

# Stop Sign Safety Study

Northampton, MA

Warner Street at Hinckley Street  
Chapel Street (Route 66) at Laurel Street  
Burts Pit Road at Redford Drive/Cardinal Way  
Crescent Street/Summer Street at Prospect Street  
Riverside Drive at Federal Street  
Hatfield Street at Cooke Avenue

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## Stop Sign Safety Study Northampton, MA

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Appendix : Traffic Analysis, Traffic Signal Warrant, Cap-X Analysis

### Sources:

Manual on Uniform Traffic Control Devices (MUTCD) -

<https://mutcd.fhwa.dot.gov/htm/2009/part2/part2b.htm#section2B06>

MassDOT Project Development and Design Guide (PDDG)-

<https://www.mass.gov/info-details/pddg-chapter-3-basic-design-controls>

Northampton Zoning -

[https://northamptonma.gov/DocumentCenter/View/21386/coverpage2023\\_zoning](https://northamptonma.gov/DocumentCenter/View/21386/coverpage2023_zoning)

Massachusetts Roadway Inventory -

<https://gis.massdot.state.ma.us/roadinventory/?page=Interactive-Map>

## 1. Study Introduction

Fuss & O'Neill has completed a stop sign study within the City of Northampton, MA. The purpose of this study was to analyze stop-control conditions to determine recommendations that improve intersection safety at the following intersections.

- Warner Street at Hinckley Street
- Chapel Street (Rt 66) at Laurel Street
- Burts Pit Road at Redford Drive and Cardinal Way
- Prospect Street at Crescent Street and Summer Street
- Riverside Drive at Federal Street
- Hatfield Street at Cooke Avenue

For each intersection, the following data was collected:

- Crash history for 3 years between January 2020 and December 2022 from the Northampton Police Department and MassDOT Impact Portal.
- Weekday morning and afternoon peak period intersection turning movement counts (TMCs) of vehicles, bicycles, and pedestrians taken on Thursday October 5, 2023, between 6:30AM to 9:15AM and 3:00PM to 5:45PM.
- Field measurements of intersection sight distance and stopping sight distance.
- Field observations on travel speed, posted speed limits and site characteristics.

Using the collected data, the following analyses were performed for each intersection:

- Safety Analysis
- Traffic Analysis
- Stopping Sight Distance (SSD) Analysis
- Intersection Sight Distance (ISD) Analysis

The 2009 Manual for Uniform Traffic Control Devices (MUTCD) Section 2B guidance on placement of stop signs and multi-way (all-way) stop signs was used to determine applicability of intersection control. Section 2B has two sections that apply to stop signs including applicability of stop signs and applicability of all-way stop control conditions. Both are presented as guidelines, rather than standards, and depend on thresholds for crash records, measured volumes of vehicles, bicycles, and pedestrians, 85<sup>th</sup> percentile speeds, and sight distance.

The Massachusetts Department of Transportation Project Development Design Guide (MassDOT PDDG) Sections 3 was used as guidelines for sight distance analysis. Sight distance is measured in two ways. First, stopping sight distance (SSD) ensures that vehicles on the major road will have sufficient visibility to safely stop for another stopped vehicle on the road at an intersection. Second, intersection sight distance (ISD) is recommended to determine if there is sufficient visibility for minor street vehicles to enter the intersection without requiring excessive braking by vehicles on the major street.

The Northampton zoning map was used to determine land use surrounding the intersections. The MassDOT Roadway Inventory Database was used to determine the roadway classification, roadway ownership, and posted speed limit.

## 2. Intersection Analysis

### 2.1. Warner Street at Hinckley Street

Warner Street at Hinckley Street is a two-way stop-controlled intersection with stop control on Hinckley Street only. Hinckley Street travels in the northbound and southbound directions and Warner Street travels in the westbound and eastbound directions. Both streets are City owned. The intersection is in an urban residential area.

A streetlight is mounted to a utility pole on the southeast corner of the intersection. There are no marked bicycle lanes within the intersection limits. Pedestrian facilities include a sidewalk along the eastern side of Hinckley Street, and the northern side of the east leg of Warner St. There is a marked crosswalk spanning the east leg of the intersection.

Warner Street is considered the major approach and Hinckley Street is considered the minor approach. Both roads are classified as local roads. The design speed on both streets is estimated to be 30 MPH based on the roadway classification. A posted speed limit was not listed in the MassDOT Roadway Inventory or observed during sight visits. Speed observations indicate general compliance with the estimated design speeds.



Hinckley Street looking north



Warner Street looking east

#### 2.1.1. Safety Analysis

MassDOT Crash Data and local police reports indicate that from January 1, 2020, to December 31, 2022, no crashes were reported at the intersection. Based on the number of crashes and the MUTCD guidelines this intersection does not meet conditions for an all way stop control.

## 2.1.2. Traffic Analysis

Turning movement counts collected on October 5, 2023, show that AM peak hour demand on Warner Street is approximately 25 vehicles per hour and PM peak hour demand is 13 vehicles per hour. For Hinckley Street AM peak hour demand is approximately 31 vehicles per hour and PM peak hour demand is 45 vehicles per hour. During the AM and PM peak hours there was combined total of 23 pedestrian crossings on the eastern leg of the intersection.

Based on measured volumes and MUTCD guidelines it is anticipated that volumes will not meet conditions for an all-way stop control.

## 2.1.3. Sight Distance Analysis

The eastbound and westbound approaches on Warner Street were analyzed for SSD. The calculations assume the roadway does not have a significant grade. In both directions on Warner Street the SSD measurement exceeds the recommended SSD for an intersection with a design speed of 30 MPH according to MassDOT PDDG. SSD calculations are noted in table 1 below.

| <b>Table 1</b>                                    |                     |              |                          |          |
|---|---------------------|--------------|--------------------------|----------|
| STOPPING SIGHT DISTANCE MEASUREMENTS              |                     |              |                          |          |
| Warner Street at Hinckley Street, Northampton, MA |                     |              |                          |          |
| Street Name                                       | Direction of Travel | Design Speed | Stopping Sight Distance  |          |
|   |                     |              | Recommended <sup>1</sup> | Existing |
| Warner Street                                     | Eastbound           | 30 MPH       | 200                      | 684      |
|   | Westbound           | 30 MPH       | 200                      | 1000     |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-8

The stop-controlled legs at this intersection on Hinckley Street were analyzed for ISD. The ISD for southbound left turns is 100 feet and visibility is restricted by a picket fence and vegetation on private property. For southbound right turns the ISD is 80 feet and visibility is restricted by vegetation located on the northwest corner of the intersection. The southbound approach does not meet the recommended distance of 335 feet for left turn ISD and 290 feet for right turn ISD from the MassDOT PDDG. The existing ISD for the northbound approach is approximately 435 feet for left turns and 600 feet for right turns. ISD for the northbound approach exceeds the recommended distance from the MassDOT PDDG. ISD calculations are noted in table 2 below.

| <b>Table 2</b><br>INTERSECTION DISTANCE MEASUREMENTS<br>Warner Street at Hinckley Street, Northampton, MA |                     |                           |                                       |          |  |          |
|---|---------------------|---------------------------|---------------------------------------|----------|--|----------|
| Minor Street Name   | Direction of Travel | Major Street Design Speed | Left Turn Intersection Sight Distance |          | Right Turn Intersection Sight Distance |          |
|   |                     |                           | Recommended <sup>1</sup>              | Existing | Recommended <sup>1</sup>               | Existing |
| Hinckley Street   | Southbound          | 30 MPH                    | 335                                   | 100      | 290                                    | 80       |
|   | Northbound          | 30 MPH                    | 335                                   | 435      | 290                                    | 600      |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-11

Based on measured SSD and ISD, and MUTCD guidelines, it is anticipated that this intersection meets conditions for an all-way stop control. As stated in section 2B.06 Stop Sign Applications of the MUTCD, best practice indicates the use of a stop sign on the minor street approach when a restricted view exists that requires road users to stop to adequately observe conflicting traffic on the through street.

#### 2.1.4. Recommendations

It is recommended that Warner Street at Hinckley Street intersection become an all-way stop controlled intersection because the ISD measurement does not meet the MassDOT PDDG threshold for a 30MPH design speed in the southbound direction and the MUTCD recommendation to install a four way stop condition when the ISD guidelines are not met in Section 2B.07 Multi-Way Stop Applications, Option C.

In addition, it is recommended that the crosswalk sign on the southwest corner be relocated to the southeast corner leg and yield teeth road paint be removed.

All-way stop control is recommended because the condition is not anticipated to cause congestion or driver frustration based on the roadway classification, and volume and speed measurements at this intersection.

## 2.2. Chapel Street (Route 66) at Laurel Street

Chapel Street (Route 66) at Laurel Street is a two-way stop-controlled intersection with stop control on Laurel Street only. Laurel Street travels in the northbound and southbound directions and Chapel Street travels in the westbound and eastbound directions. Both roads are City owned. This location is an urban area with surrounding residential, industrial, and commercial land use.

A streetlight is mounted to a utility pole on the northwestern corner of the intersection. There are no marked bicycle lanes within the intersection limits. Pedestrian facilities include a sidewalk along the southern side of Chapel Street and on both sides of the southern leg of Laurel Street.

Chapel Street is considered the major approach and is classified as an urban minor arterial. Laurel Street is considered the minor approach and is classified as a local road. The design speed on Chapel Street is estimated to be 35 MPH based on the posted speed limit of 30 MPH. The design speed on Laurel Street is estimated to be 30 MPH based on the road classification. A posted speed limit was not listed in the MassDOT Roadway Inventory or observed during sight visits. Speeds were observed to generally comply with design speed estimates and occasional excess speeds were observed on Chapel Street.



Laurel Street looking north



Chapel Street (Route 66) looking east

### 2.2.1. Safety Analysis

MassDOT Crash Data and the local police reports indicate that from January 1, 2020, to December 31, 2022, two crashes were reported at the intersection, one took place in 2020 and the other took place in 2021. Both crashes were documented as angled collisions during the day with dry road conditions, where the northbound vehicle failed to yield right of way at the stop sign. Both crashes resulted in property damage only.

Based on the number of crashes and the MUTCD guidelines it is the number of crashes does not meet guidelines for all-way stop control.

### 2.2.2. Traffic Analysis

Turning movement counts collected on October 5, 2023, show that AM peak hour demand on Chapel Street is approximately 318 vehicles per hour and PM peak hour demand is 332 vehicles. On Laurel Street the AM peak hour demand is approximately 44 vehicles per hour and PM peak hour demand is 55 vehicles per hour. During the AM and PM peak hours there was combined total of 4 pedestrians crossings on the eastern leg of the intersection.

Based on measured volumes and the MUTCD guidelines it is anticipated that volumes may meet conditions for an all-way stop control, since the traffic volume exceeds 300 vehicles per hour in the peak hours. The MUTCD guidelines recommend hourly volume to exceed 300 vehicles occur for 8 hours in one day and peak hour volumes only slightly exceed the threshold or suggest documentation of significant delay on the stop control streets.

### 2.2.3. Sight Distance Analysis

The eastbound and westbound approaches on Chapel Street were analyzed for SSD. The calculations assume the roadway does not have a significant grade. In both directions the SSD measurement exceeds the recommended SSD for the assumed design speed. SSD calculations are noted in table 3 below.

| <b>Table 3</b><br>STOPPING SIGHT DISTANCE MEASUREMENTS<br>Chapel Street (Route 66) at Laurel Street, Northampton, MA |                     |              |                          |                       |
|--|---------------------|--------------|--------------------------|-----------------------|
| Street Name  | Direction of Travel | Design Speed | Stopping Sight Distance  |                       |
|  |                     |              | Recommended <sup>1</sup> | Existing <sup>1</sup> |
| Chapel Street  | Eastbound           | 35 MPH       | 250                      | 900                   |
|  | Westbound           | 35 MPH       | 250                      | 437                   |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-8

The northbound and southbound directions on the stop-controlled legs of Laurel Street were analyzed for ISD and SSD to determine if the existing two-way stop condition is adequate. The existing ISD is 437 feet for southbound left turns and 348 feet for right turns. The right turn visibility is blocked by vegetation on the northwest corner. The ISD for northbound left turns is approximately 900 feet and for left turns ISD is 437 feet. Both approaches meet the minimum requirements for ISD from the MassDOT PDDG. However, the vegetation restricting visibility on the southbound approach could become an issue if growth is continued or if vehicles speeds exceed the design speed on Chapel Street. ISD calculations are noted in table 4 below.

| <b>Table 4</b><br>INTERSECTION DISTANCE MEASUREMENTS<br>Chapel Street (Route 66) at Laurel Street, Northampton, MA |                     |                           |                                       |          |  |          |
|--|---------------------|---------------------------|---------------------------------------|----------|--|----------|
| Minor Street Name  | Direction of Travel | Major Street Design Speed | Left Turn Intersection Sight Distance |          | Right Turn Intersection Sight Distance |          |
|  |                     |                           | Recommended <sup>1</sup>              | Existing | Recommended <sup>1</sup>               | Existing |
| Laurel Street  | Southbound          | 35 MPH                    | 390                                   | 437      | 335                                    | 348      |
|  | Northbound          | 35 MPH                    | 390                                   | 900      | 335                                    | 437      |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-11

Based on measured SSD and ISD and MUTCD guidelines it is anticipated that this intersection does not meet conditions for an all-way stop control.

## 2.2.4. Recommendations

It is recommended that Chapel Street (Route 66) at Laurel Street remain a two-way top controlled intersection. While the traffic volume on Chapel Street may qualify the intersection for all-way stop control, per Section 2B.07 Multi-Way Stop Applications, Option C, the volume has not been measured to be consistent, and supporting crash history and sight distance guidelines were not met.

It is recommended to trim the overgrown vegetation on the west side of Laurel Street on the northern leg of the intersection. Although ISD measurements are satisfactory, ISD can be further improved to increase safety, and this obstruction reduces the visibility of the posted stop sign and the visibility of the driver to eastbound traffic. It is also recommended to investigate traffic calming measures to reduce speeds on Chapel Street such as raised crosswalks, roundabout intersections, or lateral lane shifts at the intersection approaches.

## 2.3. Burts Pit Road at Redford Drive/Cardinal Way

Burts Pit Road at Redford Drive and Cardinal Way is functionally a two way stop control intersection with stop control on Redford Drive and Cardinal Way approaches. However, there is currently not a stop sign installed on Redford Drive, the southbound leg of the intersection, therefore this leg has been analyzed as a yield condition.

Redford Drive is the north leg and Cardinal Way is the south leg of the intersection. Burts Pit Road travels in the westbound and eastbound directions. All three roads are City owned. This location is an urban residential area.

A streetlight is mounted to a utility pole on the southeastern corner of the intersection. There are no marked bicycle lanes within the intersection limits. Pedestrian facilities include a sidewalk along the west side of Cardinal Way, on the southern leg of the intersection, and a cross walk across the west leg of the intersection.

Burts Pit Road is considered the major approach and is classified as an urban minor arterial. Redford Drive and Cardinal Way are considered the minor approaches and are classified as local roads. The design speed on Burts Pit Road is estimated to be 35 MPH based on the posted speed limit of 30 MPH. The design speeds on Redford Drive and Cardinal Way are estimated to be 30 MPH based on the road classification. A posted speed limit was not listed in the MassDOT Roadway Inventory or observed during sight visits. Speed observations were observed to generally comply and occasional excess speeds were observed on Burts Pit Road.



Burts Pit Road looking east



Redford Drive looking south

### 2.3.1. Safety Analysis

MassDOT Crash Data and local police reports indicate that from January 1, 2020, to December 31, 2022, one crash was reported at the intersection that took place in 2021. It was reported as an angled collision during the day and under cloudy weather conditions between eastbound and southbound vehicles. This crash resulted in property damage only.

Based on the reported crashes and the MUTCD guidelines it is anticipated that the number of crashes will not meet guidelines for all-way stop control.

