|---|---|---|---|---|---|---|---|
| Old Colony N | | Columbia Rd | | Old Colony S | | Preble St | |
| IN | OUT | IN | OUT | IN | OUT | IN | OUT |
| 820 | 416 | 384 | 171 | 645 | 1290 | 254 | 303 |

IN 2103
OUT 2180



# Old Colony Bikeway

Northeastern University

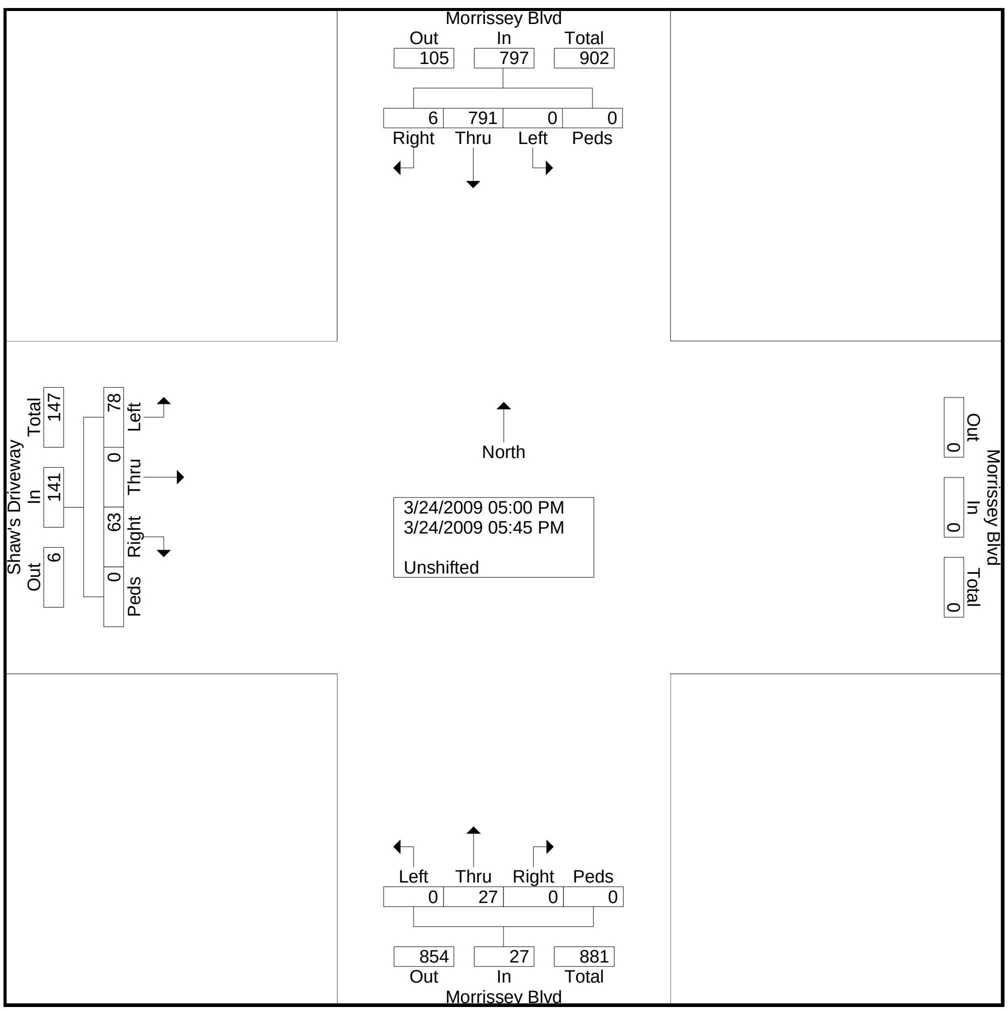
CIVU768: Transportation Capstone

Shaw's Driveway PM
Boston, MA

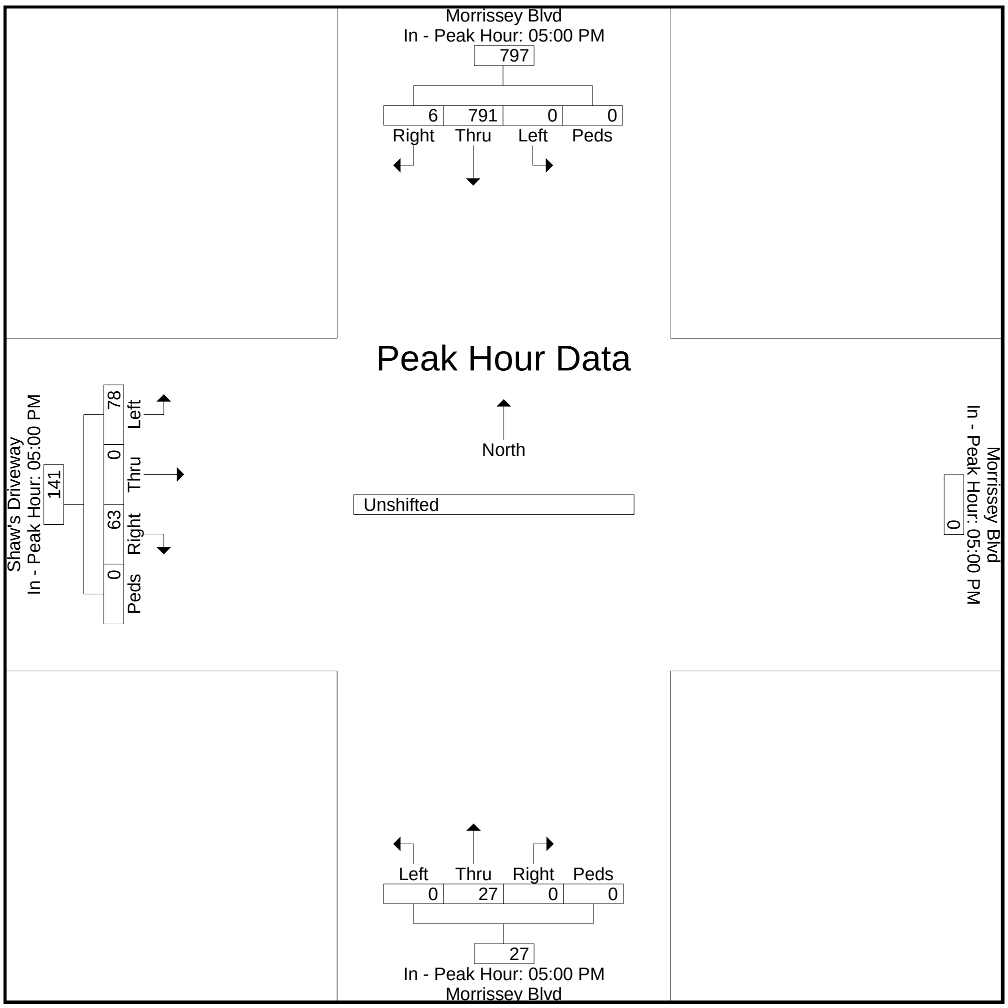
File Name : StarMarketPM
Site Code : 00005678
Start Date : 3/24/2009
Page No : 1

Groups Printed- Unshifted

| | Morrissey Blvd From North | | | | | From East | Morrissey Blvd From South | | | | | Shaw's Driveway From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | Peds | App. Total | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Int. Total |
| 05:00 PM | 1 | 181 | 0 | 0 | 182 | 0 | 0 | 8 | 0 | 0 | 8 | 16 | 0 | 15 | 0 | 31 | 221 |
| 05:15 PM | 1 | 215 | 0 | 0 | 216 | 0 | 0 | 4 | 0 | 0 | 4 | 19 | 0 | 21 | 0 | 40 | 260 |
| 05:30 PM | 0 | 200 | 0 | 0 | 200 | 0 | 0 | 8 | 0 | 0 | 8 | 14 | 0 | 19 | 0 | 33 | 241 |
| 05:45 PM | 4 | 195 | 0 | 0 | 199 | 0 | 0 | 7 | 0 | 0 | 7 | 14 | 0 | 23 | 0 | 37 | 243 |
| Total | 6 | 791 | 0 | 0 | 797 | 0 | 0 | 27 | 0 | 0 | 27 | 63 | 0 | 78 | 0 | 141 | 965 |
| | | | | | | | | | | | | | | | | | |
| Grand Total | 6 | 791 | 0 | 0 | 797 | 0 | 0 | 27 | 0 | 0 | 27 | 63 | 0 | 78 | 0 | 141 | 965 |
| Apprch % | 0.8 | 99.2 | 0 | 0 | | | 0 | 100 | 0 | 0 | | 44.7 | 0 | 55.3 | 0 | | |
| Total % | 0.6 | 82 | 0 | 0 | 82.6 | 0 | 0 | 2.8 | 0 | 0 | 2.8 | 6.5 | 0 | 8.1 | 0 | 14.6 | |



| | Morrissey Blvd From North | | | | | From East | Morrissey Blvd From South | | | | | Shaw's Driveway From West | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | Peds | App. Total | App. Total | Right | Thru | Left | Peds | App. Total | Right | Thru | Left | Peds | App. Total | Int. Total |
| Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1 | | | | | | | | | | | | | | | | | |
| Peak Hour for Each Approach Begins at: | | | | | | | | | | | | | | | | | |
| | 05:00 PM | | | | | 05:00 PM | 05:00 PM | | | | | 05:00 PM | | | | | |
| +0 mins. | 1 | 181 | 0 | 0 | 182 | 0 | 0 | 8 | 0 | 0 | 8 | 16 | 0 | 15 | 0 | 31 | |
| +15 mins. | 1 | 215 | 0 | 0 | 216 | 0 | 0 | 4 | 0 | 0 | 4 | 19 | 0 | 21 | 0 | 40 | |
| +30 mins. | 0 | 200 | 0 | 0 | 200 | 0 | 0 | 8 | 0 | 0 | 8 | 14 | 0 | 19 | 0 | 33 | |
| +45 mins. | 4 | 195 | 0 | 0 | 199 | 0 | 0 | 7 | 0 | 0 | 7 | 14 | 0 | 23 | 0 | 37 | |
| Total Volume | 6 | 791 | 0 | 0 | 797 | 0 | 0 | 27 | 0 | 0 | 27 | 63 | 0 | 78 | 0 | 141 | |
| % App. Total | 0.8 | 99.2 | 0 | 0 | | | 0 | 100 | 0 | 0 | | 44.7 | 0 | 55.3 | 0 | | |
| PHF | .375 | .920 | .000 | .000 | .922 | .000 | .000 | .844 | .000 | .000 | .844 | .829 | .000 | .848 | .000 | .881 | |



UMASS Boston
Boston

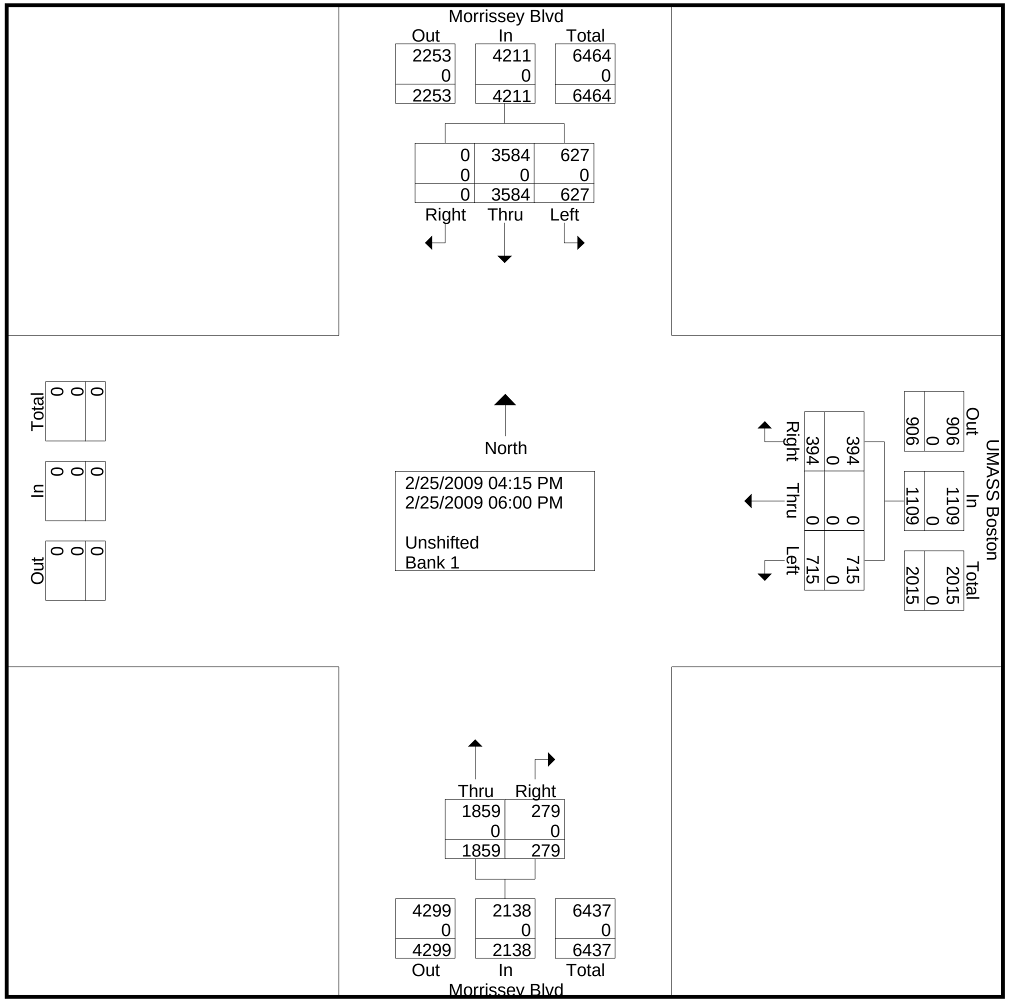
File Name : UMASS PM
Site Code : 00003333
Start Date : 2/25/2009
Page No : 1

Groups Printed- Unshifted - Bank 1

| | Morrissey Blvd From North | | | | UMASS Boston From East | | | | Morrissey Blvd From South | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | Thru | App. Total | Int. Total |
| 04:15 PM | 0 | 430 | 48 | 478 | 61 | 0 | 101 | 162 | 27 | 221 | 248 | 888 |
| 04:30 PM | 0 | 442 | 45 | 487 | 48 | 0 | 61 | 109 | 25 | 259 | 284 | 880 |
| 04:45 PM | 0 | 453 | 71 | 524 | 40 | 0 | 82 | 122 | 25 | 286 | 311 | 957 |
| Total | 0 | 1325 | 164 | 1489 | 149 | 0 | 244 | 393 | 77 | 766 | 843 | 2725 |
| | | | | | | | | | | | | |
| 05:00 PM | 0 | 390 | 68 | 458 | 40 | 0 | 106 | 146 | 34 | 194 | 228 | 832 |
| 05:15 PM | 0 | 480 | 121 | 601 | 42 | 0 | 98 | 140 | 47 | 280 | 327 | 1068 |
| 05:30 PM | 0 | 452 | 107 | 559 | 83 | 0 | 95 | 178 | 64 | 233 | 297 | 1034 |
| 05:45 PM | 0 | 528 | 120 | 648 | 43 | 0 | 118 | 161 | 37 | 194 | 231 | 1040 |
| Total | 0 | 1850 | 416 | 2266 | 208 | 0 | 417 | 625 | 182 | 901 | 1083 | 3974 |
| | | | | | | | | | | | | |
| 06:00 PM | 0 | 409 | 47 | 456 | 37 | 0 | 54 | 91 | 20 | 192 | 212 | 759 |
| Grand Total | 0 | 3584 | 627 | 4211 | 394 | 0 | 715 | 1109 | 279 | 1859 | 2138 | 7458 |
| Apprch % | 0 | 85.1 | 14.9 | | 35.5 | 0 | 64.5 | | 13 | 87 | | |
| Total % | 0 | 48.1 | 8.4 | 56.5 | 5.3 | 0 | 9.6 | 14.9 | 3.7 | 24.9 | 28.7 | |
| Unshifted | 0 | 3584 | 627 | 4211 | 394 | 0 | 715 | 1109 | 279 | 1859 | 2138 | 7458 |
| % Unshifted | 0 | 100 | 100 | 100 | 100 | 0 | 100 | 100 | 100 | 100 | 100 | 100 |
| Bank 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Bank 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

UMASS Boston
Boston

File Name : UMASS PM
Site Code : 00003333
Start Date : 2/25/2009
Page No : 2



| | Morrissey Blvd From North | | | | UMASS Boston From East | | | | Morrissey Blvd From South | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | Thru | App. Total | Int. Total |
| Peak Hour Analysis From 04:15 PM to 06:00 PM - Peak 1 of 1 | | | | | | | | | | | | |
| Peak Hour for Entire Intersection Begins at 05:00 PM | | | | | | | | | | | | |
| 05:00 PM | 0 | 390 | 68 | 458 | 40 | 0 | 106 | 146 | 34 | 194 | 228 | 832 |
| 05:15 PM | 0 | 480 | **121** | 601 | 42 | 0 | 98 | 140 | 47 | **280** | **327** | **1068** |
| 05:30 PM | 0 | 452 | 107 | 559 | **83** | 0 | 95 | **178** | **64** | 233 | 297 | 1034 |
| 05:45 PM | 0 | **528** | 120 | **648** | 43 | 0 | **118** | 161 | 37 | 194 | 231 | 1040 |
| Total Volume | 0 | 1850 | 416 | 2266 | 208 | 0 | 417 | 625 | 182 | 901 | 1083 | 3974 |
| % App. Total | 0 | 81.6 | 18.4 | | 33.3 | 0 | 66.7 | | 16.8 | 83.2 | | |
| PHF | .000 | .876 | .860 | .874 | .627 | .000 | .883 | .878 | .711 | .804 | .828 | .930 |

# Appendix C – Synchro Analysis for Existing Conditions

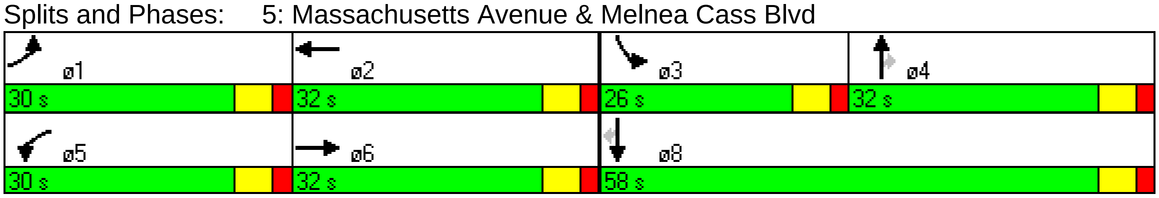
AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 11 | 12 | 14 | 10 | 12 | 16 | 11 | 12 | 12 | 11 | 12 | 16 |
| Storage Length (ft) | 0 | | 0 | 125 | | 0 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 2 | | 0 | 1 | | 1 | 0 | | 1 | 2 | | 1 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.97 | 0.95 | 0.95 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | | | | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 3539 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Flt Permitted | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 3539 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | | 288 | | | 391 | | | 527 |
| Headway Factor | 1.04 | 1.00 | 0.92 | 1.09 | 1.00 | 0.85 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 0.85 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 480 | | | 357 | | | 470 | | | 453 | |
| Travel Time (s) | | 10.9 | | | 8.1 | | | 10.7 | | | 10.3 | |
| Volume (vph) | 379 | 401 | 0 | 421 | 811 | 373 | 0 | 866 | 414 | 444 | 979 | 530 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 412 | 436 | 0 | 458 | 882 | 405 | 0 | 941 | 450 | 483 | 1064 | 576 |
| Lane Group Flow (vph) | 412 | 436 | 0 | 458 | 882 | 405 | 0 | 941 | 450 | 483 | 1064 | 576 |
| Turn Type | Prot | | | Prot | | Free | | | Perm | Prot | | Perm |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | | | | | | Free | | | 4 | | | 8 |
| Minimum Split (s) | 10.0 | 22.0 | | 10.0 | 22.0 | | | 22.0 | 22.0 | 10.0 | 22.0 | 22.0 |
| Total Split (s) | 30.0 | 32.0 | 0.0 | 30.0 | 32.0 | 0.0 | 0.0 | 32.0 | 32.0 | 26.0 | 58.0 | 58.0 |
| Total Split (%) | 25% | 27% | 0% | 25% | 27% | 0% | 0% | 27% | 27% | 22% | 48% | 48% |
| Maximum Green (s) | 24.0 | 26.0 | | 24.0 | 26.0 | | | 26.0 | 26.0 | 20.0 | 52.0 | 52.0 |
| 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) | 2.0 | 2.0 | | 2.0 | 2.0 | | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | | Lag | Lag | Lead | | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | | Yes | Yes | Yes | | |
| Walk Time (s) | | 5.0 | | | 5.0 | | | 5.0 | 5.0 | | 5.0 | 5.0 |
| Flash Dont Walk (s) | | 11.0 | | | 11.0 | | | 11.0 | 11.0 | | 11.0 | 11.0 |
| Pedestrian Calls (#/hr) | | 0 | | | 0 | | | 0 | 0 | | 0 | 0 |
| Act Effct Green (s) | 26.0 | 28.0 | | 26.0 | 28.0 | 120.0 | | 28.0 | 28.0 | 22.0 | 54.0 | 54.0 |
| Actuated g/C Ratio | 0.22 | 0.23 | | 0.22 | 0.23 | 1.00 | | 0.23 | 0.23 | 0.18 | 0.45 | 0.45 |
| v/c Ratio | 0.57 | 0.53 | | 0.66 | 1.07 | 0.23 | | 1.14 | 0.67 | 0.79 | 0.67 | 0.53 |
| Uniform Delay, d1 | 42.0 | 40.2 | | 42.9 | 46.0 | 0.0 | | 46.0 | 4.9 | 46.8 | 25.9 | 1.6 |
| Delay | 42.4 | 40.5 | | 43.4 | 87.0 | 0.0 | | 110.1 | 7.0 | 49.0 | 26.3 | 2.8 |
| LOS | D | D | | D | F | A | | F | A | D | C | A |
| Approach Delay | | 41.4 | | | 55.4 | | | 76.8 | | | 25.1 | |
| Approach LOS | | D | | | E | | | E | | | C | |
| Queue Length 50th (ft) | 148 | 156 | | 168 | ~397 | 0 | | ~447 | 36 | 186 | 333 | 20 |
| Queue Length 95th (ft) | 201 | 210 | | 226 | #527 | 0 | | #578 | 150 | #250 | 410 | 92 |
| Internal Link Dist (ft) | | 400 | | | 277 | | | 390 | | | 373 | |
| 50th Up Block Time (%) | | | | | 25% | | | 13% | | | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95th Up Block Time (%) | | | | | 42% | | | 33% | | | 7% | |
| Turn Bay Length (ft) | | | | 125 | | | | | | | | |
| 50th Bay Block Time % | | | | 22% | | | | | | | | |
| 95th Bay Block Time % | | | | 37% | | | | | | | | |
| Queuing Penalty (veh) | | | | 67 | | | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 120 | |
| Actuated Cycle Length: 120 | |
| Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green | |
| Natural Cycle: 90 | |
| Control Type: Pretimed | |
| Maximum v/c Ratio: 1.14 | |
| Intersection Signal Delay: 47.8 | Intersection LOS: D |
| Intersection Capacity Utilization 89.2% | ICU Level of Service D |
| ~ 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: 5: Massachusetts Avenue & Melnea Cass Blvd



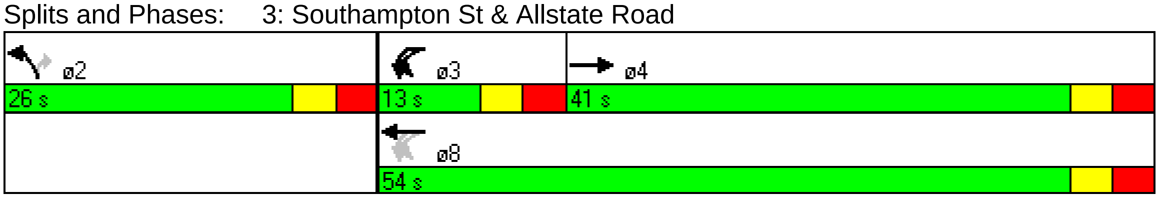
| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NWL | NWR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | | 9 | 9 | 15 | 15 | | 15 | 9 | 15 | 9 |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.956 | | | | | | | 0.850 | | |
| Flt Protected | | | | | | 0.992 | 0.950 | | | |
| Satd. Flow (prot) | 3383 | 0 | 0 | 0 | 0 | 3511 | 1770 | 1583 | 0 | 0 |
| Flt Permitted | | | | | | 0.659 | 0.950 | | | |
| Satd. Flow (perm) | 3383 | 0 | 0 | 0 | 0 | 2332 | 1770 | 1583 | 0 | 0 |
| Right Turn on Red | | | Yes | | | | | | | Yes |
| Satd. Flow (RTOR) | 7 | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | 30 | | | | | 30 | 30 | | 30 | |
| Link Distance (ft) | 299 | | | | | 536 | 224 | | 210 | |
| Travel Time (s) | 6.8 | | | | | 12.2 | 5.1 | | 4.8 | |
| Volume (vph) | 380 | 137 | 23 | 51 | 106 | 867 | 128 | 200 | 0 | 0 |
| Peak Hour Factor | 0.87 | 0.87 | 0.87 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 |
| Adj. Flow (vph) | 437 | 157 | 26 | 60 | 125 | 1020 | 151 | 235 | 0 | 0 |
| Lane Group Flow (vph) | 620 | 0 | 0 | 0 | 0 | 1205 | 151 | 235 | 0 | 0 |
| Turn Type | | | | pm+pt | pm+pt | | | Perm | | |
| Protected Phases | 4 | | | 3 | 3 | 8 | 2 | | | |
| Permitted Phases | | | | 8 | 8 | | | 2 | | |
| Minimum Split (s) | 22.0 | | | 10.0 | 10.0 | 22.0 | 22.0 | 22.0 | | |
| Total Split (s) | 41.0 | 0.0 | 0.0 | 13.0 | 13.0 | 54.0 | 26.0 | 26.0 | 0.0 | 0.0 |
| Total Split (%) | 51% | 0% | 0% | 16% | 16% | 68% | 33% | 33% | 0% | 0% |
| Maximum Green (s) | 35.0 | | | 7.0 | 7.0 | 48.0 | 20.0 | 20.0 | | |
| Yellow Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| All-Red Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| Lead/Lag | Lag | | | Lead | Lead | | | | | |
| Lead-Lag Optimize? | Yes | | | Yes | Yes | | | | | |
| Walk Time (s) | 5.0 | | | | | 5.0 | 5.0 | 5.0 | | |
| Flash Dont Walk (s) | 11.0 | | | | | 11.0 | 11.0 | 11.0 | | |
| Pedestrian Calls (#/hr) | 0 | | | | | 0 | 0 | 0 | | |
| Act Effct Green (s) | 37.0 | | | | | 50.0 | 22.0 | 22.0 | | |
| Actuated g/C Ratio | 0.46 | | | | | 0.63 | 0.28 | 0.28 | | |
| v/c Ratio | 0.40 | | | | | 0.76 | 0.31 | 0.54 | | |
| Uniform Delay, d1 | 14.0 | | | | | 9.1 | 23.0 | 24.7 | | |
| Delay | 14.2 | | | | | 9.7 | 23.5 | 25.4 | | |
| LOS | B | | | | | A | C | C | | |
| Approach Delay | 14.2 | | | | | 9.7 | 24.7 | | | |
| Approach LOS | B | | | | | A | C | | | |
| Queue Length 50th (ft) | 101 | | | | | 161 | 60 | 100 | | |
| Queue Length 95th (ft) | 135 | | | | | 192 | 102 | 158 | | |
| Internal Link Dist (ft) | 219 | | | | | 456 | 144 | | 130 | |
| 50th Up Block Time (%) | | | | | | | | | | |
| 95th Up Block Time (%) | | | | | | | | 13% | | |
| Turn Bay Length (ft) | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | |

| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NWL | NWR |
|---|---|---|---|---|---|---|---|---|---|---|
| 95th Bay Block Time % | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 13.6 Intersection LOS: B
Intersection Capacity Utilization 76.1% ICU Level of Service C

Splits and Phases: 3: Southampton St & Allstate Road

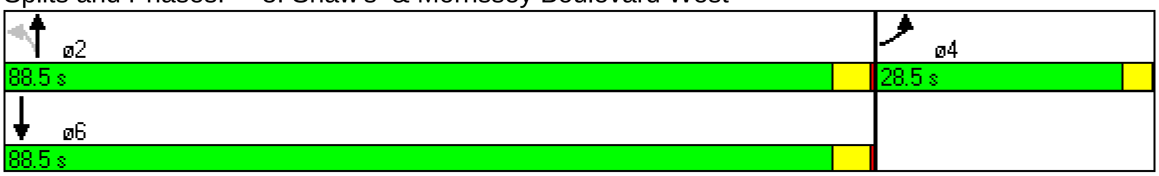


| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 16 | 10 | 10 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Leading Detector (ft) | 50 | | 50 | 50 | 50 | |
| Trailing Detector (ft) | 0 | | 0 | 0 | 0 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 |
| Frt | 0.936 | | | | | |
| Flt Protected | 0.974 | | | | | |
| Satd. Flow (prot) | 1698 | 0 | 0 | 2111 | 3303 | 0 |
| Flt Permitted | 0.974 | | | | | |
| Satd. Flow (perm) | 1698 | 0 | 0 | 2111 | 3303 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | 18 | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 0.85 | 1.09 | 1.09 |
| Link Speed (mph) | 15 | | | 30 | 30 | |
| Link Distance (ft) | 320 | | | 283 | 805 | |
| Travel Time (s) | 14.5 | | | 6.4 | 18.3 | |
| Volume (vph) | 18 | 17 | 0 | 4 | 558 | 1 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 20 | 18 | 0 | 4 | 607 | 1 |
| Lane Group Flow (vph) | 38 | 0 | 0 | 4 | 608 | 0 |
| Turn Type | | | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Detector Phases | 4 | | 2 | 2 | 6 | |
| Minimum Initial (s) | 3.5 | | 4.0 | 4.0 | 4.0 | |
| Minimum Split (s) | 8.0 | | 20.5 | 20.5 | 20.5 | |
| Total Split (s) | 28.5 | 0.0 | 88.5 | 88.5 | 88.5 | 0.0 |
| Total Split (%) | 24% | 0% | 76% | 76% | 76% | 0% |
| Yellow Time (s) | 3.0 | | 4.0 | 4.0 | 4.0 | |
| All-Red Time (s) | 0.5 | | 0.5 | 0.5 | 0.5 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | None | | Max | Max | Max | |
| Act Effct Green (s) | 6.5 | | | 110.8 | 110.8 | |
| Actuated g/C Ratio | 0.05 | | | 0.92 | 0.92 | |
| v/c Ratio | 0.36 | | | 0.00 | 0.20 | |
| Uniform Delay, d1 | 30.1 | | | 0.5 | 0.7 | |
| Delay | 27.8 | | | 1.0 | 0.9 | |
| LOS | C | | | A | A | |
| Approach Delay | 27.8 | | | 1.0 | 0.9 | |
| Approach LOS | C | | | A | A | |
| Queue Length 50th (ft) | 15 | | | 0 | 22 | |
| Queue Length 95th (ft) | 51 | | | 2 | 37 | |
| Internal Link Dist (ft) | 240 | | | 203 | 725 | |
| 50th Up Block Time (%) | | | | | | |
| 95th Up Block Time (%) | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Turn Bay Length (ft) | | | | | | |
| 50th Bay Block Time % | | | | | | |
| 95th Bay Block Time % | | | | | | |
| Queuing Penalty (veh) | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 117 | |
| Actuated Cycle Length: 120 | |
| Natural Cycle: 40 | |
| Control Type: Semi Act-Uncoord | |
| Maximum v/c Ratio: 0.36 | |
| Intersection Signal Delay: 2.4 | Intersection LOS: A |
| Intersection Capacity Utilization 26.8% | ICU Level of Service A |

Splits and Phases: 8: Shaw's & Morrissey Boulevard West

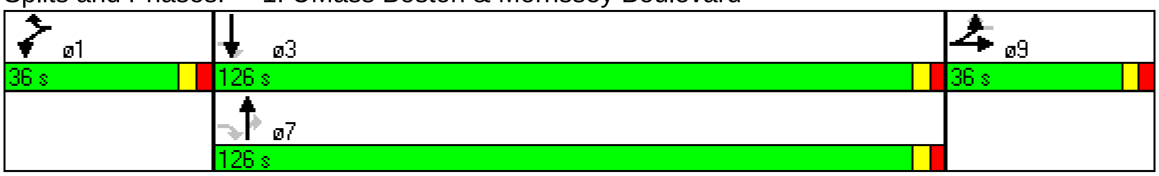


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 10 | 11 | 12 | 11 | 11 | 12 | 12 | 12 | 16 | 12 | 12 | 12 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 20 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.91 | 0.91 | 1.00 | 0.97 | 1.00 | 0.88 | 1.00 | 0.91 | 1.00 | 1.00 | 0.91 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | |
| Flt Protected | | 0.982 | | 0.950 | | | | | | | | |
| Satd. Flow (prot) | 0 | 4827 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Flt Permitted | | 0.982 | | 0.950 | | | | | | | | |
| Satd. Flow (perm) | 0 | 4827 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 455 | | | 1 | | | 199 | | | |
| Headway Factor | 1.09 | 1.04 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 129 | | | 680 | | | 766 | | | 1053 | |
| Travel Time (s) | | 2.9 | | | 15.5 | | | 17.4 | | | 23.9 | |
| Volume (vph) | 253 | 402 | 419 | 151 | 0 | 85 | 0 | 3047 | 405 | 0 | 250 | 0 |
| Peak Hour Factor | 0.94 | 0.90 | 0.92 | 0.69 | 0.92 | 0.76 | 0.92 | 0.96 | 0.91 | 0.92 | 0.87 | 0.92 |
| Adj. Flow (vph) | 269 | 447 | 455 | 219 | 0 | 112 | 0 | 3174 | 445 | 0 | 287 | 0 |
| Lane Group Flow (vph) | 0 | 716 | 455 | 219 | 0 | 112 | 0 | 3174 | 445 | 0 | 287 | 0 |
| Turn Type | Split | | custom | custom | | custom | | | Perm | | | |
| Protected Phases | 9 | 9 | | 1 | | 1 | | 7 | | | 3 | |
| Permitted Phases | | 9 | 3 7 | 1 | | 9 1 | | | 7 | | | |
| Minimum Split (s) | 10.0 | 10.0 | | 10.0 | | 10.0 | | 22.0 | 22.0 | | 22.0 | |
| Total Split (s) | 36.0 | 36.0 | 252.0 | 36.0 | 0.0 | 36.0 | 0.0 | 126.0 | 126.0 | 0.0 | 126.0 | 0.0 |
| Total Split (%) | 18% | 18% | 127% | 18% | 0% | 18% | 0% | 64% | 64% | 0% | 64% | 0% |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| All-Red Time (s) | 3.0 | 3.0 | | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Act Effct Green (s) | | 32.1 | 122.0 | 32.1 | | 67.9 | | 122.0 | 122.0 | | 122.0 | |
| Actuated g/C Ratio | | 0.16 | 0.62 | 0.16 | | 0.34 | | 0.62 | 0.62 | | 0.62 | |
| v/c Ratio | | 0.97dl | 0.40 | 0.41 | | 0.12 | | 1.01 | 0.38 | | 0.09 | |
| Uniform Delay, d1 | | 81.7 | 0.0 | 74.5 | | 44.0 | | 38.0 | 9.5 | | 15.4 | |
| Delay | | 88.6 | 1.2 | 74.8 | | 44.3 | | 53.2 | 9.7 | | 15.5 | |
| LOS | | F | A | E | | D | | D | A | | B | |
| Approach Delay | | 54.6 | | | | | | 47.9 | | | 15.5 | |
| Approach LOS | | D | | | | | | D | | | B | |
| Queue Length 50th (ft) | | 342 | 0 | 134 | | 56 | | ~1586 | 148 | | 54 | |
| Queue Length 95th (ft) | | #418 | 45 | 137 | | 72 | | #1624 | 220 | | 67 | |
| Internal Link Dist (ft) | | 49 | | | 600 | | | 686 | | | 973 | |
| 50th Up Block Time (%) | | 71% | | | | | | 21% | | | | |
| 95th Up Block Time (%) | | 73% | 2% | | | | | 22% | | | | |
| Turn Bay Length (ft) | | | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |

Intersection Summary

Area Type: Other
Cycle Length: 198
Actuated Cycle Length: 198
Offset: 0 (0%), Referenced to phase 6:, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 48.6 Intersection LOS: D
Intersection Capacity Utilization 92.5% ICU Level of Service E
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 1: UMass Boston & Morrissey Boulevard



PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 11 | 12 | 14 | 10 | 12 | 16 | 11 | 12 | 12 | 11 | 12 | 16 |
| Storage Length (ft) | 0 | | 0 | 125 | | 0 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 2 | | 0 | 1 | | 1 | 0 | | 1 | 2 | | 1 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.97 | 0.95 | 0.95 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | | 0.997 | | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 3529 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Flt Permitted | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 3529 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 2 | | | | 361 | | | 16 | | | 536 |
| Headway Factor | 1.04 | 1.00 | 0.92 | 1.09 | 1.00 | 0.85 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 0.85 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 480 | | | 357 | | | 470 | | | 453 | |
| Travel Time (s) | | 10.9 | | | 8.1 | | | 10.7 | | | 10.3 | |
| Volume (vph) | 587 | 850 | 19 | 299 | 605 | 348 | 0 | 749 | 504 | 448 | 886 | 530 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 638 | 924 | 21 | 325 | 658 | 378 | 0 | 814 | 548 | 487 | 963 | 576 |
| Lane Group Flow (vph) | 638 | 945 | 0 | 325 | 658 | 378 | 0 | 814 | 548 | 487 | 963 | 576 |
| Turn Type | Prot | | | Prot | | Free | | | custom | Prot | | Perm |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | | | | | | Free | | | 4 1 | | | 8 |
| Minimum Split (s) | 10.0 | 22.0 | | 10.0 | 22.0 | | | 22.0 | | 10.0 | 22.0 | 22.0 |
| Total Split (s) | 30.0 | 32.0 | 0.0 | 30.0 | 32.0 | 0.0 | 0.0 | 32.0 | 62.0 | 26.0 | 58.0 | 58.0 |
| Total Split (%) | 25% | 27% | 0% | 25% | 27% | 0% | 0% | 27% | 52% | 22% | 48% | 48% |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | | Lag | | Lead | | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | | Yes | | Yes | | |
| Act Effct Green (s) | 26.0 | 28.0 | | 26.0 | 28.0 | 120.0 | | 28.0 | 58.0 | 22.0 | 54.0 | 54.0 |
| Actuated g/C Ratio | 0.22 | 0.23 | | 0.22 | 0.23 | 1.00 | | 0.23 | 0.48 | 0.18 | 0.45 | 0.45 |
| v/c Ratio | 0.89 | 1.15 | | 0.47 | 0.80 | 0.21 | | 0.99 | 0.71 | 0.80 | 0.60 | 0.52 |
| Uniform Delay, d1 | 45.6 | 45.9 | | 41.0 | 43.3 | 0.0 | | 45.8 | 23.5 | 46.9 | 24.9 | 1.3 |
| Delay | 52.1 | 112.1 | | 41.3 | 44.2 | 0.0 | | 65.9 | 24.4 | 49.4 | 25.2 | 2.6 |
| LOS | D | F | | D | D | A | | E | C | D | C | A |
| Approach Delay | | 87.9 | | | 31.3 | | | 49.2 | | | 24.6 | |
| Approach LOS | | F | | | C | | | D | | | C | |
| Queue Length 50th (ft) | 248 | ~452 | | 113 | 254 | 0 | | 332 | 315 | 188 | 290 | 16 |
| Queue Length 95th (ft) | #348 | #586 | | 159 | 325 | 0 | | #467 | 455 | #254 | 359 | 86 |
| Internal Link Dist (ft) | | 400 | | | 277 | | | 390 | | | 373 | |
| 50th Up Block Time (%) | | 13% | | | | | | | | | | |
| 95th Up Block Time (%) | | 36% | | | 12% | | | 17% | 12% | | | |
| Turn Bay Length (ft) | | | | 125 | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | | | |
| 95th Bay Block Time % | | | | 19% | | | | | | | | |

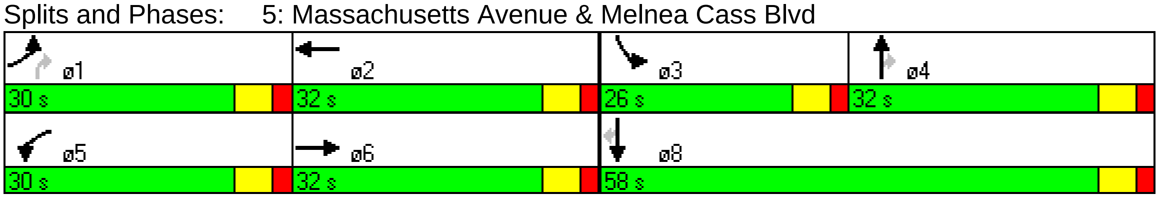
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Queuing Penalty (veh) | | | | 15 | | | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 120 | |
| Actuated Cycle Length: 120 | |
| Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green | |
| Natural Cycle: 90 | |
| Control Type: Pretimed | |
| Maximum v/c Ratio: 1.15 | |
| Intersection Signal Delay: 47.1 | Intersection LOS: D |
| Intersection Capacity Utilization 86.1% | ICU Level of Service D |

~ 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: 5: Massachusetts Avenue & Melnea Cass Blvd

