

ROAD SAFETY AUDIT

Route 9 (Boylston Street) at
Elliot Street, Woodward Street, Glenmore Terrace and
Ramsdell Street

City of Newton

April 23, 2021

Prepared For:
MassDOT



On Behalf Of:
City of Newton



Prepared By:
BETA Group, Inc.



Table of Contents

| | |
|--|-----------|
| Background | 1 |
| RSA Process..... | 1 |
| Project Description | 2 |
| Audit Observations and Potential Safety Enhancements..... | 6 |
| Summary of Road Safety Audit..... | 14 |

List of Appendices

| | |
|-------------|-----------------------------|
| Appendix A. | RSA Meeting Agenda |
| Appendix B. | RSA Audit Team Contact List |
| Appendix C. | Detailed Crash Data |
| Appendix D. | Speed Regulations |

List of Figures

| | |
|--------------------------|---|
| Figure 1: Locus Map..... | 3 |
|--------------------------|---|

List of Tables

| | |
|--|----|
| Table 1: Participating Audit Team Members..... | 2 |
| Table 2: Estimated Time Frame and Costs Breakdown..... | 14 |
| Table 3: Potential Safety Enhancement Summary..... | 15 |

Background

The Federal Highway Administration defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. A Road Safety Audit was scheduled for the intersection of Route 9 (Boylston Street) at Elliot Street, Woodward Street, Glenmore Terrace and Ramsdell Street because it has been identified as a high crash location within the Metropolitan Area Planning Council (MAPC) region. The RSA is being conducted in coordination with the City of Newton as part of mitigation funding through a proposed marijuana dispensary located near the intersection. The RSA is intended to identify potential short- and long-term safety improvements that can be made at each intersection and along the corridor, which can then be implemented through general maintenance for short-term low-cost improvements or incorporated into a reconstruction project for long term improvements.

RSA Process

A Road Safety Audit for the intersection of Route 9 (Boylston Street) at Elliot Street, Woodward Street, Glenmore Terrace and Ramsdell Street was held on Thursday, April 15, 2021 virtually through Microsoft Teams due to the on-going COVID-19 pandemic. As indicated in Table 1, the audit team consisted of representatives from State, Regional and Local agencies and included a cross-section of engineering, planning, advocacy and emergency response expertise. The agenda for the RSA meeting is provided in Appendix A of this report, and contact information for participating audit team members is included in Appendix B.

Table 1: Participating Audit Team Members

| Audit Team Member | Agency/Affiliation |
|--------------------------|---|
| Kevin Fitzgerald | MassDOT Traffic Safety |
| Dakota DelSignore | MassDOT Traffic Safety |
| Nick Zhao | MassDOT Traffic Safety |
| Hameed Pervez | MassDOT District 6, Traffic |
| Amitai Lipton | MassDOT District 6, Traffic Engineering & Transit Coordinator |
| Jesus Bastardo | MassDOT District 6, Traffic |
| Josh Weiland | MBTA Service Planning |
| Lt. John Kelly* | Massachusetts State Police |
| Jason Sobel | City of Newton, DPW Transportation Director |
| Issac Prizant | City of Newton, DPW Traffic Engineer |
| David Koses | City of Newton, DPW Transportation Coordinator |
| Lou Taverna | City of Newton, City Engineer |
| Jini Fairley | City of Newton, ADA Coordinator |
| Nicole Freedman | City of Newton, Director of Transportation Planning |
| Lt. Jay Bourgeois | Newton Fire Department |
| Sgt. Michael Wade | Newton Police Department |
| Mark Abbott | CTPS |
| Justin Curewitz | BETA Group, Inc. |
| Jeff Maxtutis | BETA Group, Inc. |
| Charles Creagh | BETA Group, Inc. |

* Unable to attend meeting but discussed safety issues prior to meeting with representatives from BETA Group, Inc.

Background material including crash history, as well as the Safety Prompt List, were provided to audit team members prior to the RSA. These materials were reviewed during the RSA meeting, then audit participants were asked to discuss safety issues at the high crash location of Route 9 (Boylston Street) at Elliot Street, Woodward Street, Glenmore Terrace and Ramsdell Street. Audit participants then conducted a virtual site visit through online maps, videos and pictures recently collected at the intersection, at which time they offered observations on safety issues and concerns. Finally, audit participants were asked to consider improvements, considering both short- and long-term improvements for each issue.

Project Description

The intersection of Route 9 (Boylston Street) at Elliot Street, Woodward Street, Glenmore Terrace and Ramsdell Street, shown in Figure 1, is located in the southwestern portion of Newton. Route 9 follows an east-west alignment and is a critical connection between Brookline and Boston to the east, and Framingham, Natick and Worcester to the west. Approximately one mile west of the study intersection Route 9 has an interchange with I-95/Route 128. The proximity to I-95/Route 128 results in increased commuter traffic during times of congestion on the highway.



Road Safety Audit
Route 9 (Boylston St) at
Elliot St/Woodward St/
Glenmore Terr/Ramsdell St

Newton, MA

Figure 1

Location Map

Elliot Street connects Route 9 to Central Avenue in Needham to the west, through the Newton Upper Falls neighborhood, while Woodward Street provides a connection to Beacon Street to the north and the Waban neighborhood. Glenmore Terrace and Ramsdell Street are both minor, dead-end, roadways intersecting Route 9 approximately 250 feet to the east of the intersection. While these two roadways are not included within the signalized intersection with Elliot Street and Woodward Street, these two roadways were included in the discussion and crash history due to their impacts to traffic operations at the intersection.

Route 9 (Boylston Street) is functionally classified as an Urban Principal Arterial and is under MassDOT jurisdiction. Elliot Street and Woodward Street are classified as Urban Collectors and are under City of Newton jurisdiction. Glenmore Terrace and Ramsdell Street are classified as local roads and are under City of Newton jurisdiction. Land use in the immediate vicinity of the intersection is a mix of residential and commercial, with single family homes on the northeast, northwest and southwest quadrants of the intersection. Small, commercial businesses are located on the northeast and northwest corners of the intersection and a commercial plaza occupies the entire southeast quadrant of the intersection. This commercial plaza includes several businesses, parking and provides access through three driveways; two located on Elliot Street and a third located on Ramsdell Street. A Sunoco gas station is also located adjacent to the plaza, between the two existing driveways for the plaza, with access through two driveways on Elliot Street. Lastly, the proposed marijuana dispensary site is located adjacent to the gas station, to the south, with a single access driveway on Elliot Street. The plaza, gas station and dispensary combine to provide five driveways within a short segment of Elliot Street.

The study intersection is a 4-way intersection under traffic signal control. Route 9 is marked with two travel lanes in each direction, while Elliot Street and Woodward Street are marked as a single lane in each direction. The Route 9 eastbound and westbound approaches each provide an exclusive left-turn lane and two through lanes. The Elliot Street northbound approach provides a short exclusive left-turn lane, a through lane and a channelized right-turn lane. The Woodward Street southbound approach provides an exclusive left-turn lane and a single through lane. Route 9 is median divided on both sides of the intersection, with a triangular channelizing island present on the Elliot Street approach. Glenmore Terrace and Ramsdell Street intersect with Route 9 approximately 250 feet east of the intersection, with Glenmore Terrace intersecting from the north and Ramsdell Street intersecting from the southeast. Both roadways are unmarked but provide two-way operation.