### 2.3.2. Traffic Analysis

Turning movement counts were collected on October 5, 2023, at the intersection. The data shows that AM peak hour demand on Burts Pit Road is approximately 97 vehicles per hour and PM peak hour demand is 119 per hour. For Redford Drive/Cardinal Way minor approach AM peak hour demand is approximately 45 vehicles per hour and PM peak hour demand is 32 vehicles per hour. During the AM and PM peak hours there was a combined total of 10 pedestrian crossings on the western leg of the intersection.

Based on measured volumes and the MUTCD guidelines it is anticipated that volumes will not meet guidelines for an all-way stop control.

### 2.3.3. Sight Distance Analysis

The eastbound and westbound approaches on Burts Pit Road were analyzed for SSD. The calculations assume the roadway does not have a significant grade. In both directions the SSD measurement exceeds the recommended SSD for an intersection with a design speed of 35 MPH according to MassDOT PDDG. Table 5 shows the SSD calculations.

| <b>Table 5</b>  |                     |              |                          |                       |
|---|---------------------|--------------|--------------------------|-----------------------|
| STOPPING SIGHT DISTANCE MEASUREMENTS                          |                     |              |                          |                       |
| Burts Pit Road at Redford Drive/Cardinal Way, Northampton, MA |                     |              |                          |                       |
| Street Name   | Direction of Travel | Design Speed | Stopping Sight Distance  |                       |
|   |                     |              | Recommended <sup>1</sup> | Existing <sup>1</sup> |
| Burts Pitt Road   | Eastbound           | 35 MPH       | 250                      | 650                   |
|   | Westbound           | 35 MPH       | 250                      | 525                   |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-8,

The northbound direction of Cardinal Way and southbound direction of Redford Drive on the stop-controlled legs of were analyzed for ISD. This calculation assumes a yield condition on Redford Drive. The ISD for southbound left turns is 310 feet. Visibility is restricted by overgrown vegetation climbing a utility pole on the southeast corner and the ISD for southbound right turns is 665 feet. The ISD for northbound left turns is approximately 375 feet. Visibility in this direction is restricted by vegetation along “294 Cardinal Way”. The ISD for northbound right turns is 734 feet. ISD calculations are noted in table 6 below.

| <b>Table 6</b><br>INTERSECTION DISTANCE MEASUREMENTS<br>Burts Pit Road at Redford Drive/Cardinal Way, Northampton, MA |                     |                           |                                       |          |  |          |
|---|---------------------|---------------------------|---------------------------------------|----------|--|----------|
| Minor Street Name   | Direction of Travel | Major Street Design Speed | Left Turn Intersection Sight Distance |          | Right Turn Intersection Sight Distance |          |
|   |                     |                           | Recommended <sup>1</sup>              | Existing | Recommended <sup>1</sup>               | Existing |
| Redford Ave   | Southbound          | 35 MPH                    | 415                                   | 310      | 415                                    | 665      |
| Cardinal Way  | Northbound          | 35 MPH                    | 390                                   | 375      | 335                                    | 734      |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-11, Exhibit 3-12

Based on measured SSD and ISD and MUTCD guidelines it is anticipated that this intersection does meet conditions for all-way stop control.

Adding a stop sign on Redford Drive will reduce the recommended ISD for right turns from 415 feet to 335 feet and from 415 feet to 390 feet for left turns. For the left turn condition, this will not result in the Redford Drive approach meeting recommended ISD without modifications to the vegetation blocking sight distance or travel speeds on Burts Pit Road.

### 2.3.4. Recommendations

It is recommended that Burts Pit Road at Redford Drive/Cardinal Way remain a functional two-way stop-controlled intersection. To implement this finding, it is recommended to add a stop sign and stop bar on Redford Drive.

East of the intersection there is a utility pole at the bottom of the crest with overgrown vegetation that is recommended to be removed to improve sight distance from the Cardinal Way approach. West of the intersection, on the north side of Burts Pit Road there are residential plantings that are recommended to be trimmed to improve sight distance. It is also recommended to investigate traffic calming measures to reduce speeds on Burts Path Road such as raised crosswalks, roundabouts, or lateral lane shift intersections approaches.

Improving the ISD and speed on Burts Pit Road is the recommended method to improve safety at this location. Left turn ISD measurements show that the intersection could qualify for all-way stop control, however, traffic volumes are significantly lower than the threshold and low for the roadway classification. A stop control condition could lead to driver frustration, conflicting with safety improvements provided by an all-way stop, therefore all-way stop is not recommended.

## 2.4. Crescent Street and Summer Street at Prospect Street

Crescent Street and Summer Street at Prospect Street is a two way stop controlled intersection with stop control on Prospect Street only. Prospect Street travels in the northbound and southbound directions. Crescent Street is the west leg of the intersection and Summer Street is the east leg of the intersection. Crescent Street and Summer Street have a downhill grade that drains from the west to the east. All three roads are City owned. This location is an urban residential area and located near educational facilities.

A streetlight is mounted to a utility pole on the southwest corner of the intersection. There are no marked bicycle lanes within the intersection limits. Pedestrian facilities include a sidewalk along both sides of Prospect Street on the north leg of the intersection, east side of Prospect Street on the south leg of the intersection and the north side of Crescent Street and Summer Street.

Crescent Street and Summer Street are considered the major approaches and are classified as local roads. Prospect Street is classified as an urban minor arterial and is considered the minor approach because it is stop controlled. The design speed on both streets is estimated to be 30 MPH based on the roadway classification, a posted speed limit was not listed in the MassDOT Roadway Inventory or observed during sight visits. Speed was observed to generally comply with the estimated design speed.



Crescent Street looking east



Prospect Street looking north

### 2.4.1. Safety Analysis

MassDOT Crash Data and local police reports indicate that from January 1, 2020, to December 31, 2022, four crashes were reported at the intersection. The crashes include two angle crashes and two single vehicle crashes. One crash resulted in a non-fatal injury during this timeframe and the rest were classified as property damage only.

- The first crash was documented in April 2020 as an angle collision during the day with wet weather conditions between westbound and southbound vehicles. The southbound vehicle was documented as disregarding traffic signs, signals, and road markings. This crash resulted in non-fatal injury.
- The second crash was documented in April 2021 as a single vehicle collision during the day with wet weather conditions where a vehicle traveling in an undocumented direction stuck a utility pole. This crash resulted in property damage only.

- The third crash was documented in July 2021 as an angle collision during the day with cloudy weather conditions, between southbound and westbound vehicles. Where the southbound vehicle was documented as disregarding traffic signs, signals, and road markings. This crash resulted in property damage only.
- The last crash was documented in January 2022 as a single vehicle collision during the night with clear weather conditions where the northbound vehicle struck a tree. This crash resulted in property damage only.

Based on the number of crashes and the MUTCD guidelines it is anticipated that the number of crashes will not meet conditions for all-way stop control.

### 2.4.2. Traffic Analysis

Turning movement counts were collected on October 5, 2023. The data shows that AM peak hour demand on Crescent Street/Summer Street is approximately 26 vehicles per hour and PM peak hour demand is 69 per hour. For Prospect Street minor approach AM peak hour demand is approximately 103 vehicles per hour and PM peak hour demand is 90 vehicles per hour. During the AM and PM peak hours there was a combined total of 32 pedestrian crossings on the eastern leg of the intersection.

Based on measured volumes and the MUTCD guidelines it is anticipated that volumes will not meet conditions for an all-way stop control. At this intersection it was also recognized that the stop-controlled approaches on Prospect Street were measured to have more volume than the approaches without stop control on Summer and Crescent Street.

### 2.4.3. Sight Distance Analysis

The eastbound and westbound approaches were analyzed for SSD. The calculations assume the roadway has a grade of 6% downward from the west to the east. In all directions the SSD measurement exceeds the recommended SSD according to the MassDOT PDDG for an intersection with a design speed of 30 MPH. Stopping Sight Distance can be found in table 7 below.

| <b>Table 7</b>  |                            |                     |                                |                       |
|---|----------------------------|---------------------|--------------------------------|-----------------------|
| <b>STOPPING SIGHT DISTANCE MEASUREMENTS</b>                       |                            |                     |                                |                       |
| Prospect Street at Crescent Street/Summer Street, Northampton, MA |                            |                     |                                |                       |
| <b>Street Name</b>  | <b>Direction of Travel</b> | <b>Design Speed</b> | <b>Stopping Sight Distance</b> |                       |
|   |                            |                     | Recommendation <sup>1</sup>    | Existing <sup>1</sup> |
| Crescent Street   | Eastbound                  | 30 MPH              | 215                            | 300                   |
| Summer Street   | Westbound                  | 30 MPH              | 184                            | 460                   |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-8, Adjusted for Grade

The northbound and southbound approaches were analyzed for ISD. ISD for southbound left turns is 130 feet and visibility is restricted by a home, vegetation, and on-street parking. The ISD for the southbound right turns is 300 feet. ISD for northbound left turns is 89 feet due to a utility pole and overgrown vegetation. ISD for northbound right turns is 289 feet. The left turns and right turns for the northbound and southbound approaches do not meet the minimum required sight distance from the MassDOT PDDG. ISD calculations are noted in table 8 below.

| <b>Table 8</b>  |                     |                           |                             |          |                             |          |
|---|---------------------|---------------------------|-----------------------------|----------|-----------------------------|----------|
| <b>INTERSECTION DISTANCE MEASUREMENTS</b>                         |                     |                           |                             |          |                             |          |
| Prospect Street at Crescent Street/Summer Street, Northampton, MA |                     |                           |                             |          |                             |          |
| Minor Street Name   | Direction of Travel | Major Street Design Speed | Left Turn                   |          | Right Turn                  |          |
|   |                     |                           | Intersection Sight Distance |          | Intersection Sight Distance |          |
|   |                     |                           | Recommended <sup>1</sup>    | Existing | Recommended <sup>1</sup>    | Existing |
| Prospect Street   | Southbound          | 30 MPH                    | 301                         | 130      | 319                         | 300      |
|   | Northbound          | 30 MPH                    | 368                         | 89       | 261                         | 289      |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-11

Based on measured SSD and ISD and MUTCD guidelines it is anticipated that this intersection does meet conditions for this intersection to become an all-way stop controlled intersection. As stated in section 2B.06 Stop Sign Applications of the MUTCD, best practice indicates the use of a stop sign on the minor street approach when a restricted view exists that requires road users to stop in order to adequately observe conflicting traffic on the through street.

#### 2.4.4. Recommendations

It is recommended that Crescent Street and Summer Street at Prospect Street become an all-way stop controlled intersection because the ISD measurements do not meet the MassDOT PDDG threshold for a 30MPH design speed and the MUTCD recommendation to install a four way stop condition when the ISD guidelines are not met in Section 2B.07 Multi-Way Stop Applications, Option C.

The southwest corner contains a large pine tree that is obstructing the visibility of northbound vehicles, and it is recommended to trim the low hanging branches to improve sight distance, in addition to adding stop control on Crescent Street and Summer Street

It is also recommended to restripe the intersection and include crosswalks across the north leg of Prospect Street and east leg of Summer Street to bring more attention to traffic at the intersection.

## 2.5. Riverside Drive at Federal Street

Riverside Drive at Federal Street/Prospect Street is a two way stop controlled intersection with stop control on Federal Street only. Federal Street travels in the northbound and southbound directions and Riverside Drive travels in the westbound and eastbound directions. Federal Street has a downhill grade that drains from the west to the east. There are speed humps on Riverside Drive Street approximately 750 feet west and an intersection ahead sign about 350 feet west of the intersection. Both roads are City owned. This location is an urban residential area and located near educational and medical facilities.

A streetlight is mounted to a utility pole on the southwestern corner of the intersection. There are no marked bicycle lanes within the intersection limits. Pedestrian facilities include a sidewalk on the southern side of Riverside Drive on the eastern leg of the intersection and along the eastern side of Federal Street on the southern leg of the intersection.

Riverside Drive is classified as an urban minor arterial and considered the major approach. Federal Street is not classified according to the MassDOT roadway inventory file and is considered the minor approach. The design speed on Riverside Drive is estimated to be 35 MPH based on a posted speed limit of 30 MPH. Federal Street is estimated to be 30 MPH based on the posted speed limit of 25 MPH. Speed observations were observed to generally comply with occasional excess speeds on Riverside Drive.



Riverside Drive looking west



Federal Street looking north

### 2.5.1. Safety Analysis

MassDOT Crash Data and local police reports indicate that from January 1, 2020, to December 31, 2022, one crash was reported at the intersection. The crash took place in 2022 during the day, under clear weather conditions, between southbound eastbound and eastbound vehicles where the southbound vehicle was documented with inattention, resulting in property damage only.

Based on the number of crashes and the MUTCD guidelines it is anticipated that the number of crashes will not meet conditions for a two-way stop control.

## 2.5.2. Traffic Counts

Turning movement counts were collected on October 5, 2023. The data shows that AM peak hour demand on Riverside Drive is approximately 302 vehicles per hour and PM peak hour demand is 367 vehicles per hour. For Federal Street minor approach AM peak hour demand is approximately 77 vehicles per hour and PM peak hour demand is 82 vehicles per hour. During the AM and PM peak hours there was a combined total of 40 pedestrian crossings on the eastern leg of the intersection.

Based on measured volumes and the eligibility factors listed under Section 2B.07 Multi-Way Stop Application MUTCD guidelines it is anticipated that volumes may meet conditions for all-way stop control. The measured peak hour volume does exceed 300 vehicles per day, there is potential for speeds more than 40 MPH and a high number of pedestrians were observed to cross the major street.

## 2.5.3. Sight Distance Analysis

The eastbound and westbound approaches on Riverside Drive were analyzed for SSD. The calculations assume the roadway has a 6% grade draining from west to east. In the eastbound and westbound directions, the SSD measurement exceeds the recommended SSD according to the MassDOT PDDG. SSD in the eastbound direction is blocked by the crest curve on Federal Street, however SSD does meet the recommended criteria for the design speed and is not considered deficient. It was recognized that occasional speeds on Riverside Drive may exceed the design speed because of the downhill grade. The MassDOT PDDG Exhibit 3-8 shows that the existing SSD would be considered deficient for vehicles traveling over 45 MPH. SSD calculations can be found in table 9 below.

| <b>Table 9</b>   |                            |                     |                                |                       |
|--|----------------------------|---------------------|--------------------------------|-----------------------|
| <b>STOPPING SIGHT DISTANCE MEASUREMENTS</b>                        |                            |                     |                                |                       |
| Riverside Drive at Federal Street/Prospect Street, Northampton, MA |                            |                     |                                |                       |
| <b>Street Name</b>   | <b>Direction of Travel</b> | <b>Design Speed</b> | <b>Stopping Sight Distance</b> |                       |
|  |                            |                     | Recommendation <sup>1</sup>    | Existing <sup>1</sup> |
| Riverside Drive  | Eastbound                  | 35 MPH              | 271                            | 403                   |
|  | Westbound                  | 35 MPH              | 229                            | 1000                  |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-8, Adjusted for Grade

The northbound and southbound approaches on Federal Street were analyzed for ISD. The ISD for southbound right turns is 125 feet and visibility is restricted by vegetation located on the northwest corner. The recommended ISD for southbound right turns is 301 ft. The ISD for southbound left turns is 439 feet and visibility is restricted by vegetation located on the northeast corner. The recommended ISD for southbound left turns is 429 ft. The existing ISD for northbound left turns is approximately 205 feet. Visibility for the northbound right turns is blocked by vegetation located along the east side of Riverside Drive. The recommended ISD for northbound right turns is approximately 368 ft. The southbound and northbound approach do not meet the minimum requirement sight distance from the MassDOT PDDG. ISD calculations are noted in table 10 below.

| <b>Table 10</b><br>INTERSECTION DISTANCE MEASUREMENTS<br>Riverside Drive at Federal Street/Prospect Street, Northampton, MA |                     |                           |                                       |          |  |          |
|---|---------------------|---------------------------|---------------------------------------|----------|--|----------|
| Minor Street Name   | Direction of Travel | Major Street Design Speed | Left Turn Intersection Sight Distance |          | Right Turn Intersection Sight Distance |          |
|   |                     |                           | Recommended <sup>1</sup>              | Existing | Recommended <sup>1</sup>               | Existing |
| Federal Street  | Southbound          | 35 MPH                    | 429                                   | 439      | 301                                    | 125      |
|   | Northbound          | 35 MPH                    | 351                                   | 205      | 368                                    | 352      |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-11, Adjusted for Grade

Based on measured SSD and ISD and MUTCD guidelines it is anticipated that this intersection does meet conditions for this intersection to become an all-way stop controlled intersection. As stated in section 2B.06 Stop Sign Applications of the MUTCD, best practice indicates the use of a stop sign on the minor street approach when a restricted view exists that requires road users to stop in order to adequately observe conflicting traffic on the through street.