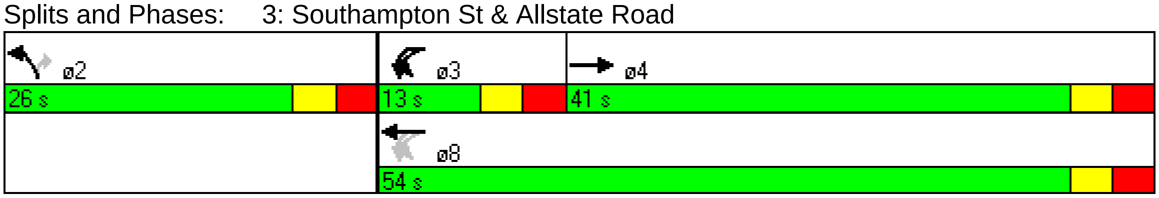


| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NWL | NWR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | | 9 | 9 | 15 | 15 | | 15 | 9 | 15 | 9 |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.908 | | | | | | | 0.850 | | |
| Flt Protected | | | | | | 0.980 | 0.950 | | | |
| Satd. Flow (prot) | 3214 | 0 | 0 | 0 | 0 | 3468 | 1770 | 1583 | 0 | 0 |
| Flt Permitted | | | | | | 0.546 | 0.950 | | | |
| Satd. Flow (perm) | 3214 | 0 | 0 | 0 | 0 | 1932 | 1770 | 1583 | 0 | 0 |
| Right Turn on Red | | | Yes | | | | | | | Yes |
| Satd. Flow (RTOR) | 14 | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | 30 | | | | | 30 | 30 | | 30 | |
| Link Distance (ft) | 299 | | | | | 536 | 224 | | 210 | |
| Travel Time (s) | 6.8 | | | | | 12.2 | 5.1 | | 4.8 | |
| Volume (vph) | 438 | 621 | 84 | 30 | 271 | 447 | 78 | 191 | 0 | 0 |
| Peak Hour Factor | 0.88 | 0.88 | 0.88 | 0.90 | 0.90 | 0.90 | 0.91 | 0.91 | 0.92 | 0.92 |
| Adj. Flow (vph) | 498 | 706 | 95 | 33 | 301 | 497 | 86 | 210 | 0 | 0 |
| Lane Group Flow (vph) | 1299 | 0 | 0 | 0 | 0 | 831 | 86 | 210 | 0 | 0 |
| Turn Type | | | | pm+pt | pm+pt | | | Perm | | |
| Protected Phases | 4 | | | 3 | 3 | 8 | 2 | | | |
| Permitted Phases | | | | 8 | 8 | | | 2 | | |
| Minimum Split (s) | 22.0 | | | 10.0 | 10.0 | 22.0 | 22.0 | 22.0 | | |
| Total Split (s) | 41.0 | 0.0 | 0.0 | 13.0 | 13.0 | 54.0 | 26.0 | 26.0 | 0.0 | 0.0 |
| Total Split (%) | 51% | 0% | 0% | 16% | 16% | 68% | 33% | 33% | 0% | 0% |
| Maximum Green (s) | 35.0 | | | 7.0 | 7.0 | 48.0 | 20.0 | 20.0 | | |
| Yellow Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| All-Red Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| Lead/Lag | Lag | | | Lead | Lead | | | | | |
| Lead-Lag Optimize? | Yes | | | Yes | Yes | | | | | |
| Walk Time (s) | 5.0 | | | | | 5.0 | 5.0 | 5.0 | | |
| Flash Dont Walk (s) | 11.0 | | | | | 11.0 | 11.0 | 11.0 | | |
| Pedestrian Calls (#/hr) | 0 | | | | | 0 | 0 | 0 | | |
| Act Effct Green (s) | 37.0 | | | | | 50.0 | 22.0 | 22.0 | | |
| Actuated g/C Ratio | 0.46 | | | | | 0.63 | 0.28 | 0.28 | | |
| v/c Ratio | 1.06dr | | | | | 1.14dl | 0.18 | 0.48 | | |
| Uniform Delay, d1 | 19.1 | | | | | 7.4 | 22.1 | 24.2 | | |
| Delay | 22.0 | | | | | 7.7 | 22.6 | 24.9 | | |
| LOS | C | | | | | A | C | C | | |
| Approach Delay | 22.0 | | | | | 7.7 | 24.2 | | | |
| Approach LOS | C | | | | | A | C | | | |
| Queue Length 50th (ft) | 291 | | | | | 96 | 33 | 87 | | |
| Queue Length 95th (ft) | 373 | | | | | 129 | 68 | 152 | | |
| Internal Link Dist (ft) | 219 | | | | | 456 | 144 | | 130 | |
| 50th Up Block Time (%) | 17% | | | | | | | | | |
| 95th Up Block Time (%) | 25% | | | | | | | 11% | | |
| Turn Bay Length (ft) | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | |

| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NWL | NWR |
|---|---|---|---|---|---|---|---|---|---|---|
| 95th Bay Block Time % | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 80 | |
| Actuated Cycle Length: 80 | |
| Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green | |
| Natural Cycle: 65 | |
| Control Type: Pretimed | |
| Maximum v/c Ratio: 0.87 | |
| Intersection Signal Delay: 17.4 | Intersection LOS: B |
| Intersection Capacity Utilization 86.0% | ICU Level of Service D |
| dl Defacto Left Lane. Recode with 1 though lane as a left lane. | |
| dr Defacto Right Lane. Recode with 1 though lane as a right lane. | |

Splits and Phases: 3: Southampton St & Allstate Road

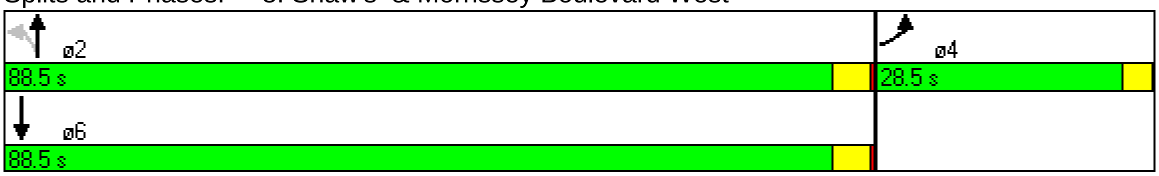


| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 16 | 10 | 10 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Leading Detector (ft) | 50 | | 50 | 50 | 50 | |
| Trailing Detector (ft) | 0 | | 0 | 0 | 0 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 |
| Frt | 0.940 | | | | 0.999 | |
| Flt Protected | 0.973 | | | | | |
| Satd. Flow (prot) | 1704 | 0 | 0 | 2111 | 3300 | 0 |
| Flt Permitted | 0.973 | | | | | |
| Satd. Flow (perm) | 1704 | 0 | 0 | 2111 | 3300 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | 31 | | | | 2 | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 0.85 | 1.09 | 1.09 |
| Link Speed (mph) | 15 | | | 30 | 30 | |
| Link Distance (ft) | 320 | | | 283 | 805 | |
| Travel Time (s) | 14.5 | | | 6.4 | 18.3 | |
| Volume (vph) | 78 | 63 | 0 | 27 | 791 | 6 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 85 | 68 | 0 | 29 | 860 | 7 |
| Lane Group Flow (vph) | 153 | 0 | 0 | 29 | 867 | 0 |
| Turn Type | | | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Detector Phases | 4 | | 2 | 2 | 6 | |
| Minimum Initial (s) | 3.5 | | 4.0 | 4.0 | 4.0 | |
| Minimum Split (s) | 8.0 | | 20.5 | 20.5 | 20.5 | |
| Total Split (s) | 28.5 | 0.0 | 88.5 | 88.5 | 88.5 | 0.0 |
| Total Split (%) | 24% | 0% | 76% | 76% | 76% | 0% |
| Yellow Time (s) | 3.0 | | 4.0 | 4.0 | 4.0 | |
| All-Red Time (s) | 0.5 | | 0.5 | 0.5 | 0.5 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | None | | Max | Max | Max | |
| Act Effct Green (s) | 13.0 | | | 92.2 | 92.2 | |
| Actuated g/C Ratio | 0.11 | | | 0.82 | 0.82 | |
| v/c Ratio | 0.69 | | | 0.02 | 0.32 | |
| Uniform Delay, d1 | 38.1 | | | 2.0 | 2.6 | |
| Delay | 35.0 | | | 2.7 | 3.0 | |
| LOS | D | | | A | A | |
| Approach Delay | 35.0 | | | 2.7 | 3.0 | |
| Approach LOS | D | | | A | A | |
| Queue Length 50th (ft) | 84 | | | 3 | 53 | |
| Queue Length 95th (ft) | 146 | | | 11 | 99 | |
| Internal Link Dist (ft) | 240 | | | 203 | 725 | |
| 50th Up Block Time (%) | | | | | | |
| 95th Up Block Time (%) | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Turn Bay Length (ft) | | | | | | |
| 50th Bay Block Time % | | | | | | |
| 95th Bay Block Time % | | | | | | |
| Queuing Penalty (veh) | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 117 | |
| Actuated Cycle Length: 113.1 | |
| Natural Cycle: 40 | |
| Control Type: Semi Act-Uncoord | |
| Maximum v/c Ratio: 0.69 | |
| Intersection Signal Delay: 7.7 | Intersection LOS: A |
| Intersection Capacity Utilization 39.5% | ICU Level of Service A |

Splits and Phases: 8: Shaw's & Morrissey Boulevard West

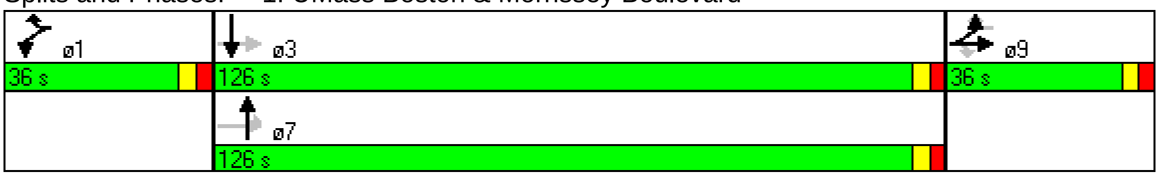


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 10 | 11 | 12 | 11 | 11 | 12 | 12 | 12 | 16 | 12 | 12 | 12 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 20 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.91 | 0.91 | 1.00 | 0.97 | 1.00 | 0.88 | 1.00 | 0.91 | 1.00 | 1.00 | 0.91 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | |
| Flt Protected | | 0.984 | | 0.950 | | | | | | | | |
| Satd. Flow (prot) | 0 | 4837 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Flt Permitted | | 0.984 | | 0.950 | | | | | | | | |
| Satd. Flow (perm) | 0 | 4837 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 47 | | | 199 | | | 200 | | | |
| Headway Factor | 1.09 | 1.04 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 129 | | | 680 | | | 324 | | | 604 | |
| Travel Time (s) | | 2.9 | | | 15.5 | | | 7.4 | | | 13.7 | |
| Volume (vph) | 141 | 275 | 666 | 417 | 0 | 208 | 0 | 901 | 182 | 0 | 1184 | 0 |
| Peak Hour Factor | 0.94 | 0.90 | 0.92 | 0.69 | 0.92 | 0.76 | 0.92 | 0.96 | 0.91 | 0.92 | 0.87 | 0.92 |
| Adj. Flow (vph) | 150 | 306 | 724 | 604 | 0 | 274 | 0 | 939 | 200 | 0 | 1361 | 0 |
| Lane Group Flow (vph) | 0 | 456 | 724 | 604 | 0 | 274 | 0 | 939 | 200 | 0 | 1361 | 0 |
| Turn Type | Split | | Perm | custom | | custom | | | Perm | | | |
| Protected Phases | 9 | 9 | | 1 | | 1 | | 7! | | | 3! | |
| Permitted Phases | | 3 7! | 9 | 1 | | 9 1 | | | 7 | | | |
| Minimum Split (s) | 10.0 | 10.0 | 10.0 | 10.0 | | 10.0 | | 22.0 | 22.0 | | 22.0 | |
| Total Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 0.0 | 36.0 | 0.0 | 126.0 | 126.0 | 0.0 | 126.0 | 0.0 |
| Total Split (%) | 18% | 18% | 18% | 18% | 0% | 18% | 0% | 64% | 64% | 0% | 64% | 0% |
| Yellow Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Act Effct Green (s) | | 158.0 | 32.1 | 32.1 | | 67.9 | | 122.0 | 122.0 | | 122.0 | |
| Actuated g/C Ratio | | 0.80 | 0.16 | 0.16 | | 0.34 | | 0.62 | 0.62 | | 0.62 | |
| v/c Ratio | | 0.12 | 2.45 | 1.13 | | 0.25 | | 0.30 | 0.17 | | 0.43 | |
| Uniform Delay, d1 | | 4.5 | 69.7 | 83.0 | | 12.0 | | 17.9 | 0.0 | | 19.9 | |
| Delay | | 4.5 | 376.6 | 142.1 | | 12.7 | | 18.0 | 1.7 | | 20.0 | |
| LOS | | A | F | F | | B | | B | A | | C | |
| Approach Delay | | 232.8 | | | | | | 15.1 | | | 20.0 | |
| Approach LOS | | F | | | | | | B | | | C | |
| Queue Length 50th (ft) | | 43 | ~1511 | ~466 | | 37 | | 205 | 0 | | 330 | |
| Queue Length 95th (ft) | | 53 | #1778 | 365 | | 49 | | 232 | 34 | | 347 | |
| Internal Link Dist (ft) | | 49 | | | 600 | | | 244 | | | 524 | |
| 50th Up Block Time (%) | | | 83% | | | | | | | | | |
| 95th Up Block Time (%) | | 3% | 84% | | | | | | | | | |
| Turn Bay Length (ft) | | | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |

Intersection Summary

Area Type: Other
Cycle Length: 198
Actuated Cycle Length: 198
Offset: 4 (2%), Referenced to phase 6:, Start of Green
Natural Cycle: 65
Control Type: Pretimed
Maximum v/c Ratio: 2.45
Intersection Signal Delay: 89.6 — Intersection LOS: F
Intersection Capacity Utilization 98.4% — ICU Level of Service E
~ 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.
! Phase conflict between lane groups.

Splits and Phases: 1: UMass Boston & Morrissey Boulevard



# Appendix D – Synchro Analysis of No Build Situation

# AM Peak Hour

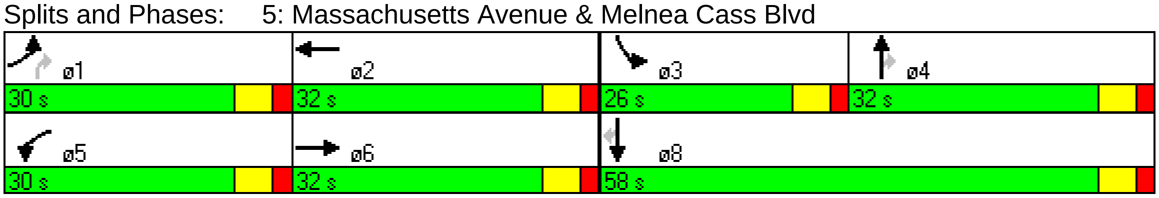
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 11 | 12 | 14 | 10 | 12 | 16 | 11 | 12 | 12 | 11 | 12 | 16 |
| Storage Length (ft) | 0 | | 0 | 100 | | 0 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 2 | | 0 | 1 | | 1 | 0 | | 1 | 2 | | 1 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 15 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.97 | 0.95 | 0.95 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | | | | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 3539 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Flt Permitted | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 3539 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | | 288 | | | 50 | | | 525 |
| Headway Factor | 1.04 | 1.00 | 0.92 | 1.09 | 1.00 | 0.85 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 0.85 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 480 | | | 505 | | | 470 | | | 453 | |
| Travel Time (s) | | 10.9 | | | 11.5 | | | 10.7 | | | 10.3 | |
| Volume (vph) | 413 | 438 | 0 | 460 | 887 | 408 | 0 | 947 | 453 | 484 | 1070 | 579 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 449 | 476 | 0 | 500 | 964 | 443 | 0 | 1029 | 492 | 526 | 1163 | 629 |
| Lane Group Flow (vph) | 449 | 476 | 0 | 500 | 964 | 443 | 0 | 1029 | 492 | 526 | 1163 | 629 |
| Turn Type | Prot | | | Prot | | Free | | | custom | Prot | | Perm |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | | | | | | Free | | | 4 1 | | | 8 |
| Minimum Split (s) | 10.0 | 22.0 | | 10.0 | 22.0 | | | 22.0 | | 10.0 | 22.0 | 22.0 |
| Total Split (s) | 30.0 | 32.0 | 0.0 | 30.0 | 32.0 | 0.0 | 0.0 | 32.0 | 62.0 | 26.0 | 58.0 | 58.0 |
| Total Split (%) | 25% | 27% | 0% | 25% | 27% | 0% | 0% | 27% | 52% | 22% | 48% | 48% |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | | Lag | | Lead | | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | | Yes | | Yes | | |
| Act Effct Green (s) | 26.0 | 28.0 | | 26.0 | 28.0 | 120.0 | | 28.0 | 58.0 | 22.0 | 54.0 | 54.0 |
| Actuated g/C Ratio | 0.22 | 0.23 | | 0.22 | 0.23 | 1.00 | | 0.23 | 0.48 | 0.18 | 0.45 | 0.45 |
| v/c Ratio | 0.62 | 0.58 | | 0.72 | 1.17 | 0.25 | | 1.25 | 0.62 | 0.87 | 0.73 | 0.57 |
| Uniform Delay, d1 | 42.6 | 40.7 | | 43.6 | 46.0 | 0.0 | | 46.0 | 20.2 | 47.5 | 27.0 | 3.3 |
| Delay | 43.0 | 41.1 | | 44.0 | 119.4 | 0.0 | | 144.3 | 20.9 | 53.5 | 27.4 | 4.1 |
| LOS | D | D | | D | F | A | | F | C | D | C | A |
| Approach Delay | | 42.0 | | | 71.9 | | | 104.4 | | | 27.0 | |
| Approach LOS | | D | | | E | | | F | | | C | |
| Queue Length 50th (ft) | 163 | 172 | | 186 | ~467 | 0 | | ~522 | 247 | 205 | 380 | 44 |
| Queue Length 95th (ft) | 219 | 230 | | 247 | #600 | 0 | | #655 | 364 | #295 | 463 | 141 |
| Internal Link Dist (ft) | | 400 | | | 425 | | | 390 | | | 373 | |
| 50th Up Block Time (%) | | | | | 9% | | | 26% | | | 3% | |
| 95th Up Block Time (%) | | | | | 30% | | | 41% | 2% | | 13% | |
| Turn Bay Length (ft) | | | | 100 | | | | | | | | |
| 50th Bay Block Time % | | | | 38% | | | | | | | | |
| 95th Bay Block Time % | | | | 48% | | | | | | | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Queuing Penalty (veh) | | | | 107 | | | | | | | | |

**Intersection Summary**

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 100
Control Type: Pretimed
Maximum v/c Ratio: 1.25
Intersection Signal Delay: 59.6 Intersection LOS: E
Intersection Capacity Utilization 96.3% ICU Level of Service E
~ 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.

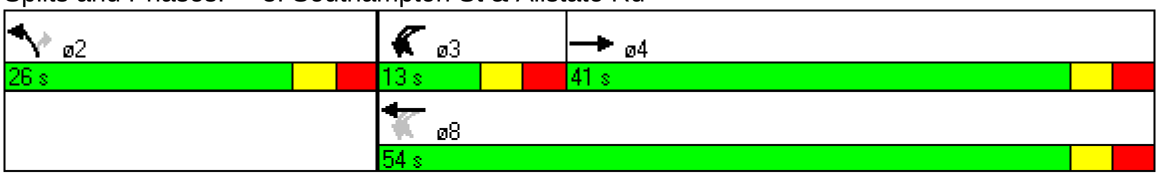
Splits and Phases: 5: Massachusetts Avenue & Melnea Cass Blvd



| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NWL | NWR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | | 9 | 9 | 15 | 15 | | 15 | 9 | 15 | 9 |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.956 | | | | | | | 0.850 | | |
| Flt Protected | | | | | | 0.992 | 0.950 | | | |
| Satd. Flow (prot) | 3383 | 0 | 0 | 0 | 0 | 3511 | 1770 | 1583 | 0 | 0 |
| Flt Permitted | | | | | | 0.635 | 0.950 | | | |
| Satd. Flow (perm) | 3383 | 0 | 0 | 0 | 0 | 2247 | 1770 | 1583 | 0 | 0 |
| Right Turn on Red | | | Yes | | | | | | | Yes |
| Satd. Flow (RTOR) | 7 | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | 30 | | | | | 30 | 30 | | 30 | |
| Link Distance (ft) | 299 | | | | | 536 | 224 | | 210 | |
| Travel Time (s) | 6.8 | | | | | 12.2 | 5.1 | | 4.8 | |
| Volume (vph) | 415 | 150 | 25 | 56 | 116 | 948 | 127 | 195 | 0 | 0 |
| Peak Hour Factor | 0.87 | 0.87 | 0.87 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 |
| Adj. Flow (vph) | 477 | 172 | 29 | 66 | 136 | 1115 | 149 | 229 | 0 | 0 |
| Lane Group Flow (vph) | 678 | 0 | 0 | 0 | 0 | 1317 | 149 | 229 | 0 | 0 |
| Turn Type | | | | pm+pt | pm+pt | | | Perm | | |
| Protected Phases | 4 | | | 3 | 3 | 8 | 2 | | | |
| Permitted Phases | | | | 8 | 8 | | | 2 | | |
| Minimum Split (s) | 22.0 | | | 10.0 | 10.0 | 22.0 | 22.0 | 22.0 | | |
| Total Split (s) | 41.0 | 0.0 | 0.0 | 13.0 | 13.0 | 54.0 | 26.0 | 26.0 | 0.0 | 0.0 |
| Total Split (%) | 51% | 0% | 0% | 16% | 16% | 68% | 33% | 33% | 0% | 0% |
| Yellow Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| All-Red Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| Lead/Lag | Lag | | | Lead | Lead | | | | | |
| Lead-Lag Optimize? | Yes | | | Yes | Yes | | | | | |
| Act Effct Green (s) | 37.0 | | | | | 50.0 | 22.0 | 22.0 | | |
| Actuated g/C Ratio | 0.46 | | | | | 0.63 | 0.28 | 0.28 | | |
| v/c Ratio | 0.43 | | | | | 0.85 | 0.31 | 0.53 | | |
| Uniform Delay, d1 | 14.3 | | | | | 10.1 | 22.9 | 24.6 | | |
| Delay | 14.5 | | | | | 12.6 | 23.5 | 25.3 | | |
| LOS | B | | | | | B | C | C | | |
| Approach Delay | 14.5 | | | | | 12.6 | 24.6 | | | |
| Approach LOS | B | | | | | B | C | | | |
| Queue Length 50th (ft) | 113 | | | | | 185 | 59 | 97 | | |
| Queue Length 95th (ft) | 150 | | | | | 219 | 101 | 155 | | |
| Internal Link Dist (ft) | 219 | | | | | 456 | 144 | | 130 | |
| 50th Up Block Time (%) | | | | | | | | | | |
| 95th Up Block Time (%) | | | | | | | | 12% | | |
| Turn Bay Length (ft) | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | |

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green
Natural Cycle: 65
Control Type: Pretimed
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 15.0 Intersection LOS: B
Intersection Capacity Utilization 80.5% ICU Level of Service D

Splits and Phases: 3: Southampton St & Allstate Rd

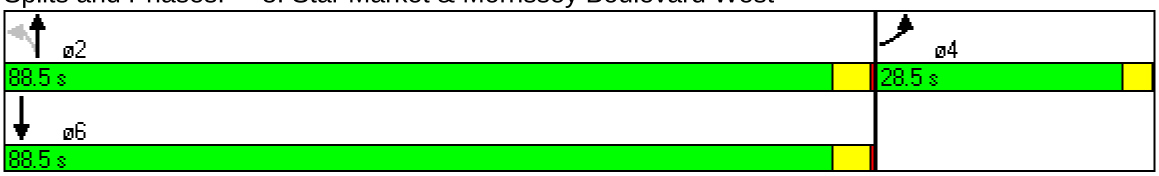


| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 16 | 10 | 10 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Leading Detector (ft) | 50 | | 50 | 50 | 50 | |
| Trailing Detector (ft) | 0 | | 0 | 0 | 0 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 |
| Frt | 0.934 | | | | | |
| Flt Protected | 0.975 | | | | | |
| Satd. Flow (prot) | 1696 | 0 | 0 | 2111 | 3303 | 0 |
| Flt Permitted | 0.975 | | | | | |
| Satd. Flow (perm) | 1696 | 0 | 0 | 2111 | 3303 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | 21 | | | | 1 | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 0.85 | 1.09 | 1.09 |
| Link Speed (mph) | 15 | | | 30 | 30 | |
| Link Distance (ft) | 320 | | | 283 | 805 | |
| Travel Time (s) | 14.5 | | | 6.4 | 18.3 | |
| Volume (vph) | 20 | 19 | 0 | 5 | 610 | 2 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 22 | 21 | 0 | 5 | 663 | 2 |
| Lane Group Flow (vph) | 43 | 0 | 0 | 5 | 665 | 0 |
| Turn Type | | | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Detector Phases | 4 | | 2 | 2 | 6 | |
| Minimum Initial (s) | 3.5 | | 4.0 | 4.0 | 4.0 | |
| Minimum Split (s) | 8.0 | | 20.5 | 20.5 | 20.5 | |
| Total Split (s) | 28.5 | 0.0 | 88.5 | 88.5 | 88.5 | 0.0 |
| Total Split (%) | 24% | 0% | 76% | 76% | 76% | 0% |
| Yellow Time (s) | 3.0 | | 4.0 | 4.0 | 4.0 | |
| All-Red Time (s) | 0.5 | | 0.5 | 0.5 | 0.5 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | None | | Max | Max | Max | |
| Act Effct Green (s) | 6.6 | | | 110.4 | 110.4 | |
| Actuated g/C Ratio | 0.05 | | | 0.92 | 0.92 | |
| v/c Ratio | 0.39 | | | 0.00 | 0.22 | |
| Uniform Delay, d1 | 29.2 | | | 0.6 | 0.8 | |
| Delay | 27.1 | | | 1.2 | 0.9 | |
| LOS | C | | | A | A | |
| Approach Delay | 27.1 | | | 1.2 | 0.9 | |
| Approach LOS | C | | | A | A | |
| Queue Length 50th (ft) | 17 | | | 0 | 17 | |
| Queue Length 95th (ft) | 54 | | | 2 | 33 | |
| Internal Link Dist (ft) | 240 | | | 203 | 725 | |
| 50th Up Block Time (%) | | | | | | |
| 95th Up Block Time (%) | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Turn Bay Length (ft) | | | | | | |
| 50th Bay Block Time % | | | | | | |
| 95th Bay Block Time % | | | | | | |
| Queuing Penalty (veh) | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 117 | |
| Actuated Cycle Length: 119.7 | |
| Natural Cycle: 40 | |
| Control Type: Semi Act-Uncoord | |
| Maximum v/c Ratio: 0.39 | |
| Intersection Signal Delay: 2.5 | Intersection LOS: A |
| Intersection Capacity Utilization 28.4% | ICU Level of Service A |

Splits and Phases: 8: Star Market & Morrissey Boulevard West

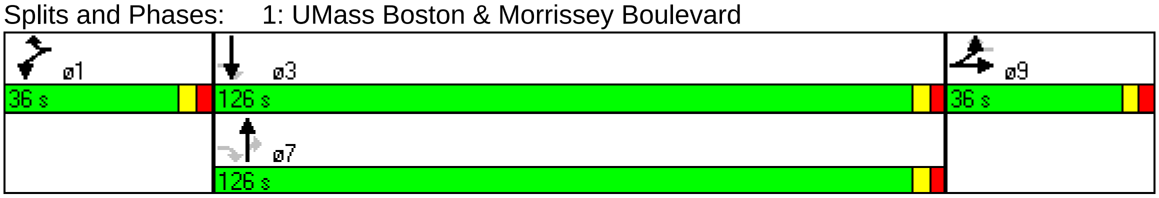


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 10 | 11 | 12 | 11 | 11 | 12 | 12 | 12 | 16 | 12 | 12 | 12 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 20 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.91 | 0.91 | 1.00 | 0.97 | 1.00 | 0.88 | 1.00 | 0.91 | 1.00 | 1.00 | 0.91 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | |
| Flt Protected | | 0.982 | | 0.950 | | | | | | | | |
| Satd. Flow (prot) | 0 | 4827 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Flt Permitted | | 0.982 | | 0.950 | | | | | | | | |
| Satd. Flow (perm) | 0 | 4827 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 478 | | | 1 | | | 200 | | | |
| Headway Factor | 1.09 | 1.04 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 129 | | | 680 | | | 766 | | | 1053 | |
| Travel Time (s) | | 2.9 | | | 15.5 | | | 17.4 | | | 23.9 | |
| Volume (vph) | 277 | 440 | 440 | 165 | 0 | 93 | 0 | 3331 | 443 | 0 | 250 | 0 |
| Peak Hour Factor | 0.94 | 0.90 | 0.92 | 0.69 | 0.92 | 0.76 | 0.92 | 0.96 | 0.91 | 0.92 | 0.87 | 0.92 |
| Adj. Flow (vph) | 295 | 489 | 478 | 239 | 0 | 122 | 0 | 3470 | 487 | 0 | 287 | 0 |
| Lane Group Flow (vph) | 0 | 784 | 478 | 239 | 0 | 122 | 0 | 3470 | 487 | 0 | 287 | 0 |
| Turn Type | Split | | custom | custom | | custom | | | Perm | | | |
| Protected Phases | 9 | 9 | | 1 | | 1 | | 7 | | | 3 | |
| Permitted Phases | | 9 | 3 7 | 1 | | 9 1 | | | 7 | | | |
| Minimum Split (s) | 10.0 | 10.0 | | 10.0 | | 10.0 | | 22.0 | 22.0 | | 22.0 | |
| Total Split (s) | 36.0 | 36.0 | 252.0 | 36.0 | 0.0 | 36.0 | 0.0 | 126.0 | 126.0 | 0.0 | 126.0 | 0.0 |
| Total Split (%) | 18% | 18% | 127% | 18% | 0% | 18% | 0% | 64% | 64% | 0% | 64% | 0% |
| Yellow Time (s) | 3.0 | 3.0 | | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| All-Red Time (s) | 3.0 | 3.0 | | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Act Effct Green (s) | | 32.1 | 122.0 | 32.1 | | 67.9 | | 122.0 | 122.0 | | 122.0 | |
| Actuated g/C Ratio | | 0.16 | 0.62 | 0.16 | | 0.34 | | 0.62 | 0.62 | | 0.62 | |
| v/c Ratio | | 1.06dl | 0.41 | 0.45 | | 0.13 | | 1.11 | 0.41 | | 0.09 | |
| Uniform Delay, d1 | | 83.0 | 0.0 | 74.9 | | 44.2 | | 38.0 | 10.5 | | 15.4 | |
| Delay | | 106.0 | 1.1 | 75.3 | | 44.5 | | 93.2 | 10.7 | | 15.5 | |
| LOS | | F | A | E | | D | | F | B | | B | |
| Approach Delay | | 66.3 | | | | | | 83.1 | | | 15.5 | |
| Approach LOS | | E | | | | | | F | | | B | |
| Queue Length 50th (ft) | | ~383 | 0 | 147 | | 61 | | ~1879 | 180 | | 54 | |
| Queue Length 95th (ft) | | #485 | 45 | 147 | | 77 | | #1903 | 259 | | 67 | |
| Internal Link Dist (ft) | | 49 | | | 600 | | | 686 | | | 973 | |
| 50th Up Block Time (%) | | 72% | | | | | | 29% | | | | |
| 95th Up Block Time (%) | | 75% | 2% | | | | | 29% | | | | |
| Turn Bay Length (ft) | | | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |

Intersection Summary

Area Type: Other
Cycle Length: 198
Actuated Cycle Length: 198
Offset: 0 (0%), Referenced to phase 6:, Start of Green
Natural Cycle: 150
Control Type: Pretimed
Maximum v/c Ratio: 1.11
Intersection Signal Delay: 75.0 Intersection LOS: E
Intersection Capacity Utilization 100.2% ICU Level of Service F
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 1: UMass Boston & Morrissey Boulevard



# PM Peak Hour

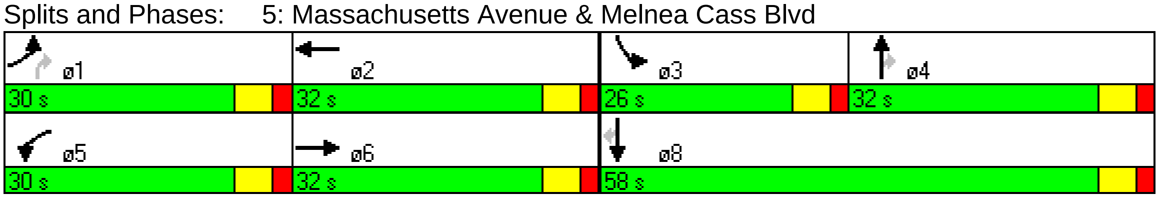
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 11 | 12 | 14 | 10 | 12 | 16 | 11 | 12 | 12 | 11 | 12 | 16 |
| Storage Length (ft) | 0 | | 0 | 125 | | 0 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 2 | | 0 | 1 | | 1 | 0 | | 1 | 2 | | 1 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.97 | 0.95 | 0.95 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | | 0.997 | | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 3529 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Flt Permitted | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 3529 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 2 | | | | 361 | | | 10 | | | 532 |
| Headway Factor | 1.04 | 1.00 | 0.92 | 1.09 | 1.00 | 0.85 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 0.85 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 480 | | | 357 | | | 470 | | | 453 | |
| Travel Time (s) | | 10.9 | | | 8.1 | | | 10.7 | | | 10.3 | |
| Volume (vph) | 642 | 929 | 21 | 327 | 661 | 380 | 0 | 819 | 551 | 490 | 968 | 579 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 698 | 1010 | 23 | 355 | 718 | 413 | 0 | 890 | 599 | 533 | 1052 | 629 |
| Lane Group Flow (vph) | 698 | 1033 | 0 | 355 | 718 | 413 | 0 | 890 | 599 | 533 | 1052 | 629 |
| Turn Type | Prot | | | Prot | | Free | | | custom | Prot | | Perm |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | | | | | | Free | | | 4 1 | | | 8 |
| Minimum Split (s) | 10.0 | 22.0 | | 10.0 | 22.0 | | | 22.0 | | 10.0 | 22.0 | 22.0 |
| Total Split (s) | 30.0 | 32.0 | 0.0 | 30.0 | 32.0 | 0.0 | 0.0 | 32.0 | 62.0 | 26.0 | 58.0 | 58.0 |
| Total Split (%) | 25% | 27% | 0% | 25% | 27% | 0% | 0% | 27% | 52% | 22% | 48% | 48% |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | 4.0 |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | 2.0 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | | Lag | | Lead | | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | | Yes | | Yes | | |
| Act Effct Green (s) | 26.0 | 28.0 | | 26.0 | 28.0 | 120.0 | | 28.0 | 58.0 | 22.0 | 54.0 | 54.0 |
| Actuated g/C Ratio | 0.22 | 0.23 | | 0.22 | 0.23 | 1.00 | | 0.23 | 0.48 | 0.18 | 0.45 | 0.45 |
| v/c Ratio | 0.97 | 1.25 | | 0.51 | 0.87 | 0.23 | | 1.08 | 0.78 | 0.88 | 0.66 | 0.57 |
| Uniform Delay, d1 | 46.6 | 45.9 | | 41.4 | 44.2 | 0.0 | | 46.0 | 25.2 | 47.7 | 25.8 | 3.0 |
| Delay | 65.3 | 146.2 | | 41.8 | 48.5 | 0.0 | | 89.9 | 26.3 | 54.6 | 26.2 | 3.9 |
| LOS | E | F | | D | D | A | | F | C | D | C | A |
| Approach Delay | | 113.6 | | | 33.4 | | | 64.3 | | | 26.7 | |
| Approach LOS | | F | | | C | | | E | | | C | |
| Queue Length 50th (ft) | 278 | ~528 | | 125 | 283 | 0 | | ~404 | 368 | 209 | 328 | 41 |
| Queue Length 95th (ft) | #401 | #665 | | 174 | #382 | 0 | | #534 | 530 | #301 | 403 | 135 |
| Internal Link Dist (ft) | | 400 | | | 277 | | | 390 | | | 373 | |
| 50th Up Block Time (%) | | 28% | | | 3% | | | 4% | 2% | | | |
| 95th Up Block Time (%) | 2% | 45% | | | 22% | | | 27% | 17% | | 6% | |
| Turn Bay Length (ft) | | | | 125 | | | | | | | | |
| 50th Bay Block Time % | | | | 3% | | | | | | | | |
| 95th Bay Block Time % | | | | 24% | | | | | | | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Queuing Penalty (veh) | | | | 24 | | | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 120 | |
| Actuated Cycle Length: 120 | |
| Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green | |
| Natural Cycle: 100 | |
| Control Type: Pretimed | |
| Maximum v/c Ratio: 1.25 | |
| Intersection Signal Delay: 58.0 | Intersection LOS: E |
| Intersection Capacity Utilization 92.9% | ICU Level of Service E |

~ 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: 5: Massachusetts Avenue & Melnea Cass Blvd

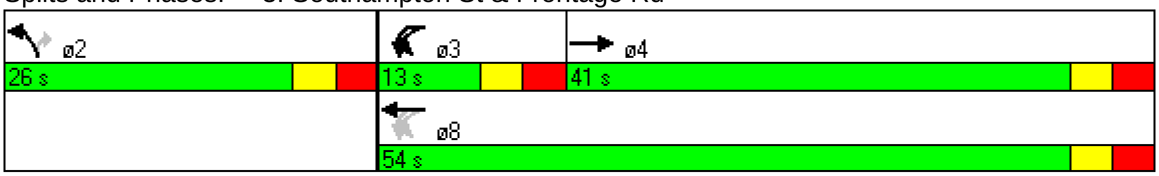


| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NBR2 | NWL | NWR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | | 20 | 9 | 15 | 15 | | 15 | 9 | 9 | 15 | 9 |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.907 | | | | | | | 0.850 | | | |
| Flt Protected | | | | | | 0.980 | 0.950 | | | | |
| Satd. Flow (prot) | 3210 | 0 | 0 | 0 | 0 | 3468 | 1770 | 1583 | 0 | 0 | 0 |
| Flt Permitted | | | | | | 0.548 | 0.950 | | | | |
| Satd. Flow (perm) | 3210 | 0 | 0 | 0 | 0 | 1939 | 1770 | 1583 | 0 | 0 | 0 |
| Right Turn on Red | | | Yes | | | | | | Yes | | Yes |
| Satd. Flow (RTOR) | 14 | | | | | | | 3 | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | 30 | | | | | 30 | 30 | | | 30 | |
| Link Distance (ft) | 299 | | | | | 536 | 224 | | | 210 | |
| Travel Time (s) | 6.8 | | | | | 12.2 | 5.1 | | | 4.8 | |
| Volume (vph) | 438 | 621 | 84 | 30 | 271 | 447 | 78 | 191 | 9 | 0 | 0 |
| Peak Hour Factor | 0.87 | 0.87 | 0.87 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 |
| Adj. Flow (vph) | 503 | 714 | 97 | 35 | 319 | 526 | 92 | 225 | 11 | 0 | 0 |
| Lane Group Flow (vph) | 1314 | 0 | 0 | 0 | 0 | 880 | 92 | 236 | 0 | 0 | 0 |
| Turn Type | | | | pm+pt | pm+pt | | | Perm | | | |
| Protected Phases | 4 | | | 3 | 3 | 8 | 2 | | | | |
| Permitted Phases | | | | 8 | 8 | | | 2 | | | |
| Minimum Split (s) | 22.0 | | | 10.0 | 10.0 | 22.0 | 22.0 | 22.0 | | | |
| Total Split (s) | 41.0 | 0.0 | 0.0 | 13.0 | 13.0 | 54.0 | 26.0 | 26.0 | 0.0 | 0.0 | 0.0 |
| Total Split (%) | 51% | 0% | 0% | 16% | 16% | 68% | 33% | 33% | 0% | 0% | 0% |
| Yellow Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | |
| All-Red Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | |
| Lead/Lag | Lag | | | Lead | Lead | | | | | | |
| Lead-Lag Optimize? | Yes | | | Yes | Yes | | | | | | |
| Act Effct Green (s) | 37.0 | | | | | 50.0 | 22.0 | 22.0 | | | |
| Actuated g/C Ratio | 0.46 | | | | | 0.63 | 0.28 | 0.28 | | | |
| v/c Ratio | 1.08dr | | | | | 1.21dl | 0.19 | 0.54 | | | |
| Uniform Delay, d1 | 19.3 | | | | | 7.6 | 22.2 | 24.3 | | | |
| Delay | 22.7 | | | | | 7.9 | 22.6 | 25.1 | | | |
| LOS | C | | | | | A | C | C | | | |
| Approach Delay | 22.7 | | | | | 7.9 | 24.4 | | | | |
| Approach LOS | C | | | | | A | C | | | | |
| Queue Length 50th (ft) | 297 | | | | | 103 | 35 | 94 | | | |
| Queue Length 95th (ft) | 372 | | | | | 127 | 67 | 150 | | | |
| Internal Link Dist (ft) | 219 | | | | | 456 | 144 | | | 130 | |
| 50th Up Block Time (%) | 18% | | | | | | | | | | |
| 95th Up Block Time (%) | 25% | | | | | | | 10% | | | |
| Turn Bay Length (ft) | | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | |

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green
Natural Cycle: 65
Control Type: Pretimed
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 17.8 Intersection LOS: B
Intersection Capacity Utilization 89.4% ICU Level of Service D
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 3: Southampton St & Frontage Rd