Sidewalks are provided along both sides of Route 9, Elliot Street, Woodward Street and Glenmore Terrace. A small section of sidewalk is also provided on the southwest side of Ramsdell Street, with no sidewalk on the northeast side. Pavement markings are in good to fair condition at the intersection. Crosswalks, with detectible warning panels, are provided across the Route 9 east leg, the Elliot Street south leg and the Woodward Street north leg of the intersection. A crosswalk is also provided across the channelized right turn lane from Elliot Street to Route 9 eastbound. Crosswalks are also provided across both Glenmore Terrace and Ramsdell Street. Pedestrian cut-throughs are provided on the triangular channelizing island on the southeast corner of the intersection. Pedestrian pushbuttons activate pedestrian phases at all crossings except for the crosswalk across the channelized right turn lane from Elliot Street to Route 9 eastbound, which is uncontrolled.

The Massachusetts Bay Transportation Authority (MBTA) provides transit accommodation via Bus Route 59A along Eliot Street and Woodward Street within the intersection. Two signed bus stops are located on

Woodward Street, north of Route 9 for each direction of travel. Scheduled round trips are provided within the morning and afternoon peaks, with two stops in each peak. Additionally, the MBTA provides light rail service via the Green Line, with Eliot Station approximately ¼ mile west of the intersection. The Green Line bisects Route 9 twice and Elliot Street once in proximity of the intersection. The Green Line crosses Route 9 approximately 750 feet west of the intersection via an elevated bridge structure and continues southeasterly, crossing Elliot Street via an elevated bridge structure approximately 500 feet south of the intersection. The Green Line then crosses underneath Route 9 approximately 1,000 feet east of the intersection.

Crash reports were obtained from both the Newton Police Department and the Massachusetts State Police as both departments respond to the intersection due to the shared jurisdiction. It should be noted that the intersection was reconstructed around 2013 and all crash data summarized is post-reconstruction. Crash data show 44 crashes for the three-year period from 2017 through 2019. A collision diagram and crash summary are included in the Appendix. It should also be noted that crash information is known to potentially be incomplete. Four of 44 crashes are not shown on the collision diagram because of limited data. Of the 40 crashes with sufficient data to be shown on the collision diagram the most prevalent crash type were rear-end, comprising 59% of all crashes at the intersection. The majority of rear-end crashes were attributed to heavy stop and go traffic as well as queued traffic at the intersection. Several crashes were also due to inattention, where drivers rear-end vehicles in front of them as they were not alert to the traffic ahead. Sixteen of the 26 rear-end crashes occurred on Route 9, including seven on the Route 9 eastbound approach and eight on the Route 9 westbound approach. In addition, four rear-end crashes occurred on the channelized right-turn lane from Elliot Street to Route 9 eastbound, all of which resulted from vehicles starting and stopping when attempting to enter Route 9 and the trailing vehicle focused on the Route 9 traffic and not the vehicle in front of them. 18% of crashes were sideswipe crashes, including four on the Route 9 eastbound approach, three on the Route 9 westbound approach and one on the Woodward Street southbound approach. Sideswipe crashes were most common on Route 9, potentially due to drivers jockeying for position in heavy traffic, both between through lanes and between vehicles in the left-turn lanes deciding to continue straight than wait for the longer light cycle to turn left. 14% of crashes were angle crashes, with one crash occurring on each the eastbound, westbound and northbound approach between vehicles in adjacent travel lanes, resulting from lane changes in which vehicles swerved in front of one another or attempted to change lanes and striking the adjacent vehicle. One angle crash involving a northbound left-turning vehicle and a southbound through vehicle; one involving a northbound vehicle and an eastbound vehicle; and one crash involving a vehicle traveling northbound on Elliot Street and a vehicle exiting from the gas station. Also of note are three single vehicle crashes resulting in vehicles striking fixed objects; one of which was caused by a driver falling asleep at the wheel. One head-on crash occurred between opposing left-turning vehicles from Elliot Street and Woodward Street which could be the result of the slightly skewed intersection approaches.

Seventeen of the 44 crashes involved traffic queues, including queued traffic at red lights; stop and go traffic and inattention to traffic ahead. Fifteen crashes occurred at night, with an additional three crashes during dawn and one crash occurring at dusk.

Audit Observations and Potential Safety Enhancements

Following a brief introduction to the RSA process and a discussion of existing geometry and crash information, the audit participants were asked to discuss safety issues at the intersection of Route 9 (Boylston Street) at Elliot Street, Woodward Street, Glenmore Terrace and Ramsdell Street. Aerial and Google Street View imagery were utilized during the virtual meeting, along with video recordings of the intersection, to spur observations and discussion on safety issues and concerns at all locations. Finally, audit participants were asked to consider improvements, considering both short- and long-term improvements for each issue. A summary of safety considerations and the potential enhancements identified during the RSA is as follows:

Safety Issue #1: Pedestrian Accommodation

Observations:

Pedestrian accommodation is vitally important at the intersection of Route 9 (Boylston Street) at Elliot Street, Woodward Street, Glenmore Terrace and Ramsdell Street, which has connections to pedestrian desire points within the study area including the MBTA Green Line Eliot Station, MBTA bus stops for Bus Route 59A and access to commercial businesses along both sides of Route 9. It is also essential to provide pedestrian connections to and from abutting neighborhoods and commercial uses. While no pedestrian related crashes occurred at the intersection, the need for safe pedestrian accommodations is critical at the intersection.

Sidewalk surfaces are not consistent along all approaches to the intersection, with some broken panels and areas with inadequate clearances for the pedestrian path. Furthermore, faded crosswalk markings and lack of consistent markings also reduce awareness and visibility of pedestrians for approaching drivers. It was noted by audit participants that the intersection is not pedestrian friendly in general.

Specific pedestrian-related safety issues are as follows:

- Sidewalks are in poor condition at the intersection. This is especially the case for the sidewalk on the east side of Elliot Street and the east side of Woodward Street. Sidewalk panels are broken, and multiple obstructions (utility poles) are located within the pedestrian clear path.
- Crosswalks at the intersection consist of two transverse lines and lack hatching for higher visibility of the crosswalk. In addition, the crosswalk across the Elliot Street right-turn lane (continental style) does not match the other five crosswalk locations.



**Image 1: Poor Sidewalk Conditions
(East side of Elliot Street)**

DRAFT

- There appears to be a pedestrian desire line along the southern corner of the channelized right-turn island, notable through a worn dirt path connecting the two pedestrian curb ramps, to the northern plaza driveway on Elliot Street.
- The Accessible Pedestrian Signal (APS) pushbuttons at the intersection provide a spoken message to help guide pedestrians across the intersection, alerting them to wait when the button is first pushed and also when the walk light is on for a specific crosswalk. This spoken message feature is provided for the concurrent pedestrian phasing at the intersection, where crosswalks operate at the same time as vehicular traffic. During a field visit prior to the audit, it was noted that these spoken messages were very soft and hard to hear due to traffic at the intersection. It was confirmed that all pushbuttons were working and that spoken messages were provided for all pushbuttons.
- A fence on the southwest corner of the intersection blocks visibility of the pedestrians on the sidewalk, waiting to cross Elliot Street. The fence is located at the back of the sidewalk and obstructs the visibility of right-turning vehicles from seeing pedestrians waiting to cross.
- No crosswalk is provided across the Route 9 west leg of the intersection. Crosswalks are provided across the remaining three legs of the intersection and across Glenmore Terrace and Ramsdell Street.