### 2.5.4. Recommendations

It is recommended that Riverside Drive at Federal Street/Prospect Street intersection be converted to an all-way top controlled intersection based on the volume exceeding the MUTCD thresholds and ISD deficiencies. The MUTCD recommends installing a four way stop condition when the ISD is not met and volume conditions are met in Section 2B.07 Multi-Way Stop Applications, Option C and Guideline C, respectively. In addition, it is recommended to trim vegetation along Riverside Drive to improve ISD and install new stop bars at the stop signs on the Federal Street approaches.

It is recommended to install a stop sign ahead sign in the location of the intersection ahead sign on Riverside Drive and confirm that 85<sup>th</sup> percentile speed does not exceed 45 MPH before installing an all way stop.

It is also recommended to consider additional traffic calming measures on Riverside Drive to improve safety conditions. It is estimated that the intersection is not a candidate for roundabout installation based on roadway grade and the existing roadway footprint.

## 2.6. Hatfield Street at Cooke Avenue

Hatfield Street at Cooke Avenue is a two-way stop-controlled intersection with stop control on Cooke Avenue only. Hatfield Street travels in the northbound and southbound directions and Cooke Avenue travels in the westbound and eastbound directions. Both roads are city owned roads. This location is an urban area with residential and commercial use. Hatfield Street provides access to regional routes including Route 5, Route 10, and I-91.

A streetlight is mounted to a utility pole on the southeastern corner of the intersection. There are no marked bicycle lanes within the intersection limits. Pedestrian facilities include a sidewalk on the northern side of Cooke Street on the east leg of the intersection only.

Hatfield Street is classified as an urban minor arterial and is considered the major approach. Cooke Avenue is classified as a local road and is considered the minor approach. The design speed on Hatfield Street is estimated to be 35 MPH based on the posted speed limit of 30 MPH. The design speed on Cooke Avenue is estimated to be 30 MPH based on roadway classification. A posted speed limit was not listed in the MassDOT Roadway Inventory or observed during sight visits on Cooke Avenue. Speed observations were observed to generally comply with occasional excess speeds on Hatfield Street.



Cooke Street looking south



Hatfield Street looking east

### 2.6.1. Safety Analysis

MassDOT Crash Data and local police reports indicate that from January 1, 2020, to December 31, 2022, six crashes were reported at the intersection. The crashes include three angle crashes, and one sideswipe, rear-end and single vehicle collision. One crash resulted in non-fatal injury during this period, and the rest were classified as property damage only.

- The first crash was documented in March 2020 as an angle collision during the day, with clear weather conditions, between northbound and westbound vehicles where the northbound vehicle was documented as disregarding traffic signs. This crash resulted in a non-fatal injury.

- The second crash was documented in July 2020 as a single vehicle collision during the night, under clear weather conditions, involving one vehicle coming from the eastbound was documented as distracted and exceeding the authorized speed limit. This crash resulted in property damage only.
- The third crash was documented in October 2020 as a rear-end collision during the day under the day, under clear weather conditions, where both vehicles were traveling westbound, and a driver was documented with inattention. This crash resulted in property damage only.
- The fourth crash was documented in September 2021 as an angle collision during the day, under cloudy weather conditions, involving a southbound vehicle turning left where the driver was documented with failure to keep in proper lane. This crash resulted in property damage only.
- The fifth crash was documented in January 2022 as a single vehicle crash during the day under sleet and hail weather conditions, where a westbound vehicle was documented to have excess speeds. This crash resulted in property damage only.
- The last crash was documented in January 2022 as an angle collision during the day, under clear weather conditions between eastbound and northbound vehicles, where the northbound vehicle was turning right and was documented with improper driving. This crash resulted in property damage only.

Based on the number of crashes and the MUTCD guidelines it is anticipated that the number of crashes will not meet conditions for an all-way stop control. The MUTCD threshold is five crashes in one year. At this intersection six crashes were reported over a three-year period, with three crashes occurring in the same year.

## 2.6.2. Traffic Counts

Turning movement counts were collected on October 5, 2023. The data shows that AM peak hour demand on Hatfield Street is approximately 751 vehicles per hour and PM peak hour demand is 874 vehicles per hour. For Cooke Avenue minor approach AM demand is approximately 64 vehicles per hour and PM peak demand is 95 vehicles per hour. During the AM and PM peak hours there was a combined total of 7 pedestrian crossings on the eastern leg of the intersection.

Based on measured volumes and the MUTCD guidelines it is anticipated that volumes will meet conditions for an all-way stop control, since the current volume exceeds 300 vehicles per hour and is the volume is estimated to result in delays that exceed MUTCD delay thresholds on the stop-controlled street.

Traffic signal warrants were analyzed based on the volumes obtained. Signal Warrant data is included in the Appendix and summarized below.

- Warrant 1, Eight-hour Vehicular Volume: The warrant was not able to be analyzed warrant because an 8-hour continuous volume count is required.
- Warrant 2, Four-Hour Vehicular Volume: This warrant did not pass.
- Warrant 3, Peak Hour Volume: This warrant did not pass.

- Warrant 4, Pedestrian Volume: This warrant did not pass.
- Warrant 7, Crashes: This warrant did not pass.
- Warrant 5, 6, 8 and 9: These warrants are not applicable and related to schools, signal coordination, roadway network and proximity to railroad crossings, respectively.

The Capacity Analysis for Planning of Junctions (Cap-X) Tool was used to analyze the volume to capacity ratio (V/C) to determine if an all-way stopped control intersection would result in significant delay or if a traffic signal or roundabout would facilitate traffic at an acceptable level. A V/C ratio of greater than one (1) is considered an unacceptable amount of delay and an acceptable amount of delay is considered under 0.85. The results showed that all four alternatives would operate with an acceptable amount of delay. The all-way stop control receiving a V/C ration of 0.81 which could indicate the intersection would operate near capacity. The traffic signal and roundabout V/C ratio results showed that these types of intersection control would produce acceptable results as well. The Cap-X results are shown table 11 below and the summary is included in Appendix A.

| <b>Table 11</b>  |  |
|--|--|
| <b>INTERSECTION V/C RATIO</b>                                      |  |
| Riverside Drive at Federal Street/Prospect Street, Northampton, MA |  |
| <b>Intersection Control Type</b>                                   | <b>Vehicle to Capacity Ratio (V/C)</b> |
| Two-way stop control   | 0.49                                   |
| All-way stop control   | 0.81                                   |
| Traffic signal (single lane approaches)                            | 0.32                                   |
| Roundabout (single lane approaches, 75 ICD*)                       | 0.50                                   |

\*ICD refers to Inscribed Circulatory Diameter which defines the size and design vehicle for the intersection

### 2.6.3. Stopping Sight Distance

The intersection approaches were analyzed for SSD and ISD. The calculations assume the roadway does not have significant grade. The SSD measurement on all approaches exceeds the recommended SSD according to the MassDOT PDDG. Stopping Sight Distance can be found on table 12 below.

| <b>Table 12</b>                                   |                            |                     |                                |                       |
|---|----------------------------|---------------------|--------------------------------|-----------------------|
| <b>STOPPING SIGHT DISTANCE MEASUREMENTS</b>       |                            |                     |                                |                       |
| Hatfield Street and Cooke Avenue, Northampton, MA |                            |                     |                                |                       |
| <b>Street Name</b>                                | <b>Direction of Travel</b> | <b>Design Speed</b> | <b>Stopping Sight Distance</b> |                       |
|   |                            |                     | Recommendation <sup>1</sup>    | Existing <sup>1</sup> |
| Hatfield Street                                   | Eastbound                  | 35 MPH              | 250                            | 647                   |
|   | Westbound                  | 35 MPH              | 250                            | 520                   |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-8

The SSD measurement on the eastbound and west bound approaches exceeds the recommended SSD according to the MassDOT PDDG, and no visible sight obstructions were noted. ISD calculations are noted in table 13 below.

| <b>Table 13</b><br>INTERSECTION DISTANCE MEASUREMENTS<br>Hatfield Street and Cooke Avenue, Northampton, MA |                     |              |                             |          |                             |          |
|--|---------------------|--------------|-----------------------------|----------|-----------------------------|----------|
| Street Name  | Direction of Travel | Design Speed | Left Turn                   |          | Right Turn                  |          |
|  |                     |              | Intersection Sight Distance |          | Intersection Sight Distance |          |
|  |                     |              | Recommendation <sup>1</sup> | Existing | Recommended <sup>2</sup>    | Existing |
| Cooke Avenue   | Southbound          | 35 MPH       | 390                         | 377      | 390                         | 272      |
|  | Northbound          | 35 MPH       | 335                         | 506      | 335                         | 805      |

Notes: <sup>1</sup> Source 2006 MassDOT Project Development and Design Guide, Exhibit 3-11.

Based on measured ISD and MUTCD guidelines it is anticipated that this intersection will not meet conditions for an all-way stop control based on the deficient intersection sight distance on Cooke Avenue. It was determined that if the intersection does meet the criteria for all way stop control based on speed, volume, or safety parameters, then based the SSD and MUTCD guidelines, is anticipated that the intersection will meet conditions for an all-way stop control based on adequate SSD on Hatfield Street.

#### 2.6.4. Recommendations

It is recommended that Cooke Avenue at Hatfield Street intersection be converted to an all-way stop-controlled intersection based on traffic volume and ISD at the intersection. The MUTCD recommends installing a four way stop condition when the ISD is not met and volume conditions are met in Section 2B.07 Multi-Way Stop Applications, Option C and Guideline C, respectively.

In addition, it is recommended to add stop bars at stop signs on Cooke Avenue and place them closer to the intersection to improve motorist sight distance. The southeast corner is also recommended to be trimmed down to improve ISD.

It is also recommended to further study the intersection to determine if a traffic signal or roundabout is appropriate to be constructed.

### 3. Recommendation Summary

Fuss and O'Neill reviewed the six intersections in Northampton, MA and developed the following recommendations as summarized in table 14 below:

| <b>Table 14</b><br>Recommendations Summary<br>Various Locations, Northampton, MA |  |  |  |  |
|--|--|--|--|--|
| <b>Location</b>  | <b>Existing Intersection Control</b>                 | <b>Recommended Intersection Control Change</b> | <b>Additional Recommendations</b>  | <b>Justification</b>   |
| Hinckley Street at Warner Street   | Two-Way Stop Control                                 | All-Way Stop Control                           | Relocate crosswalk sign and remove yield teeth paint.  | Deficient ISD for two-way stop control. Design speed and road classification support installation.   |
| Laurel Street at Chapel Street (Route 66)  | Two-Way Stop Control                                 | N/A  | Trim overgrown vegetation and consider traffic calming on Chapel Street.   | Conditions for all-way stop control not met.   |
| Burts Pit Road at Redford Drive and Cardinal Way                                 | Two-Way Stop Control with yield condition on Redford | Two-Way Stop Control                           | Trim overgrown vegetation and consider traffic calming on Burts Pit Road.  | Conditions for all-way stop control not met. ISD was determined to be deficient, however, design speed and road classification do not support all way stop installation, and ISD and travel speed can be improved. |
| Prospect Street at Crescent Street and Summer Street                             | Two-Way Stop Control                                 | All-Way Stop Control                           | Trim overgrown vegetation and paint crosswalks.  | Deficient ISD for two-way stop control.  |
| Riverside Drive at Federal Street  | Two-Way Stop Control                                 | All-Way Stop Control                           | Trim overgrown vegetation and consider traffic calming on Riverside Drive. Install stop sign ahead signs on Riverside Drive. Confirm 85 <sup>th</sup> percentile speed does not exceed 45 MPH. | Deficient ISD for two-way stop control and conditions for all-way stop control met based on volume.  |
| Hatfield Street at Cooke Avenue  | Two-Way Stop Control                                 | All-Way Stop Control                           | Painted stop bars on Cooke Ave and consider additional traffic control measures like a traffic signal or roundabout.   | Deficient ISD for two-way stop control and conditions for all-way stop control met based on volume.  |

## **Appendix**

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Traffic Analysis

Including Traffic Counts, Traffic Signal Warrant, Cap-X Analysis





|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 1               |

|          |             |
|----------|-------------|
| STREET 1 | Hinckley St |
| STREET 2 | Warner St   |
| DATE     | 10/05/2023  |

**Pedestrians and Bicycles**

| Start Time | Hinckley St - Northbound |      |      |       | Hinckley St - Southbound |      |      |       | Warner St - Eastbound |      |      |       | Warner St - Westbound |      |      |       |
|------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-----------------------|------|------|-------|-----------------------|------|------|-------|
|            | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                  | Left | Thru | Right | Peds                  | Left | Thru | Right |
| 6:30 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 1    | 0     | 0                     | 0    | 0    | 0     |
| 6:45 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 7:00 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 7:15 AM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 3                     | 0    | 0    | 0     |
| 7:30 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 7:45 AM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 8:00 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 8:15 AM    | 1                        | 0    | 0    | 0     | 2                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 5                     | 0    | 0    | 0     |
| 8:30 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 8:45 AM    | 0                        | 0    | 0    | 0     | 3                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 9:00 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 9:15 AM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 3                     | 0    | 0    | 0     |
| 3:00 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 3:15 PM    | 0                        | 0    | 0    | 0     | 2                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 3                     | 0    | 0    | 0     |
| 3:30 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 9                     | 0    | 0    | 0     |
| 3:45 PM    | 1                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 3                     | 0    | 0    | 0     |
| 4:00 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 5                     | 0    | 0    | 0     |
| 4:15 PM    | 1                        | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 4:30 PM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 4:45 PM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 5:00 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                     | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 5:15 PM    | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 5:30 PM    | 1                        | 0    | 0    | 0     | 6                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 5:45 PM    | 1                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 1                     | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |

| AM PEAK HOURS<br>8:00 AM | Hinckley St - Northbound |      |      |       | Hinckley St - Southbound |      |      |       | Warner St - Eastbound |      |      |       | Warner St - Westbound |      |      |       |
|--------------------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-----------------------|------|------|-------|-----------------------|------|------|-------|
|                          | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                  | Left | Thru | Right | Peds                  | Left | Thru | Right |
|                          | 1                        | 0    | 0    | 0     | 5                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 7                     | 0    | 0    | 0     |

| PM PEAK HOURS<br>3:00 PM | Hinckley St - Northbound |      |      |       | Hinckley St - Southbound |      |      |       | Warner St - Eastbound |      |      |       | Warner St - Westbound |      |      |       |
|--------------------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-----------------------|------|------|-------|-----------------------|------|------|-------|
|                          | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                  | Left | Thru | Right | Peds                  | Left | Thru | Right |
|                          | 1                        | 0    | 0    | 0     | 2                        | 0    | 0    | 0     | 0                     | 0    | 0    | 0     | 16                    | 0    | 0    | 0     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 2               |

|          |            |
|----------|------------|
| STREET 1 | Laurel St  |
| STREET 2 | Route 66   |
| DATE     | 10/05/2023 |