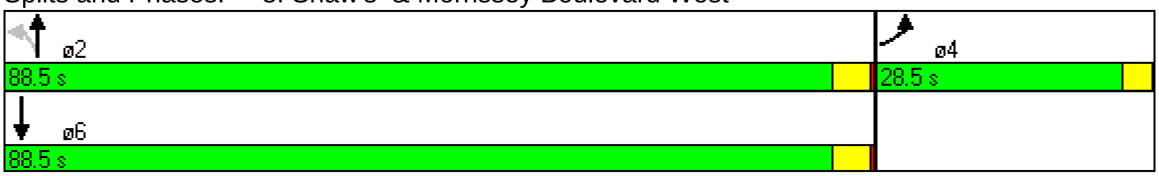


| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 16 | 10 | 10 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Leading Detector (ft) | 50 | | 50 | 50 | 50 | |
| Trailing Detector (ft) | 0 | | 0 | 0 | 0 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.95 |
| Frt | 0.939 | | | | 0.999 | |
| Flt Protected | 0.973 | | | | | |
| Satd. Flow (prot) | 1702 | 0 | 0 | 2111 | 3300 | 0 |
| Flt Permitted | 0.973 | | | | | |
| Satd. Flow (perm) | 1702 | 0 | 0 | 2111 | 3300 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | 32 | | | | 2 | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 0.85 | 1.09 | 1.09 |
| Link Speed (mph) | 15 | | | 30 | 30 | |
| Link Distance (ft) | 320 | | | 283 | 805 | |
| Travel Time (s) | 14.5 | | | 6.4 | 18.3 | |
| Volume (vph) | 85 | 69 | 0 | 30 | 865 | 7 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 92 | 75 | 0 | 33 | 940 | 8 |
| Lane Group Flow (vph) | 167 | 0 | 0 | 33 | 948 | 0 |
| Turn Type | | | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Detector Phases | 4 | | 2 | 2 | 6 | |
| Minimum Initial (s) | 3.5 | | 4.0 | 4.0 | 4.0 | |
| Minimum Split (s) | 8.0 | | 20.5 | 20.5 | 20.5 | |
| Total Split (s) | 28.5 | 0.0 | 88.5 | 88.5 | 88.5 | 0.0 |
| Total Split (%) | 24% | 0% | 76% | 76% | 76% | 0% |
| Yellow Time (s) | 3.0 | | 4.0 | 4.0 | 4.0 | |
| All-Red Time (s) | 0.5 | | 0.5 | 0.5 | 0.5 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | None | | Max | Max | Max | |
| Act Effct Green (s) | 13.8 | | | 91.2 | 91.2 | |
| Actuated g/C Ratio | 0.12 | | | 0.81 | 0.81 | |
| v/c Ratio | 0.71 | | | 0.02 | 0.36 | |
| Uniform Delay, d1 | 38.3 | | | 2.1 | 2.9 | |
| Delay | 35.6 | | | 2.9 | 3.4 | |
| LOS | D | | | A | A | |
| Approach Delay | 35.6 | | | 2.9 | 3.4 | |
| Approach LOS | D | | | A | A | |
| Queue Length 50th (ft) | 93 | | | 4 | 63 | |
| Queue Length 95th (ft) | 158 | | | 12 | 119 | |
| Internal Link Dist (ft) | 240 | | | 203 | 725 | |
| 50th Up Block Time (%) | | | | | | |
| 95th Up Block Time (%) | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
| --- | --- | --- | --- | --- | --- | --- |
| Turn Bay Length (ft) | | | | | | |
| 50th Bay Block Time % | | | | | | |
| 95th Bay Block Time % | | | | | | |
| Queuing Penalty (veh) | | | | | | |

| Intersection Summary | |
| --- | --- |
| Area Type: Other | |
| Cycle Length: 117 | |
| Actuated Cycle Length: 112.9 | |
| Natural Cycle: 40 | |
| Control Type: Semi Act-Uncoord | |
| Maximum v/c Ratio: 0.71 | |
| Intersection Signal Delay: 8.0 | Intersection LOS: A |
| Intersection Capacity Utilization 42.6% | ICU Level of Service A |

Splits and Phases: 8: Shaw's & Morrissey Boulevard West

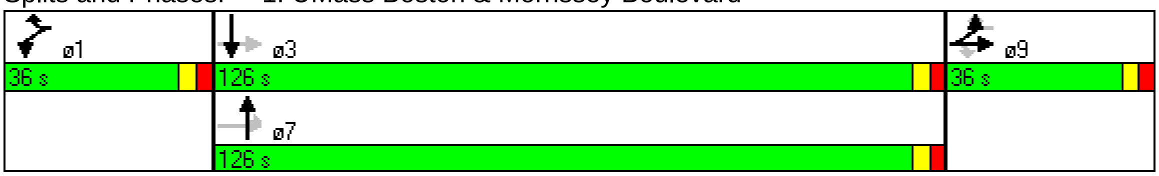


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 10 | 11 | 12 | 11 | 11 | 12 | 12 | 12 | 16 | 12 | 12 | 12 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 20 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.91 | 0.91 | 1.00 | 0.97 | 1.00 | 0.88 | 1.00 | 0.91 | 1.00 | 1.00 | 0.91 | 1.00 |
| Frt | | | 0.850 | | | 0.850 | | | 0.850 | | | |
| Flt Protected | | 0.984 | | 0.950 | | | | | | | | |
| Satd. Flow (prot) | 0 | 4837 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Flt Permitted | | 0.984 | | 0.950 | | | | | | | | |
| Satd. Flow (perm) | 0 | 4837 | 1583 | 3319 | 0 | 2787 | 0 | 5085 | 1794 | 0 | 5085 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 35 | | | 160 | | | 219 | | | |
| Headway Factor | 1.09 | 1.04 | 1.00 | 1.04 | 1.04 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 129 | | | 680 | | | 324 | | | 604 | |
| Travel Time (s) | | 2.9 | | | 15.5 | | | 7.4 | | | 13.7 | |
| Volume (vph) | 154 | 301 | 728 | 456 | 0 | 227 | 0 | 985 | 199 | 0 | 1295 | 0 |
| Peak Hour Factor | 0.94 | 0.90 | 0.92 | 0.69 | 0.92 | 0.76 | 0.92 | 0.96 | 0.91 | 0.92 | 0.87 | 0.92 |
| Adj. Flow (vph) | 164 | 334 | 791 | 661 | 0 | 299 | 0 | 1026 | 219 | 0 | 1489 | 0 |
| Lane Group Flow (vph) | 0 | 498 | 791 | 661 | 0 | 299 | 0 | 1026 | 219 | 0 | 1489 | 0 |
| Turn Type | Split | | Perm | custom | | custom | | | Perm | | | |
| Protected Phases | 9 | 9 | | 1 | | 1 | | 7! | | | 3! | |
| Permitted Phases | | 3 7! | 9 | 1 | | 9 1 | | | 7 | | | |
| Minimum Split (s) | 10.0 | 10.0 | 10.0 | 10.0 | | 10.0 | | 22.0 | 22.0 | | 22.0 | |
| Total Split (s) | 36.0 | 36.0 | 36.0 | 36.0 | 0.0 | 36.0 | 0.0 | 126.0 | 126.0 | 0.0 | 126.0 | 0.0 |
| Total Split (%) | 18% | 18% | 18% | 18% | 0% | 18% | 0% | 64% | 64% | 0% | 64% | 0% |
| Yellow Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | | 3.0 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Act Effct Green (s) | | 158.0 | 32.1 | 32.1 | | 67.9 | | 122.0 | 122.0 | | 122.0 | |
| Actuated g/C Ratio | | 0.80 | 0.16 | 0.16 | | 0.34 | | 0.62 | 0.62 | | 0.62 | |
| v/c Ratio | | 0.13 | 2.78 | 1.23 | | 0.28 | | 0.33 | 0.18 | | 0.48 | |
| Uniform Delay, d1 | | 4.5 | 72.8 | 83.0 | | 20.9 | | 18.3 | 0.0 | | 20.6 | |
| Delay | | 4.5 | 401.8 | 175.4 | | 21.2 | | 18.3 | 1.6 | | 20.7 | |
| LOS | | A | F | F | | C | | B | A | | C | |
| Approach Delay | | 248.3 | | | | | | 15.4 | | | 20.7 | |
| Approach LOS | | F | | | | | | B | | | C | |
| Queue Length 50th (ft) | | 47 | ~1721 | ~545 | | 72 | | 228 | 0 | | 375 | |
| Queue Length 95th (ft) | | 58 | #1988 | #432 | | 83 | | 257 | 35 | | 390 | |
| Internal Link Dist (ft) | | 49 | | | 600 | | | 244 | | | 524 | |
| 50th Up Block Time (%) | | 1% | 83% | | | | | | | | | |
| 95th Up Block Time (%) | | 4% | 84% | | | | | 2% | | | | |
| Turn Bay Length (ft) | | | | | | | | | | | | |
| 50th Bay Block Time % | | | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |

Intersection Summary

Area Type: Other
Cycle Length: 198
Actuated Cycle Length: 198
Offset: 4 (2%), Referenced to phase 6:, Start of Green
Natural Cycle: 60
Control Type: Pretimed
Maximum v/c Ratio: 2.78
Intersection Signal Delay: 98.8 Intersection LOS: F
Intersection Capacity Utilization 106.6% ICU Level of Service F
~ 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.
! Phase conflict between lane groups.

Splits and Phases: 1: UMass Boston & Morrissey Boulevard



# Appendix E – Synchro Analysis for Build

AM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 11 | 12 | 14 | 10 | 12 | 16 | 11 | 12 | 12 | 11 | 12 | 16 |
| Storage Length (ft) | 0 | | 0 | 160 | | 50 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 2 | | 0 | 1 | | 1 | 0 | | 1 | 2 | | 1 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 15 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.97 | 0.95 | 0.95 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frt | | | | | | 0.850 | | | 0.850 | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 3539 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Flt Permitted | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 3539 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3539 | 1794 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | | 79 | | | 342 | | | 440 |
| Headway Factor | 1.04 | 1.00 | 0.92 | 1.09 | 1.00 | 0.85 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 0.85 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 480 | | | 505 | | | 470 | | | 453 | |
| Travel Time (s) | | 10.9 | | | 11.5 | | | 10.7 | | | 10.3 | |
| Volume (vph) | 379 | 401 | 0 | 421 | 811 | 373 | 0 | 866 | 414 | 444 | 979 | 530 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 109% | 109% | 109% | 109% | 109% | 109% | 109% | 109% | 109% | 109% | 109% | 109% |
| Adj. Flow (vph) | 449 | 475 | 0 | 499 | 961 | 442 | 0 | 1026 | 490 | 526 | 1160 | 628 |
| Lane Group Flow (vph) | 449 | 475 | 0 | 499 | 961 | 442 | 0 | 1026 | 490 | 526 | 1160 | 628 |
| Turn Type | Prot | | | Prot | | Free | | | Perm | Prot | | Perm |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | 3 | 7 | |
| Permitted Phases | | | | | | Free | | | 4 | | | 7 |
| Minimum Split (s) | 10.0 | 22.0 | | 10.0 | 22.0 | | | 22.0 | 22.0 | 10.0 | 22.0 | 22.0 |
| Total Split (s) | 24.0 | 33.0 | 0.0 | 26.0 | 35.0 | 0.0 | 0.0 | 35.0 | 35.0 | 26.0 | 61.0 | 61.0 |
| Total Split (%) | 20% | 28% | 0% | 22% | 29% | 0% | 0% | 29% | 29% | 22% | 51% | 51% |
| 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) | 2.0 | 2.0 | | 2.0 | 2.0 | | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lead/Lag | Lead | Lag | | Lead | Lag | | | Lag | Lag | Lead | | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | | Yes | Yes | Yes | | |
| Act Effct Green (s) | 20.0 | 29.0 | | 22.0 | 31.0 | 120.0 | | 31.0 | 31.0 | 22.0 | 57.0 | 57.0 |
| Actuated g/C Ratio | 0.17 | 0.24 | | 0.18 | 0.26 | 1.00 | | 0.26 | 0.26 | 0.18 | 0.48 | 0.48 |
| v/c Ratio | 0.81 | 0.56 | | 0.85 | 1.05 | 0.25 | | 1.12 | 0.74 | 0.87 | 0.69 | 0.58 |
| Uniform Delay, d1 | 48.2 | 39.9 | | 47.4 | 44.5 | 0.0 | | 44.5 | 11.3 | 47.5 | 24.6 | 5.7 |
| Delay | 51.7 | 40.2 | | 52.7 | 79.9 | 0.0 | | 102.7 | 12.3 | 53.5 | 24.9 | 6.2 |
| LOS | D | D | | D | E | A | | F | B | D | C | A |
| Approach Delay | | 45.8 | | | 54.2 | | | 73.5 | | | 26.4 | |
| Approach LOS | | D | | | D | | | E | | | C | |
| Queue Length 50th (ft) | 174 | 170 | | 194 | ~427 | 0 | | ~482 | 103 | 205 | 360 | 86 |
| Queue Length 95th (ft) | #248 | 226 | | #279 | #558 | 0 | | #616 | 240 | #295 | 438 | 196 |
| Internal Link Dist (ft) | | 400 | | | 425 | | | 390 | | | 373 | |
| 50th Up Block Time (%) | | | | | | | | 19% | | | 1% | |
| 95th Up Block Time (%) | | | | | 24% | | | 37% | | | 10% | |
| Turn Bay Length (ft) | | | | 160 | | 50 | | | | | | |
| 50th Bay Block Time % | | | | 17% | 66% | | | | | | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95th Bay Block Time % | | | | 37% | 69% | | | | | | | |
| Queuing Penalty (veh) | | | | 66 | 296 | | | | | | | |

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 100

Control Type: Pretimed

Maximum v/c Ratio: 1.12

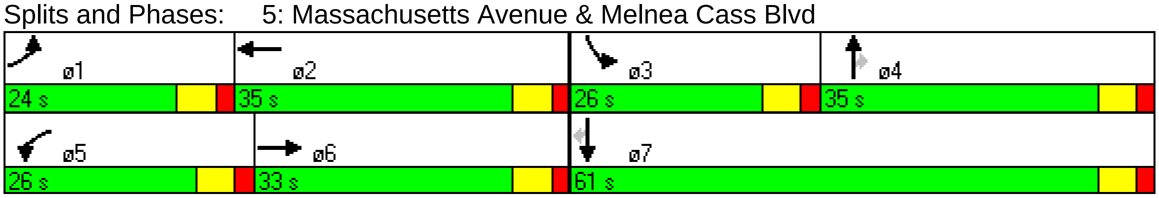
Intersection Signal Delay: 47.7 Intersection LOS: D

Intersection Capacity Utilization 96.1% ICU Level of Service E

~ 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: 5: Massachusetts Avenue & Melnea Cass Blvd

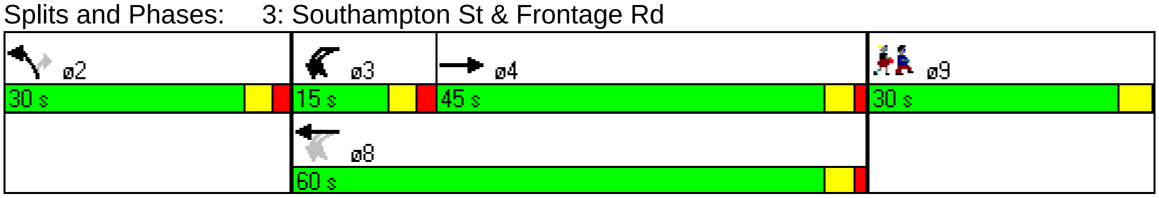


| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NWL | NWR | ø9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Leading Detector (ft) | 50 | | | 50 | 50 | 50 | 50 | 50 | | | |
| Trailing Detector (ft) | 0 | | | 0 | 0 | 0 | 0 | 0 | | | |
| Turning Speed (mph) | | 9 | 9 | 15 | 15 | | 15 | 9 | 15 | 9 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 0.956 | | | | | | | 0.850 | | | |
| Flt Protected | | | | | | 0.992 | 0.950 | | | | |
| Satd. Flow (prot) | 3383 | 0 | 0 | 0 | 0 | 3511 | 1770 | 1583 | 0 | 0 | |
| Flt Permitted | | | | | | 0.581 | 0.950 | | | | |
| Satd. Flow (perm) | 3383 | 0 | 0 | 0 | 0 | 2056 | 1770 | 1583 | 0 | 0 | |
| Right Turn on Red | | | Yes | | | | | | | Yes | |
| Satd. Flow (RTOR) | 4 | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Link Speed (mph) | 30 | | | | | 30 | 30 | | 30 | | |
| Link Distance (ft) | 299 | | | | | 536 | 224 | | 210 | | |
| Travel Time (s) | 6.8 | | | | | 12.2 | 5.1 | | 4.8 | | |
| Volume (vph) | 415 | 150 | 25 | 56 | 116 | 948 | 127 | 195 | 0 | 0 | |
| Peak Hour Factor | 0.87 | 0.87 | 0.87 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 | |
| Adj. Flow (vph) | 477 | 172 | 29 | 66 | 136 | 1115 | 149 | 229 | 0 | 0 | |
| Lane Group Flow (vph) | 678 | 0 | 0 | 0 | 0 | 1317 | 149 | 229 | 0 | 0 | |
| Turn Type | | | | pm+pt | pm+pt | | | Perm | | | |
| Protected Phases | 4 | | | 3 | 3 | 8 | 2 | | | | 9 |
| Permitted Phases | | | | 8 | 8 | | | 2 | | | |
| Detector Phases | 4 | | | 3 | 3 | 8 | 2 | 2 | | | |
| Minimum Initial (s) | 4.0 | | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | 4.0 |
| Minimum Split (s) | 35.0 | | | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | | | 22.0 |
| Total Split (s) | 45.0 | 0.0 | 0.0 | 15.0 | 15.0 | 60.0 | 30.0 | 30.0 | 0.0 | 0.0 | 30.0 |
| Total Split (%) | 38% | 0% | 0% | 13% | 13% | 50% | 25% | 25% | 0% | 0% | 25% |
| Yellow Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.5 |
| All-Red Time (s) | 1.5 | | | 2.0 | 2.0 | 1.5 | 2.0 | 2.0 | | | 0.5 |
| Lead/Lag | Lag | | | Lead | Lead | | | | | | |
| Lead-Lag Optimize? | Yes | | | Yes | Yes | | | | | | |
| Recall Mode | Max | | | Max | Max | None | None | None | | | Min |
| Act Effct Green (s) | 41.1 | | | | | 75.1 | 21.4 | 21.4 | | | |
| Actuated g/C Ratio | 0.36 | | | | | 0.66 | 0.19 | 0.19 | | | |
| v/c Ratio | 0.56 | | | | | 0.76 | 0.45 | 0.77 | | | |
| Uniform Delay, d1 | 28.9 | | | | | 10.6 | 41.1 | 43.9 | | | |
| Delay | 29.9 | | | | | 11.5 | 41.0 | 44.1 | | | |
| LOS | C | | | | | B | D | D | | | |
| Approach Delay | 29.9 | | | | | 11.5 | 42.9 | | | | |
| Approach LOS | C | | | | | B | D | | | | |
| Queue Length 50th (ft) | 210 | | | | | 264 | 98 | 161 | | | |
| Queue Length 95th (ft) | 270 | | | | | 319 | 152 | 233 | | | |
| Internal Link Dist (ft) | 219 | | | | | 456 | 144 | | 130 | | |
| 50th Up Block Time (%) | | | | | | | | 13% | | | |
| 95th Up Block Time (%) | 14% | | | | | | 9% | 33% | | | |
| Turn Bay Length (ft) | | | | | | | | | | | |

| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NWL | NWR | ø9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 50th Bay Block Time % | | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 120 | |
| Actuated Cycle Length: 114.1 | |
| Natural Cycle: 130 | |
| Control Type: Semi Act-Uncoord | |
| Maximum v/c Ratio: 0.77 | |
| Intersection Signal Delay: 21.7 | Intersection LOS: C |
| Intersection Capacity Utilization 80.5% | ICU Level of Service D |

Splits and Phases: 3: Southampton St & Frontage Rd

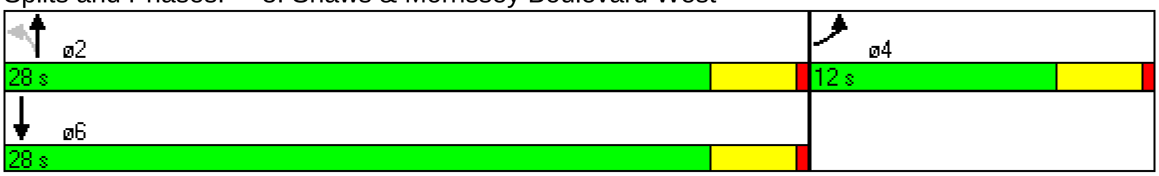


| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 16 | 10 | 10 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Leading Detector (ft) | 50 | | 50 | 50 | 50 | |
| Trailing Detector (ft) | 0 | | 0 | 0 | 0 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.934 | | | | | |
| Flt Protected | 0.975 | | | | | |
| Satd. Flow (prot) | 1696 | 0 | 0 | 2111 | 1739 | 0 |
| Flt Permitted | 0.975 | | | | | |
| Satd. Flow (perm) | 1696 | 0 | 0 | 2111 | 1739 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | 21 | | | | 1 | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 0.85 | 1.09 | 1.09 |
| Link Speed (mph) | 15 | | | 30 | 30 | |
| Link Distance (ft) | 320 | | | 283 | 805 | |
| Travel Time (s) | 14.5 | | | 6.4 | 18.3 | |
| Volume (vph) | 20 | 19 | 0 | 5 | 610 | 2 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 22 | 21 | 0 | 5 | 663 | 2 |
| Lane Group Flow (vph) | 43 | 0 | 0 | 5 | 665 | 0 |
| Turn Type | | | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Detector Phases | 4 | | 2 | 2 | 6 | |
| Minimum Initial (s) | 3.5 | | 4.0 | 4.0 | 4.0 | |
| Minimum Split (s) | 8.0 | | 20.5 | 20.5 | 20.5 | |
| Total Split (s) | 12.0 | 0.0 | 28.0 | 28.0 | 28.0 | 0.0 |
| Total Split (%) | 30% | 0% | 70% | 70% | 70% | 0% |
| Yellow Time (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| All-Red Time (s) | 0.5 | | 0.5 | 0.5 | 0.5 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | None | | Max | Max | Max | |
| Act Effct Green (s) | 7.1 | | | 76.0 | 76.0 | |
| Actuated g/C Ratio | 0.08 | | | 0.89 | 0.89 | |
| v/c Ratio | 0.28 | | | 0.00 | 0.43 | |
| Uniform Delay, d1 | 20.3 | | | 0.8 | 1.4 | |
| Delay | 9.2 | | | 2.0 | 2.1 | |
| LOS | A | | | A | A | |
| Approach Delay | 9.3 | | | 2.0 | 2.1 | |
| Approach LOS | A | | | A | A | |
| Queue Length 50th (ft) | 0 | | | 0 | 0 | |
| Queue Length 95th (ft) | 26 | | | 2 | 92 | |
| Internal Link Dist (ft) | 240 | | | 203 | 725 | |
| 50th Up Block Time (%) | | | | | | |
| 95th Up Block Time (%) | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Turn Bay Length (ft) | | | | | | |
| 50th Bay Block Time % | | | | | | |
| 95th Bay Block Time % | | | | | | |
| Queuing Penalty (veh) | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 40 | |
| Actuated Cycle Length: 85.4 | |
| Natural Cycle: 40 | |
| Control Type: Semi Act-Uncoord | |
| Maximum v/c Ratio: 0.43 | |
| Intersection Signal Delay: 2.5 | Intersection LOS: A |
| Intersection Capacity Utilization 45.0% | ICU Level of Service A |

Splits and Phases: 8: Shaws & Morrissey Boulevard West



| Lane Group | WBL | WBR | NBT | NBR | SBU | SBL | SBT | ø4 |
|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 2100 | 1900 | 1900 | 1900 | 2100 | |
| Lane Width (ft) | 11 | 11 | 12 | 16 | 10 | 10 | 12 | |
| Storage Length (ft) | 0 | 0 | | 0 | | 200 | | |
| Storage Lanes | 2 | 2 | | 1 | | 2 | | |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Turning Speed (mph) | 15 | 9 | | 9 | 9 | 15 | | |
| Lane Util. Factor | 0.97 | 0.88 | 0.91 | 1.00 | 0.91 | 0.94 | 0.91 | |
| Frt | | 0.850 | | 0.850 | | | | |
| Flt Protected | 0.950 | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 2694 | 5621 | 1794 | 0 | 4658 | 5621 | |
| Flt Permitted | 0.950 | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 2694 | 5621 | 1794 | 0 | 4658 | 5621 | |
| Right Turn on Red | | Yes | | Yes | | | | |
| Satd. Flow (RTOR) | | 55 | | 320 | | | | |
| Headway Factor | 1.04 | 1.04 | 1.00 | 0.85 | 1.09 | 1.09 | 1.00 | |
| Link Speed (mph) | 30 | | 30 | | | | 30 | |
| Link Distance (ft) | 680 | | 766 | | | | 1053 | |
| Travel Time (s) | 15.5 | | 17.4 | | | | 23.9 | |
| Volume (vph) | 165 | 93 | 3331 | 443 | 277 | 440 | 731 | |
| Peak Hour Factor | 0.69 | 0.76 | 0.96 | 0.91 | 0.92 | 0.92 | 0.87 | |
| Adj. Flow (vph) | 239 | 122 | 3470 | 487 | 301 | 478 | 840 | |
| Lane Group Flow (vph) | 239 | 122 | 3470 | 487 | 0 | 779 | 840 | |
| Turn Type | | custom | | Perm | Prot | Prot | | |
| Protected Phases | 1 | 1 | 7 | | 8 | 8 | 3 | 4 |
| Permitted Phases | 1 | 1 | | 7 | | | | |
| Minimum Split (s) | 10.5 | 10.5 | 22.0 | 22.0 | 22.5 | 22.5 | 22.0 | 31.0 |
| Total Split (s) | 13.0 | 13.0 | 64.5 | 64.5 | 22.5 | 22.5 | 47.0 | 40.0 |
| Total Split (%) | 13% | 13% | 65% | 65% | 23% | 23% | 47% | 40% |
| Yellow Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.5 |
| All-Red Time (s) | 3.5 | 3.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0.5 |
| Lead/Lag | | | Lead | Lead | Lag | Lag | Lead | Lag |
| Lead-Lag Optimize? | | | Yes | Yes | Yes | Yes | Yes | Yes |
| Act Effct Green (s) | 9.0 | 9.0 | 60.5 | 60.5 | | 18.5 | 43.0 | |
| Actuated g/C Ratio | 0.09 | 0.09 | 0.61 | 0.61 | | 0.19 | 0.43 | |
| v/c Ratio | 0.80 | 0.42 | 1.02 | 0.40 | | 0.98dl | 0.35 | |
| Uniform Delay, d1 | 44.6 | 23.3 | 19.8 | 3.0 | | 39.9 | 19.1 | |
| Delay | 53.2 | 25.0 | 37.3 | 3.2 | | 47.0 | 19.2 | |
| LOS | D | C | D | A | | D | B | |
| Approach Delay | 43.7 | | 33.1 | | | | 32.6 | |
| Approach LOS | D | | C | | | | C | |
| Queue Length 50th (ft) | 78 | 0 | ~816 | 37 | | 173 | 128 | |
| Queue Length 95th (ft) | 89 | 41 | #950 | 93 | | #245 | 153 | |
| Internal Link Dist (ft) | 600 | | 686 | | | | 973 | |
| 50th Up Block Time (%) | | | 9% | | | | | |
| 95th Up Block Time (%) | | | 16% | | | | | |
| Turn Bay Length (ft) | | | | | | 200 | | |
| 50th Bay Block Time % | | | | | | | | |
| 95th Bay Block Time % | | | | | | 19% | | |

| Lane Group | WBL | WBR | NBT | NBR | SBU | SBL | SBT | ø4 |
|---|---|---|---|---|---|---|---|---|
| Queuing Penalty (veh) | | | | | | 24 | | |

Intersection Summary

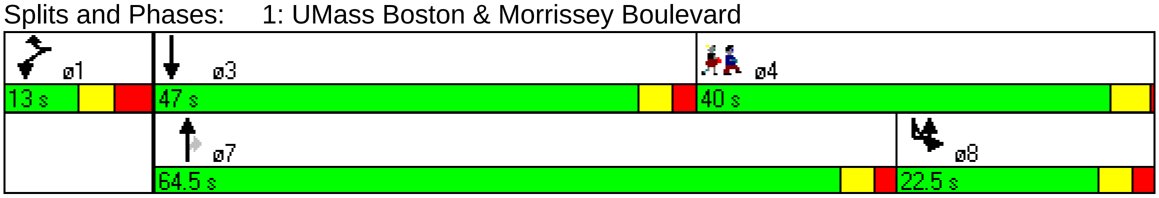
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 6:, Start of Green
Natural Cycle: 100
Control Type: Pretimed
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 33.6 — Intersection LOS: C
Intersection Capacity Utilization 92.3% — ICU Level of Service E

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 1: UMass Boston & Morrissey Boulevard



PM Peak Hour

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 11 | 12 | 14 | 10 | 12 | 16 | 11 | 12 | 12 | 11 | 12 | 16 |
| Storage Length (ft) | 0 | | 0 | 125 | | 0 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 2 | | 0 | 1 | | 1 | 0 | | 1 | 2 | | 0 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Lane Util. Factor | 0.97 | 0.95 | 0.95 | 0.97 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 0.95 |
| Frt | | 0.997 | | | | 0.850 | | | 0.850 | | 0.941 | |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 3529 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3330 | 0 |
| Flt Permitted | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 3529 | 0 | 3204 | 3539 | 1794 | 0 | 3539 | 1583 | 3319 | 3330 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 2 | | | | 369 | | | 16 | | 158 | |
| Headway Factor | 1.04 | 1.00 | 0.92 | 1.09 | 1.00 | 0.85 | 1.04 | 1.00 | 1.00 | 1.04 | 1.00 | 0.85 |
| Link Speed (mph) | | 30 | | | 30 | | | 30 | | | 30 | |
| Link Distance (ft) | | 990 | | | 707 | | | 935 | | | 794 | |
| Travel Time (s) | | 22.5 | | | 16.1 | | | 21.3 | | | 18.0 | |
| Volume (vph) | 642 | 929 | 21 | 327 | 645 | 380 | 0 | 819 | 551 | 490 | 900 | 579 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 698 | 1010 | 23 | 355 | 701 | 413 | 0 | 890 | 599 | 533 | 978 | 629 |
| Lane Group Flow (vph) | 698 | 1033 | 0 | 355 | 701 | 413 | 0 | 890 | 599 | 533 | 1607 | 0 |
| Turn Type | Prot | | | Prot | | Free | | | custom | Prot | | |
| Protected Phases | 1 | 6 | | 5 | 2 | | | 4 | | 3 | 8 | |
| Permitted Phases | | | | | | Free | | | 4 1 | | | |
| Minimum Split (s) | 10.0 | 22.0 | | 10.0 | 22.0 | | | 22.0 | | 10.0 | 22.0 | |
| Total Split (s) | 32.0 | 41.0 | 0.0 | 21.0 | 30.0 | 0.0 | 0.0 | 32.0 | 64.0 | 26.0 | 58.0 | 0.0 |
| Total Split (%) | 27% | 34% | 0% | 18% | 25% | 0% | 0% | 27% | 53% | 22% | 48% | 0% |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | | 4.0 | | 4.0 | 4.0 | |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | | 2.0 | | 2.0 | 2.0 | |
| Lead/Lag | Lead | Lag | | Lead | Lag | | | Lag | | Lead | | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | | Yes | | Yes | | |
| Act Effct Green (s) | 28.0 | 37.0 | | 17.0 | 26.0 | 120.0 | | 28.0 | 60.0 | 22.0 | 54.0 | |
| Actuated g/C Ratio | 0.23 | 0.31 | | 0.14 | 0.22 | 1.00 | | 0.23 | 0.50 | 0.18 | 0.45 | |
| v/c Ratio | 0.90 | 0.95 | | 0.78 | 0.91 | 0.23 | | 1.08 | 0.75 | 0.88 | 1.01 | |
| Uniform Delay, d1 | 44.7 | 40.5 | | 49.7 | 45.9 | 0.0 | | 46.0 | 23.2 | 47.7 | 29.7 | |
| Delay | 51.9 | 50.7 | | 52.9 | 54.6 | 0.0 | | 89.9 | 24.2 | 54.6 | 50.7 | |
| LOS | D | D | | D | D | A | | F | C | D | D | |
| Approach Delay | | 51.2 | | | 38.8 | | | 63.5 | | | 51.6 | |
| Approach LOS | | D | | | D | | | E | | | D | |
| Queue Length 50th (ft) | 272 | 410 | | 138 | 281 | 0 | | ~404 | 351 | 209 | ~626 | |
| Queue Length 95th (ft) | #377 | #548 | | #204 | #392 | 0 | | #534 | 506 | #301 | #513 | |
| Internal Link Dist (ft) | | 910 | | | 627 | | | 855 | | | 714 | |
| 50th Up Block Time (%) | | | | | | | | | | | | |
| 95th Up Block Time (%) | | | | | | | | | | | | |
| Turn Bay Length (ft) | | | | 125 | | | | | | | | |
| 50th Bay Block Time % | | | | 11% | | | | | | | | |
| 95th Bay Block Time % | | | | 34% | | | | | | | | |

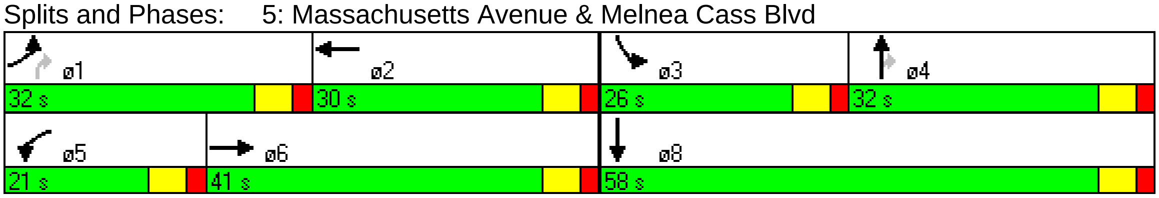
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Queuing Penalty (veh) | | | | 39 | | | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 120 | |
| Actuated Cycle Length: 120 | |
| Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green | |
| Natural Cycle: 100 | |
| Control Type: Pretimed | |
| Maximum v/c Ratio: 1.08 | |
| Intersection Signal Delay: 51.4 | Intersection LOS: D |
| Intersection Capacity Utilization 96.5% | ICU Level of Service E |

~ 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: 5: Massachusetts Avenue & Melnea Cass Blvd



| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NBR2 | NWL | NWR | ø9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Leading Detector (ft) | 50 | | | 50 | 50 | 50 | 50 | 50 | | | | |
| Trailing Detector (ft) | 0 | | | 0 | 0 | 0 | 0 | 0 | | | | |
| Turning Speed (mph) | | 9 | 9 | 15 | 15 | | 15 | 9 | 9 | 15 | 9 | |
| Lane Util. Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | 0.907 | | | | | | | 0.850 | | | | |
| Flt Protected | | | | | | 0.980 | 0.950 | | | | | |
| Satd. Flow (prot) | 3210 | 0 | 0 | 0 | 0 | 3468 | 1770 | 1583 | 0 | 0 | 0 | |
| Flt Permitted | | | | | | 0.539 | 0.950 | | | | | |
| Satd. Flow (perm) | 3210 | 0 | 0 | 0 | 0 | 1908 | 1770 | 1583 | 0 | 0 | 0 | |
| Right Turn on Red | | | Yes | | | | | | Yes | | Yes | |
| Satd. Flow (RTOR) | 9 | | | | | | | 2 | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Link Speed (mph) | 30 | | | | | 30 | 30 | | | 30 | | |
| Link Distance (ft) | 299 | | | | | 536 | 224 | | | 210 | | |
| Travel Time (s) | 6.8 | | | | | 12.2 | 5.1 | | | 4.8 | | |
| Volume (vph) | 438 | 621 | 84 | 30 | 271 | 447 | 78 | 191 | 9 | 0 | 0 | |
| Peak Hour Factor | 0.87 | 0.87 | 0.87 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.85 | 0.92 | 0.92 | |
| Adj. Flow (vph) | 503 | 714 | 97 | 35 | 319 | 526 | 92 | 225 | 11 | 0 | 0 | |
| Lane Group Flow (vph) | 1314 | 0 | 0 | 0 | 0 | 880 | 92 | 236 | 0 | 0 | 0 | |
| Turn Type | | | | custom | pm+pt | | | Perm | | | | |
| Protected Phases | 4 | | | | 3 | 8 | 2 | | | | | 9 |
| Permitted Phases | | | | 3 | 8 | | | 2 | | | | |
| Detector Phases | 4 | | | 3 | 3 | 8 | 2 | 2 | | | | |
| Minimum Initial (s) | 4.0 | | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | | | 4.0 |
| Minimum Split (s) | 35.0 | | | 10.0 | 10.0 | 80.0 | 10.0 | 10.0 | | | | 29.0 |
| Total Split (s) | 56.0 | 0.0 | 0.0 | 11.0 | 11.0 | 67.0 | 24.0 | 24.0 | 0.0 | 0.0 | 0.0 | 29.0 |
| Total Split (%) | 47% | 0% | 0% | 9% | 9% | 56% | 20% | 20% | 0% | 0% | 0% | 24% |
| Yellow Time (s) | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | | | 3.5 |
| All-Red Time (s) | 2.0 | | | 0.5 | 0.5 | 2.0 | 2.0 | 2.0 | | | | 0.5 |
| Lead/Lag | Lag | | | Lead | Lead | | | | | | | |
| Lead-Lag Optimize? | Yes | | | Yes | Yes | | | | | | | |
| Recall Mode | Max | | | Max | Max | Max | None | None | | | | None |
| Act Effct Green (s) | 52.0 | | | | | 80.5 | 19.3 | 19.3 | | | | |
| Actuated g/C Ratio | 0.48 | | | | | 0.75 | 0.18 | 0.18 | | | | |
| v/c Ratio | 1.04dr | | | | | 0.49 | 0.29 | 0.83 | | | | |
| Uniform Delay, d1 | 24.2 | | | | | 4.6 | 38.3 | 42.2 | | | | |
| Delay | 25.4 | | | | | 4.8 | 38.7 | 50.3 | | | | |
| LOS | C | | | | | A | D | D | | | | |
| Approach Delay | 25.4 | | | | | 4.8 | 47.1 | | | | | |
| Approach LOS | C | | | | | A | D | | | | | |
| Queue Length 50th (ft) | 407 | | | | | 95 | 56 | 153 | | | | |
| Queue Length 95th (ft) | 479 | | | | | 111 | 98 | #259 | | | | |
| Internal Link Dist (ft) | 219 | | | | | 456 | 144 | | | 130 | | |
| 50th Up Block Time (%) | 25% | | | | | | | 10% | | | | |
| 95th Up Block Time (%) | 29% | | | | | | | 39% | | | | |
| Turn Bay Length (ft) | | | | | | | | | | | | |

| Lane Group | EBT | EBR | EBR2 | WBL2 | WBL | WBT | NBL | NBR | NBR2 | NWL | NWR | ø9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50th Bay Block Time % | | | | | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | | | | | |

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 107.8

Natural Cycle: 130

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.85

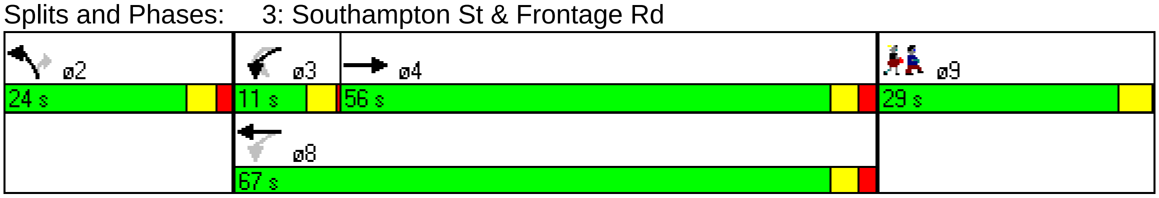
Intersection Signal Delay: 21.0 Intersection LOS: C

Intersection Capacity Utilization 89.4% ICU Level of Service D

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 3: Southampton St & Frontage Rd



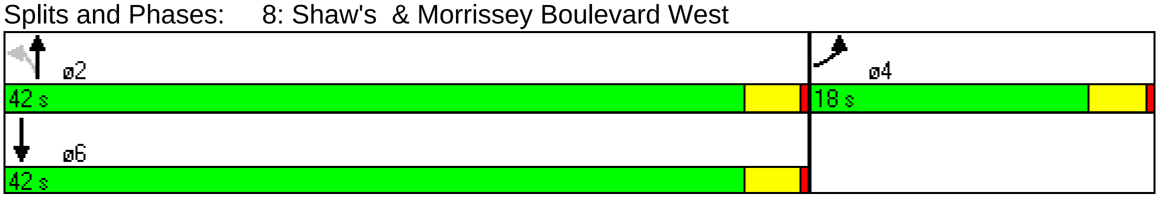
| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 16 | 10 | 10 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Leading Detector (ft) | 50 | | 50 | 50 | 50 | |
| Trailing Detector (ft) | 0 | | 0 | 0 | 0 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.939 | | | | 0.999 | |
| Flt Protected | 0.973 | | | | | |
| Satd. Flow (prot) | 1702 | 0 | 0 | 2111 | 1737 | 0 |
| Flt Permitted | 0.973 | | | | | |
| Satd. Flow (perm) | 1702 | 0 | 0 | 2111 | 1737 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | 64 | | | | 1 | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 0.85 | 1.09 | 1.09 |
| Link Speed (mph) | 15 | | | 30 | 30 | |
| Link Distance (ft) | 320 | | | 283 | 805 | |
| Travel Time (s) | 14.5 | | | 6.4 | 18.3 | |
| Volume (vph) | 85 | 69 | 0 | 30 | 865 | 7 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 92 | 75 | 0 | 33 | 940 | 8 |
| Lane Group Flow (vph) | 167 | 0 | 0 | 33 | 948 | 0 |
| Turn Type | | | Perm | | | |
| Protected Phases | 4 | | | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Detector Phases | 4 | | 2 | 2 | 6 | |
| Minimum Initial (s) | 3.5 | | 4.0 | 4.0 | 4.0 | |
| Minimum Split (s) | 8.0 | | 20.5 | 20.5 | 20.5 | |
| Total Split (s) | 18.0 | 0.0 | 42.0 | 42.0 | 42.0 | 0.0 |
| Total Split (%) | 30% | 0% | 70% | 70% | 70% | 0% |
| Yellow Time (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| All-Red Time (s) | 0.5 | | 0.5 | 0.5 | 0.5 | |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | None | | Max | Max | Max | |
| Act Effct Green (s) | 9.5 | | | 51.2 | 51.2 | |
| Actuated g/C Ratio | 0.14 | | | 0.76 | 0.76 | |
| v/c Ratio | 0.58 | | | 0.02 | 0.71 | |
| Uniform Delay, d1 | 16.8 | | | 2.1 | 4.5 | |
| Delay | 13.2 | | | 3.2 | 9.9 | |
| LOS | B | | | A | A | |
| Approach Delay | 13.2 | | | 3.2 | 9.9 | |
| Approach LOS | B | | | A | A | |
| Queue Length 50th (ft) | 33 | | | 2 | 115 | |
| Queue Length 95th (ft) | 76 | | | 10 | #498 | |
| Internal Link Dist (ft) | 240 | | | 203 | 725 | |
| 50th Up Block Time (%) | | | | | | |
| 95th Up Block Time (%) | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Turn Bay Length (ft) | | | | | | |
| 50th Bay Block Time % | | | | | | |
| 95th Bay Block Time % | | | | | | |
| Queuing Penalty (veh) | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 60 | |
| Actuated Cycle Length: 67.1 | |
| Natural Cycle: 60 | |
| Control Type: Semi Act-Uncoord | |
| Maximum v/c Ratio: 0.71 | |
| Intersection Signal Delay: 10.2 | Intersection LOS: B |
| Intersection Capacity Utilization 66.3% | ICU Level of Service B |