Image 2: Fence Blocks Visibility on the Southwest Corner

Enhancements:

- Reconstructing sidewalks on Elliot Street and Woodward Street and maintaining consistent clear zone meeting ADA and AAB guidelines.
- Restriping all crosswalks, including the crosswalk across the Elliot Street channelized right-turn lane, with high visibility markings to increase conspicuousness and awareness. High visibility markings can be applied to existing crosswalk and include “Ladder” type crosswalk hatching for improved safety.
- Shift the crosswalk on the Elliot Street channelized right-turn lane further south on the island and providing new pedestrian curb ramps and sidewalk connections to the crosswalks at Route 9. This shift would provide more separation from the right-turn yield decision point and make pedestrians more visible to right-turning vehicles.
- Verify the programmed settings for the APS pushbuttons and spoken messages. Consider switching settings to ambient noise setting if not already programmed. Consider relocating pushbuttons greater than ten feet apart to change to percussive tone setting for walk indication.
- Widen the curb radius along with sidewalk on the southwest corner of the intersection. This would provide more visibility of pedestrians on the sidewalk, while also requiring right-turning vehicles

to slow down to complete the turning movement. Turning movements for larger trucks and emergency vehicles should be verified as part of this enhancement.

- Provide the missing crosswalk across the Route 9 west leg of the intersection, including new pedestrian curb ramps, pedestrian signals, and phasing. Impacts to signal timing as well as the commercial driveway on the northwest corner should be considered as part of this enhancement.

Safety Issue #2: Elliot Street Channelized Right-turn Lane

Observations:

Several crashes at the intersection can be attributed to the relation between the channelized right turn lane and higher volumes along Route 9 eastbound, which limits the number of available gaps in traffic. In addition, the close proximity of Ramsdell Street and the Plaza entrance to the channelized right-turn lane merge add to driver confusion and aggression observed. This merge requires drivers to yield to all three approach movements at the intersection: the Route 9 eastbound through movement, the Route 9 westbound U-turn movement and the Woodward Street southbound left-turn movement. Significant eastbound traffic volumes, coupled with long signal cycles and higher speeds can result in vehicles starting, then stopping when attempting to judge acceptable gaps to merge into traffic, resulting in the crashes observed on this movement.

The existing roadway width for the segment of Route 9 between Elliot Street and Ramsdell Street is very wide and can act as three travel lanes, with the right most lane operating as an acceleration/deceleration lane to Route 9 eastbound and the Plaza driveway/Ramsdell Street, respectively. This wider pavement and lack of markings exacerbates driver confusion as to the appropriate lane designation when turning right from Elliot Street.

Specific Elliot Street channelized right-turn lane-related safety issues are as follows:

- The lack of signage and striping for the wide pavement width between Elliot Street and Ramsdell Street results in driver confusion, aggression and frustration for right-turning vehicles from Elliot Street. Merge movements into Route 9 eastbound traffic creates queues on this approach and often leads to honking and impatience of drivers waiting in the queue.
- The Yield sign for the channelized right-turn lane is substandard in size and appears to be mounted higher than the standard height. No pavement markings for the yield control (“shark teeth”) exist.



Image 3: Substandard Yield Sign and lack of pavement markings

Enhancements:

- Update signage and pavement markings for the merge to better define the lane designation.
- Consider signaling the channelized right-turn lane for protected movement.
- Consider removing the bus shelter and reconfiguring the curb line to better define the existing roadway alignment.
- Consider replacing Yield signage with proper signage (size and mounting height) and new pavement markings for yield line “shark teeth” to provide better visibility of the yield control.
- Consider restricting U-turns from Route 9 westbound to eliminate one additional conflicting movement for the channelized right-turn lane.

Safety Issue #3: Bus Stops and Transit Accommodations

Observations:

Bus stops and transit accommodations were noted as a safety concern at the intersection. Existing bus stops for the MBTA Bus Route 59A are located on both sides of Woodward Street just north of intersection with Route 9. Audit participants noted a discrepancy between the existing northbound bus stop shown on Google Maps and the actual signed stop. A bus shelter and small curb cut out is provided on the south side of Route 9 between Elliot Street and Ramsdell Road, yet ownership and operation status were unknown. In discussion during the audit, participants from MassDOT, the MBTA and the City of Newton did not believe that this shelter was in use or associated with any bus routes in the area, but further investigation was required to confirm this. In addition, the MBTA Green Line’s Eliot Station is northwest of the study intersection with access provided via Route 9 and Lincoln Street.

Specific bus stop and transit accommodations safety issues are as follows:


- Verify whether the bus shelter provided on the south side of Route 9 between Elliot Street and Ramsdell Road is active. If this shelter is active, a bus stopping there could block the visibility of vehicles attempting to enter Route 9 eastbound from Elliot Street as well as vehicles exiting from the Plaza driveway and Ramsdell Street.
- Currently Bus Route 59A only provides a far-side bus stop for the northbound direction. It was noted during  audit that a far-side stop on Elliot Street is preferred for the southbound direction to reduce impacts to intersection operations.
- The bus stop on the east side of Woodward Street is not an accessible location. The stop location does not provide the



Image 4: Non-accessible bus stop on Woodward Street

necessary continuous sidewalk width required. Currently a grass strip between the sidewalk and roadway exists and does not allow for the proper boarding and alighting of buses.

- The Green Line's Eliot Station is located within a residential neighborhood with limited parking.
- It was noted that there is a future, privately-funded, shuttle as part of the planned Northland Development project that will be free to the public. This shuttle will run between the Northland Development on Oak Street and the Newton Highlands Green Line Station. While the exact route of this shuttle is not yet known, it was mentioned as a consideration under the transit accommodations discussion during the audit.

Enhancements:

- Verify the bus shelter ownership as well as the land ownership and whether the shelter is currently in use. If not in use, consider with the owner, removing the bus shelter and bumping out the curb line to narrow the existing roadway width to help reduce driver confusion over the merge.
- Consider relocation of existing southbound bus stop to far side location on Elliot Street. Consideration should be taken to the frequency of the bus at this stop location. This enhancement would require coordination between the MBTA, MassDOT and the City of Newton.
- Consider relocating/improving existing bus stops on Woodward Street to meet accessibility requirements. Paving the grass strip provided for the northbound stop or relocating the stop further south, closer to the intersection could also be considered.
- Consider relocating the Eliot Station to the southeast and providing access via the Plaza parking lot. This relocation would allow easier access to the Station, rather than the current location with the residential neighborhood.
- Coordinate with Northland Developer on the shuttle service as it pertains to the intersection and its operations. Shuttle stops, frequency and routes should be coordinated with the MBTA, MassDOT and the City of Newton to avoid conflicts with existing bus service.

Safety Issue #4: Access Management

Observations:

Several specific concerns related to access management were discussed by audit participants. With several local area businesses in close proximity to the intersection, entrance and exit driveways impact intersection operations and overall traffic flows along the approaches.

Specific access management safety issues are as follows:

- The Sunoco gas station on Elliot Street has high demand and often blocks traffic on Elliot Street from entering and exiting vehicles. Vehicles exiting from the gas station will block northbound traffic, especially the northbound right-turn traffic, while attempting to access Route 9 westbound

via the signalized intersection. Similarly, entering vehicles from Elliot Street southbound often are blocked by queued traffic from the signal.

- No parking signage existed in front the gas station in the past but have since been removed or knocked down. It was noted that larger trucks park on Elliot Street to unload, blocking traffic along the roadway.
- Five commercial driveways exist along the east side of Elliot Street south of the intersection with Route 9: two Plaza driveways, two gas station driveways and one additional driveway for the proposed marijuana dispensary. These five driveways are all located within a span of 200 feet, with some driveways appearing to provide access to multiple properties, resulting in driver confusion as to which driveway corresponds to each property.