**Passenger Cars & Heavy Vehicles Combined**

| Start Time | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|            | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn               | Left | Thru | Right | U-Turn               | Left | Thru | Right |
| 6:30 AM    | 0                      | 0    | 0    | 2     | 0                      | 0    | 0    | 0     | 0                    | 0    | 23   | 0     | 1                    | 0    | 12   | 0     |
| 6:45 AM    | 0                      | 0    | 1    | 1     | 0                      | 0    | 0    | 0     | 0                    | 0    | 32   | 1     | 0                    | 2    | 13   | 0     |
| 7:00 AM    | 0                      | 0    | 5    | 2     | 0                      | 0    | 0    | 0     | 0                    | 0    | 33   | 1     | 0                    | 3    | 22   | 0     |
| 7:15 AM    | 0                      | 2    | 3    | 3     | 0                      | 0    | 0    | 0     | 0                    | 1    | 44   | 2     | 0                    | 1    | 15   | 0     |
| 7:30 AM    | 0                      | 0    | 3    | 1     | 0                      | 0    | 1    | 0     | 0                    | 1    | 50   | 3     | 0                    | 6    | 12   | 0     |
| 7:45 AM    | 0                      | 1    | 5    | 5     | 0                      | 1    | 1    | 0     | 0                    | 1    | 48   | 5     | 0                    | 11   | 16   | 0     |
| 8:00 AM    | 0                      | 0    | 4    | 1     | 0                      | 0    | 0    | 0     | 0                    | 1    | 41   | 1     | 0                    | 5    | 23   | 0     |
| 8:15 AM    | 0                      | 1    | 4    | 4     | 0                      | 0    | 0    | 0     | 0                    | 2    | 45   | 5     | 0                    | 9    | 19   | 0     |
| 8:30 AM    | 0                      | 3    | 9    | 3     | 0                      | 2    | 0    | 0     | 0                    | 2    | 57   | 4     | 0                    | 6    | 17   | 0     |
| 8:45 AM    | 0                      | 0    | 12   | 2     | 0                      | 0    | 0    | 0     | 0                    | 2    | 48   | 3     | 0                    | 3    | 19   | 0     |
| 9:00 AM    | 0                      | 1    | 5    | 2     | 0                      | 0    | 0    | 0     | 0                    | 0    | 30   | 1     | 0                    | 0    | 22   | 0     |
| 9:15 AM    | 0                      | 2    | 1    | 2     | 0                      | 0    | 0    | 0     | 0                    | 1    | 27   | 0     | 0                    | 2    | 10   | 0     |
| 3:00 PM    | 0                      | 6    | 8    | 2     | 0                      | 0    | 0    | 0     | 0                    | 0    | 29   | 4     | 0                    | 8    | 45   | 0     |
| 3:15 PM    | 0                      | 2    | 20   | 0     | 0                      | 1    | 0    | 0     | 0                    | 2    | 32   | 4     | 0                    | 6    | 38   | 0     |
| 3:30 PM    | 0                      | 1    | 6    | 2     | 0                      | 0    | 0    | 0     | 0                    | 0    | 34   | 4     | 0                    | 8    | 42   | 1     |
| 3:45 PM    | 0                      | 1    | 6    | 0     | 0                      | 0    | 0    | 0     | 0                    | 1    | 30   | 1     | 0                    | 5    | 34   | 0     |
| 4:00 PM    | 0                      | 2    | 9    | 2     | 0                      | 1    | 0    | 0     | 0                    | 3    | 19   | 2     | 0                    | 3    | 38   | 3     |
| 4:15 PM    | 0                      | 0    | 3    | 1     | 0                      | 0    | 0    | 0     | 0                    | 1    | 30   | 3     | 0                    | 3    | 42   | 0     |
| 4:30 PM    | 0                      | 3    | 9    | 2     | 0                      | 0    | 0    | 0     | 0                    | 0    | 40   | 0     | 0                    | 6    | 50   | 1     |
| 4:45 PM    | 0                      | 4    | 12   | 0     | 0                      | 0    | 1    | 1     | 0                    | 4    | 31   | 0     | 0                    | 2    | 43   | 2     |
| 5:00 PM    | 0                      | 3    | 7    | 1     | 0                      | 0    | 0    | 0     | 0                    | 0    | 21   | 1     | 0                    | 5    | 47   | 1     |
| 5:15 PM    | 0                      | 1    | 8    | 2     | 0                      | 1    | 0    | 0     | 0                    | 3    | 25   | 3     | 0                    | 8    | 39   | 0     |
| 5:30 PM    | 0                      | 2    | 8    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 33   | 1     | 0                    | 4    | 41   | 0     |
| 5:45 PM    | 0                      | 1    | 3    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 32   | 3     | 0                    | 2    | 28   | 1     |

| AM PEAK HOURS<br>7:45 AM | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|                          | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn               | Left | Thru | Right | U-Turn               | Left | Thru | Right |
|                          | 0                      | 5    | 22   | 13    | 0                      | 3    | 1    | 0     | 0                    | 6    | 191  | 15    | 0                    | 31   | 75   | 0     |
| PHF                      | 0.67                   |      |      |       | 0.50                   |      |      |       | 0.84                 |      |      |       | 0.95                 |      |      |       |
| HV%                      | 0.0%                   | 0.0% | 9.1% | 0.0%  | 0.0%                   | 0.0% | 0.0% | 0.0%  | 0.0%                 | 0.0% | 3.1% | 0.0%  | 0.0%                 | 9.7% | 1.3% | 0.0%  |

| PM PEAK HOURS<br>4:30 PM | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|                          | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn               | Left | Thru | Right | U-Turn               | Left | Thru | Right |
|                          | 0                      | 11   | 36   | 5     | 0                      | 1    | 1    | 1     | 0                    | 7    | 117  | 4     | 0                    | 21   | 179  | 4     |
| PHF                      | 0.81                   |      |      |       | 0.38                   |      |      |       | 0.80                 |      |      |       | 0.89                 |      |      |       |
| HV%                      | 0.0%                   | 0.0% | 0.0% | 0.0%  | 0.0%                   | 0.0% | 0.0% | 0.0%  | 0.0%                 | 0.0% | 1.7% | 0.0%  | 0.0%                 | 0.0% | 1.1% | 0.0%  |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 2               |

|          |            |
|----------|------------|
| STREET 1 | Laurel St  |
| STREET 2 | Route 66   |
| DATE     | 10/05/2023 |

**Heavy Vehicles**

| Start Time | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|            | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn               | Left | Thru | Right | U-Turn               | Left | Thru | Right |
| 6:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 2    | 0     | 0                    | 0    | 0    | 0     |
| 6:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 7:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 2    | 0     |
| 7:15 AM    | 0                      | 1    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 1    | 1    | 0     | 0                    | 0    | 2    | 0     |
| 7:30 AM    | 0                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                    | 0    | 2    | 0     | 0                    | 1    | 3    | 0     |
| 7:45 AM    | 0                      | 0    | 1    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 3    | 0     | 0                    | 1    | 1    | 0     |
| 8:00 AM    | 0                      | 0    | 1    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 1    | 0    | 0     |
| 8:15 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 8:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 2    | 0     | 0                    | 1    | 0    | 0     |
| 8:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 4    | 0     |
| 9:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 3    | 0     | 0                    | 0    | 0    | 0     |
| 9:15 AM    | 0                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 2    | 0     |
| 3:00 PM    | 0                      | 0    | 1    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |
| 3:15 PM    | 0                      | 1    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 1     | 0                    | 1    | 1    | 0     |
| 3:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 2    | 0     | 0                    | 1    | 0    | 0     |
| 3:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 1    | 1    | 0     |
| 4:00 PM    | 0                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |
| 4:15 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 4:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 1    | 0     |
| 4:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 1    | 0     |
| 5:00 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |
| 5:15 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |
| 5:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 5:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |

| AM PEAK HOURS<br>7:45 AM | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|                          | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn               | Left | Thru | Right | U-Turn               | Left | Thru | Right |
|                          | 0                      | 0    | 2    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 6    | 0     | 0                    | 3    | 1    | 0     |

| PM PEAK HOURS<br>4:30 PM | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|                          | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn               | Left | Thru | Right | U-Turn               | Left | Thru | Right |
|                          | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 2    | 0     | 0                    | 0    | 2    | 0     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 2               |

|          |            |
|----------|------------|
| STREET 1 | Laurel St  |
| STREET 2 | Route 66   |
| DATE     | 10/05/2023 |

**Pedestrians and Bicycles**

| Start Time | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|            | Peds                   | Left | Thru | Right | Peds                   | Left | Thru | Right | Peds                 | Left | Thru | Right | Peds                 | Left | Thru | Right |
| 6:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 6:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 7:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 7:15 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 7:30 AM    | 1                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 7:45 AM    | 1                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 8:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 8:15 AM    | 2                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |
| 8:30 AM    | 1                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |
| 8:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 1     | 0                    | 0    | 0    | 0     |
| 9:00 AM    | 1                      | 0    | 0    | 0     | 1                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 9:15 AM    | 1                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 3:00 PM    | 1                      | 0    | 0    | 0     | 0                      | 0    | 1    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 3:15 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 1    | 0     | 0                    | 0    | 0    | 0     |
| 3:30 PM    | 0                      | 0    | 1    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 3:45 PM    | 0                      | 0    | 0    | 0     | 1                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 4:00 PM    | 2                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 4:15 PM    | 1                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 4:30 PM    | 0                      | 0    | 1    | 0     | 0                      | 0    | 1    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 0    | 0     |
| 4:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 0                    | 0    | 1    | 0     |
| 5:00 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 2                    | 0    | 0    | 0     | 3                    | 0    | 0    | 0     |
| 5:15 PM    | 0                      | 1    | 1    | 0     | 0                      | 0    | 0    | 0     | 0                    | 1    | 0    | 0     | 0                    | 0    | 1    | 0     |
| 5:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 1     | 0                    | 0    | 0    | 0     |
| 5:45 PM    | 4                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                    | 0    | 0    | 0     | 2                    | 0    | 0    | 0     |

| AM PEAK HOURS<br>7:45 AM | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|                          | Peds                   | Left | Thru | Right | Peds                   | Left | Thru | Right | Peds                 | Left | Thru | Right | Peds                 | Left | Thru | Right |
|                          | 4                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                    | 0    | 2    | 0     | 0                    | 0    | 0    | 0     |

| PM PEAK HOURS<br>4:30 PM | Laurel St - Northbound |      |      |       | Laurel St - Southbound |      |      |       | Route 66 - Eastbound |      |      |       | Route 66 - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|----------------------|------|------|-------|----------------------|------|------|-------|
|                          | Peds                   | Left | Thru | Right | Peds                   | Left | Thru | Right | Peds                 | Left | Thru | Right | Peds                 | Left | Thru | Right |
|                          | 0                      | 1    | 2    | 0     | 0                      | 0    | 1    | 0     | 2                    | 1    | 0    | 0     | 3                    | 0    | 2    | 0     |





|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 3               |

|          |                           |
|----------|---------------------------|
| STREET 1 | Redford Dr / Cardinal Way |
| STREET 2 | Burts Pit Rd              |
| DATE     | 10/05/2023                |

**Pedestrians and Bicycles**

| Start Time | Cardinal Way - Northbound |      |      |       | Redford Dr - Southbound |      |      |       | Burts Pit Rd - Eastbound |      |      |       | Burts Pit Rd - Westbound |      |      |       |
|------------|---------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|            | Peds                      | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right |
| 6:30 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 6:45 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 2                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 7:00 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 7:15 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 7:30 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 7:45 AM    | 2                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 3                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 8:00 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 8:15 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 8:30 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 4                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 8:45 AM    | 0                         | 0    | 0    | 0     | 2                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 9:00 AM    | 1                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 9:15 AM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 3:00 PM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 3:15 PM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 3:30 PM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 3:45 PM    | 0                         | 0    | 0    | 0     | 1                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 4:00 PM    | 1                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 3                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     |
| 4:15 PM    | 0                         | 0    | 0    | 0     | 1                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 4:30 PM    | 2                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 2                        | 0    | 0    | 1     | 0                        | 0    | 0    | 0     |
| 4:45 PM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 5:00 PM    | 0                         | 0    | 0    | 0     | 1                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     |
| 5:15 PM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 5:30 PM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 5:45 PM    | 0                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     |

| AM PEAK HOURS<br>7:45 AM | Cardinal Way - Northbound |      |      |       | Redford Dr - Southbound |      |      |       | Burts Pit Rd - Eastbound |      |      |       | Burts Pit Rd - Westbound |      |      |       |
|--------------------------|---------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|                          | Peds                      | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right |
|                          | 2                         | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 8                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |

| PM PEAK HOURS<br>4:30 PM | Cardinal Way - Northbound |      |      |       | Redford Dr - Southbound |      |      |       | Burts Pit Rd - Eastbound |      |      |       | Burts Pit Rd - Westbound |      |      |       |
|--------------------------|---------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|                          | Peds                      | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right |
|                          | 2                         | 0    | 0    | 0     | 1                       | 0    | 0    | 0     | 2                        | 0    | 1    | 1     | 0                        | 0    | 0    | 0     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 4               |

|          |                         |
|----------|-------------------------|
| STREET 1 | Prospect St             |
| STREET 2 | Crescent St / Summer St |
| DATE     | 10/05/2023              |

**Passenger Cars & Heavy Vehicles Combined**

| Start Time | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|            | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                | Left | Thru | Right |
| 6:30 AM    | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 2    | 0     |
| 6:45 AM    | 0                        | 1    | 0    | 0     | 0                        | 2    | 0    | 2     | 0                       | 0    | 0    | 0     | 0                     | 0    | 1    | 0     |
| 7:00 AM    | 0                        | 0    | 1    | 0     | 0                        | 2    | 3    | 3     | 0                       | 1    | 0    | 0     | 0                     | 0    | 1    | 2     |
| 7:15 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 1    | 1     | 0                       | 0    | 0    | 0     | 0                     | 0    | 1    | 1     |
| 7:30 AM    | 0                        | 0    | 2    | 0     | 0                        | 3    | 4    | 0     | 0                       | 1    | 0    | 0     | 0                     | 2    | 0    | 1     |
| 7:45 AM    | 0                        | 0    | 2    | 2     | 0                        | 1    | 6    | 2     | 0                       | 0    | 0    | 0     | 0                     | 3    | 2    | 2     |
| 8:00 AM    | 0                        | 1    | 13   | 3     | 0                        | 4    | 5    | 6     | 0                       | 1    | 0    | 0     | 0                     | 1    | 3    | 5     |
| 8:15 AM    | 0                        | 1    | 8    | 1     | 0                        | 1    | 11   | 5     | 0                       | 0    | 0    | 0     | 0                     | 0    | 5    | 1     |
| 8:30 AM    | 1                        | 0    | 4    | 6     | 0                        | 5    | 6    | 3     | 0                       | 1    | 0    | 0     | 0                     | 1    | 3    | 0     |
| 8:45 AM    | 0                        | 2    | 0    | 2     | 0                        | 4    | 7    | 4     | 0                       | 0    | 0    | 0     | 0                     | 1    | 2    | 2     |
| 9:00 AM    | 0                        | 1    | 1    | 3     | 0                        | 1    | 3    | 2     | 0                       | 0    | 0    | 0     | 0                     | 0    | 6    | 2     |
| 9:15 AM    | 0                        | 0    | 5    | 2     | 0                        | 2    | 5    | 0     | 0                       | 1    | 0    | 0     | 0                     | 1    | 3    | 1     |
| 3:00 PM    | 0                        | 2    | 5    | 2     | 0                        | 3    | 5    | 2     | 0                       | 6    | 9    | 0     | 0                     | 0    | 6    | 3     |
| 3:15 PM    | 0                        | 1    | 4    | 2     | 0                        | 4    | 4    | 2     | 0                       | 0    | 4    | 1     | 0                     | 1    | 5    | 2     |
| 3:30 PM    | 0                        | 1    | 5    | 2     | 0                        | 3    | 5    | 1     | 0                       | 0    | 12   | 3     | 0                     | 0    | 3    | 1     |
| 3:45 PM    | 0                        | 2    | 7    | 2     | 0                        | 3    | 6    | 2     | 0                       | 4    | 10   | 0     | 0                     | 1    | 1    | 4     |
| 4:00 PM    | 0                        | 1    | 11   | 2     | 0                        | 3    | 1    | 2     | 0                       | 4    | 7    | 1     | 0                     | 2    | 4    | 2     |
| 4:15 PM    | 0                        | 2    | 5    | 2     | 0                        | 2    | 9    | 4     | 0                       | 0    | 6    | 0     | 0                     | 0    | 4    | 2     |
| 4:30 PM    | 1                        | 1    | 10   | 1     | 1                        | 1    | 8    | 1     | 0                       | 1    | 9    | 0     | 0                     | 3    | 2    | 2     |
| 4:45 PM    | 0                        | 1    | 13   | 2     | 0                        | 2    | 5    | 1     | 0                       | 0    | 2    | 0     | 0                     | 0    | 2    | 3     |
| 5:00 PM    | 0                        | 1    | 8    | 4     | 0                        | 3    | 4    | 5     | 0                       | 3    | 3    | 0     | 0                     | 1    | 5    | 2     |
| 5:15 PM    | 0                        | 1    | 6    | 2     | 0                        | 3    | 6    | 2     | 0                       | 1    | 7    | 1     | 0                     | 3    | 3    | 1     |
| 5:30 PM    | 0                        | 0    | 7    | 1     | 0                        | 1    | 2    | 1     | 0                       | 2    | 2    | 0     | 0                     | 0    | 6    | 3     |
| 5:45 PM    | 0                        | 3    | 1    | 1     | 0                        | 3    | 5    | 4     | 0                       | 0    | 10   | 1     | 0                     | 1    | 4    | 4     |