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: Shaw's & Morrissey Boulevard West



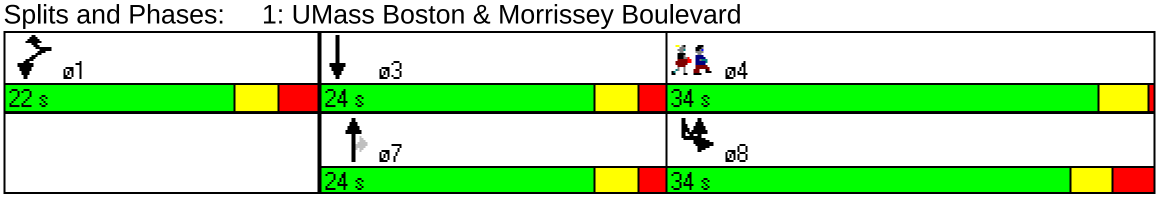
| Lane Group | WBL | WBR | NBT | NBR | SBU | SBL | SBT | ø4 |
|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | |
| Ideal Flow (vphpl) | 1900 | 1900 | 2100 | 1900 | 1900 | 1900 | 2100 | |
| Lane Width (ft) | 11 | 12 | 12 | 16 | 10 | 10 | 12 | |
| Storage Length (ft) | 0 | 0 | | 0 | | 200 | | |
| Storage Lanes | 2 | 2 | | 1 | | 2 | | |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| Leading Detector (ft) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Turning Speed (mph) | 15 | 9 | | 9 | 9 | 15 | | |
| Lane Util. Factor | 0.97 | 0.88 | 0.91 | 1.00 | 0.91 | 0.94 | 0.91 | |
| Frt | | 0.850 | | 0.850 | | | | |
| Flt Protected | 0.950 | | | | | 0.950 | | |
| Satd. Flow (prot) | 3319 | 2787 | 5621 | 1794 | 0 | 4658 | 5621 | |
| Flt Permitted | 0.950 | | | | | 0.950 | | |
| Satd. Flow (perm) | 3319 | 2787 | 5621 | 1794 | 0 | 4658 | 5621 | |
| Right Turn on Red | | Yes | | Yes | | | | |
| Satd. Flow (RTOR) | | 299 | | 219 | | | | |
| Headway Factor | 1.04 | 1.00 | 1.00 | 0.85 | 1.09 | 1.09 | 1.00 | |
| Link Speed (mph) | 30 | | 30 | | | | 30 | |
| Link Distance (ft) | 680 | | 766 | | | | 1053 | |
| Travel Time (s) | 15.5 | | 17.4 | | | | 23.9 | |
| Volume (vph) | 456 | 227 | 985 | 199 | 154 | 301 | 2023 | |
| Peak Hour Factor | 0.69 | 0.76 | 0.96 | 0.91 | 0.92 | 0.92 | 0.87 | |
| Adj. Flow (vph) | 661 | 299 | 1026 | 219 | 167 | 327 | 2325 | |
| Lane Group Flow (vph) | 661 | 299 | 1026 | 219 | 0 | 494 | 2325 | |
| Turn Type | | custom | | Perm | Prot | Prot | | |
| Protected Phases | 1 | 1 | 7 | | 8 | 8 | 3 | 4 |
| Permitted Phases | 1 | 1 | | 7 | | | | |
| Detector Phases | 1 | 1 | 7 | 7 | 8 | 8 | 3 | |
| Minimum Initial (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Minimum Split (s) | 10.5 | 10.5 | 22.0 | 22.0 | 22.5 | 22.5 | 22.0 | 20.0 |
| Total Split (s) | 22.0 | 22.0 | 24.0 | 24.0 | 34.0 | 34.0 | 24.0 | 34.0 |
| Total Split (%) | 28% | 28% | 30% | 30% | 43% | 43% | 30% | 43% |
| Yellow Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.5 |
| All-Red Time (s) | 3.0 | 3.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 0.5 |
| Lead/Lag | | | Lead | Lead | Lag | Lag | Lead | Lag |
| Lead-Lag Optimize? | | | Yes | Yes | Yes | Yes | Yes | Yes |
| Recall Mode | None | None | Min | Min | None | None | Min | None |
| Act Effct Green (s) | 17.2 | 17.2 | 18.1 | 18.1 | | 13.8 | 32.0 | |
| Actuated g/C Ratio | 0.28 | 0.28 | 0.30 | 0.30 | | 0.23 | 0.52 | |
| v/c Ratio | 0.71 | 0.30 | 0.62 | 0.32 | | 0.47 | 0.79 | |
| Uniform Delay, d1 | 21.6 | 0.0 | 20.4 | 0.0 | | 19.4 | 14.0 | |
| Delay | 21.3 | 3.0 | 19.1 | 3.3 | | 21.1 | 26.5 | |
| LOS | C | A | B | A | | C | C | |
| Approach Delay | 15.6 | | 16.3 | | | | 25.6 | |
| Approach LOS | B | | B | | | | C | |
| Queue Length 50th (ft) | 118 | 0 | 121 | 0 | | 59 | 201 | |
| Queue Length 95th (ft) | 131 | 0 | 175 | 41 | | 86 | #554 | |
| Internal Link Dist (ft) | 600 | | 686 | | | | 973 | |

| Lane Group | WBL | WBR | NBT | NBR | SBU | SBL | SBT | ø4 |
|---|---|---|---|---|---|---|---|---|
| 50th Up Block Time (%) | | | | | | | | |
| 95th Up Block Time (%) | | | | | | | | |
| Turn Bay Length (ft) | | | | | | 200 | | |
| 50th Bay Block Time % | | | | | | | | |
| 95th Bay Block Time % | | | | | | | | |
| Queuing Penalty (veh) | | | | | | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 80 | |
| Actuated Cycle Length: 61.3 | |
| Natural Cycle: 90 | |
| Control Type: Actuated-Uncoordinated | |
| Maximum v/c Ratio: 0.79 | |
| Intersection Signal Delay: 21.4 | Intersection LOS: C |
| Intersection Capacity Utilization 66.2% | ICU Level of Service B |
| # 95th percentile volume exceeds capacity, queue may be longer. | |
| Queue shown is maximum after two cycles. | |

Splits and Phases: 1: UMass Boston & Morrissey Boulevard



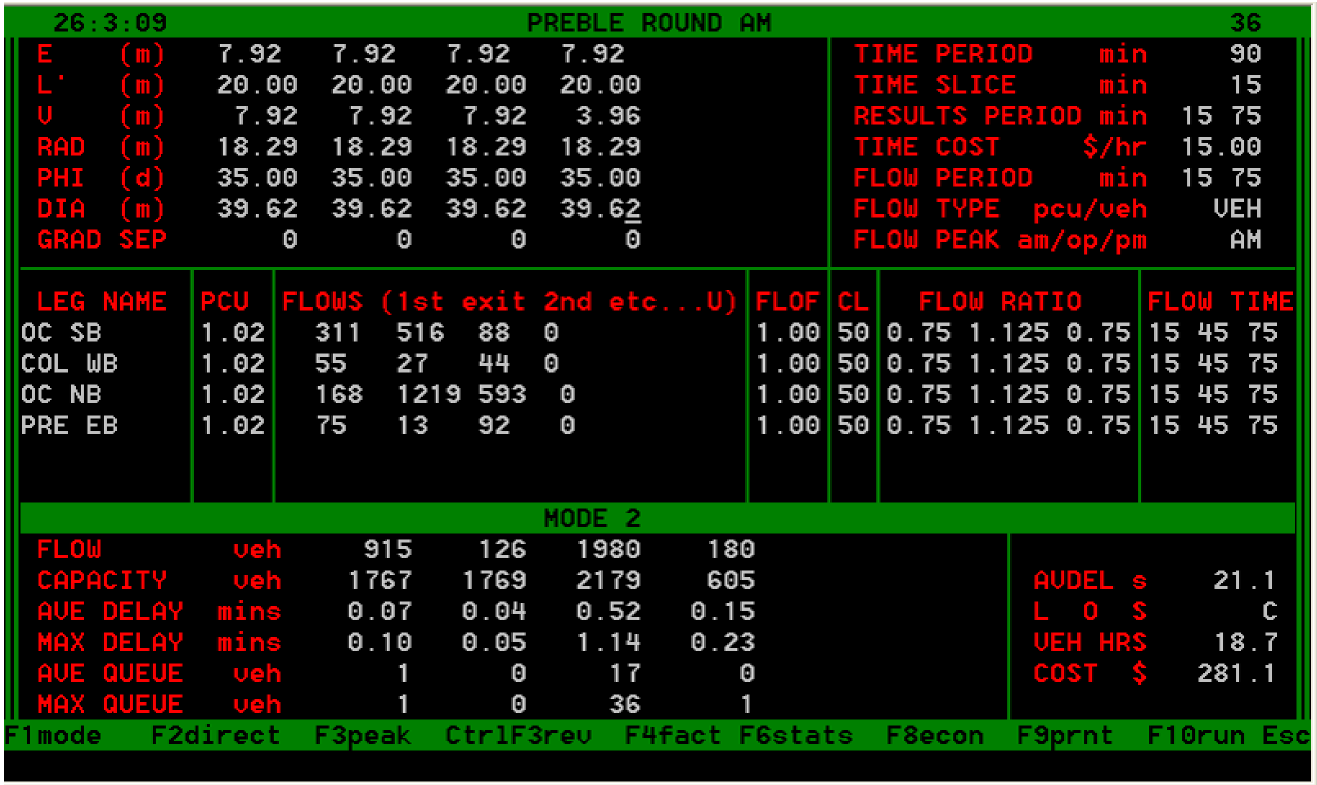
# Appendix F - Rodel Analysis for Proposed Roundabout

# AM Peak Hour

Sheet2]B1]

# Preble Roundabout

<u>Weekday Morning Peak Hour</u>



```
 26:3:09                 PREBLE ROUND AM                        36
E    (m)    7.92   7.92   7.92   7.92        TIME PERIOD    min      90
L'   (m)   20.00  20.00  20.00  20.00        TIME SLICE     min      15
V    (m)    7.92   7.92   7.92   3.96        RESULTS PERIOD min   15 75
RAD  (m)   18.29  18.29  18.29  18.29        TIME COST      $/hr  15.00
PHI  (d)   35.00  35.00  35.00  35.00        FLOW PERIOD    min   15 75
DIA  (m)   39.62  39.62  39.62  39.62        FLOW TYPE  pcu/veh     VEH
GRAD SEP       0      0      0      0        FLOW PEAK am/op/pm      AM

LEG NAME   PCU  FLOWS (1st exit 2nd etc...U) FLOF CL  FLOW RATIO      FLOW TIME
OC SB      1.02   311  516  88   0            1.00 50 0.75 1.125 0.75 15 45 75
COL WB     1.02   55   27   44   0            1.00 50 0.75 1.125 0.75 15 45 75
OC NB      1.02   168  1219 593  0            1.00 50 0.75 1.125 0.75 15 45 75
PRE EB     1.02   75   13   92   0            1.00 50 0.75 1.125 0.75 15 45 75

                              MODE 2
FLOW        veh     915    126   1980    180
CAPACITY    veh    1767   1769   2179    605             AVDEL s     21.1
AVE DELAY  mins    0.07   0.04   0.52   0.15             L  O  S        C
MAX DELAY  mins    0.10   0.05   1.14   0.23             VEH HRS     18.7
AVE QUEUE   veh       1      0     17      0             COST  $    281.1
MAX QUEUE   veh       1      0     36      1
F1mode  F2direct  F3peak  CtrlF3rev  F4fact F6stats  F8econ  F9prnt  F10run Esc
```

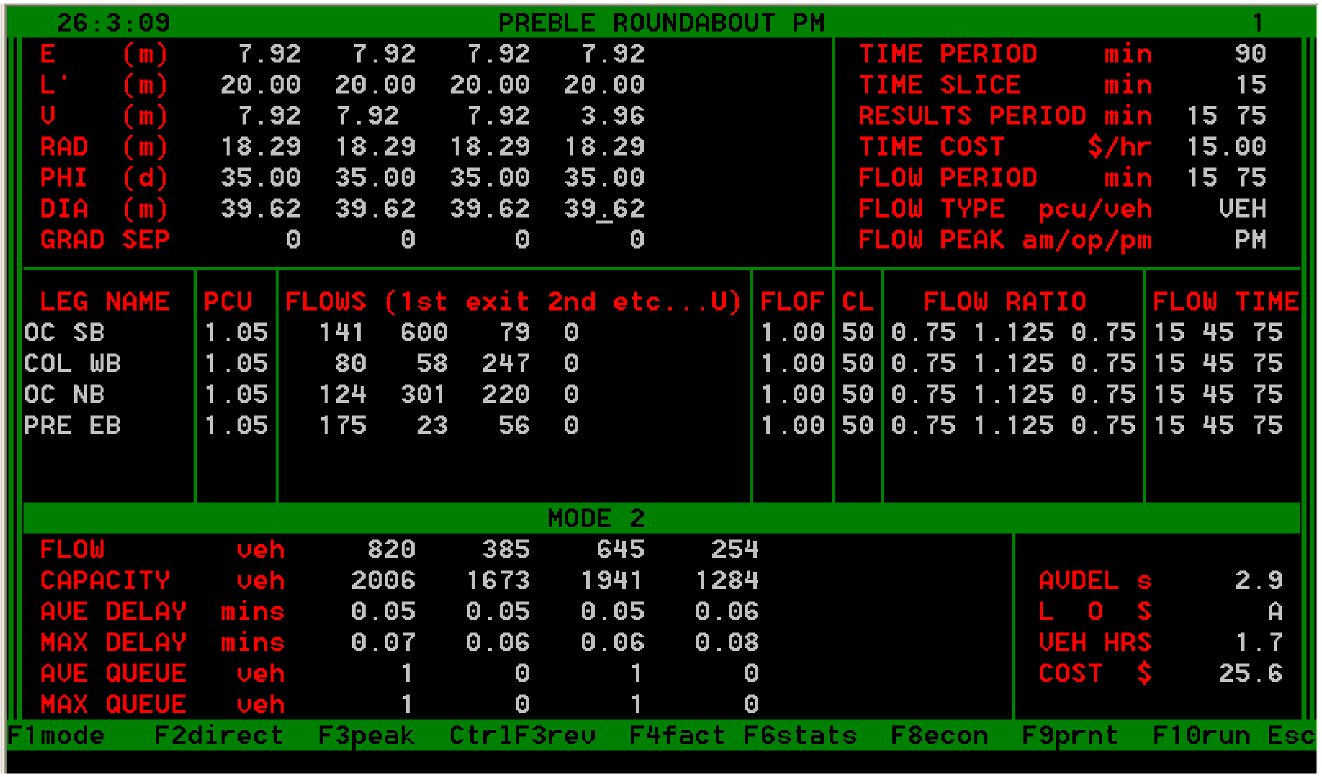
| | RODEL Delay (minutes) | Net Delay (seconds) | Level of Service (HCM Signalzed) | Queue (Vehicles) | Queue (Feet) |
|---|---|---|---|---|---|
| *Old Colony SB* | 0.07 | 6.2 | LOS A | 1 | 25 |
| *Columbia WB* | 0.04 | 4.4 | LOS A | 0 | 0 |
| *Old Colony NB* | 0.52 | 33.2 | LOS C | 17 | 425 |
| *Preble EB* | 0.15 | 11.0 | LOS B | 2 | 50 |

# PM Peak Hour

Sheet2]B1]

# Preble Roundabout

<u>Weekday Afternoon Peak Hour</u>




| | RODEL Delay (minutes) | Net Delay (seconds) | Level of Service (HCM Signalzed) | Queue (Vehicles) | Queue (Feet) |
|---|---|---|---|---|---|
| *Old Colony SB* | 0.05 | 5.0 | LOS A | 1 | 25 |
| *Columbia WB* | 0.05 | 5.0 | LOS A | 0 | 0 |
| *Old Colony NB* | 0.05 | 5.0 | LOS A | 1 | 25 |
| *Preble EB* | 0.06 | 5.6 | LOS A | 0 | 0 |

# Appendix G – Destination Signage Travel Times

## Destination Signage Travel Times

| Melnea Cass | Miles | Biking Time | Walking Time | Directions |
|---|---|---|---|---|
| South Bay Center | 0.5 | 3 | 10 | East |
| Dot Ave/Andrew Square T Station | 0.8 | 4 | 16 | East |
| Preble Circle/Moakley Park | 1.1 | 6 | 21 | East |
| JFK/Umass T Station | 1.7 | 9 | 33 | East |
| Bayside Expo Center | 1.9 | 10 | 38 | East |
| Umass Boston | 2.2 | 12 | 44 | East |
| **South Bay Center** | | | | |
| Melnea Cass | 0.5 | 3 | 10 | West |
| Dot Ave/Andrew Square T Station | 0.3 | 2 | 7 | East |
| Preble Circle/Moakley Park | 0.6 | 3 | 12 | East |
| JFK/Umass T Station | 1.2 | 6 | 24 | East |
| Bayside Expo Center | 1.4 | 8 | 28 | East |
| Umass Boston | 1.7 | 9 | 34 | East |
| **Dot Ave/Andrew Square** | | | | |
| Melnea Cass | 0.8 | 4 | 16 | West |
| South Bay Center | 0.3 | 2 | 7 | West |
| Preble Circle/Moakley Park | 0.3 | 1 | 5 | East |
| JFK/Umass T Station | 0.9 | 5 | 17 | East |
| Bayside Expo Center | 1.1 | 6 | 21 | East |
| Umass Boston | 1.4 | 8 | 28 | East |
| **Preble Circle/Moakley Park** | | | | |
| Melnea Cass | 1.1 | 6 | 21 | West |
| South Bay Center | 0.6 | 3 | 12 | West |
| Dot Ave/Andrew Square Station | 0.3 | 1 | 5 | West |
| JFK/Umass T Station | 0.6 | 3 | 12 | South |
| Bayside Expo Center | 0.8 | 4 | 16 | South |
| Umass Boston | 1.1 | 6 | 23 | South |
| **JFK/Umass T Station** | | | | |
| Melnea Cass | 1.7 | 9 | 33 | North |
| South Bay Center | 1.2 | 6 | 24 | North |
| Dot Ave/Andrew Square Station | 0.9 | 5 | 17 | North |
| Preble Circle/Moakley Park | 0.6 | 3 | 12 | North |
| Bayside Expo Center | 0.2 | 1 | 4 | East |
| Umass Boston | 0.5 | 3 | 11 | South |
| **UMASS Boston** | | | | |
| Melnea Cass | 2.2 | 12 | 44 | West Side/Northbound |
| South Bay Center | 1.7 | 9 | 34 | West Side/Northbound |
| Dot Ave/Andrew Square Station | 1.4 | 8 | 28 | West Side/Northbound |
| Preble Circle/Moakley Park | 1.1 | 6 | 23 | West Side/Northbound |
| JFK/Umass T Station | 0.5 | 3 | 11 | West Side/Northbound |
| Bayside Expo Center | 0.7 | 4 | 13 | East Side/Northbound |

# Appendix H – Detailed Breakdown of Cost Estimate

## 103 - Tree Removed (Diameter under 24 inches)

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Preble Rotary Island | 56+25 | 58+10 | 14 |
| | | **Total** | **14** |

## 106.12 - Bridge Curb Removed and Reset

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Southampton Over I-93 | 31+10 | 32+80 | 170 |
| Southampton over Train Tracks | 37+10 | 37+90 | 80 |
| | | **Total** | **250** |

## 120 - Earth Excavation

| Description | Quantity (CF) | Quantity (CY) |
|---|---|---|
| Roundabout | 66700 | 2470 |
| | **Total** | **2470** |

## 125 - Loam Stripped and Stockpiled

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Preble Rotary | 56+25 | 58+10 | 471 |
| | | **Total** | **471** |

## 127 - Concrete Excavation

| Description | Station Begin | Station End | Area | Depth | Quantity |
|---|---|---|---|---|---|
| Mass Ave Island | 00+75 | 02+00 | 1060 | 0.5 | 20 |
| Mass Ave Slip Lane | 00+00 | 00+75 | 850 | 0.5 | 16 |
| Southampton up on side walk to Bridge | 19+75 | 29+25 | 7600 | 0.5 | 141 |
| Southampton @ frontage Road W | 30+80 | 31+25 | 406 | 0.5 | 8 |
| Southampton (Frontage Rd to Bridge) | 32+75 | 35+75 | 2100 | 0.5 | 39 |
| Southampton (Bridge to Ellery St) | 35+90 | 38+25 | 2300 | 0.5 | 43 |
| Southampton (Ellery to Dot Ave) | 38+50 | 42+00 | 7100 | 0.5 | 131 |
| Preble (Dot Ave to off curb) | 42+50 | 45+00 | 4300 | 0.5 | 80 |
| Round about (Preble and Old colony N) | 53+00 | 53+75 | 2000 | 0.5 | 37 |
| Roundabout (Old Colony and Columbia Rd) | 54+75 | 56+75 | 3150 | 0.5 | 58 |
| Preble St @ Roundabout S | 53+50 | 53+75 | 500 | 0.5 | 9 |
| Old Colony @ Logan Way | 08+40 | 09+20 | 1000 | 0.5 | 19 |
| Old colony (O'Callighan) | 17+80 | 18+10 | 300 | 0.5 | 6 |
| Mount Vernon (T Station) | 30+10 | 32+50 | 2645 | 0.5 | 49 |
| Morrissey (T Station) | 32+70 | 34+60 | 2000 | 0.5 | 37 |
| Morrissey (T to Shaws) | 34+90 | 36+70 | 2000 | 0.5 | 37 |
| Morrissey (Shaws) | 37+00 | 39+50 | 2300 | 0.5 | 43 |
| Morrissey (Shaws to Driveway 1) | 39+90 | 42+40 | 2500 | 0.5 | 46 |
| Morrissey Driveway 1 to 2 | 42+75 | 46+00 | 3400 | 0.5 | 63 |
| Morrissey Driveway 2 to Umass | 46+25 | 62+00 | 8600 | 0.5 | 159 |
| | | | | **Total** | **1019** |

**129.6 - Bridge Pavement Excavation**

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Southampton Over I-93 | 31+10 | 32+80 | 945 |
| Southampton over Train Tracks | 37+10 | 37+90 | 445 |
| | | **Total** | **1390** |

## 220 - Manhole Adjusted

| Description | Station | Quantity |
|---|---|---|
| Southampton (New Market Square in Cycle Track) 1 | 20+60 | 1 |
| Southampton (New Market Square in Cycle Track) 2 | 22+60 | 1 |
| Southampton (Dorchester Ave) | 43+75 | 1 |
| Morrissey Blvd (Merge from Columbia Circle) | 44+00 | 1 |
| Morrissey Blvd (Boston Globe) 1 | 52+75 | 1 |
| Morrissey Blvd (Boston Globe) 2 | 55+10 | 1 |
| | **Total** | **6** |

## 220.3 - Drainage Structure Change in Type

| Description | Station | Quantity |
|---|---|---|
| Southampton (Southbay) 1 | 23+75 | 1 |
| Southampton (Southbay) 2 | 26+91 | 1 |
| Southampton (Frontage Rd and Railroad) | 34+10 | 1 |
| Southampton (Ellery St) | 37+90 | 1 |
| Old Colony (Roundabout South) | 01+40 | 1 |
| Old Colony (O'Callaghan Bus Stop) | 17+75 | 1 |
| Mount Vernon (JFK Bus Exit) | 30+50 | 1 |
| Morrissey (JFK entrance) | 35+10 | 1 |
| Morrissey (Merge from Columbia Rd Rotary) | 43+40 | 1 |
| Morrissey (Umass) | 61+00 | 1 |
| | **Total** | **10** |

## 376.2 - Hydrant Remove and Relocate

| Description | Station | Quantity |
|---|---|---|
| Southampton (Frontage Rd) | 35+25 | 1 |
| Mount Vernon (Bus Exit) | 31+13 | 1 |
| | **Total** | **2** |

**129 - Asphalt Pavement Excavation by Cold Planer**

**460 - Hot Mix Asphalt**

**464 - Bitumen for Tack Coat**

| Description | Station Begin | Station End | Width | Length | Depth | Quantity Hot-Mix | Quantity Removed | Bitumen Tack Coat |
|---|---|---|---|---|---|---|---|---|
| Mass Ave to Theo Glynn | 00+00 | 11+00 | 50 | 1100 | 1.50 | 513 | 6111 | 306 |
| Theo Glynn to New Market Square | 11+00 | 19+50 | 50 | 850 | 1.50 | 397 | 4722 | 236 |
| New Market to Frontage | 19+50 | 33+00 | 55 | 1350 | 1.50 | 693 | 8250 | 413 |
| Frontage W to Frontage E | 33+00 | 35+50 | 100 | 250 | 1.50 | 233 | 2778 | 139 |
| Frontage E to Dorchester Ave W | 35+50 | 43+50 | 55 | 800 | 1.50 | 411 | 4889 | 244 |
| Dorchester Ave E to Preble W | 43+50 | 44+75 | 200 | 125 | 1.50 | 233 | 2778 | 139 |
| Preble W to Preble Rotary | 44+75 | 56+00 | 60 | 1125 | 1.50 | 630 | 7500 | 375 |
| Old Colony N Approach to Rotary | 56+25 | 57+00 | 50 | 200 | 1.50 | 93 | 1111 | 56 |
| Columbia Rd Approach to Rotary | 57+50 | 59+00 | 50 | 175 | 1.50 | 82 | 972 | 49 |
| Roundabout | 56+00 | 57+25 | 26 | 330 | 1.50 | 80 | 953 | 48 |
| Old Colony S Approach to Roundabout | 00+75 | 02+50 | 50 | 140 | 1.50 | 65 | 778 | 39 |
| Old Colony Ave | 02+50 | 19+00 | 75 | 1650 | 1.50 | 1155 | 13750 | 688 |
| Old Colony and Columbia Rd | 19+00 | 22+50 | 100 | 350 | 1.50 | 327 | 3889 | 194 |
| Old Colony Ave | 22+50 | 29+50 | 55 | 700 | 1.50 | 359 | 4278 | 214 |
| Old Colony to Mount Vernon | 29+50 | 31+50 | 40 | 200 | 1.50 | 75 | 889 | 44 |
| Mount Vernon under bridge | 31+50 | 33+00 | 50 | 500 | 1.50 | 233 | 2778 | 139 |
| Morrissey (JFK T Station) | 31+50 | 43+00 | 45 | 1150 | 1.50 | 483 | 5750 | 288 |
| Morrissey to Uturn (Southbound) | 43+00 | 57+50 | 65 | 1450 | 1.50 | 880 | 10472 | 524 |
| U-turn to Umass (Southbound) | 57+50 | 62+00 | 80 | 450 | 1.50 | 336 | 4000 | 200 |
| Umass to U-Turn (Northbound) | 62+00 | 55+50 | 80 | 650 | 1.50 | 485 | 5778 | 289 |
| U-turn to Split (Northbound) | 55+50 | 44+00 | 70 | 1150 | 1.50 | 751 | 8944 | 447 |
| Split to Mount Vernon (Northbound) | 44+00 | 34+00 | 50 | 1000 | 1.50 | 467 | 5556 | 278 |
| | | | | | **Total** | **8982** | **106926** | **5346** |

## 460.1 - Hot Mix Asphalt Dense Binder

| Description | Width | Length | Depth | Quantity Mix | Area | Sub Base |
|---|---|---|---|---|---|---|
| Morrissey Blvd (Removed median) | 10 | 1600 | 18.00 | 1792 | 1778 | 889 |
| Roundabout | 112 | 112 | 18.00 | 1410 | 1399 | 699 |
| | | | **Total** | **3202** | **3177** | **1588** |

## 482.3 - Sawcut Asphalt Pavement

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Mass Ave | 00+00 | 00+00 | 50 |
| Southampton (Slip Lane) | 00+75 | 01+00 | 20 |
| Southampton (Bradston Street) | 01+50 | 01+75 | 25 |
| Southampton (U-turn) | 01+90 | 02+25 | 25 |
| Southampton (Atkinson Street) | 08+10 | 08+50 | 35 |
| Southampton (Topeka Street) | 11+25 | 11+50 | 30 |
| Southampton (Theo Glynn) | 11+00 | 11+75 | 70 |
| Southampton (Cummings Street) | 14+00 | 14+40 | 35 |
| Southampton (Moore Street) | 16+80 | 17+30 | 45 |
| Southampton (New Market Square | 19+70 | 20+60 | 85 |
| Southampton (South Bay Center) | 24+60 | 25+60 | 100 |
| Southampton (Frontage Rd N) | 33+25 | 34+25 | 80 |
| Southampton (Frontage Rd S) | 34+75 | 35+50 | 50 |
| Southampton (Ellery St N) | 40+25 | 40+60 | 30 |
| Southampton (Ellery St S) | 40+50 | 40+75 | 25 |
| Southampton (Dorchester Ave N) | 43+75 | 44+50 | 70 |
| Southampton (Boston St) | 43+60 | 44+00 | 45 |
| Southampton (Dorchester Ave S) | 44+10 | 44+50 | 50 |
| Preble (Carpenter St) | 46+00 | 46+20 | 20 |
| Preble (Mohawk St) | 47+50 | 47+90 | 35 |
| Preble (Rogers St N) | 48+60 | 48+80 | 15 |
| Preble (Rogers St S) | 49+00 | 49+25 | 25 |
| Preble (Wendeller St) | 50+25 | 50+50 | 20 |
| Preble (Ward St N) | 51+40 | 51+60 | 25 |
| Preble (Ward St S) | 51+50 | 51+70 | 20 |
| Preble (Vinton St) | 49+80 | 55+00 | 25 |
| Roundabout (Old Colony N approach) | 55+50 | 56+75 | 70 |
| Roundabout (Columbia Rd approach) | 59+00 | 59+00 | 65 |
| Old Colony Ave (Devine Way) | 02+50 | 02+75 | 25 |
| Old Colony Ave (McDonough Way) | 03+75 | 04+00 | 20 |
| Old Colony Ave (Logan Way N) | 08+20 | 08+40 | 25 |
| Old Colony Ave (Logan Way S) | 09+10 | 09+40 | 25 |
| Old Colony Ave (MSGR O'Callaghan Way)( | 18+00 | 18+40 | 25 |
| Old Colony Ave (Columbian Rd) | 21+00 | 22+00 | 60 |
| Old Colony Ave (Columbia Rd U-turn) | 23+50 | 23+80 | 30 |
| Mounth Vernon St (Bus Exit) | 29+75 | 30+00 | 30 |
| Morrissey Blvd (Mount Vernon (under Bridge) | 32+25 | 32+50 | 55 |
| Morrissey Blvd N (Mount Vernon ) | 34+50 | 35+00 | 60 |
| Morrisey Blvd (Taxi Exit) | 32+40 | 32+70 | 25 |
| Morrissey Blvd (Bus/Taxi Entrance) | 34+50 | 34+90 | 30 |
| Morrissey Blvd (Shaws Entrance) | 36+60 | 37+00 | 35 |
| Morrissey Blvd (Shaws Exit) | 39+50 | 40+00 | 30 |
| Morrissey Blvd (Driveway 1) | 42+40 | 42+75 | 35 |
| Morrissey Blvd (Driveway 2) | 45+90 | 46+20 | 25 |
| Morrissey Blvd (Driveway 3) | 47+50 | 48+10 | 50 |
| Morrissey Blvd (Driveway 4) | 53+00 | 53+50 | 45 |
| Morrissey Blvd (Driveway 5) | 55+40 | 55+90 | 50 |
| Morrissey Blvd (End of Southbound) | 62+00 | 62+00 | 40 |
| Morrissey Blvd (Begin Northbound) | 62+00 | 62+00 | 60 |

| | | | |
|---|---|---|---|
| Morrissey Blvd (Umass Entrance) | 61+70 | 61+30 | 35 |
| Morrissey Blvd (Umass Exit) | 61+20 | 60+90 | 50 |
| Morrissey Blvd (Driveway 6) | 58+25 | 58+00 | 25 |
| Morrissey Blvd (Driveway 7) | 54+50 | 54+80 | 30 |
| Morrissey Blvd (Driveway 8) | 45+80 | 46+10 | 30 |
| Morrissey Blvd (Driveway 9) | 43+50 | 43+75 | 25 |
| Morrissey Blvd (Driveway 10) | 36+75 | 37+75 | 100 |
| | | **Total** | **2265** |

### 485 - Rumble Block Granite Pavement

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Preble Rotary Mountable Area | 56+25 | 58+10 | 452 |
| | | **Total** | **452** |

## 504 - Granite Curb

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Southampton Bus Stop (Atkinson St) | 06+50 | 08+10 | 200 |
| Southampton Bus Stop (New Market Square) | 19+50 | 21+00 | 200 |
| Preble Rotary (All sections) | 55+25 | 58+50 | 4000 |
| | | **Total** | **4400** |

## 510 - Granite Edging

| Description | Station Begin | Station End | Quantity |
| --- | --- | --- | --- |
| Preble Rotary edge of mountable | 56+25 | 58+10 | 245 |
| | | **Total** | **245** |

## 580.1 - Granite Curb Remove and Replace

| Description | Station Begin | Station End | Quantity |
|---|---|---|---|
| Mass Ave Left turn island | 00+75 | 02+00 | 140 |
| Southampton (Driveway 13 and 14) | 21+25 | 21+60 | 40 |
| Southampton (Driveway 14 to I-93 Bridge) | 22+25 | 31+25 | 900 |
| Southampton (I-93 Bridge to Frontage Rd) | 32+75 | 33+50 | 75 |
| Southampton (Frontage Rd to Train Bridge) | 35+00 | 37+25 | 225 |
| Southampton (Train Bridge to Ellery St) | 38+00 | 40+30 | 230 |
| Preble (Dorchester Ave to Driveway 1) | 44+50 | 45+10 | 60 |
| Preble St (Bus Stop) | 53+75 | 54+90 | 115 |
| Old Colony (Devine way to MCDonough Way) | 02+75 | 03+75 | 100 |
| Old Colony (Logan Way Island | 08+40 | 09+20 | 150 |
| Old Colony Bus Stop | 16+60 | 18+10 | 160 |
| Old Colony T station Exit | 29+10 | 29+75 | 90 |
| Mount Vernon (T Station) | 30+10 | 32+30 | 210 |
| Morrissey (Taxi exit to Entrance) | 32+75 | 34+60 | 185 |
| Morrissey (Entrance to Shaws Entrance) | 34+90 | 36+50 | 160 |
| Morrissey (Shaws Entrance to Exit) | 36+90 | 39+50 | 260 |
| Morrissey (Shaws Exit to Driveway 1) | 40+00 | 42+40 | 240 |
| Morrissey (Driveway1 to Umass) | 42+75 | 61+75 | 1900 |
| | | **Total** | **5240** |

**701 - Concrete Sidewalk**

**151 - Gravel Borrow**

| Description | Station Begin | Station End | Quantity (SF) | Quantity (SY) | Gravel Quantity |
|---|---|---|---|---|---|
| Southampton Up on Curb 1 | 19+60 | 21+00 | 2500 | 278 | 62 |
| Southampton Up on Curb 2 | 21+25 | 21+60 | 500 | 56 | 12 |
| Southampton Up on Curb 3 | 22+20 | 29+10 | 11250 | 1250 | 278 |
| Southampton Up on Curb 4 | 30+75 | 31+50 | 1030 | 114 | 25 |
| Southampton Up on Curb 5 | 32+75 | 35+30 | 5000 | 556 | 123 |
| Southampton Up on Curb 6 | 35+75 | 38+25 | 4100 | 456 | 101 |
| Southampton Up on Curb 7 | 38+60 | 39+60 | 1800 | 200 | 44 |
| Southampton Up on Curb 8 | 39+90 | 40+40 | 700 | 78 | 17 |
| Southampton Up on Curb 9 | 40+60 | 41+20 | 900 | 100 | 22 |
| Southampton Up on Curb 10 | 41+40 | 42+00 | 2000 | 222 | 49 |
| Preble 1 | 42+50 | 43+00 | 1200 | 133 | 30 |
| Preble 2 | 43+25 | 44+90 | 2900 | 322 | 72 |
| Roundabout 1 | 53+25 | 54+00 | 4300 | 478 | 106 |
| Roundabout 2 | 54+75 | 56+50 | 3300 | 367 | 81 |
| Roundabout 3 | 00+00 | 02+00 | 4300 | 478 | 106 |
| Roundabout 4 | 00+75 | 01+10 | 2200 | 244 | 54 |
| Old colony Logan Way | 08+40 | 09+20 | 2110 | 234 | 52 |
| Old colony O'Callaghan | 16+65 | 18+10 | 4100 | 456 | 101 |
| Mount Vernon (T Station) | 30+10 | 32+50 | 4300 | 478 | 106 |
| Morrissey 1 | 32+70 | 34+50 | 2750 | 306 | 68 |
| Morrissey 2 | 34+90 | 36+60 | 3440 | 382 | 85 |
| Morrissey 3 | 37+00 | 39+60 | 5400 | 600 | 133 |
| Morrissey 4 | 40+00 | 42+40 | 4700 | 522 | 116 |
| Morrissey 5 | 42+75 | 06+00 | 7300 | 811 | 180 |
| Morrissey 6 | 46+25 | 47+60 | 4700 | 522 | 116 |
| Morrissey 7 | 48+25 | 53+00 | 12000 | 1333 | 296 |
| Morrissey 8 | 53+50 | 55+40 | 4300 | 478 | 106 |
| Morrissey 9 | 56+00 | 62+00 | 14900 | 1656 | 368 |
| Morrissey 10 | 61+50 | 62+00 | 1330 | 148 | 33 |
| | | | **Total** | **13257** | **2946** |

## 701.2 - Concrete Wheelchair Ramps

| Description | Station Begin | Station End | Quantity (SF) | Quantity (SY) |
|---|---|---|---|---|
| Southampton Slip lane | 00+50 | 00+75 | 310 | 34 |
| Southampton up onto curb | 19+60 | 19+75 | 305 | 34 |
| Southampton South Bay | 25+95 | 26+15 | 112 | 12 |
| southampton Frontage Rd NW | 31+00 | 31+50 | 570 | 63 |
| Southampton Frontage Rd NE | 32+75 | 33+25 | 310 | 34 |
| Southampton Ellery St NW | 37+90 | 38+30 | 525 | 58 |
| Southampton Ellery St NE | 38+60 | 38+80 | 475 | 53 |
| Southampton Dot Ave | 41+50 | 42+00 | 750 | 83 |
| Preble Dot Ave | 42+50 | 42+90 | 1250 | 139 |
| Preble down off curb | 44+60 | 44+80 | 250 | 28 |
| Preble Approach to roundbaout N | 53+45 | 53+60 | 500 | 56 |
| Old Colony N approach to roundbaout | 53+75 | 54+00 | 120 | 13 |
| Columbia Rd approach to roundabout | 56+40 | 56+50 | 150 | 17 |
| Old Colony S approach to roundabout | 01+60 | 01+70 | 60 | 7 |
| Preble Approach to roundbaout s | 53+50 | 53+75 | 475 | 53 |
| Old colony Logan Way N | 08+40 | 08+50 | 135 | 15 |
| Old colony lgan way across | 08+80 | 09+00 | 125 | 14 |
| Old Colony Logan Way S | 09+00 | 09+15 | 140 | 16 |
| Old Colony Bus Stop | 16+60 | 16+70 | 90 | 10 |
| Old Colony across | 17+30 | 17+45 | 125 | 14 |
| Old Colony O'Callaghan | 17+90 | 18+10 | 500 | 56 |
| Mount Vernon Bus Exit | 30+30 | 30+40 | 60 | 7 |
| Mount Vernon T Station | 32+00 | 32+40 | 1200 | 133 |
| Mount Vernon Taxi Exit S | 32+70 | 32+80 | 60 | 7 |
| Morrissey T Entrance N | 34+25 | 34+50 | 170 | 19 |
| Morrissey T Entrance S | 34+90 | 35+10 | 250 | 28 |
| Morrissey Shaws Entrance N | 36+25 | 36+60 | 450 | 50 |
| Morrissey Shaws Entrance S | 36+90 | 37+20 | 300 | 33 |
| Morrissey Shaws Exit N | 39+35 | 39+60 | 400 | 44 |
| Morrissey Shaws Exit S | 39+90 | 40+25 | 300 | 33 |
| Morrissey Driveway 1 N | 42+25 | 42+40 | 300 | 33 |
| Morrissey Driveway 1 S | 42+75 | 43+20 | 750 | 83 |
| Morrissey Driveway 2 N | 45+80 | 46+00 | 450 | 50 |
| Morrissey Driveway 2 S | 46+25 | 46+35 | 350 | 39 |
| Morrissey Driveway 3 N | 47+50 | 47+60 | 450 | 50 |
| Morrissey Driveway 3 S | 48+15 | 48+25 | 370 | 41 |
| Morrissey Driveway 4 N | 53+00 | 53+20 | 370 | 41 |
| Morrissey Driveway 4 S | 53+60 | 53+70 | 350 | 39 |
| Morrissey Driveway 5 N | 55+40 | 55+60 | 350 | 39 |
| Morrissey Driveway 5 S | 56+00 | 56+20 | 350 | 39 |
| Morrissey @ Umass W | 61+50 | 62+00 | 1100 | 122 |
| Morrissey @ Umass E | 61+75 | 62+25 | 700 | 78 |
| | | **Total** | **16357** | **1817** |