Image 5: Five commercial driveways along Elliot Street

- Vehicles exiting the Plaza to access Route 9 ignore the gore line for the channelized right turn island. These vehicles exit the northern plaza driveway on Elliot Street and continue straight across the Elliot Street northbound approach to access Route 9 westbound and Woodward Street northbound. Similar to the issues noted above, these vehicles have also been observed blocking right-turning traffic on Elliot Street.

Enhancements:

- Consider “Do Not Block the Box” signage and markings for these driveways. This enhancement may be limited due to the multiple driveways in succession but should be considered to the greatest extent practical. Consideration should be given to the whether laws/regulations are strictly for intersections as opposed to driveways.
- Consider re-installing “No Parking” signs along the east side of Elliot Street to avoid issues of larger vehicles blocking traffic. Confirm the jurisdiction of the two gas station driveways and which layout they abut.
- Continued enforcement of on-street parking restrictions for Elliot Street.

- Consider consolidating driveways on Elliot Street to reduce the number of curb openings and conflicts with pedestrians. This would require discussions and negotiations with the private plaza property owners.
- Consider the closure of the southern Plaza entrance on Elliot Street.
- Coordinate driveway consolidation and Plaza circulations with property owners when any future redevelopment happens.
- Consider restricting the northern plaza driveway on Elliot Street to right-in, right-out operations.

Safety Issue #5: Traffic Signal Operations

Observations:

Several observations were made regarding the existing traffic signal operations at the intersection. These observations included driver frustration issues from existing traffic, cut-through traffic and signal head visibility.

Specific traffic signal operational safety issues are as follows:

- Audit participants noted driver impatience due to the longer cycle lengths of the signal. Specific issues were noted for left-turning vehicles on Route 9, where vehicles queued for multiple cycles will merge back into the through lanes and find an alternative route rather than wait another cycle to turn at the intersection.
- The Elliot Street Fire Station is located approximately ¼ mile south of the intersection. Due to the curvature of the Elliot Street approach at the intersection and the MBTA Green Line bridge structure, the optical pre-emption detection often does not trigger the signal with enough time to clear the intersection prior to a fire truck's arrival. This range is also limited when queued traffic exists on the Elliot Street approach.
- Cut-through traffic attempting to avoid the signalized intersection exists for both Route 9 eastbound and westbound. Vehicles attempting to bypass the signal to the north will utilize Lincoln Street to Dickerman Road instead of Woodward Street to access Route 9 westbound. Vehicles attempting to bypass the signal from the west will utilize Circuit Avenue instead of Route 9 eastbound to access Elliot Street southbound.
- Local businesses on the northern corners of the intersection have limited parking for patrons and would benefit from additional on-street parking areas on Woodward Street. Prior to the reconstruction of the intersection, on-street parking existed on the west side of Woodward Street approaching the intersection with Route 9. Under the reconstruction, the parking was removed to provide an exclusive left turn lane to Route 9 eastbound.

- Long signal cycle lengths at the intersection results in longer delays for all approaches at the intersection. The longer delays are a factor in drivers jockeying for position in traffic and shifting lanes from the left-turn lanes to the through lanes.
- The intersection and signals are blocked for a brief moment on the Route 9 eastbound approach due to the Green Line bridge structure. An existing static “Signal Ahead” warning sign is provided just prior to the bridge structure, but the intersection visibility and traffic queues can be obstructed when approaching the intersection from the west.
- It was noted by the State Police that enforcement at the intersection is difficult as there are limited areas to watch operations within the intersection.
- A current MassDOT Transportation Improvement Program (TIP) Project is currently under construction along Highland Avenue in Newton and will include the signalization of the Route 9 Ramps to Winchester Street and Centre Street was noted by audit participants.

Enhancements:

- Consider removing left turns from both Route 9 approaches. This enhancement would require discussion between MassDOT and the City of Newton as well as an in-depth study of the traffic impacts at nearby intersections as a result of the left-turn displacements.
- Consider relocation/installation of an additional optical pre-emption detector further south on Elliot Street to trigger the signal with significant time to clear the intersection and the Elliot Street approach prior to arrival of fire trucks. Possible locations for detector include the MBTA Green Line bridge structure or an existing signal post adjacent to the City lot, south of the bridge. This enhancement would require coordination between the MBTA, MassDOT and the City of Newton Fire Department.
- Consider installation of GPS-based preemption detection that is currently used throughout the City of Newton at signalized intersections. This enhancement would require coordination between MassDOT and the City of Newton Fire Department.
- Consider on-street parking for Woodward Street and whether existing roadway width could accommodate parking safely. MBTA bus stops should also be considered as part of this enhancement to ensure intersection and bus operations are not significantly impacted.
- Consider Red Signal Ahead illuminated sign on the Route 9 eastbound approach prior to the MBTA Green Line bridge.

Summary of Road Safety Audit


Following review of available materials and a discussion of existing safety issues, audit participants were asked to consider improvements. Audit participants were encouraged to consider both short and long term improvements for each issue. Each improvement considered has been categorized as short-term, mid-term, or long-term based on the definitions shown in Table 2. Additionally, a cost category has been assigned to each improvement based on the parameters set forth in Table 2.

Table 2: Estimated Time Frame and Costs Breakdown

| Time Frame | Duration | Cost Category | Amount |
|-------------------|-----------------|----------------------|-------------------|
| Short-Term | <1 Year | Low | <\$10,000 |
| Mid-Term | 1-3 Years | Medium | \$10,001-\$50,000 |
| Long-Term | >3 Years | High | >\$50,000 |

Table 3 summarizes potential recommendations discussed by the audit team. The recommendations are categorized based on the potential safety payoff, as well as by time frame and cost. The safety payoff is a qualitative judgment of the effectiveness of the potential safety improvements.

Table 3: Potential Safety Enhancement Summary

| Safety Issue | Potential Safety Enhancement | Safety Payoff | Time Frame | Cost | Roadway Jurisdiction |
|---|--|---------------|------------|--|----------------------|
| Pedestrian Accommodation | Consider reconstructing sidewalks on Elliot Street and Woodward Street and maintaining consistent clear zone meeting ADA and AAB guidelines. | Medium | Mid-term | Medium | Newton/ MassDOT |
| Pedestrian Accommodation | Consider restriping all crosswalks, including the crosswalk across the Elliot Street channelized right-turn lane, with high visibility markings to increase conspicuousness and awareness. High visibility markings can be applied to existing crosswalk and include “Ladder” type crosswalk hatching for improved safety. | Medium | Short-term | Low | MassDOT |
| Pedestrian Accommodation | Consider shifting the Elliot Street channelized right-turn lane crosswalk further south on the island and providing new pedestrian curb ramps and sidewalk connections to the crosswalks at Route 9. | Medium | Mid-term | Medium | MassDOT |
| Pedestrian Accommodation | Verify the programmed settings for the APS pushbuttons and spoken messages. Consider switching settings to ambient noise setting if not already programmed. Consider relocating pushbuttons greater than ten feet apart to change to percussive tone setting for walk indication. | Medium | Short-term | Low | MassDOT |
| Pedestrian Accommodation | Consider widening the curb radius along with sidewalk on the southwest corner of the intersection. Turning movements for larger trucks and emergency vehicles should be verified as part of this enhancement. | Medium | Long-term | High  | MassDOT |
| Pedestrian Accommodation | Consider providing the missing crosswalk across the Route 9 west leg of the intersection, including new pedestrian curb ramps, pedestrian signals, and phasing. | Medium | Mid-term | Medium | MassDOT |
| Elliot Street Channelized Right-Turn Lane | Consider installing signage and pavement markings for the merge to better define the lane designation. | High | Mid-term | High | Newton/ MassDOT |