| AM PEAK HOURS | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|---------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|               | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                | Left | Thru | Right |
| 8:00 AM       | 1                        | 4    | 25   | 12    | 0                        | 14   | 29   | 18    | 0                       | 2    | 0    | 0     | 0                     | 3    | 13   | 8     |
| PHF           | 0.62                     |      |      |       | 0.90                     |      |      |       | 0.50                    |      |      |       | 0.67                  |      |      |       |
| HV%           | 0.0%                     | 0.0% | 4.0% | 0.0%  | 0.0%                     | 7.1% | 3.4% | 0.0%  | 0.0%                    | 0.0% | 0.0% | 0.0%  | 0.0%                  | 0.0% | 0.0% | 0.0%  |

| PM PEAK HOURS | Prospect St - Northbound |       |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|---------------|--------------------------|-------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|               | U-Turn                   | Left  | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                | Left | Thru | Right |
| 3:45 PM       | 1                        | 6     | 33   | 7     | 1                        | 9    | 24   | 9     | 0                       | 9    | 32   | 1     | 0                     | 6    | 11   | 10    |
| PHF           | 0.84                     |       |      |       | 0.72                     |      |      |       | 0.75                    |      |      |       | 0.84                  |      |      |       |
| HV%           | 0.0%                     | 16.7% | 0.0% | 0.0%  | 0.0%                     | 0.0% | 0.0% | 0.0%  | 0.0%                    | 0.0% | 3.1% | 0.0%  | 0.0%                  | 0.0% | 0.0% | 0.0%  |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 4               |

|          |                         |
|----------|-------------------------|
| STREET 1 | Prospect St             |
| STREET 2 | Crescent St / Summer St |
| DATE     | 10/05/2023              |

**Heavy Vehicles**

| Start Time | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|            | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                | Left | Thru | Right |
| 6:30 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 6:45 AM    | 0                        | 1    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 7:00 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 7:15 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 7:30 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 7:45 AM    | 0                        | 0    | 0    | 1     | 0                        | 0    | 0    | 1     | 0                       | 0    | 1    | 0     | 0                     | 1    | 0    | 0     |
| 8:00 AM    | 0                        | 0    | 1    | 0     | 0                        | 1    | 1    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 8:15 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 8:30 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 8:45 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 9:00 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 9:15 AM    | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 3:00 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 3:15 PM    | 0                        | 0    | 0    | 1     | 0                        | 1    | 1    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 3:30 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 3:45 PM    | 0                        | 1    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 4:00 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                     | 0    | 0    | 0     |
| 4:15 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 4:30 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 4:45 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 5:00 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 5:15 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 5:30 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 5:45 PM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |

| AM PEAK HOURS<br>8:00 AM | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|--------------------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|                          | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                | Left | Thru | Right |
|                          | 0                        | 0    | 1    | 0     | 0                        | 1    | 1    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |

| PM PEAK HOURS<br>3:45 PM | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|--------------------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|                          | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                | Left | Thru | Right |
|                          | 0                        | 1    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                     | 0    | 0    | 0     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 4               |

|          |                         |
|----------|-------------------------|
| STREET 1 | Prospect St             |
| STREET 2 | Crescent St / Summer St |
| DATE     | 10/05/2023              |

**Pedestrians and Bicycles**

| Start Time | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|            | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                  | Left | Thru | Right |
| 6:30 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 6:45 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 7:00 AM    | 0                        | 0    | 0    | 0     | 5                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                     | 0    | 0    | 0     |
| 7:15 AM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 7:30 AM    | 0                        | 0    | 0    | 0     | 2                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 4                     | 0    | 0    | 0     |
| 7:45 AM    | 1                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 3                     | 0    | 0    | 0     |
| 8:00 AM    | 0                        | 0    | 1    | 0     | 1                        | 0    | 0    | 0     | 0                       | 0    | 0    | 1     | 1                     | 0    | 0    | 0     |
| 8:15 AM    | 0                        | 0    | 0    | 0     | 2                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 8:30 AM    | 0                        | 0    | 0    | 0     | 2                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 8:45 AM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 1    | 0     | 0                       | 0    | 0    | 1     | 3                     | 0    | 0    | 0     |
| 9:00 AM    | 0                        | 0    | 0    | 0     | 2                        | 0    | 1    | 0     | 0                       | 0    | 0    | 1     | 4                     | 0    | 0    | 0     |
| 9:15 AM    | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 7                     | 0    | 1    | 0     |
| 3:00 PM    | 0                        | 0    | 2    | 0     | 2                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 3:15 PM    | 0                        | 0    | 2    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 3                     | 0    | 1    | 0     |
| 3:30 PM    | 0                        | 0    | 1    | 0     | 0                        | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 3:45 PM    | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 5                     | 0    | 0    | 0     |
| 4:00 PM    | 0                        | 0    | 1    | 1     | 4                        | 0    | 1    | 0     | 1                       | 0    | 0    | 0     | 11                    | 0    | 0    | 0     |
| 4:15 PM    | 0                        | 0    | 2    | 0     | 1                        | 0    | 4    | 0     | 0                       | 0    | 0    | 0     | 1                     | 0    | 0    | 0     |
| 4:30 PM    | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     | 3                       | 0    | 0    | 0     | 8                     | 0    | 0    | 0     |
| 4:45 PM    | 0                        | 0    | 1    | 0     | 2                        | 1    | 0    | 0     | 0                       | 0    | 0    | 1     | 4                     | 0    | 0    | 0     |
| 5:00 PM    | 0                        | 0    | 0    | 0     | 2                        | 0    | 1    | 0     | 1                       | 0    | 0    | 0     | 2                     | 0    | 0    | 0     |
| 5:15 PM    | 0                        | 0    | 1    | 1     | 1                        | 0    | 1    | 1     | 0                       | 0    | 0    | 0     | 5                     | 0    | 0    | 0     |
| 5:30 PM    | 0                        | 0    | 0    | 0     | 1                        | 0    | 1    | 1     | 0                       | 0    | 0    | 0     | 4                     | 0    | 0    | 0     |
| 5:45 PM    | 0                        | 0    | 0    | 0     | 5                        | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 5                     | 0    | 0    | 0     |

| AM PEAK HOURS<br>8:00 AM | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|--------------------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|                          | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                  | Left | Thru | Right |
|                          | 0                        | 0    | 1    | 0     | 6                        | 0    | 1    | 0     | 0                       | 0    | 0    | 2     | 7                     | 0    | 0    | 0     |

| PM PEAK HOURS<br>3:45 PM | Prospect St - Northbound |      |      |       | Prospect St - Southbound |      |      |       | Crescent St - Eastbound |      |      |       | Summer St - Westbound |      |      |       |
|--------------------------|--------------------------|------|------|-------|--------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------|------|------|-------|
|                          | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                  | Left | Thru | Right |
|                          | 0                        | 0    | 5    | 1     | 5                        | 0    | 5    | 0     | 4                       | 0    | 0    | 0     | 25                    | 0    | 0    | 0     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 5               |

|          |              |
|----------|--------------|
| STREET 1 | Federal St   |
| STREET 2 | Riverside Dr |
| DATE     | 10/05/2023   |

**Passenger Cars & Heavy Vehicles Combined**

| Start Time | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|            | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right |
| 6:30 AM    | 0                       | 0    | 0    | 1     | 0                       | 0    | 0    | 1     | 0                        | 1    | 7    | 0     | 0                        | 1    | 6    | 0     |
| 6:45 AM    | 0                       | 0    | 0    | 0     | 0                       | 1    | 1    | 0     | 0                        | 0    | 23   | 3     | 0                        | 0    | 5    | 0     |
| 7:00 AM    | 0                       | 1    | 1    | 0     | 0                       | 1    | 0    | 0     | 0                        | 0    | 22   | 1     | 0                        | 0    | 8    | 0     |
| 7:15 AM    | 0                       | 0    | 2    | 0     | 0                       | 1    | 0    | 1     | 0                        | 5    | 29   | 1     | 0                        | 0    | 7    | 1     |
| 7:30 AM    | 0                       | 1    | 2    | 1     | 0                       | 4    | 1    | 2     | 0                        | 1    | 28   | 2     | 0                        | 0    | 12   | 1     |
| 7:45 AM    | 0                       | 0    | 3    | 1     | 0                       | 3    | 2    | 7     | 0                        | 4    | 35   | 4     | 0                        | 0    | 14   | 2     |
| 8:00 AM    | 0                       | 1    | 1    | 0     | 0                       | 2    | 1    | 0     | 0                        | 2    | 36   | 2     | 0                        | 0    | 23   | 1     |
| 8:15 AM    | 0                       | 2    | 0    | 1     | 0                       | 1    | 1    | 2     | 0                        | 2    | 21   | 12    | 0                        | 0    | 16   | 2     |
| 8:30 AM    | 0                       | 5    | 2    | 1     | 0                       | 4    | 4    | 0     | 0                        | 3    | 40   | 20    | 0                        | 1    | 26   | 3     |
| 8:45 AM    | 0                       | 13   | 9    | 1     | 0                       | 0    | 14   | 3     | 0                        | 1    | 34   | 38    | 0                        | 1    | 24   | 2     |
| 9:00 AM    | 0                       | 2    | 3    | 0     | 0                       | 1    | 7    | 1     | 0                        | 3    | 22   | 1     | 0                        | 2    | 28   | 0     |
| 9:15 AM    | 0                       | 1    | 1    | 1     | 0                       | 1    | 1    | 1     | 0                        | 0    | 21   | 4     | 0                        | 3    | 17   | 1     |
| 3:00 PM    | 0                       | 4    | 1    | 0     | 0                       | 2    | 1    | 1     | 0                        | 2    | 20   | 5     | 0                        | 0    | 22   | 1     |
| 3:15 PM    | 0                       | 9    | 5    | 2     | 0                       | 1    | 8    | 4     | 0                        | 0    | 21   | 6     | 0                        | 1    | 46   | 1     |
| 3:30 PM    | 0                       | 16   | 11   | 0     | 0                       | 2    | 5    | 3     | 0                        | 1    | 25   | 9     | 0                        | 3    | 58   | 10    |
| 3:45 PM    | 0                       | 8    | 2    | 0     | 0                       | 0    | 4    | 4     | 0                        | 2    | 27   | 5     | 0                        | 4    | 30   | 5     |
| 4:00 PM    | 0                       | 5    | 1    | 0     | 0                       | 2    | 4    | 2     | 0                        | 1    | 34   | 2     | 0                        | 2    | 51   | 1     |
| 4:15 PM    | 0                       | 1    | 4    | 2     | 0                       | 0    | 4    | 2     | 0                        | 1    | 32   | 6     | 0                        | 2    | 53   | 3     |
| 4:30 PM    | 0                       | 10   | 0    | 0     | 0                       | 0    | 4    | 3     | 0                        | 5    | 28   | 2     | 0                        | 1    | 40   | 1     |
| 4:45 PM    | 0                       | 5    | 2    | 0     | 0                       | 1    | 4    | 7     | 0                        | 2    | 26   | 5     | 0                        | 0    | 45   | 1     |
| 5:00 PM    | 0                       | 2    | 6    | 1     | 0                       | 2    | 4    | 2     | 0                        | 0    | 31   | 7     | 0                        | 1    | 56   | 3     |
| 5:15 PM    | 0                       | 6    | 1    | 1     | 0                       | 1    | 2    | 2     | 0                        | 1    | 26   | 4     | 0                        | 1    | 40   | 3     |
| 5:30 PM    | 0                       | 4    | 2    | 0     | 0                       | 4    | 5    | 2     | 0                        | 5    | 21   | 3     | 0                        | 1    | 34   | 4     |
| 5:45 PM    | 0                       | 3    | 2    | 0     | 0                       | 3    | 0    | 1     | 0                        | 0    | 22   | 2     | 0                        | 0    | 45   | 5     |

| AM PEAK HOURS | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|---------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|               | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right |
| 8:15 AM       | 0                       | 22   | 14   | 3     | 0                       | 6    | 26   | 6     | 0                        | 9    | 117  | 71    | 0                        | 4    | 94   | 7     |
| PHF           | 0.42                    |      |      |       | 0.56                    |      |      |       | 0.67                     |      |      |       | 0.88                     |      |      |       |
| HV%           | 0.0%                    | 0.0% | 0.0% | 0.0%  | 0.0%                    | 0.0% | 0.0% | 0.0%  | 0.0%                     | 0.0% | 2.6% | 0.0%  | 0.0%                     | 0.0% | 2.1% | 14.3% |

| PM PEAK HOURS | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|---------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|               | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right |
| 3:30 PM       | 0                       | 30   | 18   | 2     | 0                       | 4    | 17   | 11    | 0                        | 5    | 118  | 22    | 0                        | 11   | 192  | 19    |
| PHF           | 0.46                    |      |      |       | 0.80                    |      |      |       | 0.93                     |      |      |       | 0.78                     |      |      |       |
| HV%           | 0.0%                    | 0.0% | 0.0% | 0.0%  | 0.0%                    | 0.0% | 0.0% | 0.0%  | 0.0%                     | 0.0% | 1.7% | 0.0%  | 0.0%                     | 0.0% | 0.5% | 0.0%  |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 5               |

|          |              |
|----------|--------------|
| STREET 1 | Federal St   |
| STREET 2 | Riverside Dr |
| DATE     | 10/05/2023   |

**Heavy Vehicles**

| Start Time | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|            | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right |
| 6:30 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 1     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 6:45 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     |
| 7:00 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 1    | 0     |
| 7:15 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     |
| 7:30 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 2    | 0     | 0                        | 0    | 0    | 0     |
| 7:45 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 8:00 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 1    | 1    | 0     | 0                        | 0    | 0    | 0     |
| 8:15 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 8:30 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 2    | 0     | 0                        | 0    | 1    | 0     |
| 8:45 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 1     |
| 9:00 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 1    | 0     |
| 9:15 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 3:00 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     |
| 3:15 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 1    | 0     |
| 3:30 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 1    | 0     |
| 3:45 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 4:00 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 4:15 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 2    | 0     | 0                        | 0    | 0    | 0     |
| 4:30 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 4:45 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 5:00 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 5:15 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 5:30 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 5:45 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |

| AM PEAK HOURS<br>8:15 AM | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|--------------------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|                          | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right |
|                          | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 3    | 0     | 0                        | 0    | 2    | 1     |

| PM PEAK HOURS<br>3:30 PM | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|--------------------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|                          | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                   | Left | Thru | Right | U-Turn                   | Left | Thru | Right |
|                          | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 2    | 0     | 0                        | 0    | 1    | 0     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 5               |

|          |              |
|----------|--------------|
| STREET 1 | Federal St   |
| STREET 2 | Riverside Dr |
| DATE     | 10/05/2023   |