**751 - Loam Borrow**

**765 - Seeding**

| Description | Area | Depth | Quantity Loam | Quantity Seed |
|---|---|---|---|---|
| Roundabout 1 | 6060 | 0.50 | 337 | 673 |
| Roundabout 2 | 2400 | 0.50 | 133 | 267 |
| Roundabout 3 | 10208 | 0.50 | 567 | 1134 |
| Roundabout 4 | 533 | 0.50 | 30 | 59 |
| Roundabout 5 | 8040 | 0.50 | 447 | 893 |
| Roundabout 6 | 1333 | 0.50 | 74 | 148 |
| Roundabout 7 | 1278 | 0.50 | 71 | 142 |
| Roundabout 8 | 1000 | 0.50 | 56 | 111 |
| Roundabout 9 | 1000 | 0.50 | 56 | 111 |
| Roundabout 10 | 1217 | 0.50 | 68 | 135 |
| Roundabout 11 | 400 | 0.50 | 22 | 44 |
| Roundabout 12 | 400 | 0.50 | 22 | 44 |
| Roundabout 13 | 400 | 0.50 | 22 | 44 |
| Roundabout 14 | 400 | 0.50 | 22 | 44 |
| Roundabout 15 | 900 | 0.50 | 50 | 100 |
| Roundabout 16 | 2950 | 0.50 | 164 | 328 |
| Roundabout 17 | 1259 | 0.50 | 70 | 140 |
| Roundabout 18 | 3150 | 0.50 | 175 | 350 |
| Roundabout 19 | 2250 | 0.50 | 125 | 250 |
| Roundabout 20 | 15300 | 0.50 | 850 | 1700 |
| | | **Total** | **3360** | **6720** |

## 823.70 - Light Pole Remove and Relocate

| Description | Station | Quantity |
|---|---|---|
| Southampton (Newmarket Square) | 21+40 | 1 |
| Southampton (South Bay) 1 | 24+15 | 1 |
| Southampton (South Bay) 2 | 24+95 | 1 |
| Southamton (Frontage Rd) | 33+55 | 1 |
| Southampton (Railroad Tracks) | 34+98 | 1 |
| Roundabout | 53+70 | 3 |
| Old Colony (Logan Way) | 09+02 | 1 |
| Old Colony (O'Callaghan Bus Stop) | 17+46 | 1 |
| Mount Vernon (JFK) | 31+03 | 1 |
| Morrissey (Shaws Entrance) | 37+54 | 1 |
| Morrissey (Pedestrian Bridge) | 40+51 | 1 |
| | **Total** | **13** |

## 866.04 - 4" White Thermoplastic

**Broken Lane Line**

| Description | Station Begin | Station End | Length | # of Lines | Quantity |
|---|---|---|---|---|---|
| Southampton St (U-turn to Fire Station) | 03+50 | 06+75 | 325 | 2 | 163 |
| Southampton St (Fire Station to Theo Glynn) | 07+90 | 11+00 | 210 | 2 | 105 |
| Southampton St (Theo Glynn to Merge) | 11+50 | 22+00 | 1050 | 1 | 263 |
| Southampton St (Merge to Dorchester Ave) | 22+00 | 40+00 | 1800 | 2 | 900 |
| Preble Roundabout | 53+25 | 56+50 | 330 | 1 | 83 |
| Old Colony Ave (North Approach) | 53+50 | 54+60 | 300 | 1 | 75 |
| Columbia Rd approach | 55+50 | 57+00 | 120 | 1 | 30 |
| Old Colony Ave | 01+00 | 20+00 | 2000 | 2 | 1000 |
| Columbia Rd Intersection to Rotary | 20+00 | 27+00 | 700 | 1 | 175 |
| Morrissey Blvd Exit NB | 36+60 | 37+90 | 130 | 1 | 33 |
| Morrissey Blvd | 40+50 | 42+75 | 225 | 1 | 56 |
| Morrissey Blvd | 42+75 | 44+00 | 125 | 2 | 63 |
| Morrissey Blvd | 44+00 | 58+50 | 1450 | 3 | 1088 |
| Morrissey continued lane lines left turn | 60+50 | 61+50 | 200 | 4 | 200 |
| Morrissey continued lane lines through | 60+50 | 62+00 | 150 | 3 | 113 |
| Umass @ intersection | 60+50 | 61+50 | 220 | 2 | 110 |
| Umass @ intersection | 60+50 | 61+50 | 150 | 1 | 38 |
| | | | | **Sub-total** | **4491** |

**Solid Lane Line**

| Description | Station Begin | Station End | Length | # of Lines | Quantity |
|---|---|---|---|---|---|
| Southampton St Mass Ave Intersection | 00+25 | 01+90 | 160 | 5 | 800 |
| Southampton St U-turn Light | 02+50 | 03+50 | 100 | 4 | 400 |
| Southampton St (U-turn to Fire Station) | 03+50 | 06+75 | 325 | 2 | 650 |
| Southampton St (Fire Station) | 06+75 | 07+90 | 115 | 4 | 460 |
| Southampton St (Fire Station to Theo Glynn) | 07+90 | 11+00 | 210 | 2 | 420 |
| Southampton St (Theo Glynn to Dorchester Ave) | 11+00 | 40+00 | 2900 | 2 | 5800 |
| Southhamton St (Dorchester Ave) | 40+00 | 41+50 | 150 | 3 | 450 |
| Preble St | 42+75 | 54+00 | 1125 | 4 | 4500 |
| Preble Roundabout | 55+25 | 58+50 | 410 | 1 | 410 |
| Old Colony Ave (North Approach) | 56+00 | 57+00 | 240 | 1 | 240 |
| Columbia Rd approach | 57+25 | 59+00 | 320 | 1 | 320 |
| Old Colony Ave (Roundabout to Columbia Rd) | 01+00 | 21+00 | 2000 | 5 | 10000 |
| Old Colony Ave (Columbia Rd to Morrissey | 21+00 | 32+00 | 1100 | 4 | 4400 |
| Morrissey Blvd | 32+00 | 58+50 | 2650 | 3 | 7950 |
| Morrissey Blvd @ Umass | 58+50 | 60+50 | 200 | 7 | 1400 |
| Morrissey Blvd past Umass | 60+50 | 63+00 | 250 | 2 | 500 |
| | | | | **Sub-total** | **38700** |

| Hatching | | | | | |
|---|---|---|---|---|---|
| **Description** | **Station Begin** | **Station End** | **Length** | **# of Lines** | **Quantity** |
| Slip Lane 1 | 00+60 | 01+00 | 5 | 7 | 32 |
| Slip Lane 2 | 01+25 | 01+60 | 9 | 10 | 85 |
| Southampton Separation 1 | 01+90 | 02+35 | 6 | 10 | 60 |
| Southampton Separation 2 | 02+70 | 02+80 | 6 | 2 | 11 |
| Southampton Separation 3 | 03+30 | 03+80 | 6 | 13 | 78 |
| Southampton Separation 4 | 04+60 | 04+70 | 6 | 2 | 12 |
| Southampton Separation 5 | 04+90 | 05+00 | 7 | 3 | 21 |
| Southampton Separation 6 | 05+30 | 06+10 | 6 | 19 | 105 |
| Southampton Separation 7 | 08+60 | 11+10 | 6 | 60 | 348 |
| Southampton Separation 8 | 11+60 | 11+70 | 7 | 3 | 21 |
| Southampton Separation 9 | 12+10 | 12+40 | 7 | 8 | 56 |
| Southampton Separation 10 | 12+60 | 14+05 | 7 | 32 | 208 |
| Southampton Separation 11 | 14+50 | 15+10 | 6 | 15 | 92 |
| Southampton Separation 12 | 15+60 | 16+85 | 6 | 32 | 176 |
| Southampton Separation 13 | 17+40 | 17+70 | 5 | 6 | 30 |
| Southampton Separation 14 | 18+30 | 18+40 | 5 | 4 | 20 |
| Southampton Separation 15 | 19+00 | 19+10 | 6 | 2 | 12 |
| Preble Separation 1 | 45+25 | 46+60 | 7 | 29 | 189 |
| Preble Separation 2 | 47+00 | 49+25 | 7 | 42 | 294 |
| Preble Separation 3 | 49+75 | 51+75 | 8 | 34 | 255 |
| Old Colony Separation 1 | 02+80 | 03+75 | 15 | 21 | 315 |
| Old Colony Separation 2 | 04+10 | 08+00 | 7 | 94 | 639 |
| Old Colony Separation 3 | 09+50 | 16+60 | 6 | 168 | 1008 |
| Old Colony Separation 4 | 18+50 | 22+50 | 5 | 88 | 440 |
| Old Colony Separation 5 | 22+50 | 29+75 | 21 | 131 | 2751 |
| | | | | **Sub-Total** | **7256** |
| | | | | **Total** | **50447** |

## 866.12 - 12" White Thermoplastic

| Crosswalk Striping | | | |
|---|---|---|---|
| **Description** | **Station Begin** | **Station End** | **Quantity** |
| Slip lane at Melnea Cass | 00+70 | 01+00 | 100 |
| Across Branston St (Southampton) | 01+50 | 01+70 | 100 |
| Southampton U-turn | 01+95 | 02+25 | 150 |
| Southampton befor U-turn | 02+30 | 02+40 | 230 |
| Southampton fire station | 06+30 | 06+40 | 220 |
| Atkinson St (Southampton) | 08+15 | 08+55 | 170 |
| Topeka St (Southampton) | 11+10 | 11+50 | 150 |
| Cummings St (Southampton) | 14+05 | 14+50 | 160 |
| Moore St (Southampton) | 16+90 | 17+40 | 200 |
| Southampton new market | 19+40 | 19+50 | 250 |
| Frontage Rd (Southampton) 3 sections | 33+30 | 34+80 | 490 |
| Ellery St (Southampton) | 40+20 | 40+60 | 170 |
| Dorchester Ave (Southampton & Preble) | 43+80 | 44+50 | 280 |
| Preble St (Mohawk St) | 47+40 | 47+50 | 240 |
| Rogers St (Preble St) | 48+60 | 49+00 | 110 |
| Preble St (Ward St) | 51+30 | 51+40 | 240 |
| Ward St (Preble St) | 51+30 | 51+80 | 150 |
| Vinton St (Preble St) | 54+90 | 55+30 | 130 |
| Preble St (Preble Rotary) | 55+50 | 55+60 | 200 |
| Old Colony Ave North Entrance (Preble Rotary) | 56+20 | 57+00 | 240 |
| Columbia Road East Entrance (Preble Rotary) | 57+60 | 57+70 | 200 |
| Old Colony Ave South Entrance (Preble Rotary) | 56+40 | 57+00 | 250 |
| Devine Way (Old Colony Ave) | 02+50 | 02+90 | 130 |
| McDonough Way (Old Colony Ave) | 03+75 | 04+10 | 100 |
| Logan Way North (Old Colony Ave) | 08+10 | 08+40 | 120 |
| Old Colony Ave (Logan Way) 2 Sections | 08+85 | 08+95 | 320 |
| Logan Way South (Old Colony Ave) | 09+10 | 09+40 | 120 |
| Old Colony Ave (South of Ped overpass) 2 Sections | 12+10 | 12+20 | 400 |
| Old Colony Ave (Second south of ped overpass) 2 Sections | 14+80 | 14+90 | 390 |
| Old Colony Ave (MSGR O'Callghan Way) 2 Sections | 17+30 | 17+40 | 310 |
| MSGR O'Callghan Way (Old Colony Ave) | 18+10 | 18+40 | 120 |
| Columbia Road (Old Colony Ave) 2 sections | 21+00 | 22+20 | 410 |
| JFK/Umass T Station Bus Exit (Mount Vernon St) | 29+75 | 30+10 | 135 |
| Mount Vernon St (Morrissey Blvd) | 32+10 | 32+20 | 70 |
| JFK/Umass T Station Taxi Exit (Morrissey Blvd) | 32+40 | 32+70 | 120 |
| JFK/Umass T Station Bus/Taxi Entrance (Morrissey Blvd) | 34+55 | 34+90 | 140 |
| Shaws Entrance (Morrissey Blvd) | 36+50 | 37+10 | 170 |
| Shaws Exit (Morrissey Blvd) | 39+60 | 40+00 | 135 |
| Driveway 1 (Morrissey Blvd) | 42+40 | 42+75 | 160 |
| Driveway 2 (Morrissey Blvd) | 45+90 | 46+20 | 110 |
| Driveway 3 (Morrissey Blvd) | 47+60 | 48+10 | 220 |
| Driveway 4 (Morrissey Blvd) | 53+10 | 53+60 | 200 |
| Driveway 5 (Morrissey Blvd) | 55+30 | 55+90 | 200 |
| Umass Left Turn Exit (Morrissey Blvd) | 60+15 | 60+45 | 160 |
| Morrissey Blvd (Umass Exit) 2 sections | 61+80 | 61+90 | 380 |
| | | **Sub-total** | **9050** |

| Bike Crossing Edge | | | |
|---|---|---|---|
| **Description** | **Station Begin** | **Station End** | **Quantity** |
| Slip lane at Melnea Cass | 00+70 | 01+50 | 25 |
| Across Branston St (Southampton) | 01+50 | 01+70 | 16 |
| Driveway 1 (Southampton) | 02+50 | 02+80 | 16 |
| Driveway 2 (Southampton) | 02+85 | 03+25 | 22 |
| Driveway 3 (Southampton) | 03+80 | 04+60 | 40 |
| Driveway 4 (Southampton) | 04+70 | 04+90 | 12 |
| Driveway 5 (Southampton) | 05+00 | 05+30 | 14 |
| Driveway 6 (Southampton) | 06+10 | 06+30 | 12 |
| Atkinson St (Southampton) | 08+15 | 08+55 | 26 |
| Topeka St (Southampton) | 11+00 | 11+60 | 30 |
| Driveway 7 (Southampton) | 11+70 | 12+05 | 18 |
| Driveway 8 (Southampton) | 12+40 | 12+70 | 18 |
| Cummings St (Southampton) | 14+05 | 14+50 | 24 |
| Driveway 9 (Southampton) | 15+10 | 15+60 | 26 |
| Moore St (Southampton) | 16+90 | 17+40 | 30 |
| Driveway 10 (Southampton) | 17+30 | 18+20 | 26 |
| Driveway 11 (Southampton) | 18+30 | 19+00 | 34 |
| Driveway 12 (Southampton) | 19+10 | 19+40 | 18 |
| Driveway 13 (Southampton) | 21+00 | 21+25 | 14 |
| Driveway 14 (Southampton) | 21+60 | 22+25 | 34 |
| Frontage Rd (Southampton) 3 sections | 33+30 | 34+80 | 61 |
| Ellery St (Southampton) | 40+20 | 40+60 | 28 |
| Driveway 15 (Southampton) | 41+60 | 41+90 | 20 |
| Driveway 16 (Southampton) | 42+30 | 42+60 | 14 |
| Driveway 17 (Southampton) | 43+15 | 43+40 | 15 |
| Dorchester Ave (Southampton & Preble) | 43+80 | 44+50 | 37 |
| Driveway 1 (Preble) | 45+10 | 45+30 | 12 |
| Driveway 2 (Preble) | 45+40 | 45+70 | 12 |
| Driveway 3 (Preble) | 46+85 | 47+20 | 16 |
| Rogers St (Preble St) | 48+60 | 49+00 | 22 |
| Ward St (Preble St) | 51+30 | 51+80 | 20 |
| Vinton St (Preble St) | 54+90 | 55+30 | 21 |
| Preble St (Preble Rotary) | 55+50 | 55+60 | 22 |
| Old Colony Ave North Entrance (Preble Rotary) | 56+20 | 57+00 | 28 |
| Columbia Road East Entrance (Preble Rotary) | 57+60 | 57+70 | 22 |
| Old Colony Ave South Entrance (Preble Rotary) | 56+40 | 57+00 | 28 |
| Devine Way (Old Colony Ave) | 02+50 | 02+90 | 16 |
| McDonough Way (Old Colony Ave) | 03+75 | 04+10 | 18 |
| Logan Way North (Old Colony Ave) | 08+10 | 08+40 | 19 |
| Logan Way South (Old Colony Ave) | 09+10 | 09+40 | 19 |
| MSGR O'Callghan Way (Old Colony Ave) | 18+10 | 18+50 | 21 |
| JFK/Umass T Station Bus Exit (Mount Vernon St) | 29+75 | 30+10 | 25 |
| JFK/Umass T Station Taxi Exit (Morrissey Blvd) | 32+40 | 32+70 | 20 |
| JFK/Umass T Station Bus/Taxi Entrance (Morrissey Blvd) | 34+55 | 34+90 | 24 |
| Shaws Entrance (Morrissey Blvd) | 36+50 | 37+10 | 25 |
| Shaws Exit (Morrissey Blvd) | 39+60 | 40+00 | 23 |
| Driveway 1 (Morrissey Blvd) | 42+40 | 42+75 | 20 |
| Driveway 2 (Morrissey Blvd) | 45+90 | 46+20 | 14 |
| Driveway 3 (Morrissey Blvd) | 47+60 | 48+10 | 27 |

| | | | |
|---|---|---|---|
| Driveway 4 (Morrissey Blvd) | 53+10 | 53+60 | 25 |
| Driveway 5 (Morrissey Blvd) | 55+30 | 55+90 | 24 |
| Morrissey Blvd (Umass Exit) 2 sections | 61+80 | 61+90 | 46 |
| | | **Sub-total** | **1199** |

| **Stop Lines** | | | |
|---|---|---|---|
| **Description** | **Station Begin** | **Station End** | **Quantity** |
| Southampton befor U-turn | 02+48 | 02+49 | 50 |
| Southampton fire station | 06+74 | 06+75 | 35 |
| Atkinson St (Southampton) | 08+15 | 08+45 | 18 |
| Topeka St (Southampton) | 11+10 | 11+50 | 14 |
| Cummings St (Southampton) | 14+05 | 14+50 | 18 |
| Moore St (Southampton) | 16+90 | 17+40 | 22 |
| Southampton E (South Bay) | 24+24 | 24+25 | 22 |
| Southampton W (South Bay) | 26+18 | 26+19 | 22 |
| Southampton E (Frontage Rd) | 33+30 | 33+31 | 22 |
| Frontage Rd (Southampton) | 33+30 | 33+60 | 20 |
| Southampton W (Frontage Rd) | 35+52 | 35+53 | 25 |
| Ellery St (Southampton) | 40+20 | 40+60 | 14 |
| Mohawk St (Preble St) | 47+60 | 47+90 | 17 |
| Rogers St (Preble St) | 48+60 | 49+00 | 10 |
| Ward St (Preble St) | 51+30 | 51+80 | 12 |
| Vinton St (Preble St) | 54+90 | 55+30 | 12 |
| Devine Way (Old Colony Ave) | 02+50 | 02+90 | 12 |
| McDonough Way (Old Colony Ave) | 03+75 | 04+10 | 11 |
| Old Colony Ave (Logan Way) 2 Sections | 08+85 | 08+95 | 50 |
| Logan Way South (Old Colony Ave) | 09+10 | 09+40 | 30 |
| Old Colony Ave (MSGR O'Callghan Way) 2 Sections | 17+30 | 17+40 | 50 |
| MSGR O'Callghan Way (Old Colony Ave) | 18+10 | 18+40 | 25 |
| Columbia Road S (Old Colony Ave) | 20+50 | 20+60 | 25 |
| Columbia Road N (Old Colony Ave) | 21+00 | 22+20 | 25 |
| Old Colony Ave (Columbia Rd) | 21+80 | 21+90 | 25 |
| JFK/Umass T Station Bus Exit (Mount Vernon St) | 29+75 | 30+10 | 30 |
| Mount Vernon St (Morrissey Blvd) | 32+00 | 32+05 | 20 |
| JFK/Umass T Station Taxi Exit (Morrissey Blvd) | 32+40 | 32+70 | 25 |
| Morrissey Blvd S (Shaws Exit) | 39+30 | 39+31 | 15 |
| Shaws Exit (Morrissey Blvd) | 39+60 | 40+00 | 15 |
| Morrissey Blvd N (Shaws Exit) | 40+20 | 40+21 | 15 |
| Morrissey Blvd S (TV Station) | 42+15 | 42+16 | 15 |
| Umass Left Turn Exit (Morrissey Blvd) | 60+15 | 60+45 | 30 |
| Morrissey Blvd S (Umass Exit) | 60+40 | 60+50 | 70 |
| Morrissey Blvd N (Umass Exit) | 62+05 | 62+10 | 40 |
| | | **Sub-total** | **861** |
| | | **Total** | **9911** |

## 867.04 - 4" Yellow Thermoplastic

**Bike Lane Center Line**

| Description | Station Begin | Station End | Length | # of Lines | Quantity |
|---|---|---|---|---|---|
| Southampton St | 00+00 | 44+00 | 4400 | 1 | 1100 |
| Preble St | 44+00 | 55+50 | 1150 | 1 | 287.5 |
| Preble Rotary (All sections) | 55+25 | 58+50 | 600 | 1 | 150 |
| Old Colony Ave | 01+00 | 30+00 | 2900 | 1 | 725 |
| Mount Vernon St | 30+00 | 32+00 | 200 | 1 | 50 |
| Morrissey Blvd | 32+00 | 62+00 | 3000 | 1 | 750 |
| Across Morrissety @ Umass | 61+75 | 62+00 | 150 | 1 | 37.5 |
| | | | | **Sub-total** | **3100** |

**Vehicle Center Line**

| Description | Station Begin | Station End | Length | # of Lines | Quantity |
|---|---|---|---|---|---|
| Southampton St (Mass Ave to Theo Glynn) | 00+00 | 11+00 | 1100 | 1 | 1100 |
| Southampton St (Theo Glynn to Dorchest Ave) | 11+00 | 43+50 | 3250 | 2 | 6500 |
| Preble St | 44+50 | 55+50 | 1100 | 2 | 2200 |
| Preble Roundabout | 55+25 | 58+50 | 245 | 1 | 245 |
| Old Colony Ave (North Approach) | 56+00 | 57+00 | 240 | 1 | 240 |
| Columbia Rd approach | 57+25 | 59+00 | 320 | 1 | 320 |
| Old Colony Ave (Roundabout to Columbia Rd) | 01+00 | 21+00 | 2000 | 2 | 4000 |
| Old Colony Ave (Columbia Rd to Morrissey | 21+00 | 32+00 | 1100 | 2 | 2200 |
| Morrissey Blvd | 32+00 | 62+00 | 3000 | 3 | 9000 |
| | | | | **Sub-total** | **25805** |
| | | | | **Total** | **28905** |

# Appendix I – 2004-2006 Statewide Top 200 Intersection Crash List

# 2006 TOP CRASH LOCATIONS REPORT

## JULY 2008

EOT

MASS HIGHWAY

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF TRANSPORTATION
MASSACHUSETTS HIGHWAY DEPARTMENT

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LIEUTENANT GOVERNOR

BERNARD COHEN
SECRETARY

LUISA PAIEWONSKY
COMMISSIONER

Dear Reader:

Enclosed is MassHighway's edition of the 2006 *Top Crash Locations Report*, which may be used to evaluate top crash intersection locations and top crash pedestrian and bicycle locations in order to improve the safety of our roadway system. This report, like last year's report, is a change from previous editions of the top crash locations report in that the focus is on intersection locations and is based on crashes entered into the new Crash Data System (CDS). New for this year, reflecting MassHighway's commitment to a safe multi-modal transportation system, is the identification of top bicycle-motor vehicle and pedestrian-motor vehicle crash locations. This information is also available by contacting your Regional Planning Agencies. In the near future, a report will be published identifying the top interchange locations.

In an effort to reduce injury and fatal crashes, the Massachusetts Highway Department, in cooperation with a wide variety of public and private safety stakeholders, has prepared the Massachusetts Strategic Highway Safety Plan (SHSP). To view the SHSP, download a copy of the Plan or to learn more about it, go to the MassHighway website: http://www.mhd.state.ma.us/default.asp?pgid=content/traffic/shsp&sid=level2. The SHSP identified the State's key safety needs and the Plan can be used to guide investment decisions to achieve significant reductions in highway fatalities and serious injuries on all public roads based upon a data-driven process.

I am pleased to present this dataset which may be used as a screening tool to evaluate locations and make changes to improve the safety of our roadway system. The 2006 *Top Crash Locations Report* is one of the tools for the statewide Highway Safety Improvement Program (HSIP) to identify safety projects using a data-driven process.

Please note that this report is based only on crash records that have been entered into the statewide crash system and have been geocoded to a specific location. Although Massachusetts General Laws Chapter 90 § 26 and 29 require drivers and police departments to file crash reports that exceed specific thresholds, this is not always the case. Improving the crash reporting system and the quality of the data will help to focus resources where they are most needed.

I am convinced that we can make great strides in improving safety on Massachusetts roadways for all users. If you have questions, please contact Neil Boudreau, State Traffic Engineer at (617) 973-8211.

Sincerely,

Luisa Paiewonsky
Commissioner

TEN PARK PLAZA, BOSTON, MA 02116-3969
TELEPHONE: (617) 973-7800 • TELEFAX: (617) 973-8040 • TDD: (617) 973-7306 • WWW.MHD.STATE.MA.US

# TOP HIGH CRASH LOCATIONS REPORT
## Top 200 Intersection Locations 2004-2006
## Top Pedestrian Locations 2002-2006
## Top Bicycle Locations 2002-2006

**Introduction**

MassHighway obtains crash data from the Massachusetts Registry of Motor Vehicles (RMV) and uses it for a number of purposes. The primary function, however, is that it provides the foundation for developing safety improvement projects. The Top High Crash Locations Report is one of the tools used in this process. Previously, MassHighway, with the assistance from Central Transportation Planning Staff (CTPS), produced a Top 1000 Highway Crash Locations Report which included all types of locations (interchanges, intersections and rotaries). Last year, MassHighway developed a new report type where the locations identified were crash clusters at intersections (no grade separated locations and no locations with weaving sections). In the report it was noted that in the near future the top bicycle and pedestrian clusters would be identified and reported as well. This year, MassHighway is again preparing a Top High Crash Locations Report which includes the top 200 high crash intersection locations using crash data from 2004-2006 and also includes the highest frequency bicycle-motor vehicle and pedestrian-motor vehicle crash locations for 2002-2006.

The Registry of Motor Vehicles (RMV) obtains crash data from State and local police reports and from motor vehicle operators (motorists) who are involved in crashes. The RMV Crash Records Section collects, enters and maintains crash data records, which are the source of the MassHighway crash data.

To produce this high crash locations listing, MassHighway, with the assistance of Geonetics, has developed an automated procedure for processing, standardizing, matching and aggregating the crash data by geographical location using Geographic Information System (GIS) tools and procedures. This automated process replaced the previous largely-manual process used by CTPS in developing the integrated Top 1000 High Crash Locations Report.

This report, like last year's report, is based on the new Registry of Motor Vehicles crash system which has been operational since 2002 and collects crash information in a different format. The new Crash Data System (CDS) was designed, built and tested over a period of several years involving assistance and input from a number of State, Federal and local agencies, including MassHighway and the Federal Highway Administration. Due to the difficulty of obtaining complete and accurate information on crash locations, one of the key parts of the CDS project was working with the police and the RMV to attempt to obtain more accurate crash location data. New crash data forms for both police and operator reports were designed to correspond to the new data entry system at the RMV. The CDS includes new data entry tools to assist analysts attempting to validate the crash location data. Improved accuracy of the crash data along with the standardization of street names is allowing MassHighway to do a better job of evaluating crash locations. Generally, the geocoding rate (the rate at which crashes can be located to a specific geographical point) has jumped from 62% to nearly 80% of crashes in the statewide system. However, the geocoding rate is not uniform for all crashes nor for all types of crash locations. Some crashes may be more difficult to geocode because of multiple intersections between the same roadway names within a community, inconsistencies in roadway names between E911 files and the Road Inventory File or a host of other reasons.

Furthermore, the reporting levels of some communities have changed dramatically between the old reporting format (pre-2002) and the new format. As an example, one community has dropped reporting levels by nearly a factor of 10, while another community has dramatically increased their reporting levels so that they are now reporting nearly 10 times the number of crashes. Obviously, these reporting changes significantly impact the results of the Top High Crash Locations Report.

Due to the many difficulties in obtaining precise, useable crash location data and many issues involved in variations in crash reporting rates by some jurisdictions, this report should be used as a general purpose screening tool rather than as a precise listing of crash frequencies by individual locations.

**Methodology – Intersection Locations**

The intersection crash cluster analysis method, developed by Geonetics, is a comprehensive method designed to locate crash clusters. At the heart of the method is a 25 meter fixed search distance around each crash. In basic terms, this radius controls how far the application will search for adjacent crashes. Using a 25 meter radius, the analysis method found nearby crashes and merged their areas together, thus creating clusters. If two distinct clusters are found to share a common crash, the two clusters are merged into a single cluster. This method of search-and-merge results in a set of many distinct clusters of different sizes. The application then stores these clusters to the GIS output file, along with the count of crashes within the cluster. The clusters were then ranked by the number of Equivalent Property Damage Only (EPDO) crashes contained within their boundaries. As in previous Top Crash Lists, fatal crashes are weighted by 10, injury crashes are weighted by 5 and property damage only or non-reported is weighted by 1. These are the same weights that were used to generate the previous Top 1000 High Crash Locations Report.

The crashes were then named based on the highest functional classification roadway within the cluster, followed by the roadway with the second highest functional classification. In instances where there were two roadways with the identical classification, the first street name selected was the street with the longest segment contained within the cluster. Some cluster naming was modified to insert the name of a private way or site drive, rather than leaving it as unnamed (such as at an intersection of a roadway with a site drive). Note that the area encompassing the crash cluster may be more broad than just the intersection.

The module to automatically determine whether the location was an intersection, rotary, interchange or other, has not yet been developed. Therefore, a review of each location was required to make that determination. Generally, a location was determined to be an "intersection" if the cluster did not contain roadways with grade separation (interchange) nor weaving sections (rotaries or ramps). The clusters were reviewed in descending EPDO order until 200 locations were obtained. A sample of the top 2 ranked intersection locations is included in this report to illustrate the concept of the intersection clustering. The actual crash clusters can be viewed on the interactive maps at mass.gov/mhd/topcrashclusters. Furthermore, a shape file of the top crash intersection locations is available upon request.

The above method was used to develop the top 200 intersection crash locations for crashes occurring during the three year period from 2004 to 2006. As with previous editions, the crash location analysis has been scored over a three-year period. By using crash experience over the three-year period, anomalies in the individual years of data tend to be reduced.

**Methodology – Pedestrian and Bicycle Locations**

New for this year, the top locations where reported collisions occurred between pedestrians and motor vehicles and bicycles and motor vehicles have been identified. The crash cluster analysis methodology for both the top pedestrian and the top bicycle crashes is similar to the top intersection location methodology in that it uses a fixed meter search distance (for both pedestrian and bicycle crashes it is 100 meters compared to 25 meters for intersection locations) to merge crash clusters together. Crashes involving collisions between motor vehicles and pedestrians or bicycles were identified by using the non-motorist type code within the CDS database (which may yield different results from using most harmful event, first harmful event, or sequence of events data fields). Furthermore, the methodology uses the

Equivalent Property Damage Only (EPDO) weighting to rank the clusters. However, because of the relatively small number of reported pedestrian and bicycle crashes in the crash data file, the clustering analysis used crashes from the five year period from 2002-2006, instead of the three year analysis for intersection locations. Additionally, due to the larger geographic area encompassed by both the pedestrian and the bicycle crash clusters, it was difficult to name them so they were left unnamed but can be viewed spatially. The top 10 ranked pedestrian crash locations and the top 10 bicycle crash locations are included in this report. The actual crash clusters can be viewed on the interactive maps mass.gov/mhd/topcrashclusters.

For further information, please contact Neil Boudreau, State Traffic Engineer, Traffic Engineering Section, Massachusetts Highway Department, 10 Park Plaza, Room 7210, Boston, MA 02116, phone (617) 973-8211.

# NOTICE

**It should be noted that the Top 200 High Crash Intersection Locations Report was compiled under the authority of United States Code Title 23, Section 148, Highway Safety Improvement Program, sponsored by the Federal Highway Administration. The compilation of such information is, therefore, subject to the limitations of Section 148 (g) (4) which states:**

**"Discovery and admission into evidence of certain reports, surveys, and information - Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose directly relating to paragraph (1) or subsection (c)(1)(D), or published by the Secretary in accordance with paragraph (3), shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in such reports, surveys, schedules, lists, or other data."**

2004-2006 STATEWIDE TOP 200 INTERSECTION CRASH LIST

| Rank | Town | RPA | MHD District | Street 1 | Route 1 | Street 2 | Route 2 | Total Crashes | EPDO Crashes | Fatal Crashes | Injury Crashes | PDO & Non Reported Crashes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | LOWELL | NMCOG | 4 | BRIDGE STREET | 38 | VETERANS OF FOREIGN WARS HIGHWAY | | 154 | 384 | 2 | 53 | 99 |
| 2 | FALL RIVER | SRPEDD | 5 | PLYMOUTH AVENUE | 81 | RODMAN STREET | | 158 | 310 | 0 | 38 | 120 |
| 3 | LOWELL | NMCOG | 4 | MIDDLESEX STREET | | WOOD STREET | | 139 | 267 | 0 | 32 | 107 |
| 4 | SHREWSBURY | CMRPC | 3 | BOSTON TURNPIKE | 9 | SOUTH QUINSIGAMOND AVENUE | | 148 | 260 | 0 | 28 | 120 |
| 5 | WEYMOUTH | MAPC | 4 | MAIN STREET | 18 | MIDDLE STREET | | 152 | 256 | 0 | 26 | 126 |
| 6 | FRAMINGHAM | MAPC | 3 | HOLLIS STREET | 126 | WAVERLEY STREET | 135 | 138 | 243 | 1 | 24 | 113 |
| 7 | BROCKTON | OCPC | 5 | WEST ELM STREET | | NEWBURY STREET | | 63 | 223 | 0 | 40 | 23 |
| 8 | FRAMINGHAM | MAPC | 3 | WORCESTER ROAD | 9 | TEMPLE STREET | | 105 | 222 | 1 | 27 | 77 |
| 9 | STOUGHTON | MAPC & OCPC | 5 | WASHINGTON STREET | 138 | CENTRAL STREET | | 127 | 219 | 0 | 23 | 104 |
| 10 | CHICOPEE | PVPC | 2 | BROADWAY | | CHURCH STREET | | 86 | 218 | 0 | 33 | 53 |
| 11 | WOBURN | MAPC | 4 | MONTVALE AVENUE | | WASHINGTON STREET | | 115 | 215 | 0 | 25 | 90 |
| 12 | WORCESTER | CMRPC | 3 | PARK AVENUE | 9 | MAY STREET | | 98 | 214 | 0 | 29 | 69 |
| 12 | BROCKTON | OCPC | 5 | ASH STREET | | WEST ELM STREET | | 70 | 214 | 0 | 36 | 34 |
| 14 | CHELSEA | MAPC | 4 | BROADWAY | | CONGRESS AVENUE | | 78 | 210 | 0 | 33 | 45 |
| 15 | BROCKTON | OCPC | 5 | PLEASANT STREET | 27 | WEST STREET | | 91 | 208 | 1 | 27 | 63 |
| 15 | FALL RIVER | SRPEDD | 5 | PRESIDENT AVENUE | 6 | NORTH MAIN STREET | | 104 | 208 | 0 | 26 | 78 |
| 17 | LOWELL | NMCOG | 4 | PLAIN STREET | | CHELMSFORD STREET | 110 | 97 | 205 | 0 | 27 | 70 |
| 18 | FRAMINGHAM | MAPC | 3 | WORCESTER ROAD | 9 | CALIFORNIA AVENUE | | 87 | 204 | 1 | 27 | 59 |
| 19 | LOWELL | NMCOG | 4 | CHURCH STREET | 110 | APPLETON STREET | | 95 | 203 | 0 | 27 | 68 |
| 19 | BOSTON | MAPC | 4 | MASSACHUSETTS AVENUE | | MELNEA CASS BOULEVARD | | 90 | 203 | 1 | 26 | 63 |
| 21 | LEOMINSTER | MRPC | 3 | NORTH MAIN STREET | 12 | NELSON STREET | | 97 | 201 | 0 | 26 | 71 |
| 22 | FRAMINGHAM | MAPC | 3 | WAVERLEY STREET | 135 | BEAVER STREET | | 114 | 198 | 0 | 21 | 93 |
| 23 | QUINCY | MAPC | 4 | HONORABLE THOMAS S BURGIN PARKWAY | | GRANITE STREET | | 104 | 196 | 0 | 23 | 81 |
| 24 | WORCESTER | CMRPC | 3 | BELMONT STREET | 9 | OAK AVENUE | | 102 | 194 | 0 | 23 | 79 |
| 25 | BRAINTREE | MAPC | 4 | GRANITE STREET | 37 | COMMON STREET | | 77 | 193 | 0 | 29 | 48 |
| 26 | LYNN | MAPC | 4 | WESTERN AVENUE | 107 | CENTRE STREET | | 84 | 192 | 0 | 27 | 57 |
| 27 | LYNN | MAPC | 4 | WESTERN AVENUE | 107 | FRANKLIN STREET | | 91 | 191 | 0 | 25 | 66 |
| 27 | LYNN | MAPC | 4 | WESTERN AVENUE | 107 | WASHINGTON STREET | 129 | 87 | 191 | 0 | 26 | 61 |
| 29 | PLAINVILLE | SRPEDD | 5 | WASHINGTON STREET | 1 | TAUNTON STREET | 152 | 70 | 190 | 0 | 30 | 40 |
| 30 | WILMINGTON | MAPC | 4 | LOWELL STREET | 129 | WOBURN STREET | | 63 | 187 | 0 | 31 | 32 |
| 31 | BROCKTON | OCPC | 5 | NORTH MAIN STREET | | HOWARD STREET | | 66 | 186 | 0 | 30 | 36 |
| 32 | ABINGTON | OCPC | 5 | BEDFORD STREET | 18 | RANDOLPH STREET | 139 | 89 | 185 | 0 | 24 | 65 |
| 33 | PEMBROKE | MAPC & OCPC | 5 | SCHOOSETT STREET | 139 | COLUMBIA ROAD | 53 | 63 | 183 | 0 | 30 | 33 |
| 34 | MALDEN | MAPC | 4 | EASTERN AVENUE | 60 | BROADWAY | 99 | 86 | 182 | 0 | 24 | 62 |
| 35 | LEOMINSTER | MRPC | 3 | MAIN STREET | 13 | PROSPECT STREET | | 113 | 181 | 0 | 17 | 96 |
| 35 | WORCESTER | CMRPC | 3 | BELMONT STREET | 9 | PLANTATION STREET | | 77 | 181 | 0 | 26 | 51 |
| 37 | LYNN | MAPC | 4 | LYNNFIELD STREET | 129 | BROADWAY | | 94 | 178 | 0 | 21 | 73 |
| 37 | CONCORD | MAPC | 4 | CONCORD TURNPIKE | 2 | MAIN STREET | 62 | 66 | 178 | 0 | 28 | 38 |
| 39 | WALTHAM | MAPC | 4 | MAIN STREET | 20 | LEXINGTON STREET | | 101 | 177 | 0 | 19 | 82 |
| 40 | BROCKTON | OCPC | 5 | BELMONT STREET | 123 | MANLEY STREET | | 64 | 176 | 0 | 28 | 36 |
| 41 | WORCESTER | CMRPC | 3 | BELMONT STREET | 9 | GOLDSBERRY STREET | | 82 | 174 | 0 | 23 | 59 |
| 42 | CHELSEA | MAPC | 4 | REVERE BEACH PARKWAY | 16 | WASHINGTON AVENUE | | 70 | 170 | 0 | 25 | 45 |
| 43 | WALTHAM | MAPC | 4 | LEXINGTON STREET | | TRAPELO ROAD | | 81 | 169 | 0 | 22 | 59 |
| 44 | TAUNTON | SRPEDD | 5 | COUNTY STREET | 140 | HART STREET | | 67 | 168 | 1 | 23 | 43 |
| 45 | NEW BEDFORD | SRPEDD | 5 | ALFRED BESSETTE MEMORIAL HIGHWAY | 140 | KEMPTON STREET | 6 | 65 | 167 | 2 | 21 | 42 |
| 46 | WORCESTER | CMRPC | 3 | PARK AVENUE | 9 | PLEASANT STREET | | 70 | 166 | 0 | 24 | 46 |
| 47 | SWANSEA | SRPEDD | 5 | MARKET STREET | 136 | GRAND ARMY OF THE REPUBLIC HIGHWAY | 6 | 79 | 163 | 0 | 21 | 58 |
| 48 | LOWELL | NMCOG | 4 | VETERANS OF FOREIGN WARS HIGHWAY | 113 | VARNUM AVENUE | | 94 | 162 | 0 | 17 | 77 |
| 48 | BROCKTON | OCPC | 5 | BELMONT AVENUE | | WEST ELM STREET | | 44 | 162 | 2 | 25 | 17 |
| 50 | HAVERHILL | MVPC | 4 | MAIN STREET | 97 | BAILEY BOULEVARD | | 73 | 161 | 0 | 22 | 51 |
| 51 | MARLBOROUGH | MAPC | 3 | EAST MAIN STREET | 20 | CURTIS AVENUE | | 92 | 160 | 0 | 17 | 75 |
| 51 | WESTFIELD | PVPC | 2 | FRANKLIN STREET | 20 | WASHINGTON STREET | | 68 | 160 | 0 | 23 | 45 |
| 53 | NATICK | MAPC | 3 | WEST CENTRAL STREET | 135 | SPEEN STREET | | 95 | 159 | 0 | 16 | 79 |
| 53 | BROCKTON | OCPC | 5 | PLEASANT STREET | 27 | WARREN AVENUE | | 67 | 159 | 0 | 23 | 44 |
| 55 | ATTLEBORO | SRPEDD | 5 | WASHINGTON STREET | 1 | MAY ST | | 74 | 158 | 0 | 21 | 53 |
| 55 | HAVERHILL | MVPC | 4 | SOUTH MAIN STREET | 125 | SOUTH PLEASANT STREET | | 74 | 158 | 0 | 21 | 53 |
| 57 | WORCESTER | CMRPC | 3 | CAMBRIDGE STREET | | SOUTHBRIDGE STREET | | 61 | 157 | 0 | 24 | 37 |
| 57 | BROCKTON | OCPC | 5 | CRESCENT STREET | 27 | LYMAN STREET | | 52 | 157 | 1 | 24 | 27 |
| 59 | FALL RIVER | SRPEDD | 5 | SOUTH MAIN STREET | 138 | GLOBE STREET | | 79 | 155 | 0 | 19 | 60 |
| 60 | LOWELL | NMCOG | 4 | SCHOOL STREET | | BRANCH STREET | | 66 | 154 | 0 | 22 | 44 |
| 60 | WORCESTER | CMRPC | 3 | LINCOLN STREET | 70 | MARSH AVENUE | | 62 | 154 | 0 | 23 | 39 |
| 62 | MALDEN | MAPC | 4 | BROADWAY | 99 | SALEM STREET | | 57 | 153 | 0 | 24 | 33 |