| Safety Issue | Potential Safety Enhancement | Safety Payoff | Time Frame | Cost | Roadway Jurisdiction |
|--|---|---------------|------------|--------|-----------------------------|
| Elliot Street Channelized Right-Turn Lane | Consider signaling the channelized right-turn lane for protected movement. | Medium | Mid-term | Medium | MassDOT |
| Elliot Street Channelized Right-Turn Lane, Bus Stop and Transit Accommodations | Consider removing the bus shelter and reconfiguring the curb line to better define the existing roadway alignment. | Medium | Mid-term | Medium | Newton/ MassDOT |
| Elliot Street Channelized Right-Turn Lane | Consider replacing Yield signage with proper signage (size and mounting height) and new pavement markings for yield line “shark teeth” to provide better visibility of the yield control. | Medium | Short-term | Low | Boston/ MassDOT |
| Elliot Street Channelized Right-Turn Lane | Consider restricting U-turns from Route 9 westbound to eliminate one additional conflicting movement for the channelized right-turn lane. | Low | Short-term | Low | MassDOT |
| Bus Stop and Transit Accommodations | Verify the bus shelter ownership as well as the land ownership and whether the shelter is currently in use. If not in use, consider with the owner, removing the bus shelter and bumping out the curb line to narrow the existing roadway width to help reduce driver confusion over the merge. | Medium | Mid-term | Medium | MBTA/ Newton/ MassDOT |
| Bus Stop and Transit Accommodations | Consider relocation of existing southbound bus stop to far side location on Elliot Street. Consideration should be taken to the frequency of the bus at this stop location. This enhancement would require coordination between the MBTA, MassDOT and the City of Newton. | Medium | Short-term | Medium | MBTA/ Newton/ MassDOT |
| Bus Stop and Transit Accommodations | Consider relocating/improving existing bus stops on Woodward Street to meet accessibility requirements. Paving the grass strip provided for the northbound stop or relocating the stop further south, closer to the intersection could also be considered | Medium | Short-term | Low | MBTA/ Newton/ MassDOT |
| Bus Stop and Transit Accommodations | Consider relocating the Eliot Station to the southeast and providing access via the Plaza parking lot. | Low | Long-term | High | MBTA |

| Safety Issue | Potential Safety Enhancement | Safety Payoff | Time Frame | Cost | Roadway Jurisdiction |
|-------------------------------------|--|---------------|------------|--|-----------------------------|
| Bus Stop and Transit Accommodations | Coordinate with Northland Developer on the shuttle service as it pertains to the intersection and its operations. Shuttle stops, frequency and routes should be coordinated with the MBTA, MassDOT and the City of Newton to avoid conflicts with existing bus service | Low | Mid-term | Low | MBTA/ Newton/ MassDOT |
| Access Management | Consider “Do Not Block the Box” signage and markings for these driveways. This enhancement may be limited to due to the multiple driveways in succession but should be considered to the greatest extent practical. Consideration should be given to whether laws/regulations are strictly for intersection as opposed to driveways. | Medium | Short-term | Low | Newton/ MassDOT |
| Access Management | Consider re-installing no parking signs along the east side of Elliot Street to avoid issues of larger vehicles blocking traffic. Confirm the jurisdiction of the two gas station driveways and which layout they abut. | Low | Short-term | Low | Newton/ MassDOT |
| Access Management | Continued enforcement of Elliot Street for vehicles parking on the street. | Low | Short-term | Low (Reduced enforcement elsewhere) | Newton |
| Access Management | Consider consolidating driveways on Elliot Street to reduce the number or curb openings and conflicts with pedestrians. | Medium | Mid-term | Medium | Newton/ MassDOT |
| Access Management | Consider the closure of the southern Plaza entrance on Elliot Street. | Medium | Mid-term | Medium | Newton |
| Access Management | Coordinate driveway consolidation and Plaza circulations with property owners when any future redevelopment happens. | Medium | Long-term | High | Newton |
| Access Management | Consider restricting the northern plaza driveway on Elliot Street to right-in, right-out operations. | Medium | Mid-term | Medium | Newton/ MassDOT |
| Traffic Signal Operation | Consider removing left turns from both Route 9 approaches. This enhancement would require | Medium | Long-term | High | Newton/ MassDOT |

| Safety Issue | Potential Safety Enhancement | Safety Payoff | Time Frame | Cost | Roadway Jurisdiction |
|--------------------------|--|---------------|------------|--------|-----------------------------|
| | discussion between MassDOT and the City of Newton as well as an in-depth study of the traffic impacts at nearby intersections as a result of the left-turn displacements. | | | | |
| Traffic Signal Operation | Consider relocation/installation of an additional optical pre-emption detector further south on Elliot Street to trigger the signal with significant time to clear the intersection and the Elliot Street approach prior to arrival of fire trucks. Possible locations for detector include the MBTA Green Line bridge structure or an existing signal post adjacent to the City lot, south of the bridge. This enhancement would require coordination between the MBTA, MassDOT and the City of Newton Fire Department. | Medium | Mid-term | Medium | MBTA/ Newton/ MassDOT |
| Traffic Signal Operation | Consider installation of GPS-based pre-emption detection that is currently used throughout the City of Newton at signalized intersections. This enhancement would require coordination between MassDOT and the City of Newton Fire Department. | Medium | Mid-term | Medium | Newton/ MassDOT |
| Traffic Signal Operation | Consider on-street parking for Woodward Street and whether existing roadway width could accommodate parking safely. MBTA bus stops should also be considered as part of this enhancement to ensure intersection and bus operations are not significantly impacted. | Low | Mid-term | Medium | Newton/ MassDOT |
| Traffic Signal Operation | Consider Red Signal Ahead illuminated sign on the Route 9 eastbound approach prior to the MBTA Green Line bridge | Medium | Mid-term | Medium | MassDOT |

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit

Newton, MA

**Route 9 (Boylston St) at Elliot St,
Woodward St, Ramsdell Rd and Glenmore Ter**

**Meeting Location: Virtual
Via Microsoft Teams Meeting
Tuesday, April 15, 2021
Time 1:00 PM – 4:00 PM**

Type of meeting: High Crash Location – Road Safety Audit
Attendees: Invited Participants to Comprise a Multidisciplinary Team
Please bring: Thoughts and Enthusiasm!!

1:00 PM Welcome and Introductions

1:15 PM Discussion of Safety Issues

- Crash history, Speed Regulations – provided in advance
- Existing Geometries and Conditions

2:15 PM View Video Footage and Pictures of Site

- View videos and pictures of the intersection
- As a group, identify areas for improvement

2:45 PM Discussion of Potential Improvements

- Discuss observations and finalize safety issue areas
- Discuss potential improvements and finalize recommendations

4:00 PM Adjourn for the Day – but the RSA has not ended

Instructions for Participants:

- Before attending the RSA on April 15th, participants are encouraged to drive/walk through the intersection and complete/consider elements on the RSA Prompt List with a focus on safety.
- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas, but are reminded that the synergy that develops and respect for others' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.