**Pedestrians and Bicycles**

| Start Time | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|            | Peds                    | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right |
| 6:30 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 6:45 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 0                        | 0    | 0    | 0     |
| 7:00 AM    | 0                       | 1    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 2    | 0     | 1                        | 0    | 0    | 0     |
| 7:15 AM    | 0                       | 0    | 0    | 0     | 3                       | 3    | 0    | 0     | 0                        | 0    | 1    | 0     | 2                        | 0    | 0    | 0     |
| 7:30 AM    | 0                       | 0    | 0    | 0     | 0                       | 1    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 7:45 AM    | 0                       | 0    | 1    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 8                        | 0    | 0    | 0     |
| 8:00 AM    | 0                       | 1    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 8:15 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 1     | 1                        | 0    | 0    | 0     |
| 8:30 AM    | 0                       | 0    | 0    | 0     | 2                       | 0    | 0    | 0     | 0                        | 0    | 1    | 1     | 4                        | 0    | 1    | 0     |
| 8:45 AM    | 0                       | 0    | 0    | 0     | 7                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 9                        | 0    | 0    | 1     |
| 9:00 AM    | 0                       | 0    | 0    | 0     | 1                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 2                        | 0    | 0    | 0     |
| 9:15 AM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 3                        | 0    | 0    | 0     |
| 3:00 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     |
| 3:15 PM    | 0                       | 1    | 0    | 0     | 2                       | 0    | 1    | 0     | 1                        | 0    | 1    | 0     | 4                        | 0    | 0    | 0     |
| 3:30 PM    | 0                       | 1    | 0    | 0     | 3                       | 0    | 2    | 0     | 0                        | 0    | 0    | 0     | 7                        | 0    | 0    | 0     |
| 3:45 PM    | 0                       | 0    | 0    | 0     | 2                       | 0    | 1    | 0     | 0                        | 0    | 0    | 0     | 5                        | 0    | 0    | 0     |
| 4:00 PM    | 0                       | 1    | 2    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 0                        | 0    | 0    | 0     |
| 4:15 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 1    | 0     | 15                       | 0    | 0    | 1     |
| 4:30 PM    | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 1                        | 0    | 0    | 0     |
| 4:45 PM    | 0                       | 0    | 0    | 0     | 1                       | 0    | 0    | 0     | 2                        | 0    | 2    | 0     | 3                        | 0    | 0    | 0     |
| 5:00 PM    | 0                       | 0    | 2    | 0     | 1                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 3                        | 0    | 0    | 0     |
| 5:15 PM    | 0                       | 0    | 2    | 0     | 2                       | 0    | 0    | 0     | 1                        | 0    | 0    | 0     | 2                        | 0    | 1    | 0     |
| 5:30 PM    | 0                       | 1    | 0    | 0     | 2                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 6                        | 0    | 1    | 0     |
| 5:45 PM    | 0                       | 1    | 0    | 0     | 2                       | 0    | 0    | 0     | 0                        | 0    | 0    | 0     | 4                        | 0    | 1    | 0     |

| AM PEAK HOURS<br>8:15 AM | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|--------------------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|                          | Peds                    | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right |
|                          | 0                       | 0    | 0    | 0     | 10                      | 0    | 0    | 0     | 0                        | 0    | 2    | 2     | 16                       | 0    | 1    | 1     |

| PM PEAK HOURS<br>3:30 PM | Federal St - Northbound |      |      |       | Federal St - Southbound |      |      |       | Riverside Dr - Eastbound |      |      |       | Riverside Dr - Westbound |      |      |       |
|--------------------------|-------------------------|------|------|-------|-------------------------|------|------|-------|--------------------------|------|------|-------|--------------------------|------|------|-------|
|                          | Peds                    | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                     | Left | Thru | Right | Peds                     | Left | Thru | Right |
|                          | 0                       | 2    | 2    | 0     | 5                       | 0    | 3    | 0     | 0                        | 0    | 1    | 0     | 27                       | 0    | 0    | 1     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 6               |

|          |             |
|----------|-------------|
| STREET 1 | Cooke Ave   |
| STREET 2 | Hatfield St |
| DATE     | 10/05/2023  |

**Passenger Cars & Heavy Vehicles Combined**

| Start Time | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|------------|------------------------|------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|            | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| 6:30 AM    | 0                      | 0    | 0    | 2     | 0                      | 1    | 0    | 0     | 0                       | 0    | 20   | 4     | 0                       | 7    | 40   | 0     |
| 6:45 AM    | 0                      | 1    | 1    | 3     | 0                      | 0    | 1    | 0     | 0                       | 0    | 38   | 4     | 0                       | 1    | 74   | 0     |
| 7:00 AM    | 0                      | 1    | 1    | 5     | 0                      | 0    | 2    | 1     | 0                       | 0    | 32   | 10    | 0                       | 4    | 60   | 0     |
| 7:15 AM    | 0                      | 0    | 1    | 4     | 0                      | 0    | 0    | 0     | 0                       | 0    | 71   | 4     | 0                       | 8    | 96   | 0     |
| 7:30 AM    | 0                      | 2    | 0    | 7     | 0                      | 1    | 4    | 0     | 0                       | 1    | 67   | 14    | 0                       | 14   | 93   | 1     |
| 7:45 AM    | 0                      | 0    | 1    | 11    | 0                      | 2    | 4    | 5     | 0                       | 0    | 61   | 16    | 0                       | 10   | 97   | 0     |
| 8:00 AM    | 0                      | 5    | 3    | 13    | 0                      | 1    | 0    | 0     | 0                       | 2    | 71   | 11    | 0                       | 14   | 100  | 0     |
| 8:15 AM    | 0                      | 0    | 1    | 7     | 0                      | 0    | 1    | 0     | 0                       | 0    | 62   | 13    | 0                       | 15   | 81   | 0     |
| 8:30 AM    | 0                      | 6    | 1    | 6     | 0                      | 1    | 3    | 1     | 0                       | 1    | 42   | 21    | 0                       | 13   | 68   | 1     |
| 8:45 AM    | 0                      | 1    | 0    | 9     | 0                      | 0    | 3    | 4     | 0                       | 0    | 55   | 21    | 0                       | 8    | 88   | 3     |
| 9:00 AM    | 0                      | 0    | 2    | 7     | 0                      | 1    | 1    | 1     | 0                       | 1    | 46   | 20    | 0                       | 11   | 57   | 0     |
| 9:15 AM    | 0                      | 5    | 0    | 7     | 0                      | 2    | 3    | 1     | 0                       | 0    | 58   | 24    | 0                       | 5    | 56   | 0     |
| 3:00 PM    | 0                      | 9    | 2    | 12    | 0                      | 0    | 3    | 1     | 0                       | 1    | 80   | 20    | 0                       | 13   | 73   | 1     |
| 3:15 PM    | 0                      | 6    | 0    | 7     | 0                      | 0    | 0    | 1     | 0                       | 2    | 73   | 35    | 0                       | 13   | 107  | 0     |
| 3:30 PM    | 0                      | 5    | 2    | 15    | 0                      | 2    | 0    | 1     | 0                       | 1    | 86   | 40    | 0                       | 18   | 66   | 0     |
| 3:45 PM    | 0                      | 12   | 0    | 12    | 0                      | 3    | 0    | 0     | 0                       | 1    | 68   | 26    | 0                       | 14   | 101  | 0     |
| 4:00 PM    | 0                      | 7    | 2    | 15    | 0                      | 1    | 3    | 1     | 0                       | 2    | 89   | 32    | 0                       | 19   | 79   | 2     |
| 4:15 PM    | 0                      | 5    | 3    | 8     | 0                      | 1    | 2    | 0     | 0                       | 2    | 81   | 21    | 0                       | 17   | 74   | 0     |
| 4:30 PM    | 0                      | 6    | 3    | 8     | 0                      | 1    | 1    | 0     | 0                       | 2    | 84   | 18    | 0                       | 22   | 85   | 0     |
| 4:45 PM    | 0                      | 8    | 1    | 11    | 0                      | 0    | 2    | 5     | 0                       | 2    | 67   | 28    | 0                       | 20   | 72   | 0     |
| 5:00 PM    | 0                      | 6    | 0    | 12    | 0                      | 0    | 4    | 1     | 0                       | 3    | 60   | 29    | 0                       | 8    | 66   | 0     |
| 5:15 PM    | 0                      | 7    | 4    | 7     | 0                      | 2    | 0    | 1     | 0                       | 2    | 55   | 22    | 0                       | 19   | 88   | 3     |
| 5:30 PM    | 0                      | 12   | 0    | 13    | 0                      | 0    | 0    | 0     | 0                       | 0    | 37   | 21    | 0                       | 15   | 79   | 2     |
| 5:45 PM    | 0                      | 3    | 2    | 7     | 0                      | 1    | 4    | 0     | 0                       | 2    | 47   | 12    | 0                       | 18   | 65   | 0     |

| AM PEAK HOURS<br>7:15 AM | Cooke Ave - Northbound |       |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|--------------------------|------------------------|-------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                          | U-Turn                 | Left  | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
|                          | 0                      | 7     | 5    | 35    | 0                      | 4    | 8    | 5     | 0                       | 3    | 270  | 45    | 0                       | 46   | 386  | 1     |
| PHF                      | 0.56                   |       |      |       | 0.39                   |      |      |       | 0.95                    |      |      |       | 0.95                    |      |      |       |
| HV%                      | 0.0%                   | 28.6% | 0.0% | 11.4% | 0.0%                   | 0.0% | 0.0% | 0.0%  | 0.0%                    | 0.0% | 4.1% | 0.0%  | 0.0%                    | 0.0% | 3.1% | 0.0%  |

| PM PEAK HOURS<br>3:15 PM | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |       |      |       | Hatfield St - Eastbound |       |      |       | Hatfield St - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|-------|------|-------|-------------------------|-------|------|-------|-------------------------|------|------|-------|
|                          | U-Turn                 | Left | Thru | Right | U-Turn                 | Left  | Thru | Right | U-Turn                  | Left  | Thru | Right | U-Turn                  | Left | Thru | Right |
|                          | 0                      | 30   | 4    | 49    | 0                      | 6     | 3    | 3     | 0                       | 6     | 316  | 133   | 0                       | 64   | 353  | 2     |
| PHF                      | 0.86                   |      |      |       | 0.60                   |       |      |       | 0.90                    |       |      |       | 0.87                    |      |      |       |
| HV%                      | 0.0%                   | 3.3% | 0.0% | 0.0%  | 0.0%                   | 16.7% | 0.0% | 0.0%  | 0.0%                    | 16.7% | 5.4% | 2.3%  | 0.0%                    | 3.1% | 3.1% | 0.0%  |

|                |                 |          |             |
|----------------|-----------------|----------|-------------|
| CLIENT         | Fuss & O'Neill  | STREET 1 | Cooke Ave   |
| CITY/TOWN      | Northampton, MA | STREET 2 | Hatfield St |
| WEATHER        | Sunny           | DATE     | 10/05/2023  |
| INTERSECTION # | 6               |          |             |

**Heavy Vehicles**

| Start Time | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|------------|------------------------|------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|            | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
| 6:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 2    | 0     |
| 6:45 AM    | 0                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                       | 0    | 2    | 0     | 0                       | 0    | 5    | 0     |
| 7:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 1    | 0     |
| 7:15 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 7    | 0     | 0                       | 0    | 4    | 0     |
| 7:30 AM    | 0                      | 1    | 0    | 2     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 4    | 0     |
| 7:45 AM    | 0                      | 0    | 0    | 2     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 1    | 0     |
| 8:00 AM    | 0                      | 1    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 2    | 0     | 0                       | 0    | 3    | 0     |
| 8:15 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 2    | 0     | 0                       | 0    | 4    | 0     |
| 8:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 3    | 1     | 0                       | 0    | 4    | 1     |
| 8:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 1     | 0                       | 0    | 4    | 0     | 0                       | 0    | 5    | 0     |
| 9:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 3    | 0     | 0                       | 0    | 3    | 0     |
| 9:15 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 2    | 0     | 0                       | 0    | 2    | 0     |
| 3:00 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 4    | 0     | 0                       | 0    | 2    | 0     |
| 3:15 PM    | 0                      | 1    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 4    | 3     | 0                       | 0    | 3    | 0     |
| 3:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 8     | 0                       | 0    | 1    | 0     |
| 3:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 1    | 0    | 0     | 0                       | 0    | 2    | 0     | 0                       | 2    | 2    | 0     |
| 4:00 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 3    | 0     | 0                       | 0    | 5    | 0     |
| 4:15 PM    | 0                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                       | 0    | 2    | 0     | 0                       | 0    | 0    | 0     |
| 4:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 1    | 0     |
| 4:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 6    | 0     | 0                       | 0    | 1    | 0     |
| 5:00 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 5:15 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 2    | 0     |
| 5:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 5:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 1    | 0     |

**AM PEAK HOURS**

| 7:15 AM | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|---------|------------------------|------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|         | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
|         | 0                      | 2    | 0    | 4     | 0                      | 0    | 0    | 0     | 0                       | 0    | 11   | 0     | 0                       | 0    | 12   | 0     |

**PM PEAK HOURS**

| 3:15 PM | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|---------|------------------------|------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|         | U-Turn                 | Left | Thru | Right | U-Turn                 | Left | Thru | Right | U-Turn                  | Left | Thru | Right | U-Turn                  | Left | Thru | Right |
|         | 0                      | 1    | 0    | 0     | 0                      | 1    | 0    | 0     | 0                       | 1    | 17   | 3     | 0                       | 2    | 11   | 0     |

|                |                 |
|----------------|-----------------|
| CLIENT         | Fuss & O'Neill  |
| CITY/TOWN      | Northampton, MA |
| WEATHER        | Sunny           |
| INTERSECTION # | 6               |

|          |             |
|----------|-------------|
| STREET 1 | Cooke Ave   |
| STREET 2 | Hatfield St |
| DATE     | 10/05/2023  |

**Pedestrians and Bicycles**

| Start Time | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|------------|------------------------|------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|            | Peds                   | Left | Thru | Right | Peds                   | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                    | Left | Thru | Right |
| 6:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 6:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 7:00 AM    | 2                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 2                       | 0    | 0    | 0     |
| 7:15 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 7:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 7:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 1                       | 1    | 0    | 0     |
| 8:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 1    | 0     |
| 8:15 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 8:30 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 8:45 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 9:00 AM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                       | 0    | 0    | 0     |
| 9:15 AM    | 1                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 3:00 PM    | 1                      | 0    | 1    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 3:15 PM    | 0                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 3                       | 1    | 0    | 0     |
| 3:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 3:45 PM    | 0                      | 0    | 0    | 1     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 2                       | 0    | 0    | 0     |
| 4:00 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 1                       | 1    | 0    | 0     |
| 4:15 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 4:30 PM    | 0                      | 0    | 0    | 3     | 0                      | 1    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 2    | 1    | 0     |
| 4:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 0    | 0     |
| 5:00 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 3                       | 0    | 0    | 0     |
| 5:15 PM    | 0                      | 0    | 1    | 0     | 1                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 0                       | 0    | 0    | 0     |
| 5:30 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 1                       | 0    | 0    | 1     |
| 5:45 PM    | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 0    | 0     | 0                       | 0    | 2    | 0     |

| AM PEAK HOURS<br>7:15 AM | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                          | Peds                   | Left | Thru | Right | Peds                   | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                    | Left | Thru | Right |
|                          | 0                      | 0    | 0    | 0     | 0                      | 0    | 0    | 0     | 0                       | 0    | 1    | 0     | 1                       | 1    | 1    | 0     |

| PM PEAK HOURS<br>3:15 PM | Cooke Ave - Northbound |      |      |       | Cooke Ave - Southbound |      |      |       | Hatfield St - Eastbound |      |      |       | Hatfield St - Westbound |      |      |       |
|--------------------------|------------------------|------|------|-------|------------------------|------|------|-------|-------------------------|------|------|-------|-------------------------|------|------|-------|
|                          | Peds                   | Left | Thru | Right | Peds                   | Left | Thru | Right | Peds                    | Left | Thru | Right | Peds                    | Left | Thru | Right |
|                          | 0                      | 0    | 0    | 2     | 0                      | 0    | 0    | 0     | 0                       | 0    | 2    | 0     | 6                       | 2    | 0    | 0     |



|   |            |          |       |              |
|---|------------|----------|-------|--------------|
| Prep. By:   | Date:      | Chk. by: | Date: | Project No:  |
| VLR   | 10/24/2023 |          |       | 20091145_B21 |
| 2023 Traffic Signal Warrants<br>Cooke Avenue at Hartfield Street in Northampton, MA |            |          |       | Sheet No:    |
|   |            |          |       | 1 of 4       |