2004-2006 STATEWIDE TOP 200 INTERSECTION CRASH LIST

| Rank | Town | RPA | MHD District | Street 1 | Route 1 | Street 2 | Route 2 | Total Crashes | EPDO Crashes | Fatal Crashes | Injury Crashes | PDO & Non Reported Crashes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62 | FALL RIVER | SRPEDD | 5 | BROADWAY | 138 | BRADFORD AVENUE | | 73 | 153 | 0 | 20 | 53 |
| 64 | LOWELL | NMCOG | 4 | NESMITH STREET | 38 | ANDOVER STREET | 110 | 76 | 152 | 0 | 19 | 57 |
| 64 | WORCESTER | CMRPC | 3 | HIGHLAND STREET | 9 | LANCASTER STREET | | 64 | 152 | 0 | 22 | 42 |
| 64 | LOWELL | NMCOG | 4 | THORNDIKE STREET | 3A | HIGHLAND STREET | | 59 | 152 | 1 | 21 | 37 |
| 64 | NORTH ANDOVER | MVPC | 4 | CHICKERING ROAD | 125 | MASSACHUSETTS AVENUE | | 64 | 152 | 0 | 22 | 42 |
| 64 | WEYMOUTH | MAPC | 4 | MAIN STREET | 18 | COLUMBIAN STREET | | 76 | 152 | 0 | 19 | 57 |
| 64 | WORCESTER | CMRPC | 3 | CHANDLER STREET | 122 | MURRAY AVENUE | | 72 | 152 | 0 | 20 | 52 |
| 70 | WEYMOUTH | MAPC | 4 | PLEASANT STREET | | WASHINGTON STREET | 53 | 79 | 151 | 0 | 18 | 61 |
| 71 | LOWELL | NMCOG | 4 | VETERANS OF FOREIGN WARS HIGHWAY | | AIKEN STREET | | 66 | 150 | 0 | 21 | 45 |
| 71 | HAVERHILL | MVPC | 4 | WINTER STREET | 97 | WHITE STREET | 110 | 82 | 150 | 0 | 17 | 65 |
| 73 | WORCESTER | CMRPC | 3 | BELMONT STREET | 9 | LAKE AVENUE NORTH | | 61 | 149 | 0 | 22 | 39 |
| 74 | WESTFORD | NMCOG | 3 | LITTLETON ROAD | 110 | BOSTON ROAD | | 96 | 148 | 0 | 13 | 83 |
| 74 | CAMBRIDGE | MAPC | 4 | MASSACHUSETTS AVENUE | 2A | BROOKLINE STREET | | 72 | 148 | 0 | 19 | 53 |
| 76 | WEST BRIDGEWATER | OCPC | 5 | WEST CENTER STREET | 106 | NORTH MAIN STREET | 28 | 75 | 147 | 0 | 18 | 57 |
| 76 | BROCKTON | OCPC | 5 | MAIN STREET | | LEGION PARKWAY | 123 | 55 | 147 | 0 | 23 | 32 |
| 76 | TAUNTON | SRPEDD | 5 | BROADWAY | 138 | WASHINGTON STREET | | 63 | 147 | 0 | 21 | 42 |
| 79 | HAVERHILL | MVPC | 4 | BRIDGE STREET | 125 | WATER STREET | 113 | 74 | 146 | 0 | 18 | 56 |
| 79 | HOLYOKE | PVPC | 2 | MAPLE STREET | | RESNIC BOULEVARD | | 70 | 146 | 0 | 19 | 51 |
| 81 | WELLESLEY | MAPC | 4 | WORCESTER STREET | 9 | WELLESLEY FIRE STATION HEADQUARTERS (BY PROXIMITY) | | 93 | 145 | 0 | 13 | 80 |
| 81 | ABINGTON | OCPC | 5 | BROCKTON AVENUE | 123 | BEDFORD STREET | 18 | 65 | 145 | 0 | 20 | 45 |
| 81 | OXFORD | CMRPC | 3 | SOUTHBRIDGE ROAD | 20 | LEICESTER ROAD | 56 | 64 | 145 | 1 | 18 | 45 |
| 84 | BROCKTON | OCPC | 5 | BELMONT STREET | 123 | LINWOOD STREET | | 56 | 144 | 0 | 22 | 34 |
| 84 | BROOKLINE | MAPC | 4 | BOYLSTON STREET | 9 | CHESTNUT HILL AVENUE | | 52 | 144 | 0 | 23 | 29 |
| 84 | WORCESTER | CMRPC | 3 | LINCOLN STREET | 70 | COUNTRY CLUB BOULEVARD | | 56 | 144 | 0 | 22 | 34 |
| 84 | BROCKTON | OCPC | 5 | NORTH MAIN STREET | | EAST ASHLAND STREET | | 56 | 144 | 0 | 22 | 34 |
| 88 | CAMBRIDGE | MAPC | 4 | MEMORIAL DRIVE | 3 | RIVER STREET | | 63 | 143 | 0 | 20 | 43 |
| 88 | MALDEN | MAPC | 4 | CENTRE STREET | 60 | COMMERCIAL STREET | | 51 | 143 | 0 | 23 | 28 |
| 88 | NORWOOD | MAPC | 5 | BLUE STAR MEMORIAL HIGHWAY | 1 | DEAN STREET | | 67 | 143 | 0 | 19 | 48 |
| 88 | LOWELL | NMCOG | 4 | CHELMSFORD STREET | 110 | INDUSTRIAL AVENUE | | 71 | 143 | 0 | 18 | 53 |
| 88 | WORCESTER | CMRPC | 3 | MAIN STREET | | MILL STREET | 12 | 62 | 143 | 1 | 18 | 43 |
| 88 | QUINCY | MAPC | 4 | SCHOOL STREET | | HANCOCK STREET | | 71 | 143 | 0 | 18 | 53 |
| 94 | LOWELL | NMCOG | 4 | WESTFORD STREET | 3A | WILDER STREET | | 62 | 142 | 0 | 20 | 42 |
| 94 | BROCKTON | OCPC | 5 | NORTH MONTELLO STREET | 28 | HOWARD STREET | 37 | 62 | 142 | 0 | 20 | 42 |
| 96 | PITTSFIELD | BRPC | 1 | LINDEN STREET | | SEYMOUR STREET | | 45 | 141 | 0 | 24 | 21 |
| 96 | SOMERSET | SRPEDD | 5 | GRAND ARMY OF THE REPUBLIC HIGHWAY | 6 | LEES RIVER AVENUE | | 45 | 141 | 0 | 24 | 21 |
| 96 | RAYNHAM | SRPEDD | 5 | ROUTE 44 | 44 | ORCHARD STREET | | 53 | 141 | 0 | 22 | 31 |
| 99 | WALPOLE | MAPC | 5 | PROVIDENCE TURNPIKE | 1 | HIGH PLAIN STREET | 27 | 72 | 140 | 0 | 17 | 55 |
| 99 | NEW BEDFORD | SRPEDD | 5 | ASHLEY BOULEVARD | 18 | COGGESHALL STREET | | 64 | 140 | 0 | 19 | 45 |
| 101 | NATICK | MAPC | 3 | SPEEN STREET | | FLUTIE PASS | | 87 | 139 | 0 | 13 | 74 |
| 101 | CAMBRIDGE | MAPC | 4 | MASSACHUSETTS AVENUE | 2A | ALEWIFE BROOK PARKWAY | 3 | 59 | 139 | 0 | 20 | 39 |
| 103 | WEYMOUTH | MAPC | 4 | MAIN STREET | 18 | POND STREET | | 82 | 138 | 0 | 14 | 68 |
| 103 | HOLBROOK | MAPC | 5 | SOUTH FRANKLIN STREET | 37 | UNION STREET | 139 | 62 | 138 | 0 | 19 | 43 |
| 103 | QUINCY | MAPC | 4 | WASHINGTON STREET | 3A | SOUTHERN ARTERY | 53 | 78 | 138 | 0 | 15 | 63 |
| 103 | FITCHBURG | MRPC | 3 | LUNENBURG STREET | 2A | JOHN FITCH HIGHWAY | | 66 | 138 | 0 | 18 | 48 |
| 103 | LYNN | MAPC | 4 | ESSEX STREET | | JOYCE STREET | | 62 | 138 | 0 | 19 | 43 |
| 108 | WATERTOWN | MAPC | 4 | GALEN STREET | 16 | WATERTOWN STREET | | 52 | 137 | 1 | 19 | 32 |
| 108 | WOBURN | MAPC | 4 | MAIN STREET | 38 | PLEASANT STREET | | 77 | 137 | 0 | 15 | 62 |
| 110 | LYNN | MAPC | 4 | BROADWAY | | EUCLID AVENUE | | 56 | 136 | 0 | 20 | 36 |
| 111 | CHICOPEE | PVPC | 2 | MEMORIAL DRIVE | 33 | PENDLETON AVENUE | | 51 | 135 | 0 | 21 | 30 |
| 111 | WALTHAM | MAPC | 4 | MOODY STREET | | CRESCENT STREET | | 74 | 135 | 1 | 13 | 60 |
| 111 | BOSTON | MAPC | 4 | WASHINGTON STREET | | WEST ROXBURY PARKWAY | | 43 | 135 | 0 | 23 | 20 |
| 111 | BROCKTON | OCPC | 5 | COURT STREET | 27 | MONTELLO STREET | 28 | 55 | 135 | 0 | 20 | 35 |
| 111 | CHELSEA | MAPC | 4 | REVERE BEACH PARKWAY | 16 | GARFIELD AVENUE | | 55 | 135 | 0 | 20 | 35 |
| 116 | WEYMOUTH | MAPC | 4 | WASHINGTON STREET | 53 | MAIN STREET | 18 | 82 | 134 | 0 | 13 | 69 |
| 117 | SHREWSBURY | CMRPC | 3 | BOSTON TURNPIKE | 9 | SOUTH STREET | | 85 | 133 | 0 | 12 | 73 |
| 117 | BURLINGTON | MAPC | 4 | CAMBRIDGE STREET | 3A | WINN STREET | | 77 | 133 | 0 | 14 | 63 |
| 119 | BRIDGEWATER | OCPC | 5 | BROAD STREET | 18 | MAIN STREET | 28 | 75 | 131 | 0 | 14 | 61 |
| 120 | AUBURN | CMRPC | 3 | SOUTHBRIDGE STREET | 20 | HILL STREET | | 46 | 130 | 0 | 21 | 25 |
| 120 | MIDDLEBOROUGH | SRPEDD | 5 | ROUTE 44 | 44 | PLYMPTON STREET | 105 | 54 | 130 | 0 | 19 | 35 |
| 120 | LOWELL | NMCOG | 4 | RIVERSIDE STREET | 113 | UNIVERSITY AVENUE | | 54 | 130 | 0 | 19 | 35 |
| 120 | EASTON | OCPC | 5 | DEPOT STREET | 123 | FOUNDRY STREET | 106 | 54 | 130 | 0 | 19 | 35 |
| 124 | FALL RIVER | SRPEDD | 5 | PLEASANT STREET | | QUEQUECHAN STREET | | 73 | 129 | 0 | 14 | 59 |

## 2004-2006 STATEWIDE TOP 200 INTERSECTION CRASH LIST

| Rank | Town | RPA | MHD District | Street 1 | Route 1 | Street 2 | Route 2 | Total Crashes | EPDO Crashes | Fatal Crashes | Injury Crashes | PDO & Non Reported Crashes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 124 | WEYMOUTH | MAPC | 4 | WASHINGTON STREET | 53 | MIDDLE STREET | | 77 | 129 | 0 | 13 | 64 |
| 124 | SWANSEA | SRPEDD | 5 | GRAND ARMY OF THE REPUBLIC HIGHWAY | 6 | SWANSEA MALL DRIVE | | 53 | 129 | 0 | 19 | 34 |
| 124 | FRAMINGHAM | MAPC | 3 | WORCESTER ROAD | 9 | DINSMORE AVENUE | | 57 | 129 | 0 | 18 | 39 |
| 128 | QUINCY | MAPC | 4 | SOUTHERN ARTERY | 3A | CODDINGTON STREET | | 72 | 128 | 0 | 14 | 58 |
| 128 | WORCESTER | CMRPC | 3 | PARK AVENUE | 9 | HIGHLAND STREET | | 68 | 128 | 0 | 15 | 53 |
| 128 | HAVERHILL | MVPC | 4 | LAFAYETTE SQUARE | 97 | BROADWAY | | 72 | 128 | 0 | 14 | 58 |
| 128 | BOSTON | MAPC | 4 | COLUMBIA ROAD | | DORCHESTER AVENUE | | 47 | 128 | 1 | 18 | 28 |
| 128 | WHITMAN | OCPC | 5 | BEDFORD STREET | 18 | AUBURN STREET | 14 | 63 | 128 | 1 | 14 | 48 |
| 128 | HAVERHILL | MVPC | 4 | MAIN STREET | 125 | WINTER STREET | 97 | 76 | 128 | 0 | 13 | 63 |
| 134 | EASTON | OCPC | 5 | FOUNDRY STREET | 106 | TURNPIKE STREET | 138 | 47 | 127 | 0 | 20 | 27 |
| 134 | BROCKTON | OCPC | 5 | PLEASANT STREET | 27 | MAIN STREET | | 43 | 127 | 0 | 21 | 22 |
| 134 | CHELSEA | MAPC | 4 | BROADWAY | | FIFTH STREET | | 59 | 127 | 0 | 17 | 42 |
| 134 | WORCESTER | CMRPC | 3 | HIGHLAND STREET | 9 | HARVARD STREET | | 59 | 127 | 0 | 17 | 42 |
| 134 | HOLYOKE | PVPC | 2 | MAIN STREET | | JACKSON STREET | | 51 | 127 | 0 | 19 | 32 |
| 139 | WORCESTER | CMRPC | 3 | PARK AVENUE | 9 | MILL STREET | 12 | 62 | 126 | 0 | 16 | 46 |
| 139 | BOSTON | MAPC | 4 | COLUMBIA ROAD | | MASSACHUSETTS AVENUE | | 54 | 126 | 0 | 18 | 36 |
| 139 | WORCESTER | CMRPC | 3 | PARK AVENUE | 9 | CHANDLER STREET | 122 | 66 | 126 | 0 | 15 | 51 |
| 142 | PLAINVILLE | SRPEDD | 5 | MESSENGER STREET | 106 | TAUNTON STREET | 152 | 61 | 125 | 0 | 16 | 45 |
| 142 | FALL RIVER | SRPEDD | 5 | BEDFORD STREET | | TROY STREET | | 45 | 125 | 0 | 20 | 25 |
| 142 | BOSTON | MAPC | 4 | MORTON STREET | 203 | HARVARD STREET | | 49 | 125 | 0 | 19 | 30 |
| 142 | ATTLEBORO | SRPEDD | 5 | HIGHLAND AVENUE | 123 | WASHINGTON STREET | 1 | 69 | 125 | 0 | 14 | 55 |
| 146 | LYNN | MAPC | 4 | ESSEX STREET | | FAYETTE STREET | | 56 | 124 | 0 | 17 | 39 |
| 146 | NORTH ATTLEBOROUGH | SRPEDD | 5 | EAST WASHINGTON STREET | 1 | CHESTNUT STREET | | 55 | 124 | 1 | 15 | 39 |
| 146 | MIDDLEBOROUGH | SRPEDD | 5 | SOUTH MAIN STREET | 105 | EAST GROVE STREET | 28 | 64 | 124 | 0 | 15 | 49 |
| 146 | WESTBOROUGH | CMRPC | 3 | BOSTON WORCESTER TURNPIKE | 9 | LYMAN STREET | | 68 | 124 | 0 | 14 | 54 |
| 146 | LYNN | MAPC | 4 | ESSEX STREET | | CHATHAM STREET | | 60 | 124 | 0 | 16 | 44 |
| 151 | NATICK | MAPC | 3 | WORCESTER STREET | 9 | OAK STREET | | 74 | 123 | 1 | 10 | 63 |
| 151 | BROCKTON | OCPC | 5 | CENTRE STREET | 123 | PLYMOUTH STREET | | 39 | 123 | 0 | 21 | 18 |
| 153 | FITCHBURG | MRPC | 3 | JOHN FITCH HIGHWAY | | SUMMER STREET | | 50 | 122 | 0 | 18 | 32 |
| 153 | LYNN | MAPC | 4 | UNION STREET | | WEST GREEN STREET | | 58 | 122 | 0 | 16 | 42 |
| 153 | EVERETT | MAPC | 4 | REVERE BEACH PARKWAY | 16 | VINE STREET | | 34 | 122 | 0 | 22 | 12 |
| 153 | WESTFIELD | PVPC | 2 | EAST MAIN STREET | 20 | LITTLE RIVER ROAD | 187 | 42 | 122 | 0 | 20 | 22 |
| 153 | WORCESTER | CMRPC | 3 | HIGHLAND STREET | 9 | MAIN STREET | | 66 | 122 | 0 | 14 | 52 |
| 158 | RANDOLPH | MAPC | 4 | NORTH MAIN STREET | 28 | UNION STREET | 139 | 64 | 120 | 0 | 14 | 50 |
| 158 | FALL RIVER | SRPEDD | 5 | PRESIDENT AVENUE | 6 | DAVOL STREET | | 60 | 120 | 0 | 15 | 45 |
| 158 | BROOKLINE | MAPC | 4 | BEACON STREET | | SAINT PAUL STREET | | 56 | 120 | 0 | 16 | 40 |
| 158 | SOMERVILLE | MAPC | 4 | BROADWAY | | ALEWIFE BROOK PARKWAY | 16 | 60 | 120 | 0 | 15 | 45 |
| 162 | SWAMPSCOTT | MAPC | 4 | PARADISE ROAD | 1A | SWAMPSCOTT MALL | | 46 | 119 | 1 | 16 | 29 |
| 162 | WORCESTER | CMRPC | 3 | MAIN STREET | | MAPLE STREET | | 51 | 119 | 0 | 17 | 34 |
| 162 | LYNN | MAPC | 4 | CHESTNUT STREET | | UNION STREET | | 59 | 119 | 0 | 15 | 44 |
| 162 | WALPOLE | MAPC | 5 | PROVIDENCE TURNPIKE | 1 | CONEY STREET | | 55 | 119 | 0 | 16 | 39 |
| 162 | HADLEY | PVPC | 2 | RUSSELL STREET | 9 | MIDDLE STREET | 47 | 47 | 119 | 0 | 18 | 29 |
| 167 | NORTH ANDOVER | MVPC | 4 | TURNPIKE STREET | 114 | PETERS STREET | 133 | 50 | 118 | 0 | 17 | 33 |
| 167 | BROCKTON | OCPC | 5 | CENTRE STREET | 123 | QUINCY STREET | | 54 | 118 | 0 | 16 | 38 |
| 167 | BROOKLINE | MAPC | 4 | BOYLSTON STREET | 9 | RESERVOIR ROAD | | 54 | 118 | 0 | 16 | 38 |
| 167 | FRAMINGHAM | MAPC | 3 | CONCORD STREET | 126 | LINCOLN STREET | | 46 | 118 | 0 | 18 | 28 |
| 167 | DARTMOUTH | SRPEDD | 5 | STATE ROAD | 6 | HATHAWAY ROAD | | 50 | 118 | 0 | 17 | 33 |
| 167 | BROCKTON | OCPC | 5 | REYNOLDS HIGHWAY | 27 | WESTGATE DRIVE | | 38 | 118 | 0 | 20 | 18 |
| 167 | TEWKSBURY | NMCOG | 4 | MAIN STREET | 38 | SHAWSHEEN STREET | | 50 | 118 | 0 | 17 | 33 |
| 174 | HOLYOKE | PVPC | 2 | HOLYOKE STREET | | MALL DRIVE | | 73 | 117 | 0 | 11 | 62 |
| 174 | NORTH ANDOVER | MVPC | 4 | TURNPIKE STREET | 114 | ANDOVER STREET | 125 | 49 | 117 | 0 | 17 | 32 |
| 174 | WEYMOUTH | MAPC | 4 | UNION STREET | | PLEASANT STREET | | 69 | 117 | 0 | 12 | 57 |
| 174 | LINCOLN | MAPC | 4 | CAMBRIDGE TURNPIKE | 2 | BEDFORD ROAD | | 41 | 117 | 0 | 19 | 22 |
| 178 | BOSTON | MAPC | 4 | MORTON STREET | 203 | GALLIVAN BOULEVARD | | 36 | 116 | 0 | 20 | 16 |
| 178 | MALDEN | MAPC | 4 | CENTRE STREET | 60 | MAIN STREET | | 48 | 116 | 0 | 17 | 31 |
| 178 | WEYMOUTH | MAPC | 4 | MAIN STREET | 18 | PARK AVENUE | | 64 | 116 | 0 | 13 | 51 |
| 181 | WELLESLEY | MAPC | 4 | WORCESTER STREET | 9 | OAKLAND STREET | | 55 | 115 | 0 | 15 | 40 |
| 181 | LYNN | MAPC | 4 | WESTERN AVENUE | 107 | BURNS STREET | | 47 | 115 | 0 | 17 | 30 |
| 181 | PEABODY | MAPC | 4 | MAIN STREET | | CALLER STREET | | 43 | 115 | 0 | 18 | 25 |
| 181 | WORCESTER | CMRPC | 3 | MADISON STREET | 122 | SOUTHBRIDGE STREET | | 46 | 115 | 1 | 15 | 30 |
| 181 | EVERETT | MAPC | 4 | REVERE BEACH PARKWAY | 16 | SECOND STREET | | 38 | 115 | 1 | 17 | 20 |
| 181 | LOWELL | NMCOG | 4 | WESTFORD STREET | 3A | SCHOOL STREET | | 43 | 115 | 0 | 18 | 25 |

2004-2006 STATEWIDE TOP 200 INTERSECTION CRASH LIST

| Rank | Town | RPA | MHD District | Street 1 | Route 1 | Street 2 | Route 2 | Total Crashes | EPDO Crashes | Fatal Crashes | Injury Crashes | PDO & Non Reported Crashes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 181 | SOMERSET | SRPEDD | 5 | GRAND ARMY OF THE REPUBLIC HIGHWAY | 6 | RIVERSIDE AVENUE | 103 | 63 | 115 | 0 | 13 | 50 |
| 188 | OXFORD | CMRPC | 3 | MAIN STREET | 12 | SUTTON AVENUE | | 62 | 114 | 0 | 13 | 49 |
| 188 | SOMERSET | SRPEDD | 5 | GRAND ARMY OF THE REPUBLIC HIGHWAY | 6 | BRAYTON POINT ROAD | | 54 | 114 | 0 | 15 | 39 |
| 188 | HINGHAM | MAPC | 5 | WHITING STREET | 53 | MAIN STREET | 228 | 70 | 114 | 0 | 11 | 59 |
| 188 | FALL RIVER | SRPEDD | 5 | BROADWAY | 138 | MIDDLE STREET | | 45 | 114 | 1 | 15 | 29 |
| 192 | BROCKTON | OCPC | 5 | BELMONT STREET | 123 | PEARL STREET | | 45 | 113 | 0 | 17 | 28 |
| 192 | LOWELL | NMCOG | 4 | PAWTUCKET STREET | | SCHOOL STREET | | 57 | 113 | 0 | 14 | 43 |
| 192 | CAMBRIDGE | MAPC | 4 | MASSACHUSETTS AVENUE | 2A | VASSAR STREET | | 41 | 113 | 0 | 18 | 23 |
| 192 | BOSTON | MAPC | 4 | DORCHESTER AVENUE | | GALLIVAN BOULEVARD | 203 | 41 | 113 | 0 | 18 | 23 |
| 192 | BROCKTON | OCPC | 5 | FOREST AVENUE | | BOUVE AVENUE | | 37 | 113 | 0 | 19 | 18 |
| 192 | WEYMOUTH | MAPC | 4 | WASHINGTON STREET | 53 | COMMERCIAL STREET | | 69 | 113 | 0 | 11 | 58 |
| 198 | FRAMINGHAM | MAPC | 3 | CONCORD STREET | 126 | UNION AVENUE | | 60 | 112 | 0 | 13 | 47 |
| 198 | WORCESTER | CMRPC | 3 | CHANDLER STREET | 122 | MILL STREET | | 40 | 112 | 0 | 18 | 22 |
| 198 | WELLESLEY | MAPC | 4 | WORCESTER STREET | 9 | WELLESLEY FIRE STATION HEADQUARTERS (BY ADDRESS) | | 60 | 112 | 0 | 13 | 47 |
| 198 | BROCKTON | OCPC | 5 | MONTELLO STREET | 28 | GROVE STREET | | 32 | 112 | 0 | 20 | 12 |
| 198 | WORCESTER | CMRPC | 3 | LINCOLN STREET | 70 | GOLDTHWAITE ROAD | | 40 | 112 | 0 | 18 | 22 |
| 203 | FAIRHAVEN | SRPEDD | 5 | ALDEN ROAD | | BRIDGE STREET | | 51 | 111 | 0 | 15 | 36 |
| 203 | NORTH ATTLEBOROUGH | SRPEDD | 5 | SOUTH WASHINGTON STREET | 1 | EAST WASHINGTON STREET | | 55 | 111 | 0 | 14 | 41 |
| 203 | BOSTON | MAPC | 4 | BLUE HILL AVENUE | 28 | MORTON STREET | 203 | 47 | 111 | 0 | 16 | 31 |
| 203 | LYNN | MAPC | 4 | FRANKLIN STREET | | BOSTON STREET | | 75 | 111 | 0 | 9 | 66 |
| 203 | QUINCY | MAPC | 4 | NEWPORT AVENUE | | BEALE STREET | | 67 | 111 | 0 | 11 | 56 |
| 203 | CAMBRIDGE | MAPC | 4 | MASSACHUSETTS AVENUE | 2A | ESSEX STREET | | 47 | 111 | 0 | 16 | 31 |

# Top Crash Intersections 2004-2006


## RANK
## 1

## LOWELL

BRIDGE STREET ROUTE 38
VETERANS OF FOREIGN WARS HIGHWAY

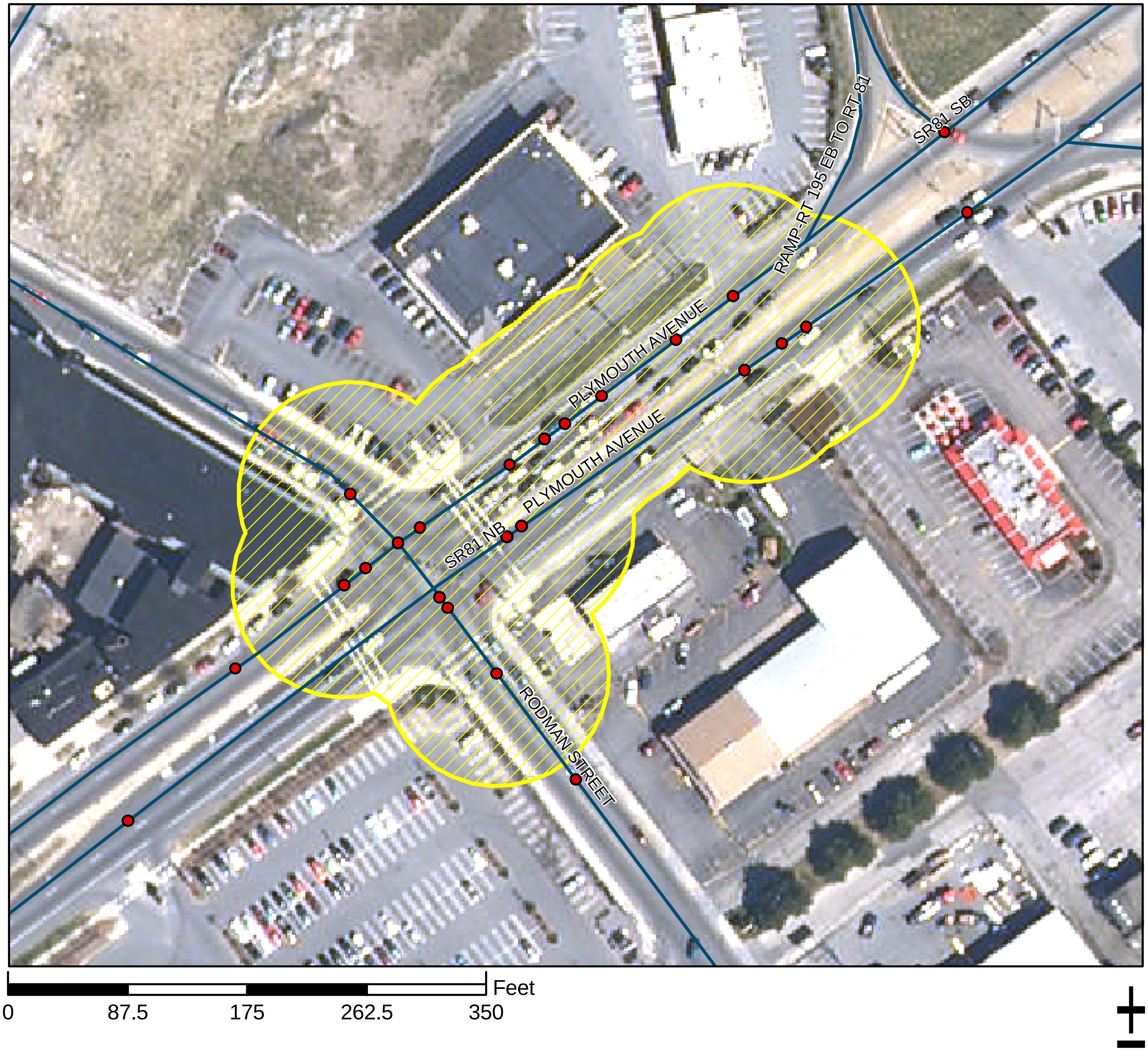
MHD District 4
RPA NMCOG
EPDO 384
Number of Fatal Crashes 2
Number of Injury Crashes 53
Number of Non-Injury Crashes 99
Total Crashes 154

Legend

- Crash Locations 2004-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Crash Intersections

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Crash Intersections 2004-2006




**RANK**
**2**

## FALL RIVER

PLYMOUTH AVENUE ROUTE 81
RODMAN STREET

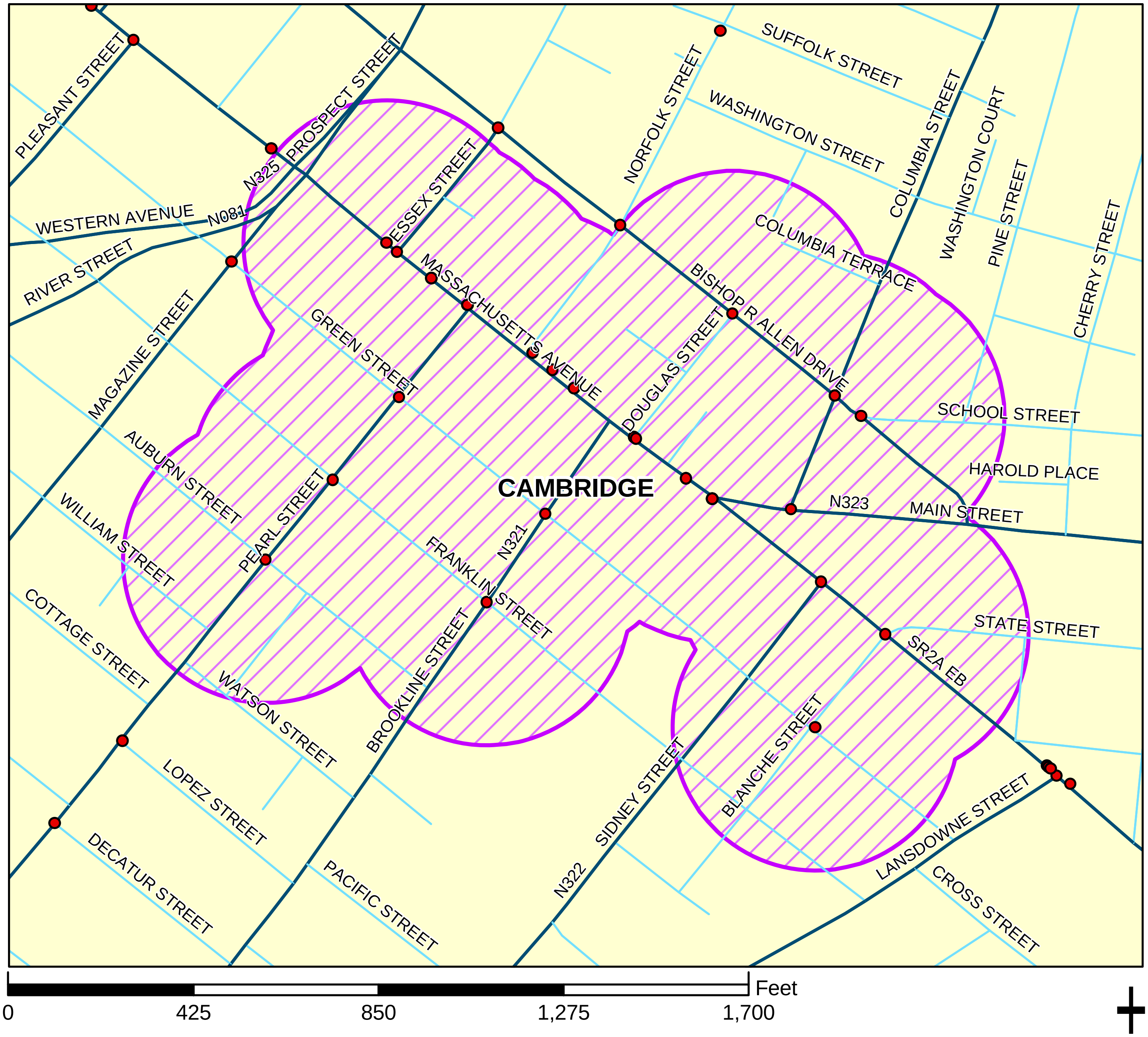
MHD District 5
RPA SRPEDD
EPDO 310
Number of Fatal Crashes 0
Number of Injury Crashes 38
Number of Non-Injury Crashes 120
Total Crashes 158

Legend

- Crash Locations 2004-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Crash Intersections

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




# RANK
# 1

## CAMBRIDGE

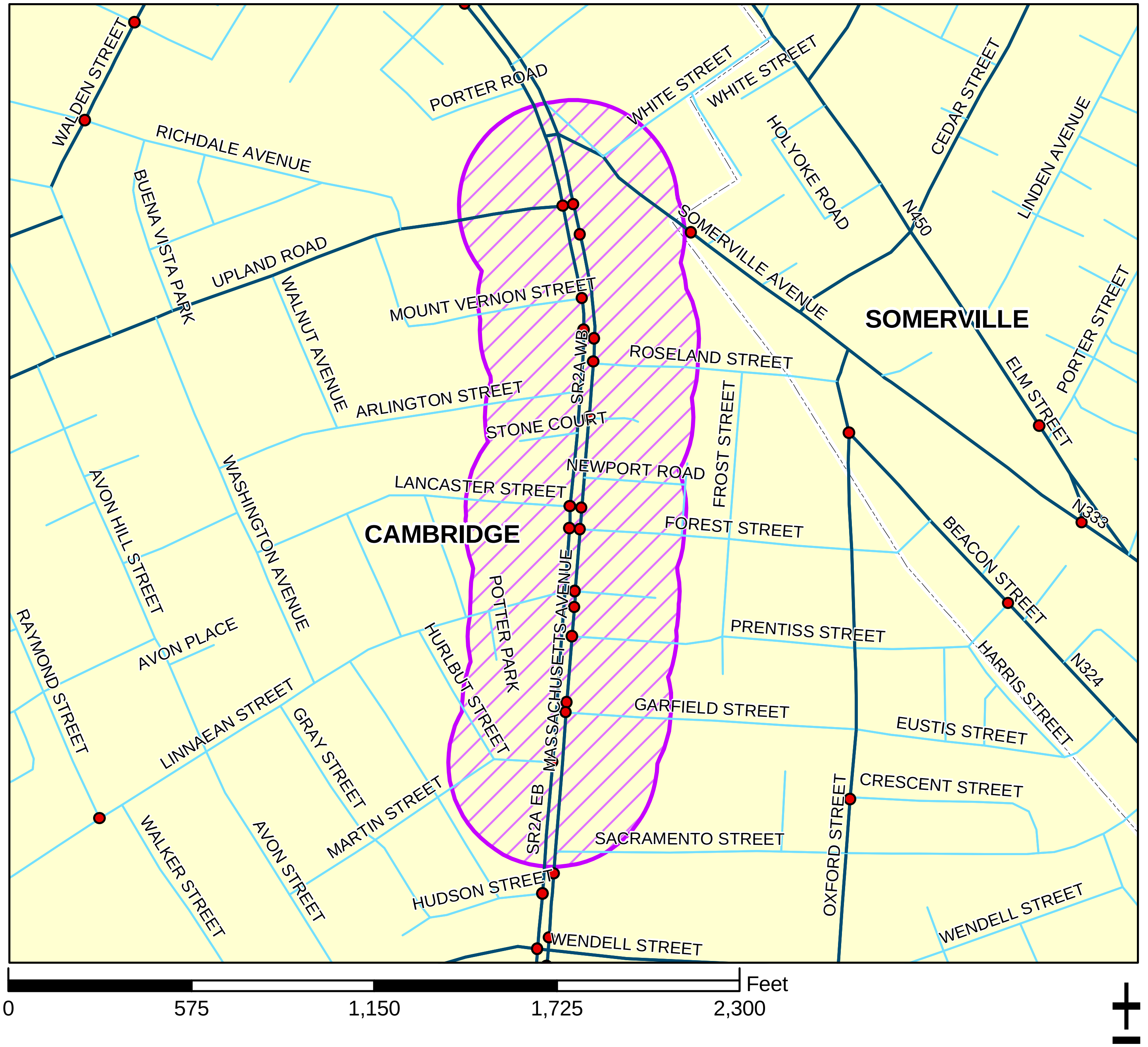
RPA MAPC
EPDO 137
Number of Fatal Bicycle Crashes 1
Number of Injury Bicycle Crashes 23
Number of Non-Injury Bicycle Crashes 12
Total Bicycle Crashes 36

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




**RANK**
**2**

## CAMBRIDGE

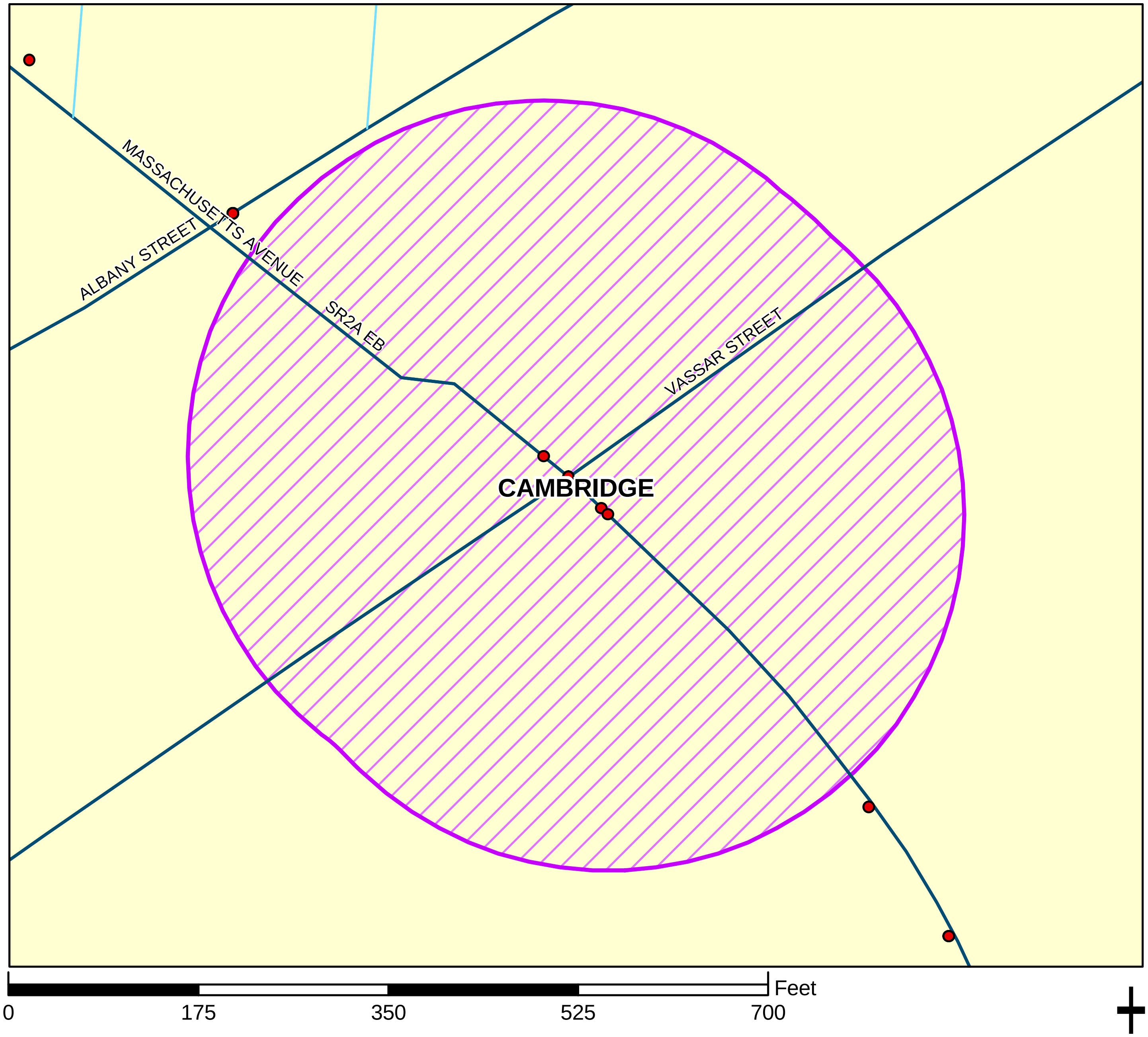
RPA MAPC
EPDO 92
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 17
Number of Non-Injury Bicycle Crashes 7
Total Bicycle Crashes 24