Appendix B. RSA Audit Team Contact List

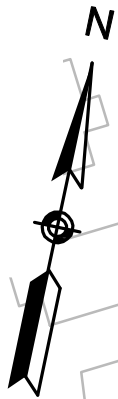
Participating Audit Team Members

Date: April 15, 2021

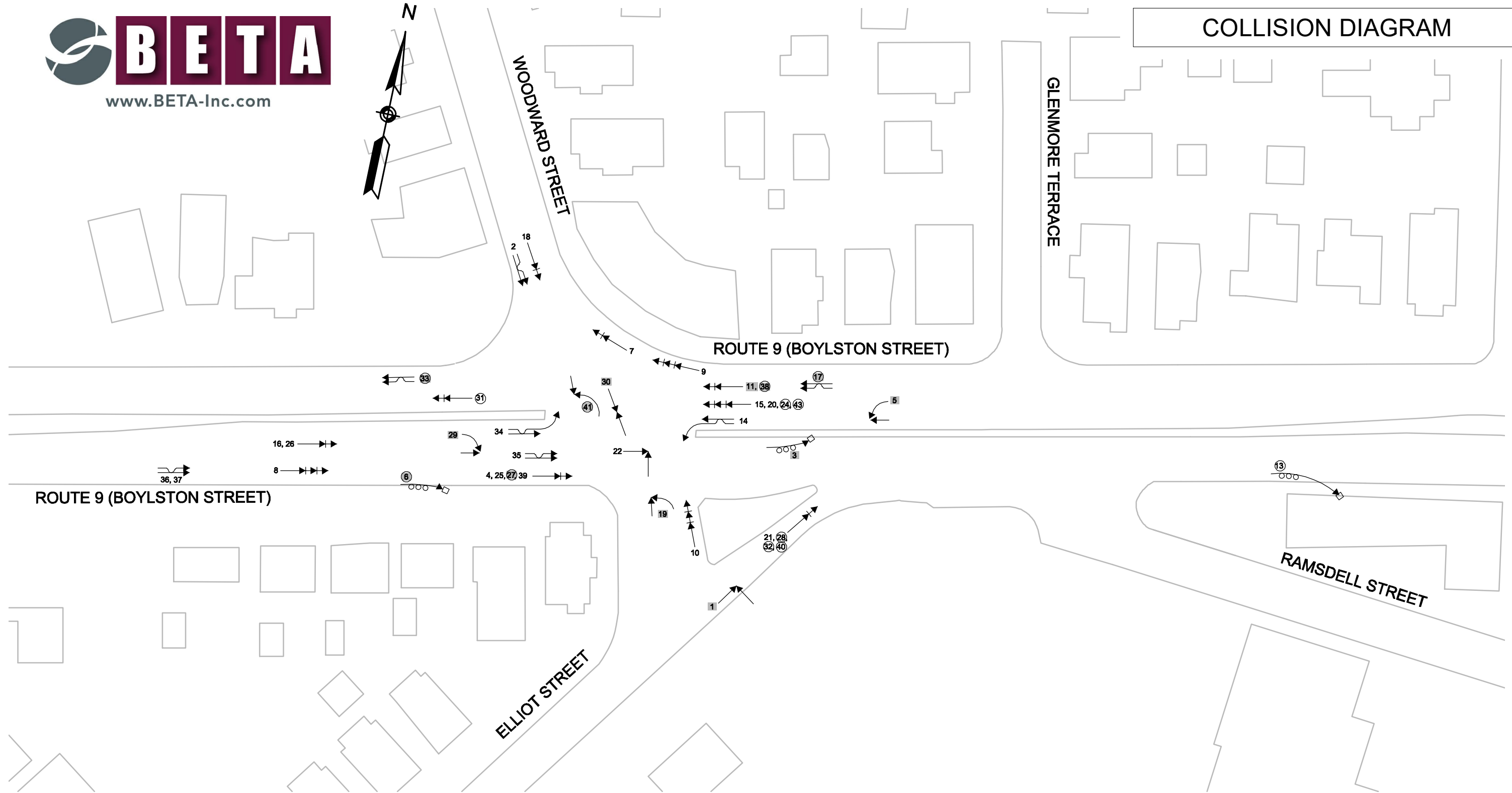
Location: Newton – Route 9 (Boylston St) at Elliot St/Woodward St/Glenmore Terr/Ramsdell St

| Audit Team Member | Agency/Affiliation | Email Address |
|--------------------------|--|---------------------------------|
| Justin Curewitz | BETA | JCurewitz@BETA-Inc.com |
| Jeff Maxtutis | BETA | JMaxtutis@BETA-Inc.com |
| Charles Creagh | BETA | CCreagh@BETA-Inc.com |
| Kevin Fitzgerald | MassDOT Traffic Safety | kevin.t.fitzgerald@state.ma.us |
| Dakota DelSignore | MassDOT Traffic Safety | dakota.d.delsignore@state.ma.us |
| Nick Zhao | MassDOT Traffic Safety | nick.w.zhao@dot.state.ma.us |
| Hameed Pervez | MassDOT D6 Projects | Hameed.Pervez@state.ma.us |
| Amitai Lipton | MassDOT D6 Traffic Engineering & Transit Coordinator | amitai.lipton@state.ma.us |
| Jesus Bastardo | MassDOT D6 Traffic | Jesus.Bastardo@state.ma.us |
| Josh Weiland | MBTA Service Planning | jweiland@mbta.com |
| Lt. John Kelly | Mass State Police | John.Kelly@pol.state.ma.us |
| Jason Sobel | City of Newton, DPW Transportation Director | jsobel@newtonma.gov |
| Issac Prizant | City of Newton, DPW Traffic Engineer | iprizant@newtonma.gov |
| David Koses | City of Newton, DPW Transportation Coordinator | dkoses@newtonma.gov |
| Lou Taverna | City of Newton, City Engineer | ltaverna@newtonma.gov |
| Jini Fairley | City of Newton, ADA Coordinator | jfairley@newtonma.gov |
| Nicole Freedman | City of Newton, Director of Transportation Planning | nfreedman@newtonma.gov |
| Lt. Jay Bourgeois | Newton Fire Department | jbourgeois@newtonma.gov |
| Sgt. Michael Wade | Newton Police Department | mwade@newtonma.gov |
| Mark Abbott | CTPS | mabbott@ctps.org |

Appendix C. Detailed Crash Data



COLLISION DIAGRAM



Crashes 12, 23, 42, and 44 are not able to be mapped

Intersection: Route 9 (Boylston Street) with Elliot Street/Woodward Street/Ramsdell Street/Glenmore Terrace
 Date Range: January 2017 - December 2019

| SYMBOLS | COLLISION TYPES |
|--------------------------|-------------------|
| ← Moving Vehicle | ← Rear End |
| ← Backing Vehicle | ← Head On |
| --- Non-Involved Vehicle | ← Side Swipe |
| ⦿ Pedestrian | ← Out of Control |
| ⦿ Bicycle | ← Left Turn |
| ▣ Parked Vehicle | ← Right Angle |
| □ Fixed Object | ⦿ Nighttime Crash |
| ○ Fatal Accident | |
| ○ Injury Accident | |

Crash Data Summary Table

Route 9 (Boylston Street) with Elliot Street/Woodward Street/Ramsdell Street/Glenmore Terrace - Newton, MA