Major St: Hartfield Street Critical Approach Speed 35 mph Count Date 10/5/2023

1 Lane: Y 2 or more:

Minor St: Cooke Avenue Critical Approach Speed 24 mph Count Date 10/5/2023

1 Lane: Y 2 or more:

Existing Control: STOP Y Signal

Critical speed of major street traffic  $\geq 40$  mph  or Rural (R)

In built up area of isolated community of  $\leq 10,000$  pop.  Rural (R)

Otherwise if neither of the above statements are true U Urban (U)

**WARRANT 1 - Eight-Hour Vehicular Volume**

**Condition A - Minimum Vehicular Volume**

100% Satisfied for 8 hours? **No**

80% Satisfied for 8 hours? **No**

70% Satisfied for 8 hours? **No** Applies to Rural Only

56% Satisfied for 8 hours? **No** Applies to Rural Only

| Number of lanes on each approach |              | VPH on major st (both approaches) |     |     |     | VPH on higher vol minor st approach (one direction only) |     |     |     |
|----------------------------------|--------------|-----------------------------------|-----|-----|-----|--|-----|-----|-----|
| Major Street                     | Minor Street | 100%                              | 80% | 70% | 56% | 100%   | 80% | 70% | 56% |
| 1                                | 1            | 500                               | 400 | 350 | 280 | 150  | 120 | 105 | 84  |
| 2 or more                        | 1            | 600                               | 480 | 420 | 336 | 150  | 120 | 105 | 84  |
| 2 or more                        | 2 or more    | 600                               | 480 | 420 | 336 | 200  | 160 | 140 | 112 |
| 1                                | 2 or more    | 500                               | 400 | 350 | 280 | 200  | 160 | 140 | 112 |

| Hour      | Major (both app.) | Minor (higher app.) |
|-----------|-------------------|---------------------|
| 1st 15:00 | 839               | 82                  |
| 2nd 16:00 | 816               | 77                  |
| 3rd 8:00  | 686               | 52                  |
| 4th 7:00  | 658               | 33                  |
| 5th 17:00 | 580               | 73                  |
| 6th 14:00 | 0                 | 0                   |
| 7th 13:00 | 0                 | 0                   |
| 8th 12:00 | 0                 | 0                   |

OR

**Condition B - Interruption of Continuous Traffic**

100% Satisfied for 8 hours? **No**

80% Satisfied for 8 hours? **No**

70% Satisfied for 8 hours? **No** Applies to Rural Only

56% Satisfied for 8 hours? **No** Applies to Rural Only

| Number of lanes on each approach |              | VPH on major st (both approaches) |     |     |     | VPH on higher vol minor st approach (one direction only) |     |     |     |
|----------------------------------|--------------|-----------------------------------|-----|-----|-----|--|-----|-----|-----|
| Major Street                     | Minor Street | 100%                              | 80% | 70% | 56% | 100%   | 80% | 70% | 56% |
| 1                                | 1            | 750                               | 600 | 525 | 420 | 75   | 60  | 53  | 42  |
| 2 or more                        | 1            | 900                               | 720 | 630 | 504 | 75   | 60  | 53  | 42  |
| 2 or more                        | 2 or more    | 900                               | 720 | 630 | 504 | 100  | 80  | 70  | 56  |
| 1                                | 2 or more    | 750                               | 600 | 525 | 420 | 100  | 80  | 70  | 56  |

| Hour      | Major (both app.) | Minor (higher app.) |
|-----------|-------------------|---------------------|
| 1st 15:00 | 839               | 82                  |
| 2nd 16:00 | 816               | 77                  |
| 3rd 8:00  | 686               | 52                  |
| 4th 7:00  | 658               | 33                  |
| 5th 17:00 | 580               | 73                  |
| 6th 14:00 | 0                 | 0                   |
| 7th 13:00 | 0                 | 0                   |
| 8th 12:00 | 0                 | 0                   |

**Warrant 1 is met when:**

Either Condition A or Condition B are met at the 100% level.

Both Conditions A and B are met at the 80% level.

Either Condition A or Condition B are met at the 70% level where Rural community ( $<10,000$  and isolated) or Major Street Approach is  $\geq 40$ mph.

Both Condition A and Condition B are met at the 56% level where Rural community ( $<10,000$  and isolated) or Major Street Approach is  $\geq 40$ mph.

**Is Warrant 1 met?**

**No**

**No**

**No**

**No**



FUSS & O'NEILL, INC.  
1550 Main St  
Springfield, MA 01108

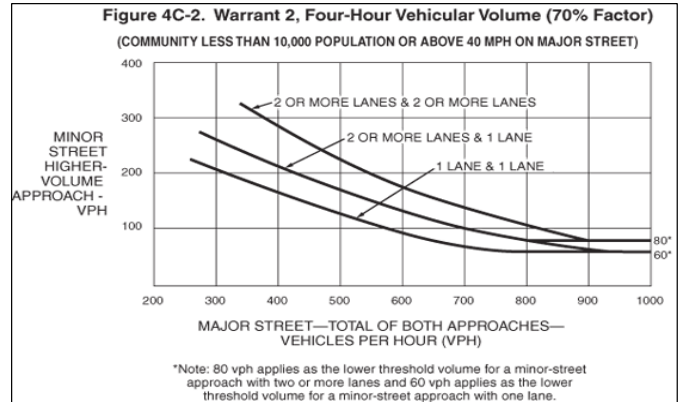
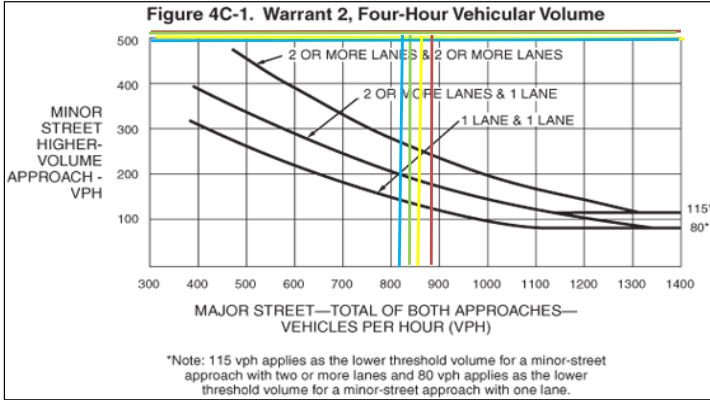
|   |            |          |       |              |
|---|------------|----------|-------|--------------|
| Prep. By:   | Date:      | Chk. by: | Date: | Project No:  |
| VLR   | 10/24/2023 |          |       | 20091145_B21 |
| 2023 Traffic Signal Warrants<br>Cooke Avenue at Hartfield Street in Northampton, MA |            |          |       | Sheet No:    |
|   |            |          |       | 2 of 4       |

**WARRANT 2 - Four- Hour Vehicular Volume**

Number of lanes on each approach

| Major Street | Minor Street |
|--------------|--------------|
| 1            | 1            |
| 2 or more    | 1            |
| 2 or more    | 2 or more    |
| 1            | 2 or more    |

| Highest Hours | Above Fig 4C-1? | Above Fig 4C-2? | Hour  | Major (both app.) | Minor (higher app.) |
|---------------|-----------------|-----------------|-------|-------------------|---------------------|
| 1st           | Yes             | Yes             | 15:00 | 839               | 82                  |
| 2nd           | Yes             | Yes             | 16:00 | 816               | 77                  |
| 3rd           | Yes             | Yes             | 8:00  | 686               | 52                  |
| 4th           | Yes             | Yes             | 7:00  | 658               | 33                  |



**Warrant 2 is met when:**

At least four hours plot above the appropriate decision curve in Figure 4C-1

At least four hours plot above the appropriate decision curve in Figure 4C-2 where Rural community (<10,000 and isolated) or Major Street Approach is >=40mph.

**Is Warrant 2 met?**

No

No

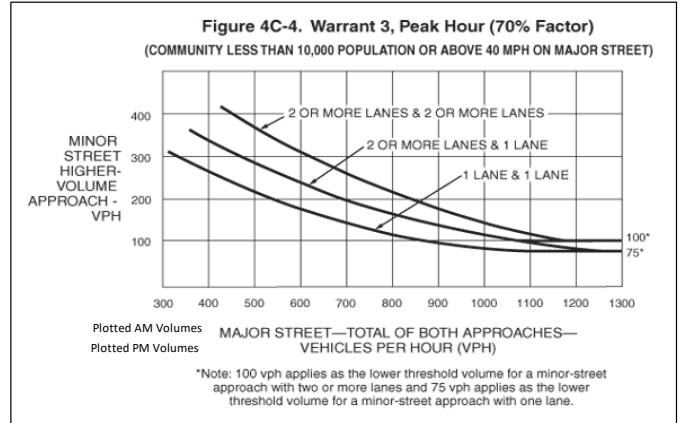
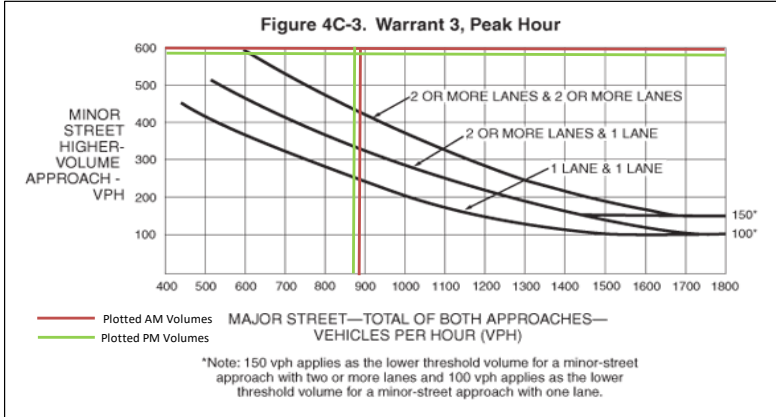
**WARRANT 3 - Peak Hour**

**Warrant 3A Peak Hour Volume**

Does at least one hour plot above the appropriate decision curve in Figure 4C-3? **No**

| PKHR | Hour  | Major (both app.) | Minor (higher app.) |
|------|-------|-------------------|---------------------|
| PM   | 15:00 | 839               | 82                  |
| AM   | 16:00 | 816               | 77                  |

Does at least one hour plot above the appropriate decision curve in Figure 4C-3 where Rural community (<10,000 and isolated) or Major Street Approach is >=40mph.? **No**



OR

**Warrant 3B Peak Hour Volume Delay**

Are all three SATISFIED? **No**

|  | SATISFIED |    |
|--|-----------|----|
|  | YES       | NO |
| The total delay experienced by traffic on a side street controlled by a STOP sign equals or exceeds four vehicle-hours for a one-lane approach and five vehicle-hours for a two-lane approach; and |           | X  |
| The volume on the side-street approaches equals or exceeds 100 vph for a one-lane approach or 150 vph for a two lane approach; and   | X         |    |
| The total entering volume serviced during this hour equals or exceeds 800 vph for intersections with four (or more) approaches or 650 vph for intersections with three approaches.                 | X         |    |

**WARRANT 4 - Pedestrian Volume**

| Highest Hours | Hour | Major St (both app.) (Veh) | Minor St (higher app.) | Peds Xing Major Street | Above Fig 4C-5 (or 4C-6 for rural)? | Above Fig 4C-7 (or 4C-8 for rural)? |     |
|---------------|------|----------------------------|------------------------|------------------------|-------------------------------------|-------------------------------------|-----|
| No            | 1st  | 15:00                      | 839                    | 82                     | 27                                  | M                                   | N/A |
|               | 2nd  | 16:00                      | 816                    | 77                     | 52                                  | No                                  | N/A |
|               | 3rd  | 8:00                       | 686                    | 52                     | 6                                   | No                                  | N/A |
| No            | 4th  | 7:00                       | 658                    | 33                     | 3                                   | No                                  | N/A |

**Warrant 4A Pedestrian Four-Hour Volume**

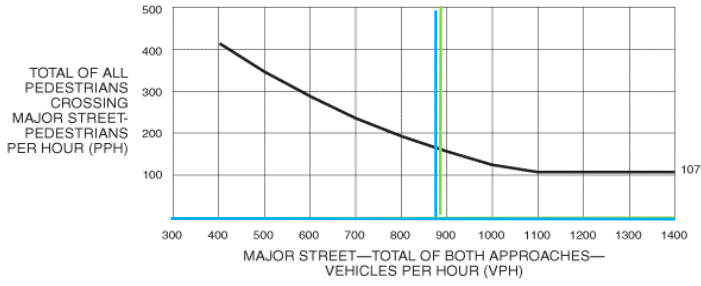
Do 4 hours during the day plot above the curve in Figure 4C-5 (4C-6 for Speed > 35mph or Population < 10K)

**Warrant 4B Pedestrian Peak Hour**

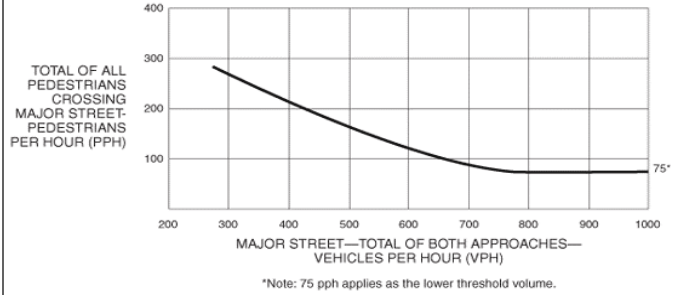
Does at least one hr plot above the curve in Figure 4C-7? (4C-8 For Speed > 35mph or Population < 10K)

\*Pedestrian counts were only done during TMC hours

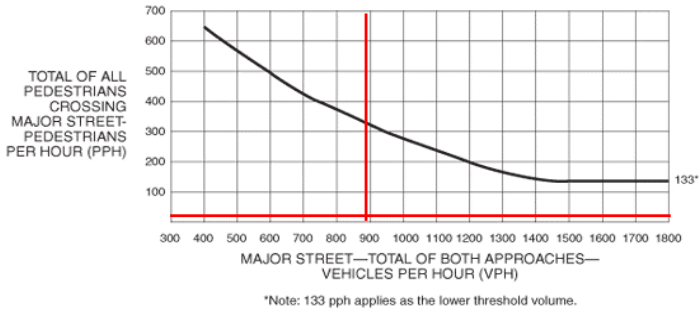
**Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume**



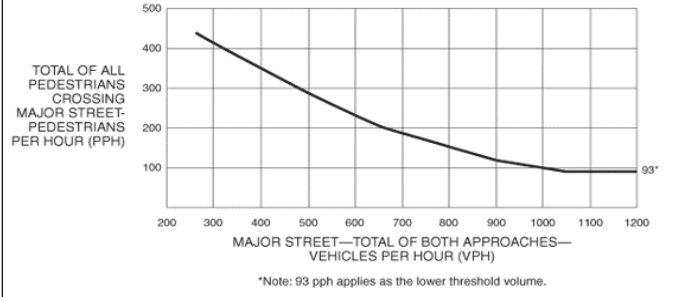
**Figure 4C-6. Warrant 4, Pedestrian Four-Hour Volume (70% Factor)**



**Figure 4C-7. Warrant 4, Pedestrian Peak Hour**



**Figure 4C-8. Warrant 4, Pedestrian Peak Hour (70% Factor)**



Warrant is met when:

Is Warrant 4 met?

At least four hours plot above the appropriate decision curve in Figure 4C-5 or 4C-6?

No





At least one hour plot above the appropriate decision curve in Figure 4C-7 or 4C-8?