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




# RANK
# 3

## CAMBRIDGE

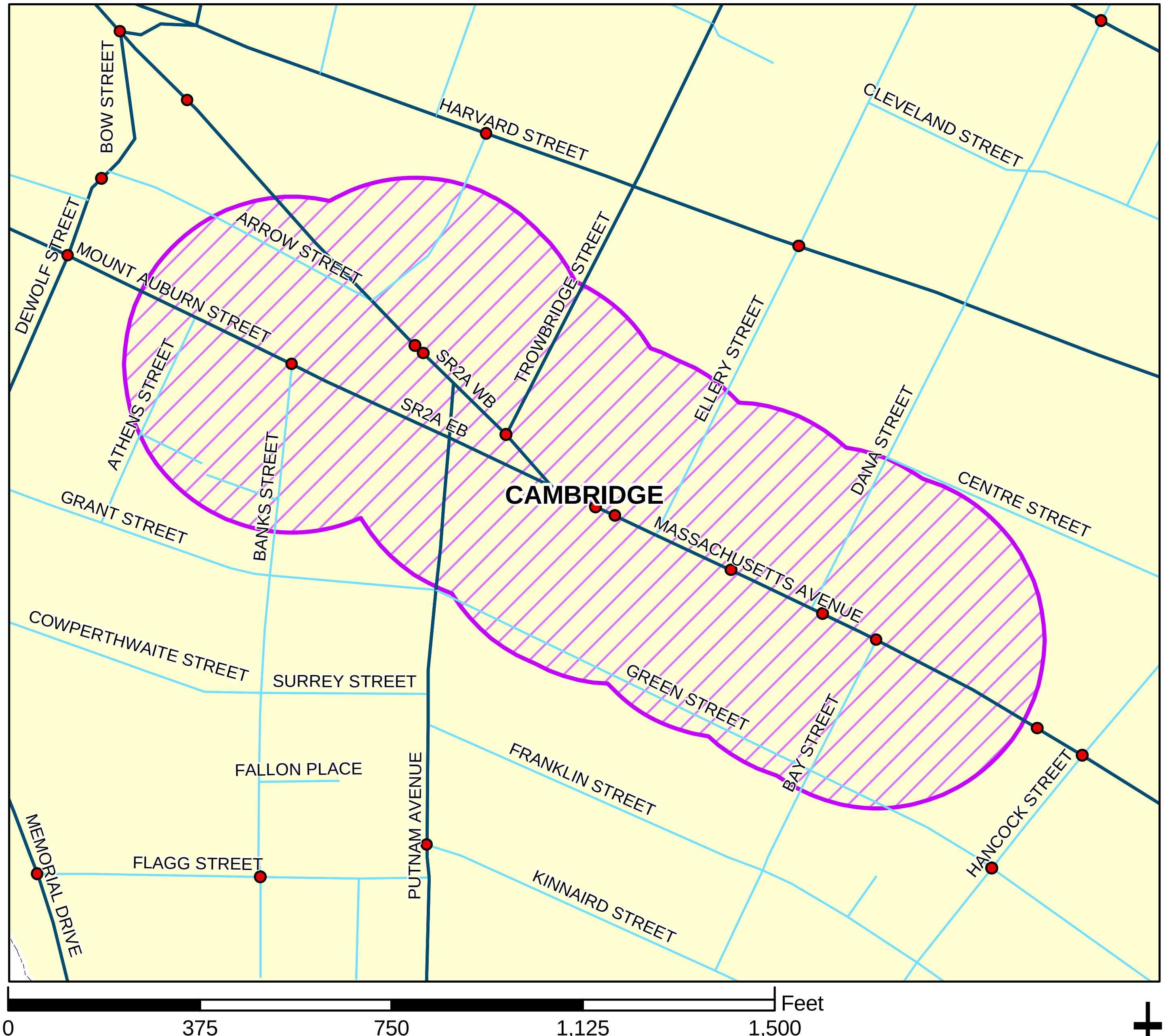
RPA MAPC
EPDO 52
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 10
Number of Non-Injury Bicycle Crashes 2
Total Bicycle Crashes 12

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




**RANK**
**4**

## CAMBRIDGE

RPA MAPC
EPDO 48
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 9
Number of Non-Injury Bicycle Crashes 3
Total Bicycle Crashes 12

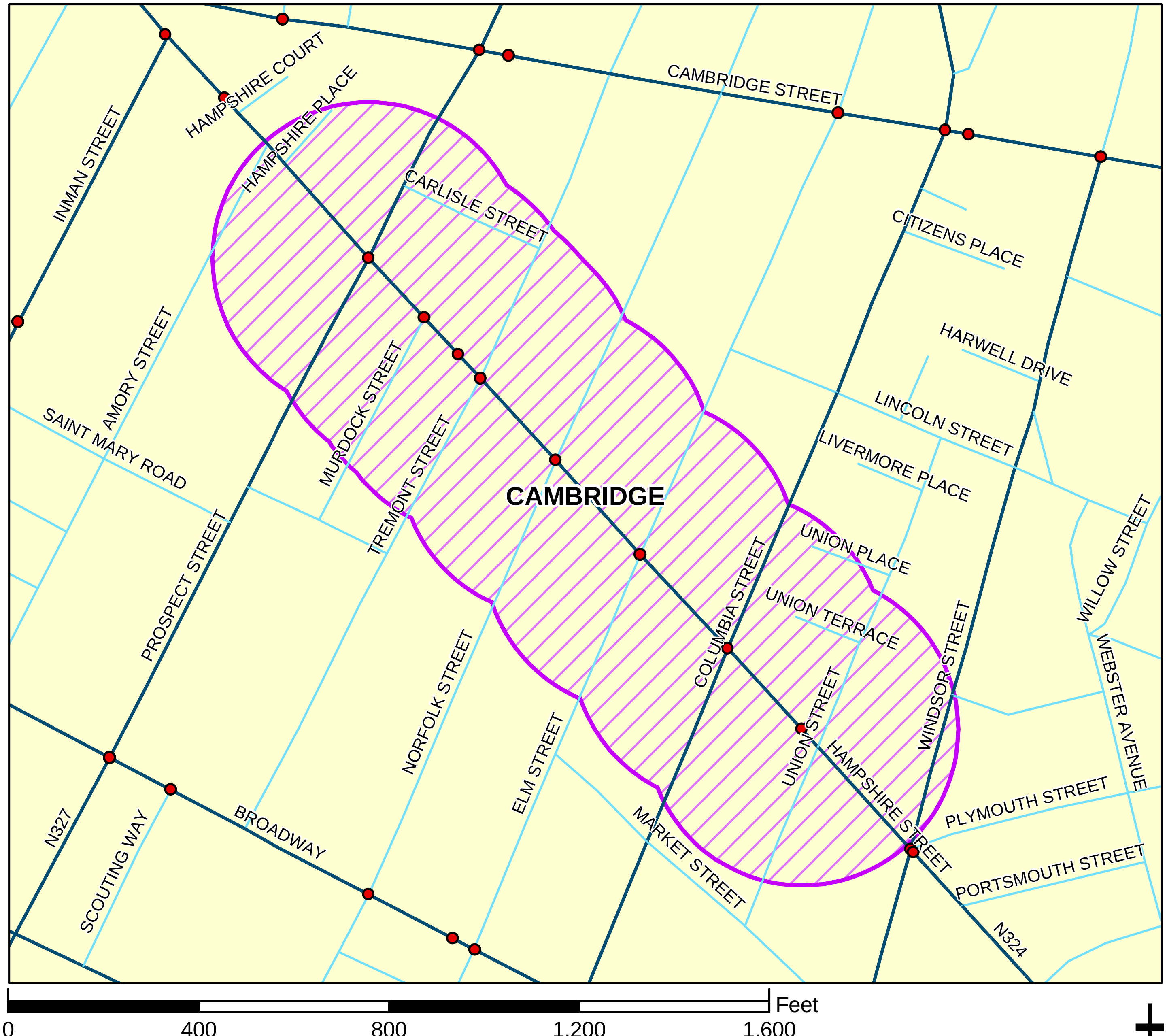
Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation

MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




## RANK
## 5

## CAMBRIDGE

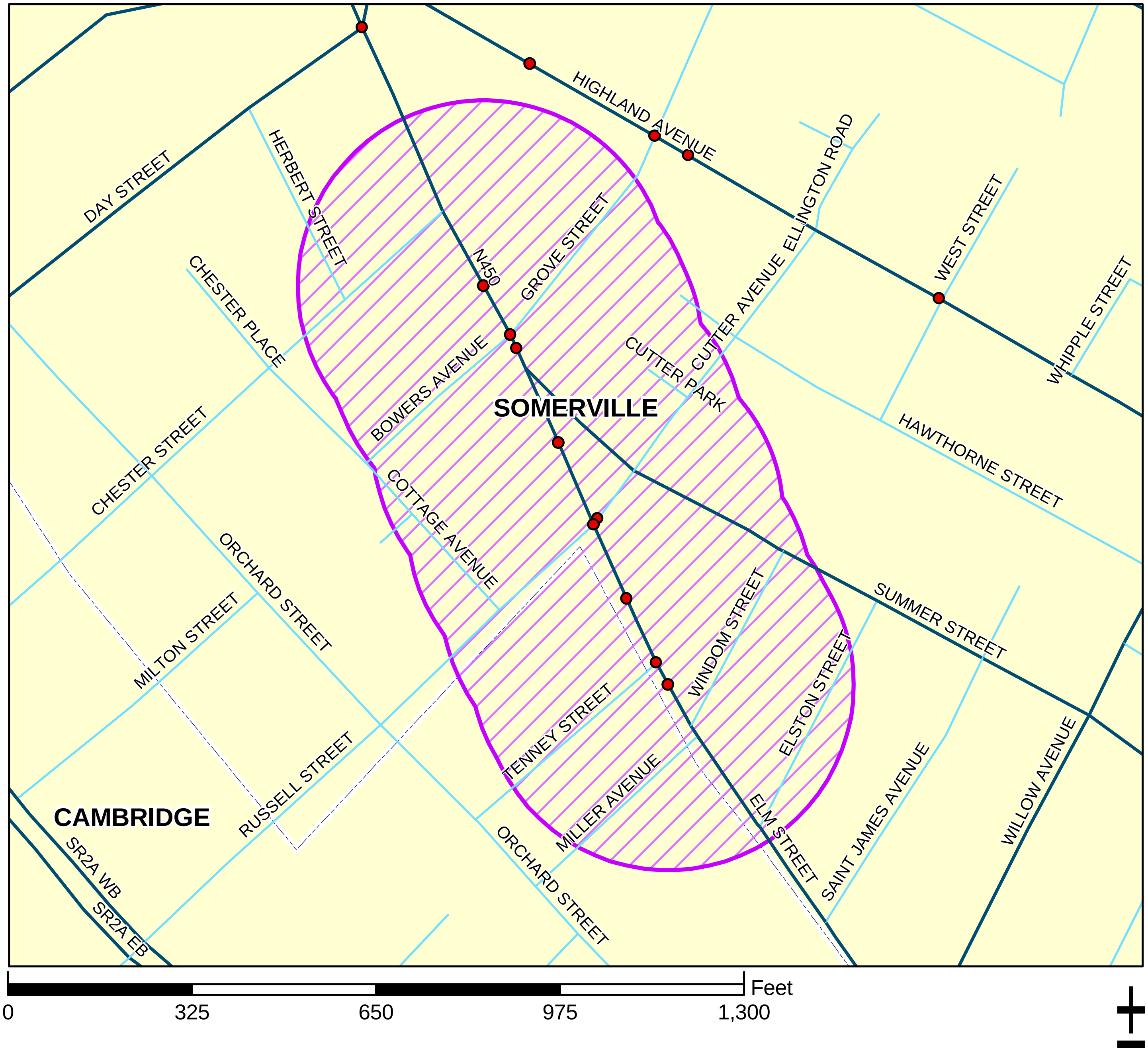
RPA MAPC
EPDO 43
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 8
Number of Non-Injury Bicycle Crashes 3
Total Bicycle Crashes 11

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




## RANK
## 6

## SOMERVILLE

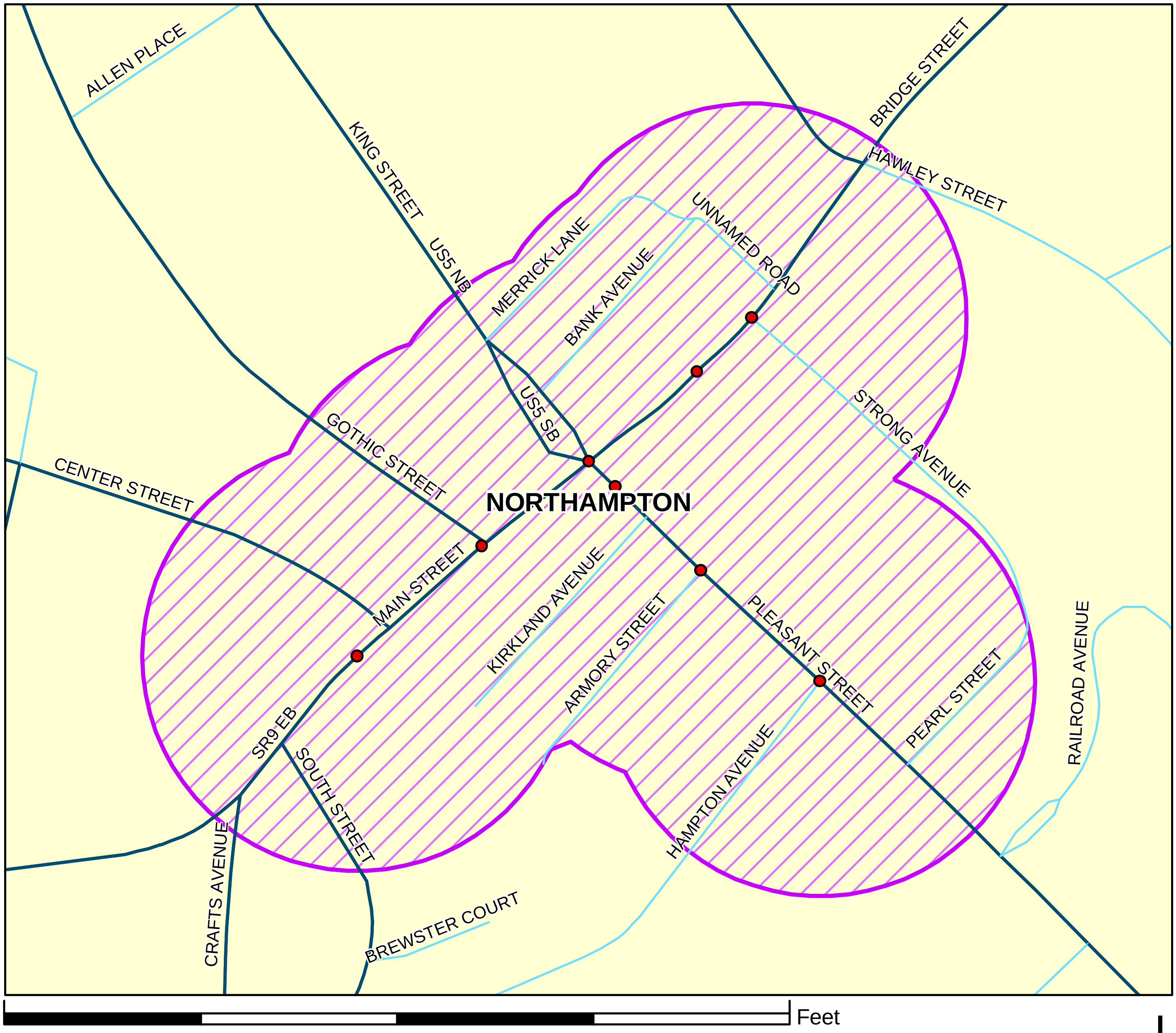
RPA MAPC
EPDO 41
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 8
Number of Non-Injury Bicycle Crashes 1
Total Bicycle Crashes 9

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT
Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




**RANK**
**6**

## NORTHAMPTON

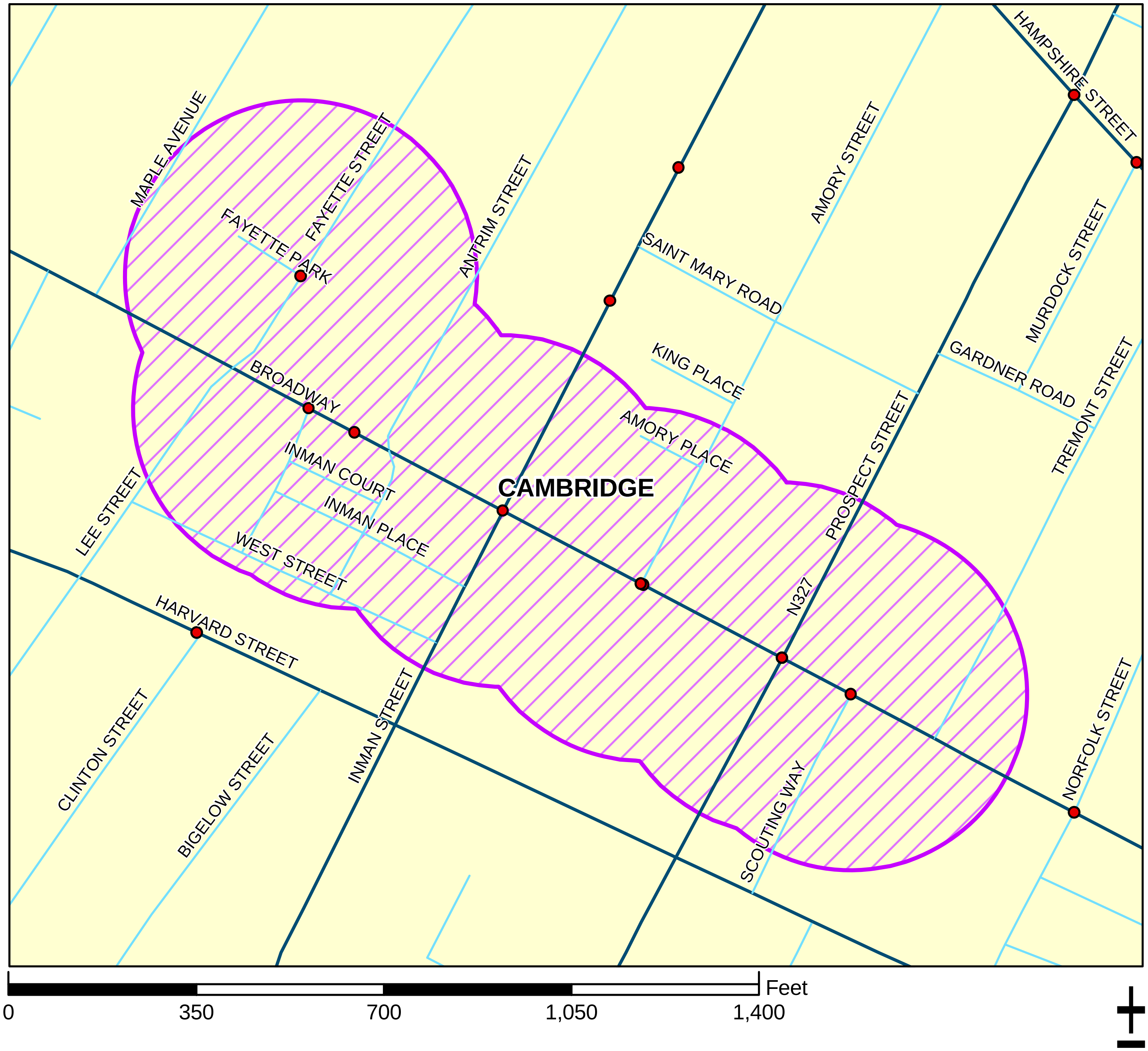
RPA PVPC
EPDO 41
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 8
Number of Non-Injury Bicycle Crashes 1
Total Bicycle Crashes 9

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




**RANK**
**8**

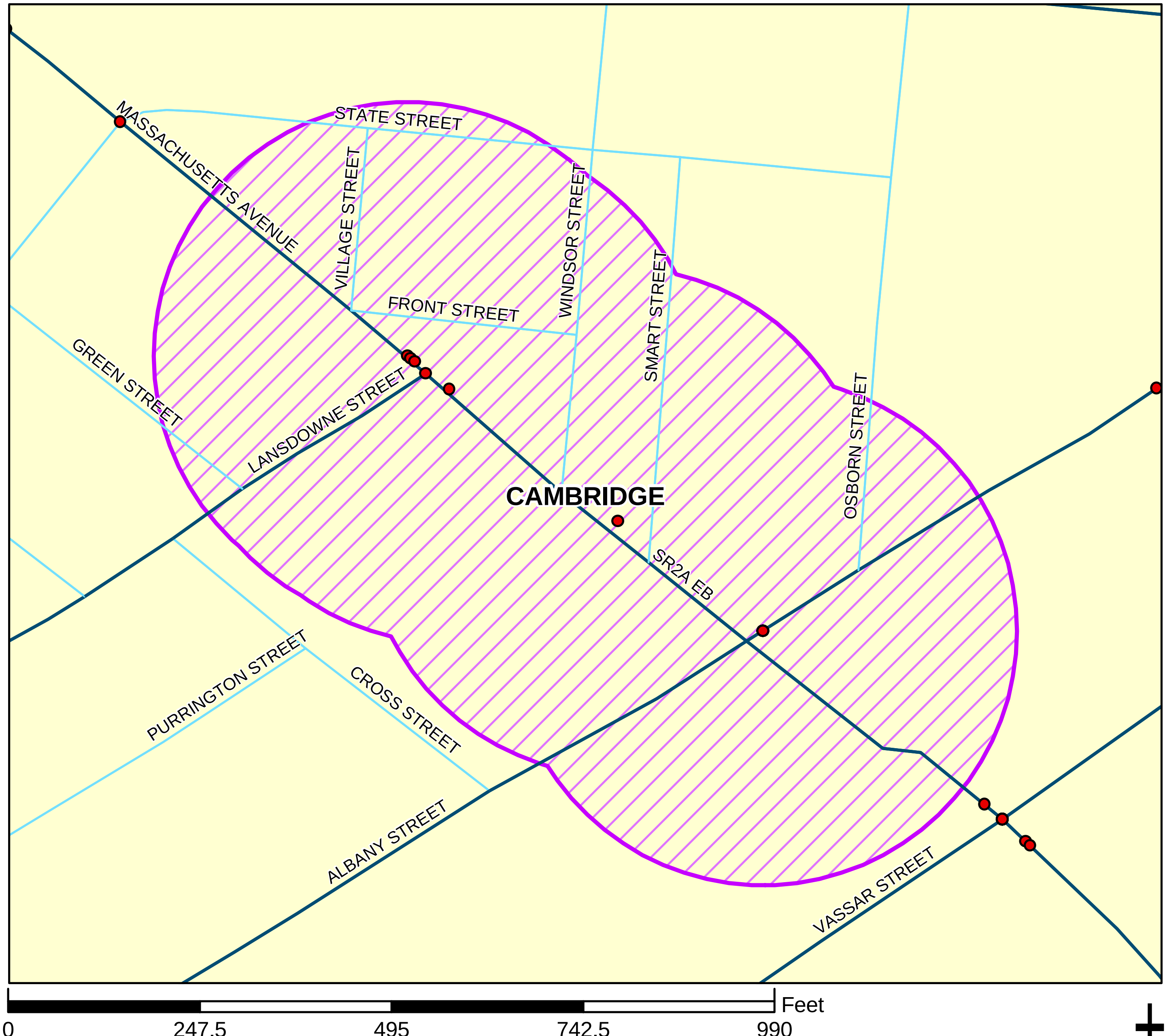
## CAMBRIDGE

RPA MAPC
EPDO 40
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 6
Number of Non-Injury Bicycle Crashes 10
Total Bicycle Crashes 16

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

# Top Bicycle Crash Cluster 2002-2006




**RANK**
**8**

## CAMBRIDGE

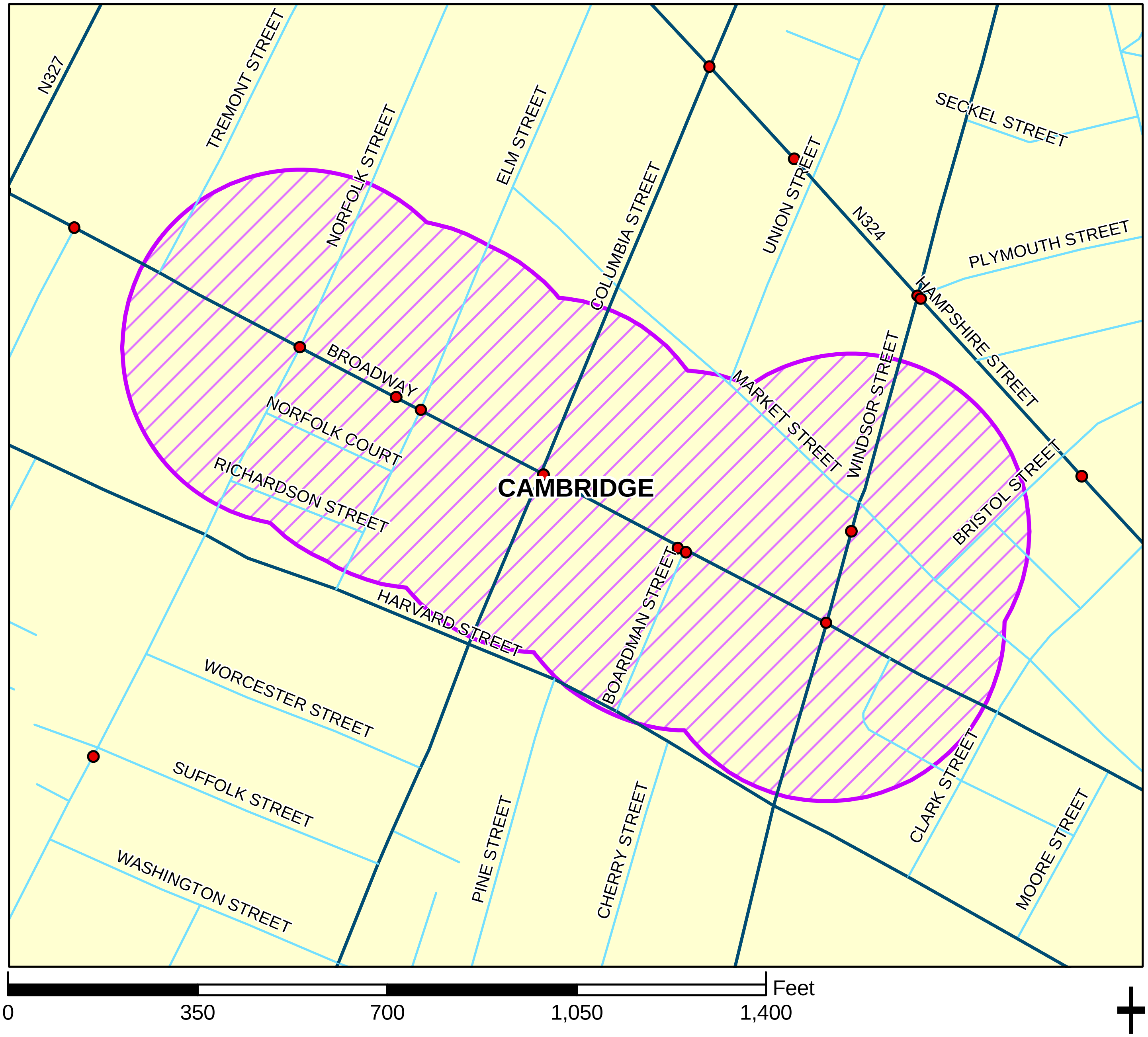
RPA MAPC
EPDO 40
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 7
Number of Non-Injury Bicycle Crashes 5
Total Bicycle Crashes 12

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Bicycle Crash Cluster 2002-2006




## RANK
## 10

## CAMBRIDGE

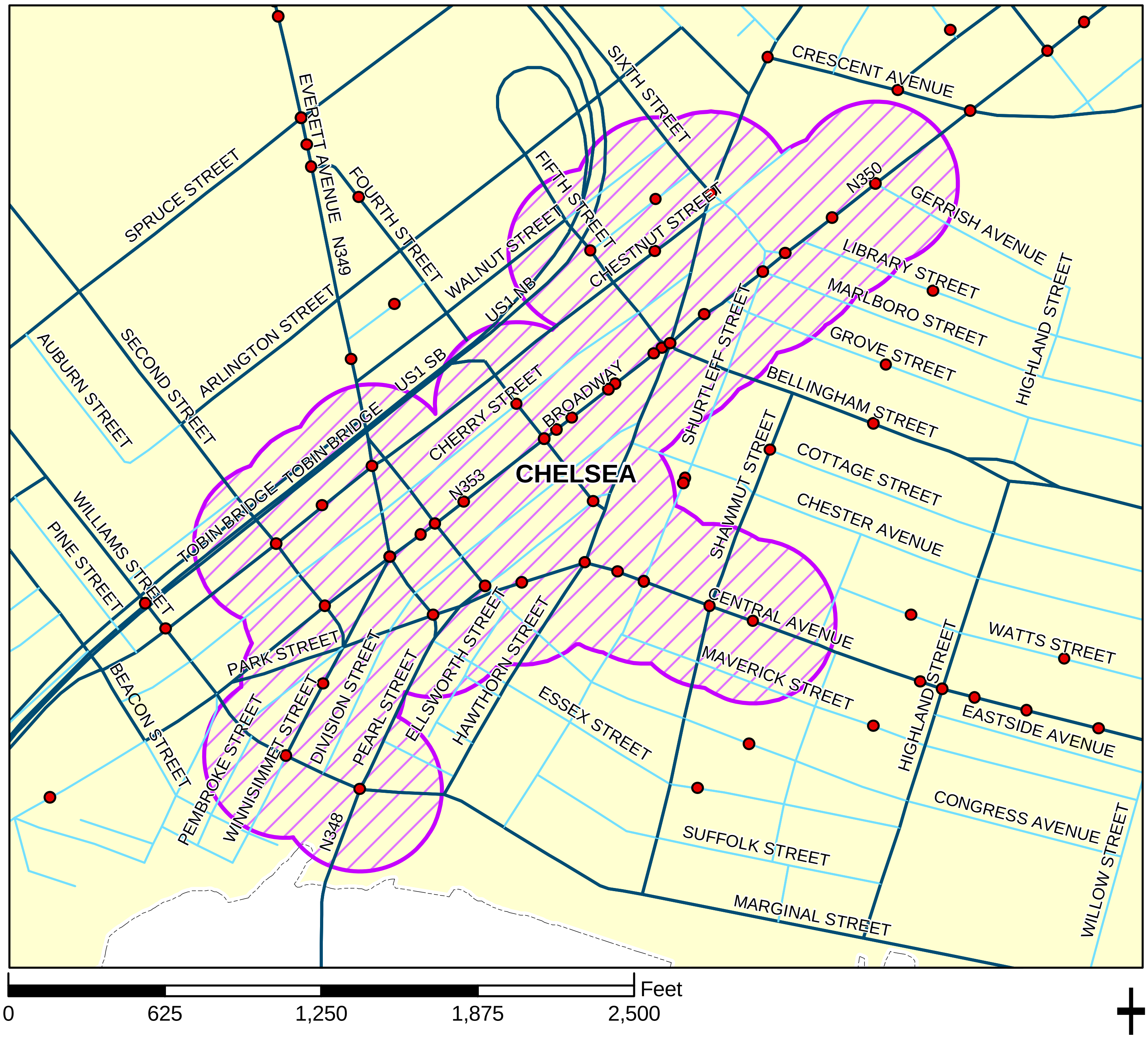
RPA MAPC
EPDO 37
Number of Fatal Bicycle Crashes 0
Number of Injury Bicycle Crashes 7
Number of Non-Injury Bicycle Crashes 2
Total Bicycle Crashes 9

Legend

- Bicycle Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Bicycle Crash Cluster
- Municipal Boundary

Massachusetts Executive Office of Transportation

# Top Pedestrian Crash Cluster 2002-2006




**RANK**
**1**

## CHELSEA

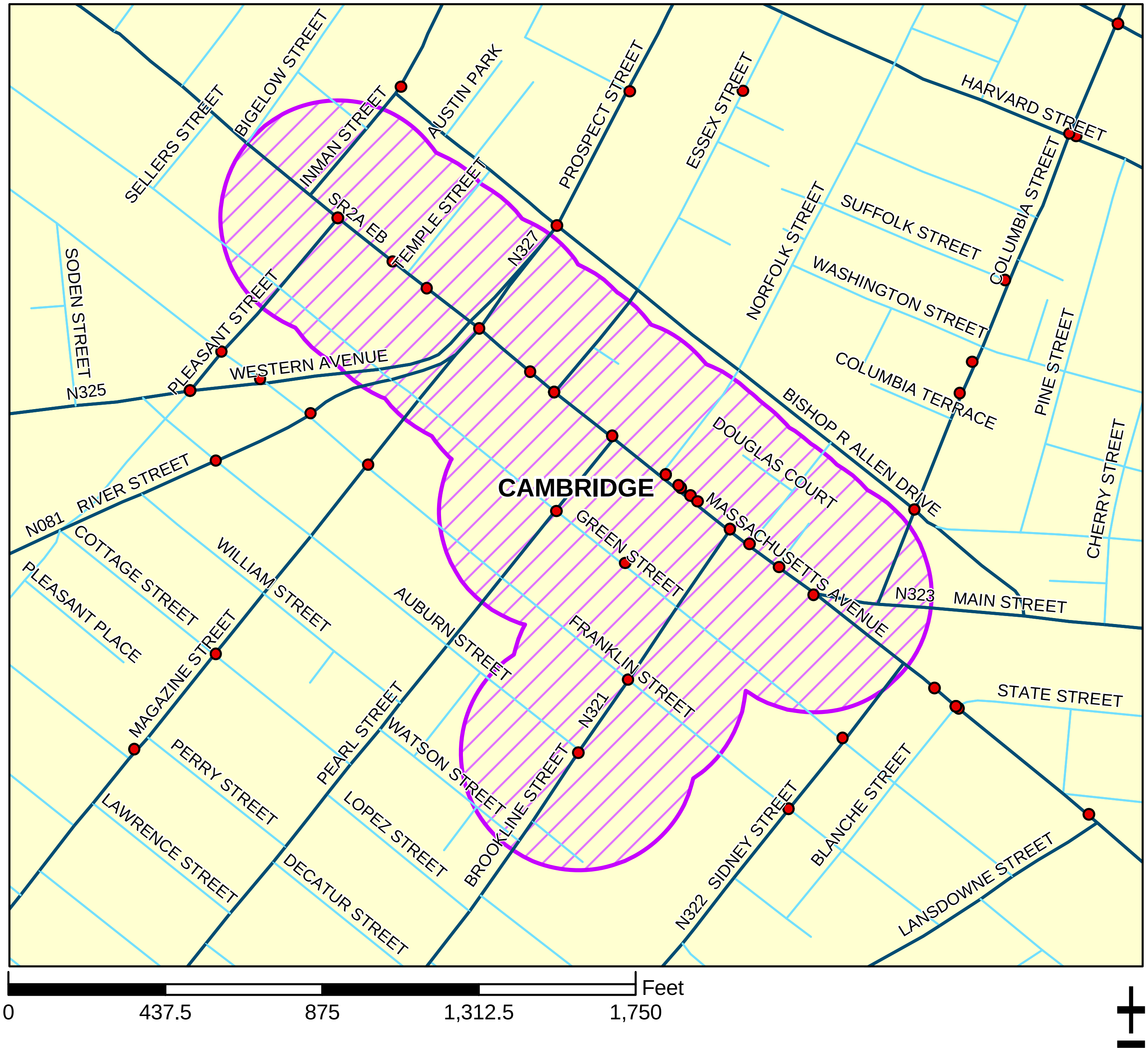
RPA MAPC
EPDO 235
Number of Fatal Pedestrian Crashes 1
Number of Injury Pedestrian Crashes 42
Number of Non-Injury Pedestrian Crashes 15
Total Pedestrian Crashes 58

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

MASSACHUSETTS EXECUTIVE OFFICE OF TRANSPORTATION
MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




**RANK**
**2**

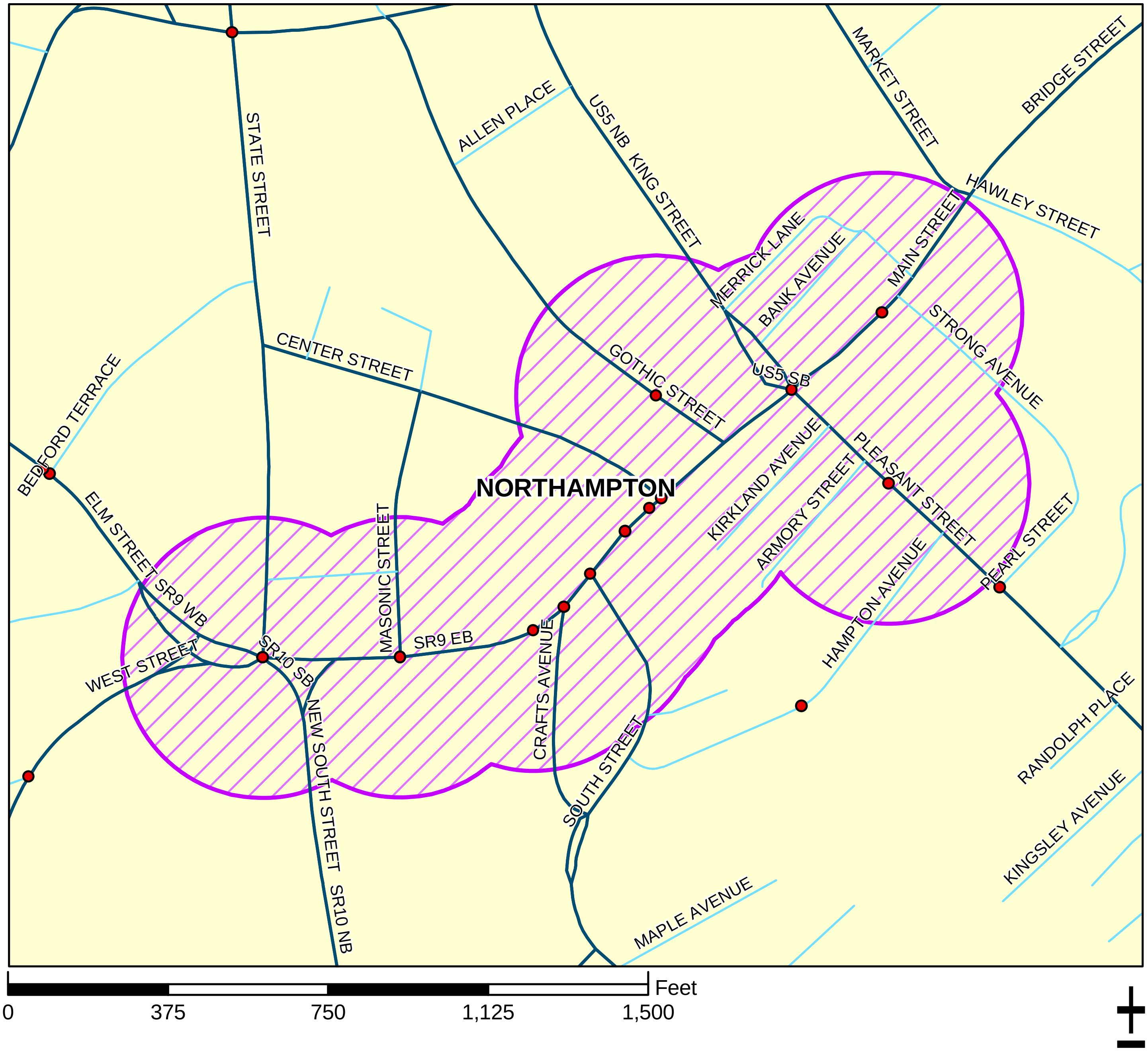
## CAMBRIDGE

RPA MAPC
EPDO 113
Number of Fatal Pedestrian Crashes 0
Number of Injury Pedestrian Crashes 19
Number of Non-Injury Pedestrian Crashes 18
Total Pedestrian Crashes 37

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

# Top Pedestrian Crash Cluster 2002-2006




## RANK
## 3

## NORTHAMPTON

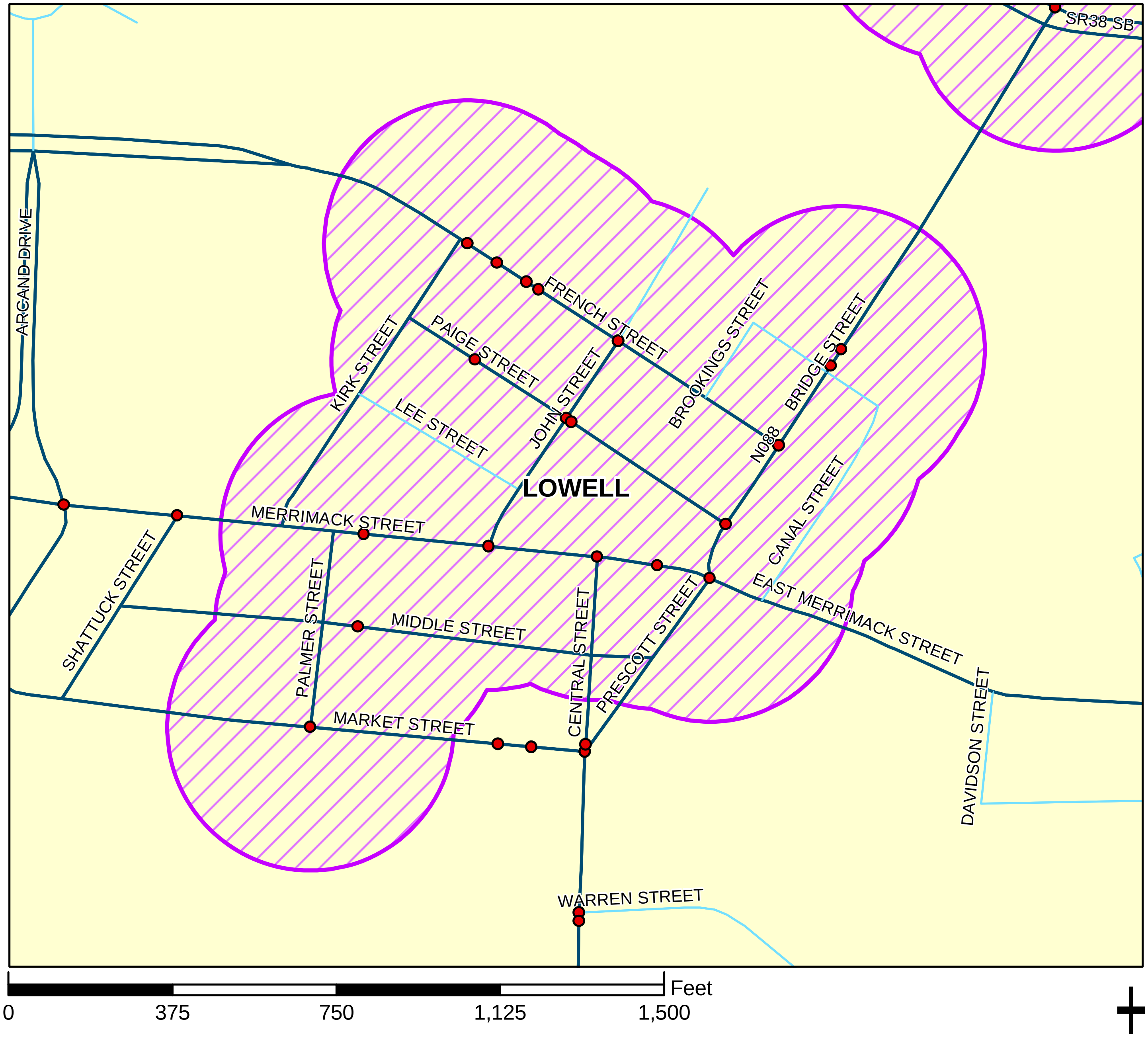
RPA PVPC
EPDO 105
Number of Fatal Pedestrian Crashes 1
Number of Injury Pedestrian Crashes 19
Number of Non-Injury Pedestrian Crashes 0
Total Pedestrian Crashes 20