January 2017 - December 2019

| Crash Diagram Ref # | Crash Date <i>m/d/y</i> | Crash Day | Time of Day <i>hh:mm</i> | Manner of Collision <i>Type</i> | Light Condition <i>Type</i> | Weather Condition <i>Type</i> | Road Surface <i>Type</i> | Driver Contributing Code <i>Type</i> | Injury Status <i>Type</i> | Comments |
|---------------------|----------------------------|-----------|-----------------------------|------------------------------------|--------------------------------|----------------------------------|-----------------------------|--|------------------------------|---|
| 1 | 1/13/17 | Friday | 4:49 PM | Angle | Dark - lighted roadway | Clear | Dry | Failed to yield right of way | PDO | Departing gas station driveway onto Elliott and struck another vehicle. |
| 2 | 2/11/17 | Saturday | 12:23 PM | Sideswipe, same direction | Daylight | Clear | Snow | Unknown | PDO | Large truck was making a wide right turn from the left lane. Vehicle in the right lane tried to pass and struck truck. |
| 3 | 3/4/17 | Saturday | 1:00 AM | Single Vehicle Crash | Dark - lighted roadway | Snow | Wet | Exceeded authorized speed limit | PDO | Vehicle travelling eastbound on Route 9 lost control of vehicle and struck center median barrier. |
| 4 | 4/9/17 | Sunday | 12:53 PM | Rear-end | Daylight | Clear | Dry | Followed too closely | PDO | Vehicle 1 slowed for yellow light. Vehicle 2 was speeding (50 mph in 40 mph zone) and struck Vehicle 1. |
| 5 | 5/30/17 | Tuesday | 10:50 PM | Angle | Dark - lighted roadway | Clear | Dry | Inattention | PDO | Vehicle 2 swerved in front of Vehicle 1 when attempting to change lanes; resulted in rollover. |
| 6 | 6/3/17 | Saturday | 11:30 PM | Single Vehicle Crash | Dark - lighted roadway | Clear | Dry | Disregarded traffic signs, signals, road markings | Possible Injury | Vehicle departed the roadway and struck a utility pole prior to the intersection with Elliot Street. |
| 7 | 7/10/17 | Monday | 1:00 PM | Rear-end | Daylight | Clear | Dry | Unknown | PDO | Vehicle 1 was turning right on to Woodward Street when struck from behind by an westbound vehicle (Vehicle 2). Vehicle 2 fled the scene. |
| 8 | 7/17/17 | Monday | 2:21 PM | Rear-end | Daylight | Clear | Dry | Other improper action | PDO | Vehicle 1 and Vehicle 2 stopped in traffic. Vehicle 3 struck Vehicle 2 and pushed it into Vehicle 1. |
| 9 | 7/26/17 | Wednesday | 5:55 PM | Rear-end | Daylight | Clear | Dry | Followed too closely | PDO | Vehicle 1 was turning right onto Woodward Street with Vehicle 2 following. Vehicle 1 slowed to make right turn, Vehicle 2 was unable to stop and struck Vehicle 1 from the rear. Vehicle 3 then struck Vehicle 2 from behind. |
| 10 | 8/16/17 | Wednesday | 9:36 AM | Rear-end | Daylight | Clear | Dry | Distracted | PDO | Vehicle 2 and Vehicle 3 stopped at red light on Elliot Street. Vehicle 1 struck Vehicle 2 and pushed it into Vehicle 3. Dog jumped from back seat to front seat causing distraction to driver of Vehicle 1. |
| 11 | 8/18/17 | Friday | 10:30 PM | Rear-end | Dark - lighted roadway | Clear | Dry | Followed too closely | PDO | Vehicle 1 was slowing for traffic ahead when struck from behind by Vehicle 2. |
| 12 | 9/7/17 | Thursday | 3:25 PM | Rear-end | Daylight | Clear | Dry | Followed too closely | PDO | Vehicle 2 merged into westbound traffic on Route 9. Traffic slowed suddenly for traffic light and Vehicle 2 struck Vehicle 1. |
| 13 | 9/8/17 | Friday | 5:45 AM | Single Vehicle Crash | Dawn | Clear | Dry | Other improper action | Possible Injury | Fell asleep at wheel. Crashed into gas station building. |
| 14 | 10/25/17 | Wednesday | 11:40 AM | Sideswipe, same direction | Daylight | Rain | Wet | No Improper Driving | PDO | Vehicle 1 was stopped in the westbound through lane when a fire truck turned left onto Elliot Street and damaged the driver's side rear-view mirror. Crash actually occurred at approximately 11:40 AM. |
| 15 | 10/29/17 | Sunday | 11:48 AM | Rear-end | Daylight | Rain | Wet | Made an improper turn | PDO | Vehicle 1 attempted to take left-turn from through lane resulting in Vehicle 4 striking Vehicle 3 and pushing it into Vehicle 2. Vehicle 1 was not struck. |
| 16 | 11/30/17 | Thursday | 7:05 AM | Rear-end | Daylight | Clear | Dry | Other improper action | PDO | Vehicle 3 attempted to pass Vehicle 2, striking rear-view mirror of Vehicle 2 and then rear-ending Vehicle 1 who was stopped in traffic. |
| 17 | 12/26/17 | Tuesday | 6:46 PM | Sideswipe, same direction | Dark - lighted roadway | Clear | Dry | Disregarded traffic signs, signals, road markings | Possible Injury | Vehicle 1 attempted to switch lanes and struck Vehicle 2. |
| 18 | 12/27/17 | Wednesday | 3:38 PM | Rear-end | Daylight | Clear | Dry | Inattention | PDO | Vehicle 1 stopped at red light, southbound at intersection of Woodward St. and Boylston St. Operator of Vehicle 2 was not paying attention and rear-ended Vehicle 1. |
| 19 | 2/5/18 | Monday | 7:30 PM | Angle | Dark - lighted roadway | Clear | Dry | Failure to keep in proper lane or running off road | | Vehicle 2 traveling in left turn lane on Elliot Street at intersection with Boylston St. Vehicle 1 attempted to take a left turn from adjacent through only lane, causing Vehicle 2 to strike Vehicle 1 left rear wheel. |
| 20 | 2/19/18 | Monday | 7:35 AM | Rear-end | Daylight | Clear | Dry | Followed too closely | PDO | Vehicle 1 stopped for emergency vehicle exiting Elliott Street. Vehicle 2 swerved to avoid Vehicle 1 and rear-ended them. Vehicle 3 then rear-ended Vehicle 2. |
| 21 | 3/23/18 | Friday | 5:10 PM | Rear-end | Daylight | Clear | Dry | Followed too closely | PDO | Vehicle 2 thought Vehicle 1 (stopped at yield sign) was going to proceed with a break in traffic. Rear-ended Vehicle 1 as a result. |
| 22 | 4/21/18 | Saturday | 6:15 AM | Angle | Daylight | Clear | Dry | No Improper Driving | PDO | Severe sun glare (eastbound) caused driver to not see red light. |
| 23 | 5/2/18 | Wednesday | 7:05 AM | Rear-end | Daylight | Clear | Dry | Inattention | PDO | Vehicle 1 slowed due to traffic conditions, resulting in Vehicle 2 failure to stop in time causing a rear-end collision. |
| 24 | 5/16/18 | Wednesday | 12:55 PM | Rear-end | Daylight | Clear | Dry | Inattention | Possible Injury | Vehicle 2 and Vehicle 3 stopped in traffic at red light on Route 9 westbound. Vehicle 1 rear ended Vehicle 2 and pushed it into Vehicle 3. Vehicle 3 was a school bus van. |
| 25 | 6/19/18 | Tuesday | 1:59 PM | Rear-end | Daylight | Cloudy | Dry | Followed too closely | PDO | Vehicle 1 and 2 were stopped in traffic westbound. Vehicle 2 thought Vehicle 1 was going to move and rear-ended Vehicle 1. |

Crash Data Summary Table

Route 9 (Boylston Street) with Elliot Street/Woodward Street/Ramsdell Street/Glenmore Terrace - Newton, MA