No

# Capacity Analysis for Planning of Junctions

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|                              |   |
|------------------------------|---|
| Project Name:                | Northhampton Stop Sign Safety Study         |
| Project Number:              | F&O 20091145_B21                            |
| Location:                    | Cooke Ave at Hatfield St in Northampton, MA |
| Date:                        | October 25, 2023                            |
| Number of Intersection Legs: | 4   |
| Major Street Direction:      | North-South                                 |

| Traffic Volume Demand          |   |   |   |   |                |               |
|--------------------------------|---|---|---|---|----------------|---------------|
|                                | Volume (Veh/hr)   |   |   |   | Percent (%)    |               |
|                                | U-Turn<br> | Left<br> | Thru<br> | Right<br> | Heavy Vehicles | Volume Growth |
| Eastbound                      | 0   | 64  | 353   | 2   | 2.00%          | 0.00%         |
| Westbound                      | 0   | 6   | 316   | 133   | 2.00%          | 0.00%         |
| Southbound                     | 0   | 6   | 3   | 3   | 2.00%          | 0.00%         |
| Northbound                     | 0   | 30  | 4   | 49  | 2.00%          | 0.00%         |
| Adjustment Factor              | 0.80  | 0.95  |   | 0.85  |                |               |
| Suggested                      | <b>0.80</b>   | <b>0.95</b>   |   | <b>0.85</b>   |                |               |
| Truck to PCE Factor            |   |   |   | <b>Suggested = 2.00</b>   | 2.00           |               |
| Multimodal Activity Level      |   | Low   |   |   |                |               |
| Critical Lane Volume Threshold | 2-phase signal  | <b>Suggested = 1800 (Urban), 1650 (Rural)</b>   |   |   | <b>1800</b>    |               |
|                                | 3-phase signal  | <b>Suggested = 1750 (Urban), 1600 (Rural)</b>   |   |   | <b>1750</b>    |               |
|                                | 4-phase signal  | <b>Suggested = 1700 (Urban), 1550 (Rural)</b>   |   |   | <b>1700</b>    |               |

# Capacity Analysis for Planning of Junctions

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| Number of Lanes for Non-roundabout Intersections |                      |   |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |
|--|----------------------|---|---|---|---|------------|---|---|---|-----------|---|---|---|-----------|---|---|---|
| TYPE OF INTERSECTION                             | Sheet                | Northbound  |   |   |   | Southbound |   |   |   | Eastbound |   |   |   | Westbound |   |   |   |
|  |                      | U   | L | T | R | U          | L | T | R | U         | L | T | R | U         | L | T | R |
| Traffic Signal                                   | <a href="#">FULL</a> | /   | 0 | 1 | 0 | /          | 0 | 1 | 0 | /         | 0 | 1 | 0 | /         | 0 | 1 | 0 |
| Two-Way Stop Control                             | <a href="#">N-S</a>  | /   | 1 | 1 | 0 | /          | 1 | 1 | 0 | /         | 0 | 1 | 0 | /         | 0 | 1 | 0 |
| All-Way Stop Control                             | <a href="#">FULL</a> | /   | 0 | 1 | 0 | /          | 0 | 1 | 0 | /         | 0 | 1 | 0 | /         | 0 | 1 | 0 |
| Quadrant Roadway                                 | <a href="#">S-W</a>  | See the respective intersection tab(s) to view the # of lanes inputs. |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |
|  | <a href="#">N-E</a>  |   |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |
|  | <a href="#">S-E</a>  |   |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |
|  | <a href="#">N-W</a>  |   |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |
| Partial Displaced Left Turn                      | <a href="#">N-S</a>  | /   | 1 | 1 | 0 | /          | 1 | 1 | 1 | /         | 1 | 1 | 1 | /         | 1 | 1 | 1 |
| Displaced Left Turn                              | <a href="#">FULL</a> | /   | 1 | 1 | 1 | /          | 1 | 1 | 1 | /         | 1 | 1 | 1 | /         | 1 | 1 | 1 |
| Signalized Restricted Crossing U-Turn            | <a href="#">N-S</a>  | 1   | 1 | 1 | 1 | 1          | 1 | 1 | 0 | /         | / | / | 1 | /         | / | / | 1 |
| Unsignalized Restricted Crossing U-Turn          | <a href="#">N-S</a>  | 1   | 1 | 1 | 1 | 1          | 1 | 1 | 0 | /         | / | / | 1 | /         | / | / | 1 |
| Median U-Turn                                    | <a href="#">N-S</a>  | 1   | / | 1 | 1 | 1          | / | 1 | 0 | /         | / | 1 | 0 | /         | / | 1 | 0 |
| Partial Median U-Turn                            | <a href="#">N-S</a>  | 1   | / | 1 | 1 | 1          | / | 1 | 0 | /         | 1 | 1 | 0 | /         | 1 | 1 | 0 |
| Bowtie   | <a href="#">N-S</a>  | /   | / | 1 | 1 | /          | / | 1 | 0 | /         | / | 1 | 0 | /         | / | 1 | 0 |
| Split Intersection                               | <a href="#">N-S</a>  | See the respective intersection tab(s) to view the # of lanes inputs. |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |

| Number of Lanes for Grade Separated Intersections |                     |            |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |
|---|---------------------|------------|---|---|---|------------|---|---|---|-----------|---|---|---|-----------|---|---|---|
| TYPE OF INTERCHANGE                               | Sheet               | Northbound |   |   |   | Southbound |   |   |   | Eastbound |   |   |   | Westbound |   |   |   |
|   |                     | U          | L | T | R | U          | L | T | R | U         | L | T | R | U         | L | T | R |
| Echelon   | <a href="#">N-S</a> | /          | 1 | 1 | 0 | /          | 1 | 1 | 0 | /         | 1 | 2 | 0 | /         | 1 | 2 | 0 |

| Number of Lanes for Interchanges |                     |   |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |
|----------------------------------|---------------------|---|---|---|---|------------|---|---|---|-----------|---|---|---|-----------|---|---|---|
| TYPE OF INTERCHANGE              | Sheet               | Northbound  |   |   |   | Southbound |   |   |   | Eastbound |   |   |   | Westbound |   |   |   |
|                                  |                     | U   | L | T | R | U          | L | T | R | U         | L | T | R | U         | L | T | R |
| Diamond                          | <a href="#">E-W</a> | /   | 0 | 2 | 0 | /          | 0 | 2 | 0 | /         | 1 | 0 | 1 | /         | 1 | 0 | 1 |
| Partial Cloverleaf A             | <a href="#">E-W</a> | /   | 1 | / | 1 | /          | 1 | / | 1 | /         | / | 2 | / | /         | / | 2 | / |
| Partial Cloverleaf B             | <a href="#">E-W</a> | /   | 1 | / | 1 | /          | 1 | / | 1 | /         | 1 | 2 | 1 | /         | 1 | 2 | 1 |
| Displaced Left Turn              | <a href="#">E-W</a> | /   | 1 | 2 | 1 | /          | 1 | 2 | 1 | /         | 1 | 2 | 1 | /         | 1 | 2 | 1 |
| Contraflow Left Interchange      | <a href="#">E-W</a> | /   | 1 | / | 1 | /          | 1 | / | 1 | /         | 1 | 2 | 1 | /         | 1 | 2 | 1 |
| Diverging Diamond Interchange    | <a href="#">E-W</a> | /   | 1 | / | 1 | /          | 1 | / | 1 | /         | 1 | 2 | 1 | /         | 1 | 2 | 1 |
| Single Point                     | <a href="#">E-W</a> | /   | 1 | 2 | 1 | /          | 1 | 2 | 1 | /         | 1 | 2 | 1 | /         | 1 | 2 | 1 |
| Single Point with Roundabout     | <a href="#">E-W</a> | See the respective intersection tab(s) to view the # of lanes inputs. |   |   |   |            |   |   |   |           |   |   |   |           |   |   |   |

# Capacity Analysis for Planning of Junctions

Detailed Report - Page 3 of 4

## Results for Non-roundabout Intersections

| TYPE OF INTERSECTION                    | Sheet                | Zone 1 (North) |             | Zone 2 (South) |             | Zone 3 (East) |             | Zone 4 (West) |             | Zone 5 (Center) |             | Overall v/c Ratio | Pedestrian Accommodations | Bicycle Accommodations |
|---|----------------------|----------------|-------------|----------------|-------------|---------------|-------------|---------------|-------------|-----------------|-------------|-------------------|---------------------------|------------------------|
|   |                      | CLV            | V/C         | CLV            | V/C         | CLV           | V/C         | CLV           | V/C         | CLV             | V/C         |                   |                           |                        |
| Traffic Signal                          | <a href="#">FULL</a> | /              | /           | /              | /           | /             | /           | /             | /           | 549             | <u>0.32</u> | 0.32              | Good                      | Excellent              |
| Two-Way Stop Control                    | <a href="#">N-S</a>  | /              | /           | /              | /           | /             | /           | /             | /           | --              | <u>0.49</u> | 0.49              | Fair                      | Good                   |
| All-Way Stop Control                    | <a href="#">FULL</a> | /              | /           | /              | /           | /             | /           | /             | /           | 969             | <u>0.81</u> | 0.81              | Good                      | Excellent              |
| Continuous Green T                      | <a href="#">W</a>    | /              | /           | /              | /           | /             | /           | /             | /           | 109             | <u>0.06</u> | 0.06              | Good                      | Excellent              |
|   | <a href="#">N</a>    | /              | /           | /              | /           | /             | /           | /             | /           | 536             | <u>0.31</u> | 0.31              | Good                      | Excellent              |
|   | <a href="#">E</a>    | /              | /           | /              | /           | /             | /           | /             | /           | 67              | <u>0.04</u> | 0.04              | Good                      | Excellent              |
|   | <a href="#">S</a>    | /              | /           | /              | /           | /             | /           | /             | /           | 454             | <u>0.26</u> | 0.26              | Good                      | Excellent              |
| Quadrant Roadway                        | <a href="#">S-W</a>  | /              | /           | 103            | <u>0.06</u> | /             | /           | 219           | <u>0.13</u> | 242             | <u>0.13</u> | 0.13              | Good                      | Excellent              |
|   | <a href="#">N-E</a>  | 266            | <u>0.15</u> | /              | /           | 236           | <u>0.13</u> | /             | /           | 271             | <u>0.15</u> | 0.15              | Good                      | Excellent              |
|   | <a href="#">S-E</a>  | /              | /           | 165            | <u>0.09</u> | 289           | <u>0.17</u> | /             | /           | 217             | <u>0.12</u> | 0.17              | Good                      | Excellent              |
|   | <a href="#">N-W</a>  | 138            | <u>0.08</u> | /              | /           | /             | /           | 236           | <u>0.13</u> | 239             | <u>0.13</u> | 0.13              | Good                      | Excellent              |
| Partial Displaced Left Turn             | <a href="#">N-S</a>  | 75             | <u>0.04</u> | 42             | <u>0.02</u> | /             | /           | /             | /           | 444             | <u>0.25</u> | 0.25              | Good                      | Excellent              |
| Displaced Left Turn                     | <a href="#">FULL</a> | 75             | <u>0.04</u> | 42             | <u>0.02</u> | 372           | <u>0.21</u> | 421           | <u>0.23</u> | 413             | <u>0.23</u> | 0.23              | Good                      | Excellent              |
| Signalized Restricted Crossing U-Turn   | <a href="#">N-S</a>  | 422            | <u>0.23</u> | 616            | <u>0.34</u> | 1028          | <u>0.57</u> | 881           | <u>0.49</u> | /               | /           | 0.57              | Good                      | Excellent              |
| Unsignalized Restricted Crossing U-Turn | <a href="#">N-S</a>  | 12             | <u>0.24</u> | 85             | <u>0.33</u> | 69            | <u>0.47</u> | 172           | <u>0.49</u> | /               | /           | 0.49              | Good                      | Excellent              |
| Median U-Turn                           | <a href="#">N-S</a>  | 58             | <u>0.03</u> | 174            | <u>0.10</u> | /             | /           | /             | /           | 524             | <u>0.29</u> | 0.29              | Good                      | Excellent              |
| Partial Median U-Turn                   | <a href="#">N-S</a>  | 51             | <u>0.03</u> | 93             | <u>0.05</u> | /             | /           | /             | /           | 586             | <u>0.34</u> | 0.34              | Good                      | Excellent              |
| Bowtie                                  | <a href="#">N-S</a>  | /              | /           | /              | /           | 464           | <u>0.37</u> | 427           | <u>0.31</u> | 690             | <u>0.39</u> | 0.39              | Good                      | Excellent              |
| Split Intersection                      | <a href="#">N-S</a>  | /              | /           | /              | /           | 455           | <u>0.26</u> | 437           | <u>0.25</u> | /               | /           | 0.26              | Good                      | Excellent              |

## Results for Grade Separated Intersections

| TYPE OF INTERSECTION | Sheet                | Zone 1 (North) |     | Zone 2 (South) |     | Zone 3 (East) |     | Zone 4 (West) |     | Zone 5 (Center) |             | Zone 6 (Raised) |             | Overall v/c Ratio | Ped  | Bicycle   |
|----------------------|----------------------|----------------|-----|----------------|-----|---------------|-----|---------------|-----|-----------------|-------------|-----------------|-------------|-------------------|------|-----------|
|                      |                      | CLV            | V/C | CLV            | V/C | CLV           | V/C | CLV           | V/C | CLV             | V/C         | CLV             | V/C         |                   |      |           |
| Echelon              | <a href="#">N-S</a>  | /              | /   | /              | /   | /             | /   | /             | /   | 188             | <u>0.10</u> | 304             | <u>0.17</u> | 0.17              | Good | Good      |
| Center Turn Overpass | <a href="#">FULL</a> | /              | /   | /              | /   | /             | /   | /             | /   | 304             | <u>0.17</u> | 101             | <u>0.06</u> | 0.17              | Good | Excellent |

# Capacity Analysis for Planning of Junctions

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| Results for Roundabouts   |                |        |        |               |        |        |                |        |        |               |        |        |                   |                           |                        |
|---------------------------|----------------|--------|--------|---------------|--------|--------|----------------|--------|--------|---------------|--------|--------|-------------------|---------------------------|------------------------|
| TYPE OF ROUNDABOUT        | Zone 1 (North) |        |        | Zone 3 (East) |        |        | Zone 2 (South) |        |        | Zone 4 (West) |        |        | Overall v/c Ratio | Pedestrian Accommodations | Bicycle Accommodations |
|                           | Lane 1         | Lane 2 | Lane 3 | Lane 1        | Lane 2 | Lane 3 | Lane 1         | Lane 2 | Lane 3 | Lane 1        | Lane 2 | Lane 3 |                   |                           |                        |
| <a href="#">50 ICD</a>    | 0.02           | /      | /      | 0.43          | /      | /      | 0.14           | /      | /      | 0.51          | /      | /      | 0.51              | Excellent                 | Good                   |
| <a href="#">75 ICD</a>    | 0.02           | /      | /      | 0.43          | /      | /      | 0.13           | /      | /      | 0.50          | /      | /      | 0.50              | Excellent                 | Good                   |
| <a href="#">1 X 1</a>     | 0.01           | /      | /      | 0.31          | /      | /      | 0.10           | /      | /      | 0.37          | /      | /      | 0.37              | Excellent                 | Excellent              |
| <a href="#">2NS X 1EW</a> | 0.01           | 0.01   | /      | 0.30          | /      | /      | 0.04           | 0.05   | /      | 0.36          | /      | /      | 0.36              | Good                      | Excellent              |
| <a href="#">2 X 2</a>     | 0.01           | 0.01   | /      | 0.18          | 0.19   | /      | 0.04           | 0.05   | /      | 0.15          | 0.16   | /      | 0.19              | Good                      | Excellent              |
| <a href="#">3 X 3</a>     | 0.01           | 0.00   | 0.00   | 0.12          | 0.12   | 0.13   | 0.03           | 0.00   | 0.05   | 0.10          | 0.10   | 0.11   | 0.13              | Fair                      | Excellent              |