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




**RANK**
**4**

## LOWELL

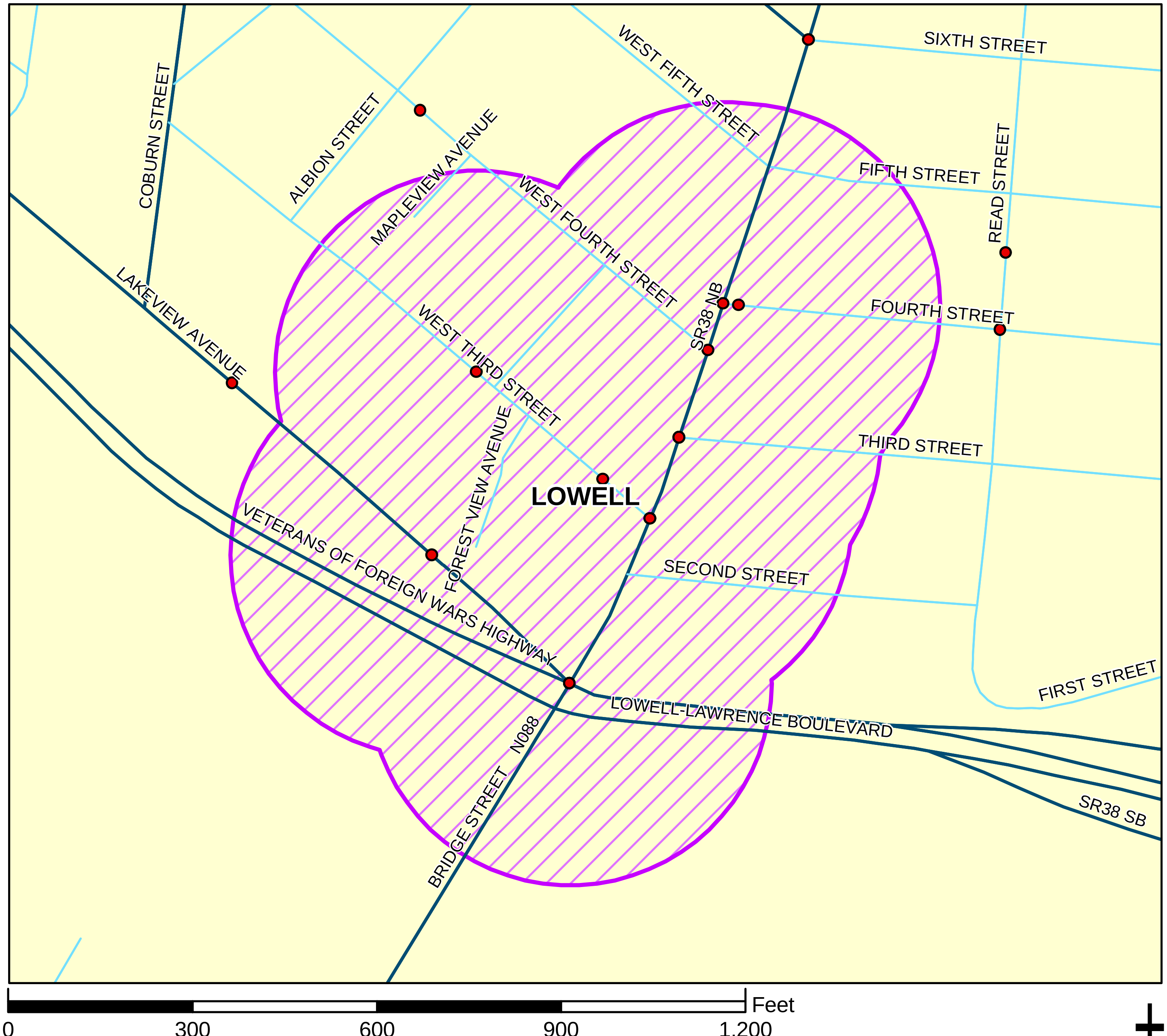
RPA NMCOG
EPDO 104
Number of Fatal Pedestrian Crashes 0
Number of Injury Pedestrian Crashes 19
Number of Non-Injury Pedestrian Crashes 9
Total Pedestrian Crashes 28

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




# RANK
# 5

## LOWELL

RPA NMCOG

EPDO 93

Number of Fatal Pedestrian Crashes 2

Number of Injury Pedestrian Crashes 14

Number of Non-Injury Pedestrian Crashes 3

Total Pedestrian Crashes 19

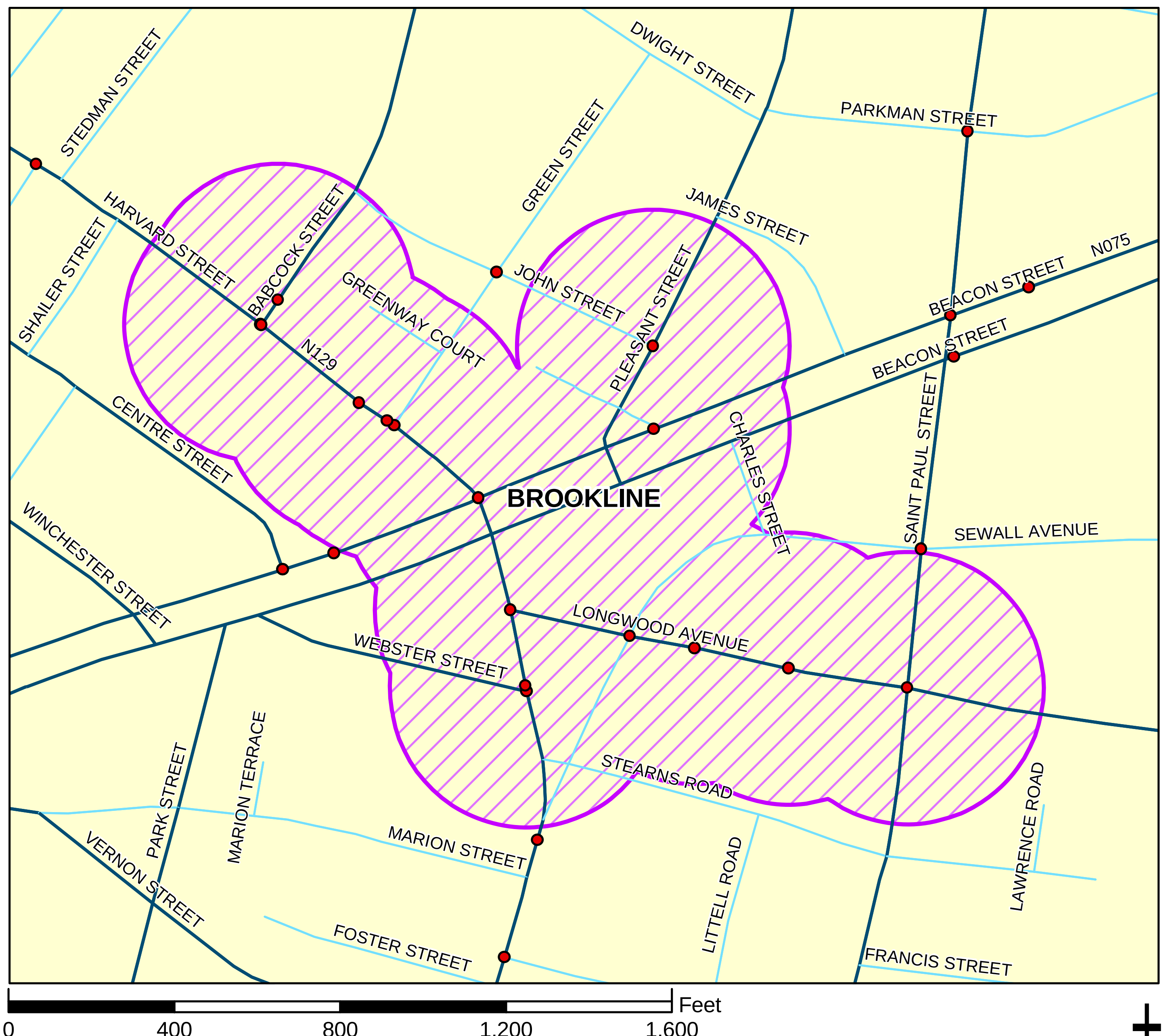
Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation

MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




**RANK**
**6**

## BROOKLINE

RPA MAPC
EPDO 75
Number of Fatal Pedestrian Crashes 0
Number of Injury Pedestrian Crashes 13
Number of Non-Injury Pedestrian Crashes 10
Total Pedestrian Crashes 23

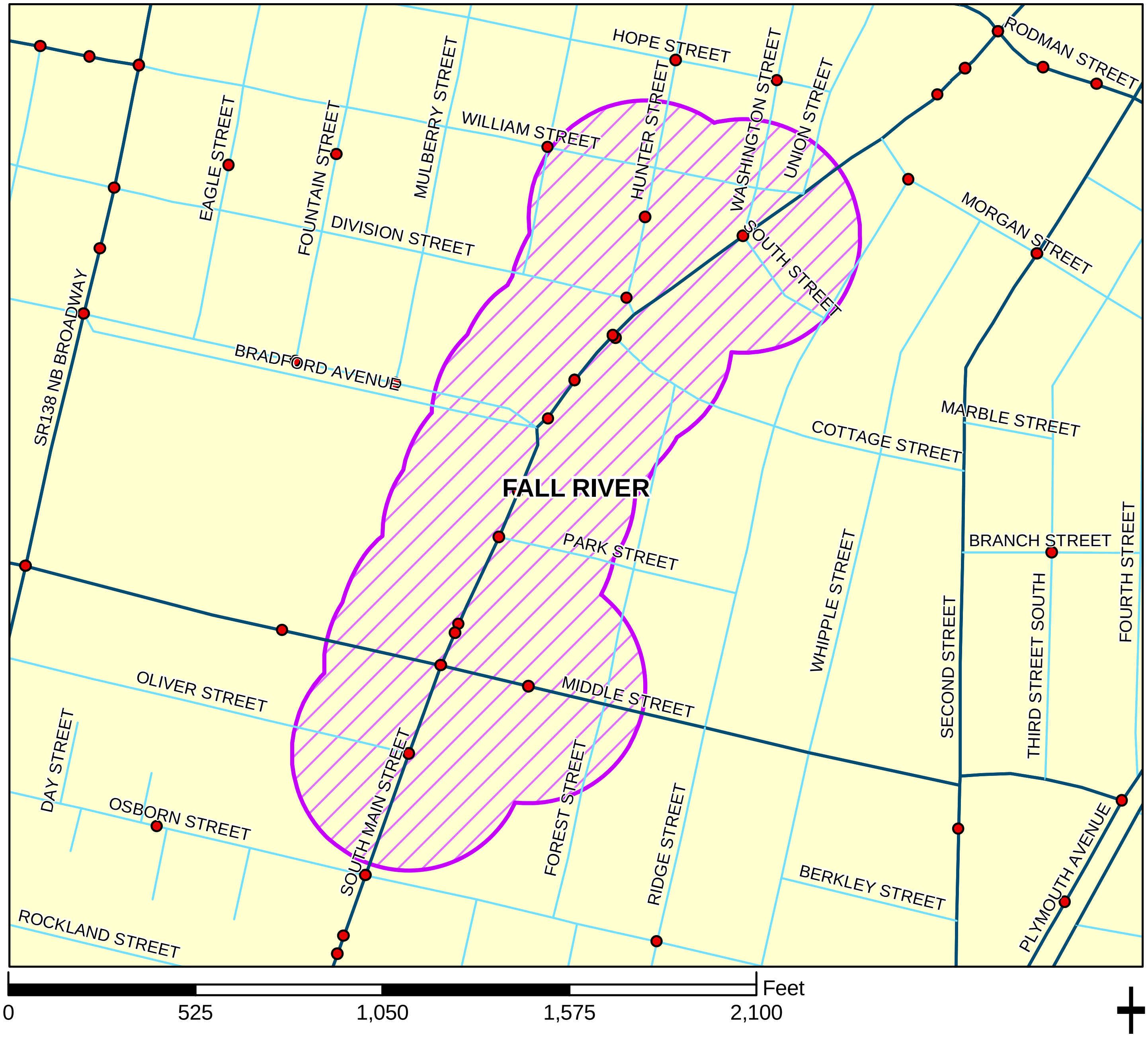
Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation

MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




## RANK 7

## FALL RIVER

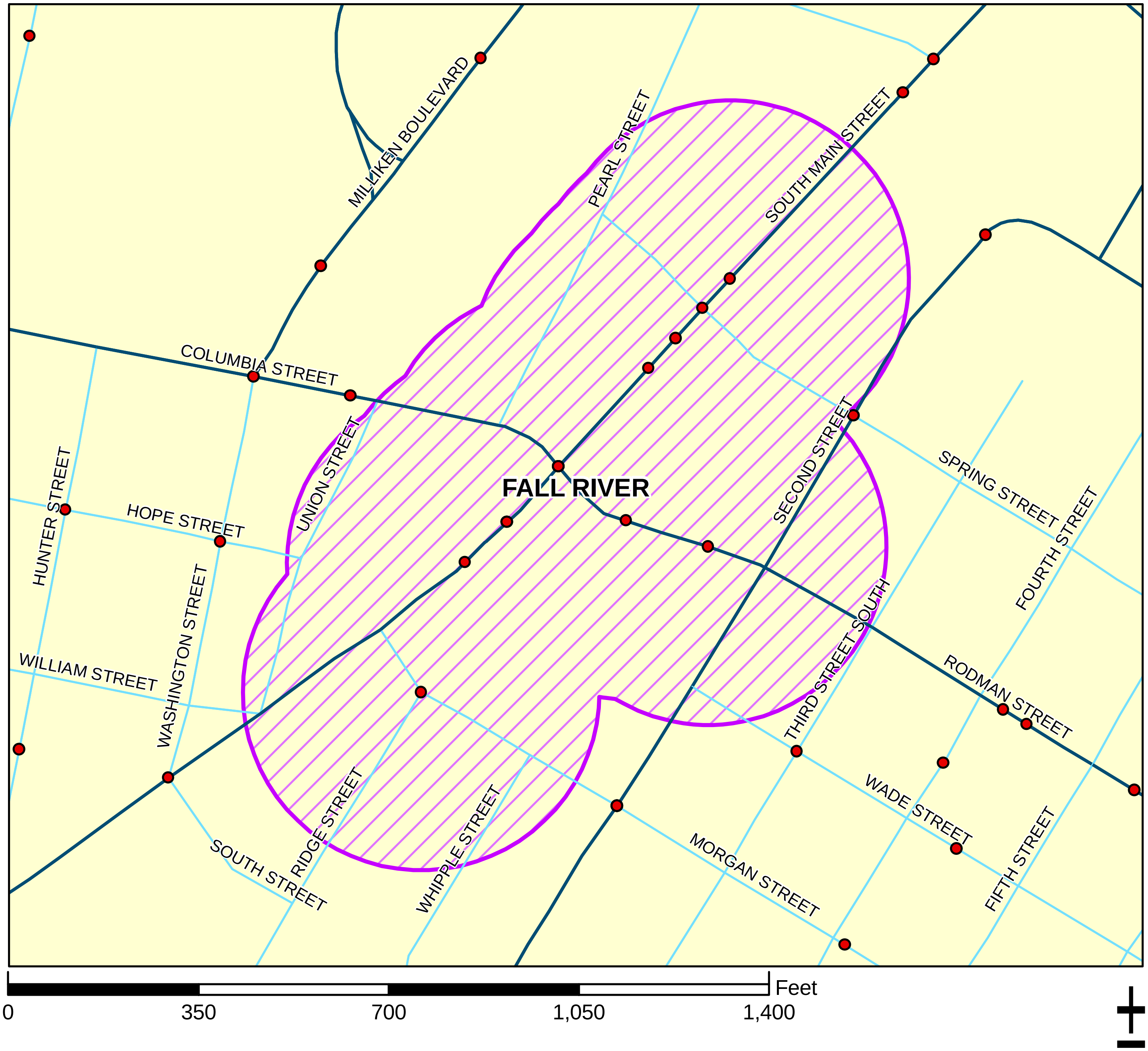
RPA SRPEDD
EPDO 71
Number of Fatal Pedestrian Crashes 0
Number of Injury Pedestrian Crashes 13
Number of Non-Injury Pedestrian Crashes 6
Total Pedestrian Crashes 19

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




**RANK**
**8**

## FALL RIVER

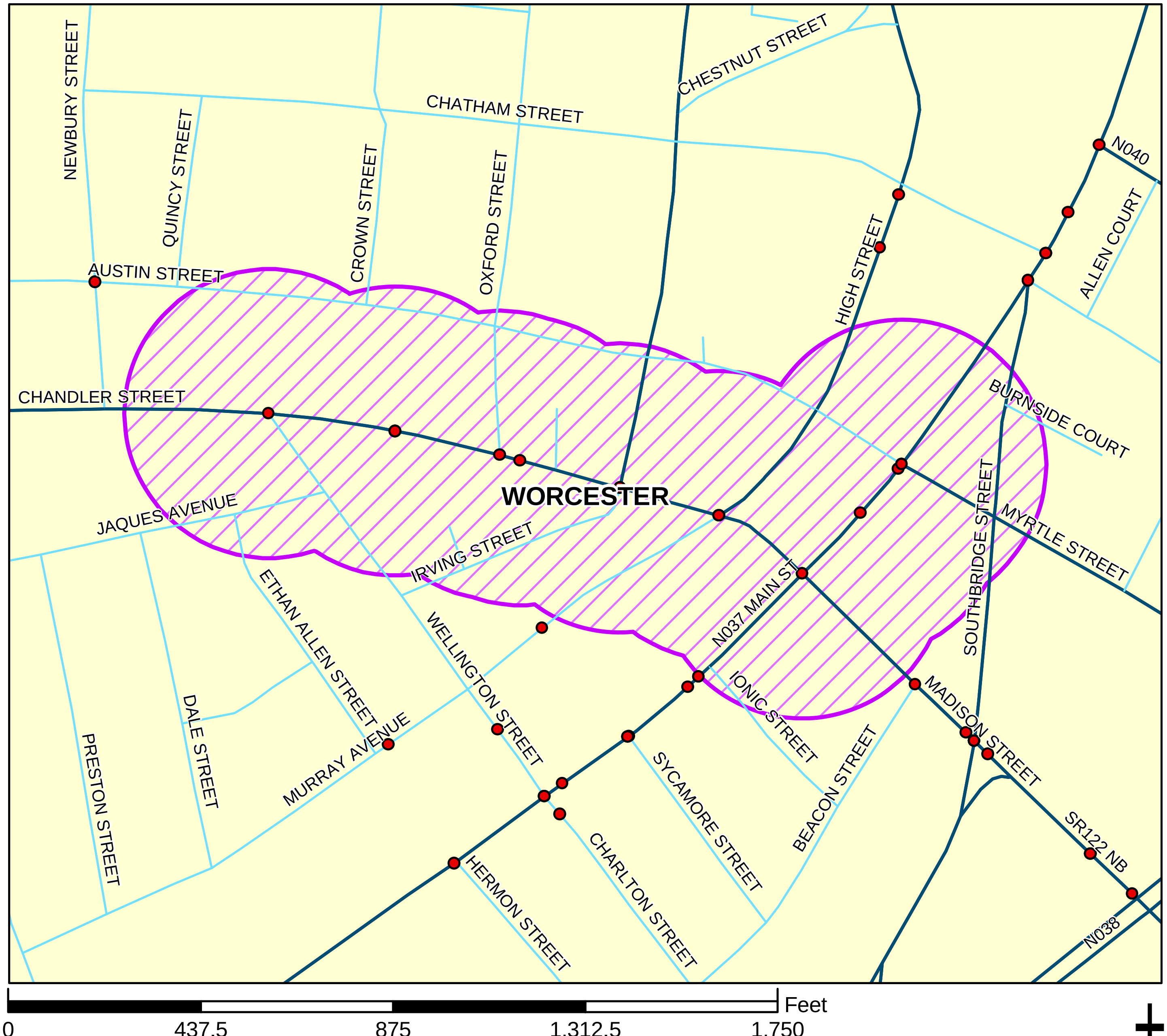
RPA SRPEDD
EPDO 70
Number of Fatal Pedestrian Crashes 0
Number of Injury Pedestrian Crashes 14
Number of Non-Injury Pedestrian Crashes 0
Total Pedestrian Crashes 14

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




## RANK 9

## WORCESTER

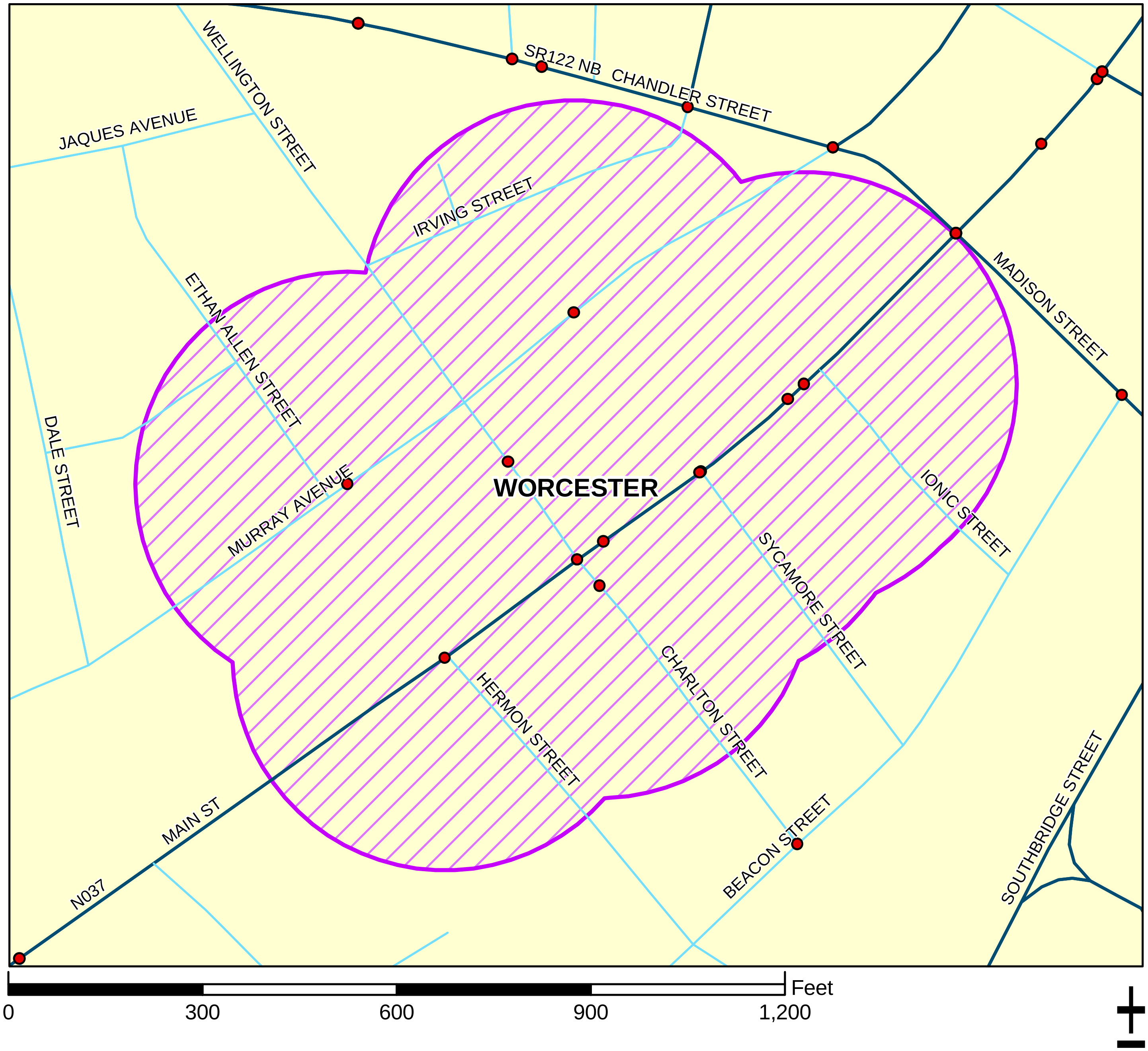
RPA CMRPC
EPDO 68
Number of Fatal Pedestrian Crashes 0
Number of Injury Pedestrian Crashes 13
Number of Non-Injury Pedestrian Crashes 3
Total Pedestrian Crashes 16

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

# Top Pedestrian Crash Cluster 2002-2006




**RANK**
**10**

## WORCESTER

RPA CMRPC
EPDO 62
Number of Fatal Pedestrian Crashes 0
Number of Injury Pedestrian Crashes 12
Number of Non-Injury Pedestrian Crashes 2
Total Pedestrian Crashes 14

Legend

- Pedestrian Crash Locations 2002-2006
- Local Roads
- All Functional Classification Except Local Roads
- Top Pedestrian Crash Cluster
- Municipal Boundary

EOT Massachusetts Executive Office of Transportation
MASS HIGHWAY

## 2002-2006 STATEWIDE TOP 10 PEDESTRIAN CRASH LIST

| Rank | Town | RPA | MHD District | Total Pedestrian Crashes | EPDO Pedestrian Crashes | Fatal Pedestrian Crashes | Injury Pedestrian Crashes | PDO & Non Reported Pedestrian Crashes |
|---|---|---|---|---|---|---|---|---|
| 1 | CHELSEA | MAPC | 4 | 58 | 235 | 1 | 42 | 15 |
| 2 | CAMBRIDGE | MAPC | 4 | 37 | 113 | 0 | 19 | 18 |
| 3 | NORTHAMPTON | PVPC | 2 | 20 | 105 | 1 | 19 | 0 |
| 4 | LOWELL | NMCOG | 4 | 28 | 104 | 0 | 19 | 9 |
| 5 | LOWELL | NMCOG | 4 | 19 | 93 | 2 | 14 | 3 |
| 6 | BROOKLINE | MAPC | 2 | 23 | 75 | 0 | 13 | 10 |
| 7 | FALL RIVER | SRPEDD | 5 | 19 | 71 | 0 | 13 | 6 |
| 8 | FALL RIVER | SRPEDD | 5 | 14 | 70 | 0 | 14 | 0 |
| 9 | WORCESTER | CMRPC | 3 | 16 | 68 | 0 | 13 | 3 |
| 10 | WORCESTER | CMRPC | 3 | 14 | 62 | 0 | 12 | 2 |

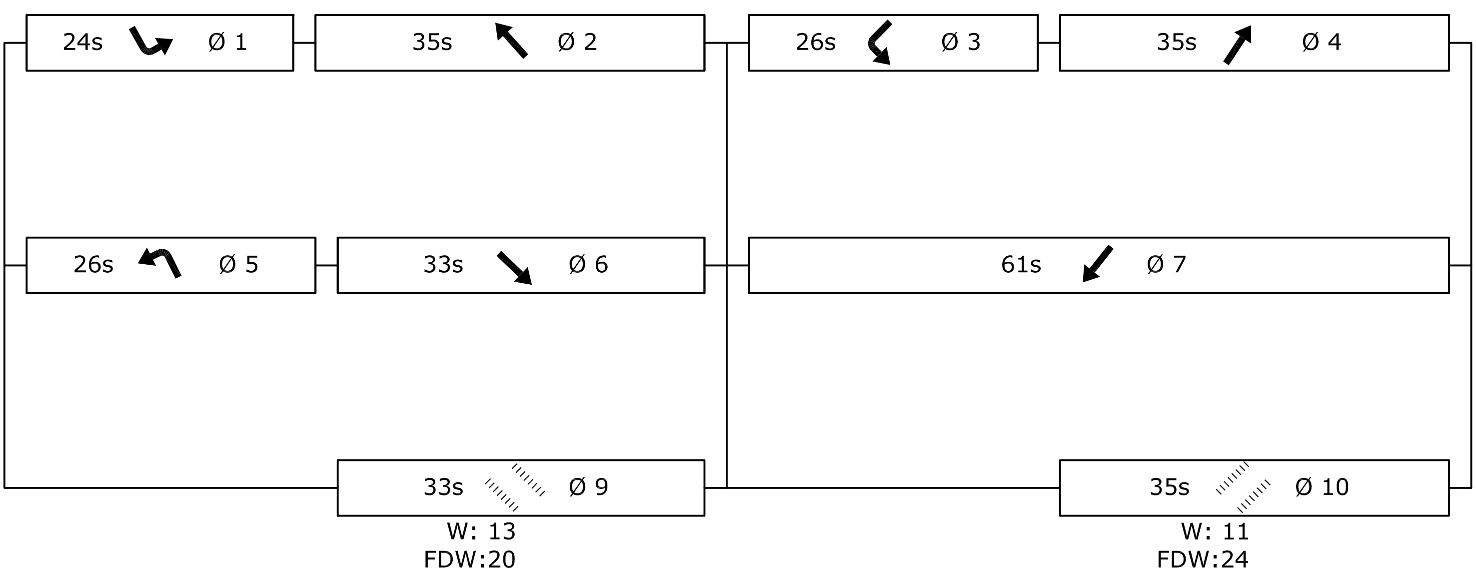
## 2002-2006 STATEWIDE TOP 10 BICYCLE CRASH LIST

| Rank | Town | RPA | MHD District | Total Bicycle Crashes | EPDO Bicycle Crashes | Fatal Bicycle Crashes | Injury Bicycle Crashes | PDO & Non Reported Bicycle Crashes |
|---|---|---|---|---|---|---|---|---|
| 1 | CAMBRIDGE | MAPC | 4 | 36 | 137 | 1 | 23 | 12 |
| 2 | CAMBRIDGE | MAPC | 4 | 24 | 92 | 0 | 17 | 7 |
| 3 | CAMBRIDGE | MAPC | 4 | 12 | 52 | 0 | 10 | 2 |
| 4 | CAMBRIDGE | MAPC | 4 | 12 | 48 | 0 | 9 | 3 |
| 5 | CAMBRIDGE | MAPC | 4 | 11 | 43 | 0 | 8 | 3 |
| 6 | SOMERVILLE | MAPC | 4 | 9 | 41 | 0 | 8 | 1 |
| 6 | NORTHAMPTON | PVPC | 2 | 9 | 41 | 0 | 8 | 1 |
| 8 | CAMBRIDGE | MAPC | 4 | 16 | 40 | 0 | 6 | 10 |
| 8 | CAMBRIDGE | MAPC | 4 | 12 | 40 | 0 | 7 | 5 |
| 10 | CAMBRIDGE | MAPC | 4 | 9 | 37 | 0 | 7 | 2 |

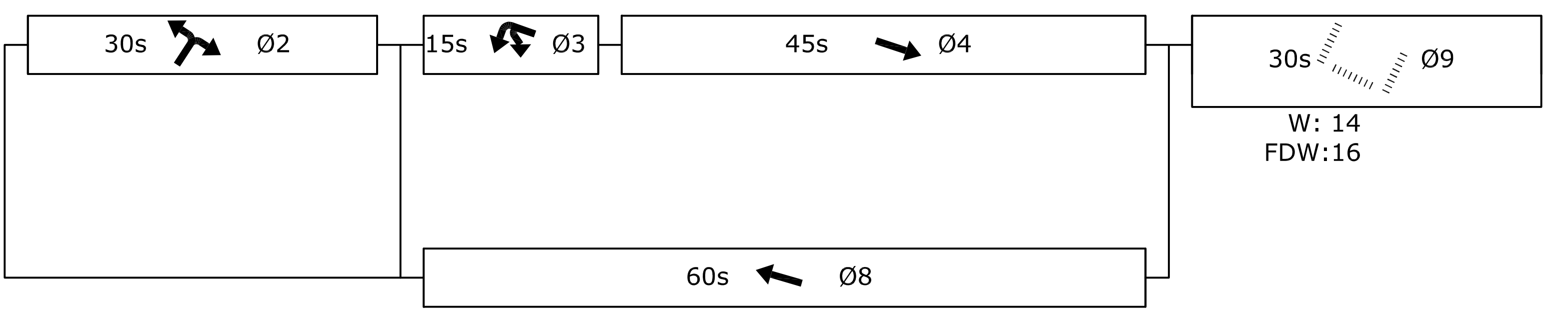
# Appendix J – Signal Phase Diagrams

AM Peak Hour

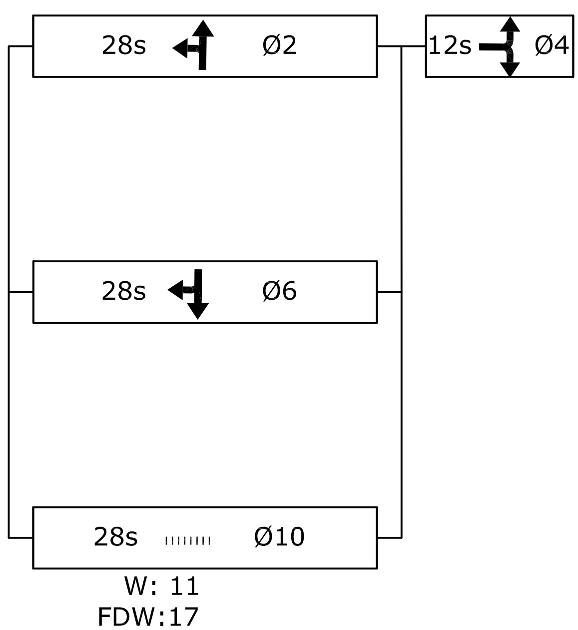

Southampton Street @ Melnea Cass Boulevard
Proposed AM Signal Timing



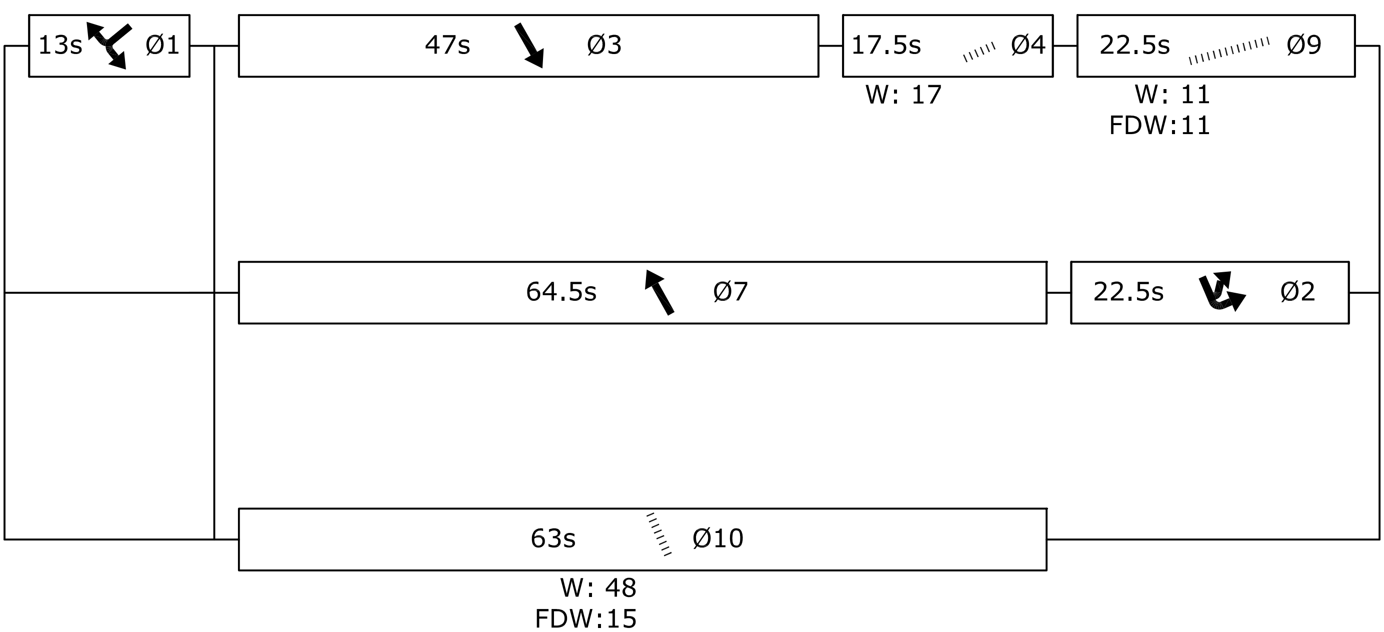

Southampton Street @ Allstate Road
Proposed AM Signal Timing




Morrissey Boulevard @ Shaw's Driveway
Proposed AM Signal Timing

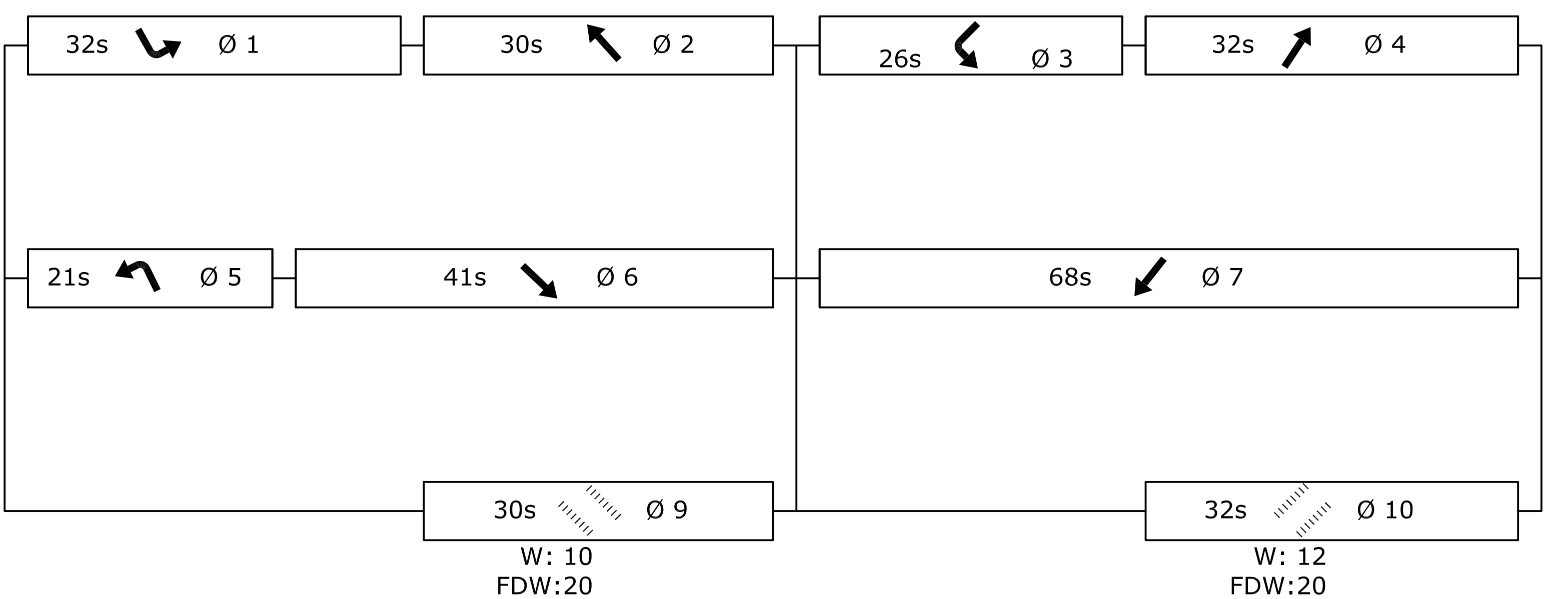



Morrissey Boulevard @ UMass Boston
Proposed AM Signal Timing



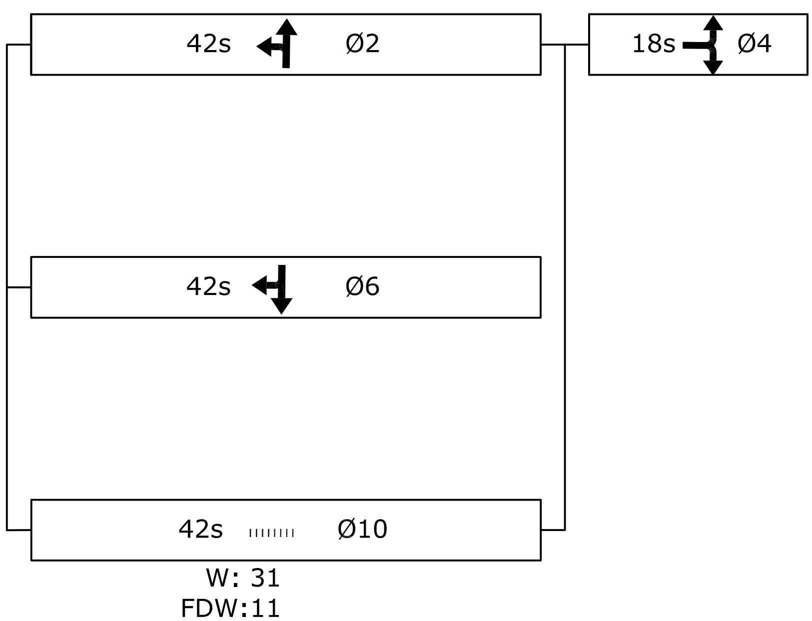
# PM Peak Hour


Southampton Street @ Melnea Cass Boulevard
Proposed PM Signal Timing




Southampton Street @ Allstate Road
Proposed PM Signal Timing


Morrissey Boulevard @ Shaw's Driveway
Proposed PM Signal Timing




Morrissey Boulevard @ UMass Boston
Proposed PM Signal Timing