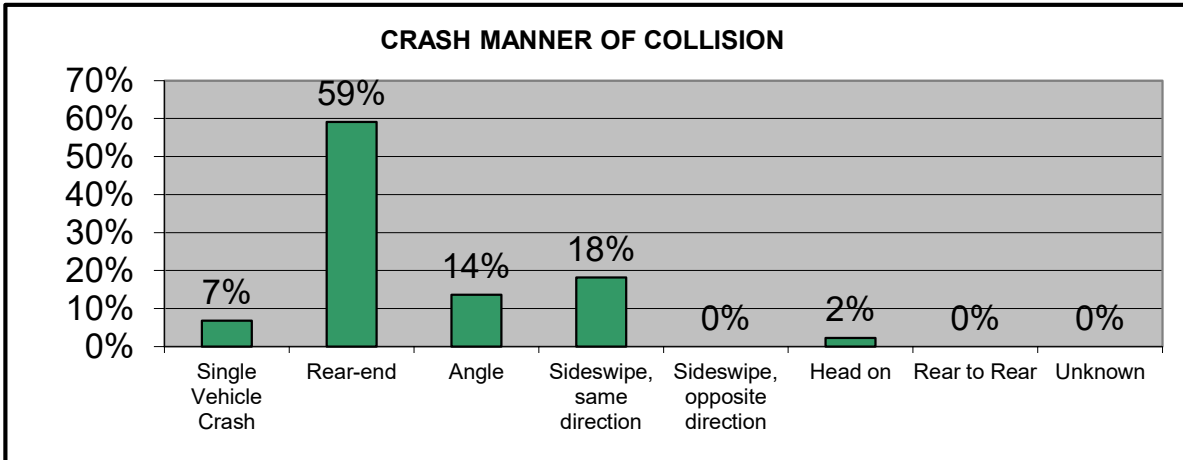
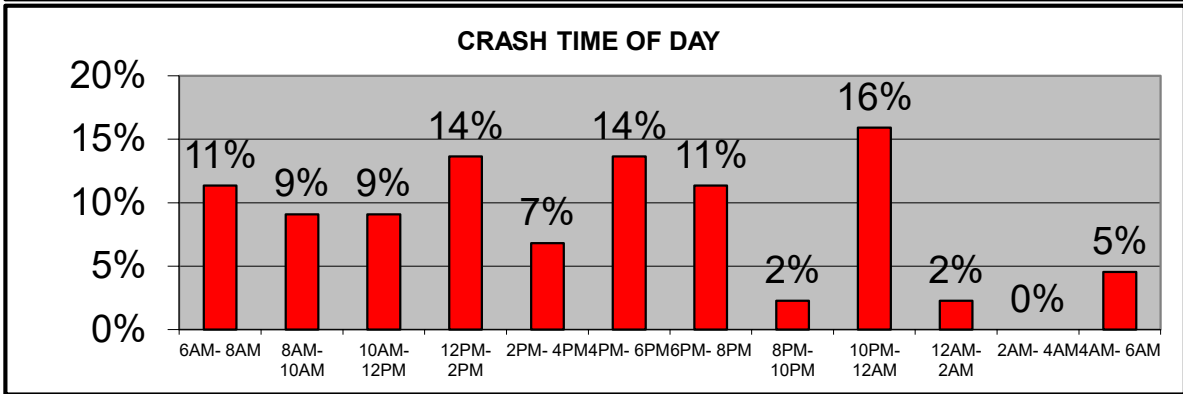
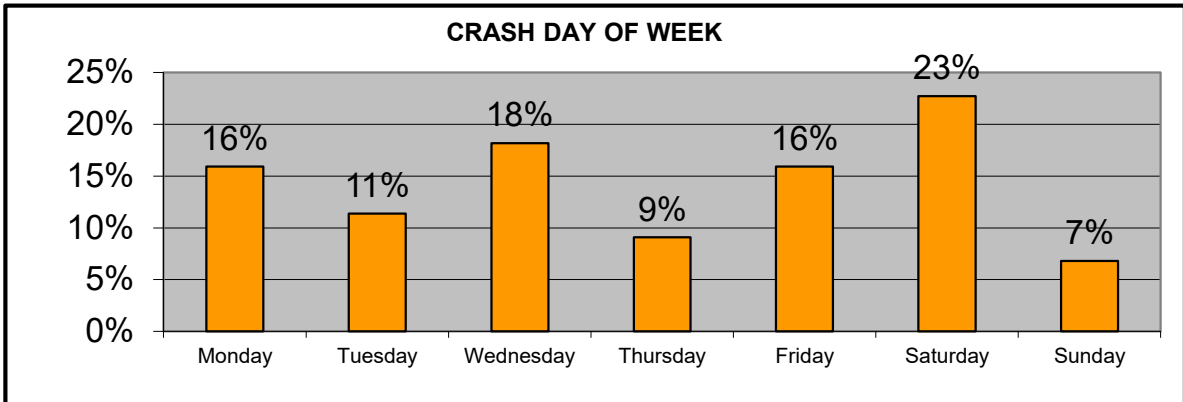
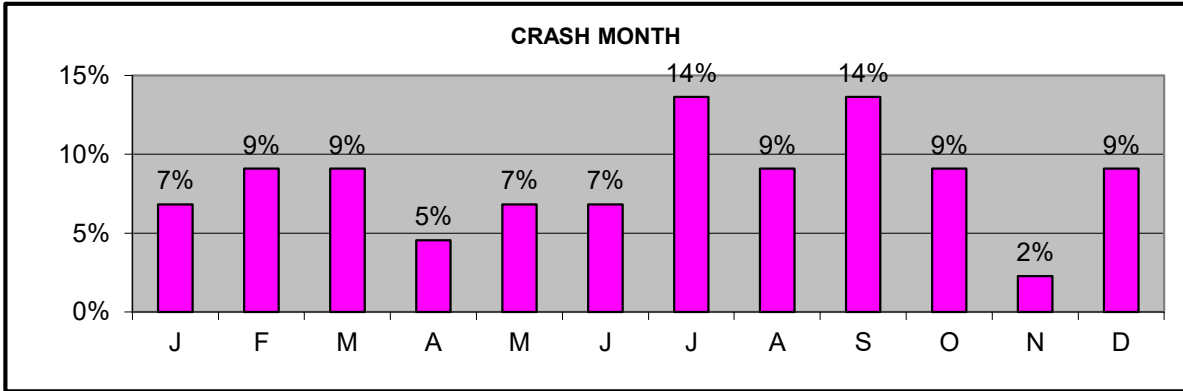
January 2017 - December 2019

| Crash Diagram Ref # | Crash Date <i>m/d/y</i> | Crash Day | Time of Day <i>hh:mm</i> | Manner of Collision <i>Type</i> | Light Condition <i>Type</i> | Weather Condition <i>Type</i> | Road Surface <i>Type</i> | Driver Contributing Code <i>Type</i> | Injury Status <i>Type</i> | Comments |
|---------------------|----------------------------|-----------|-----------------------------|------------------------------------|--------------------------------|----------------------------------|-----------------------------|---|------------------------------|---|
| 26 | 6/29/18 | Friday | 8:25 AM | Rear-end | Daylight | Clear | Dry | Inattention | PDO | Vehicle 1 traveling eastbound and came to a stop in traffic when rear-ended by Vehicle 2. Operator of Vehicle 2 looked down briefly and failed to stop in time. |
| 27 | 7/21/18 | Saturday | 11:43 PM | Rear-end | Dark - lighted roadway | Clear | Dry | Followed too closely | Possible Injury | Vehicle 1 was stopped in traffic at the red light. Operator of Vehicle 2 was not paying attention and forcefully struck Vehicle 1 (11 passengers). |
| 28 | 8/10/18 | Friday | 8:44 AM | Rear-end | Daylight | Clear | Dry | Inattention | Possible Injury | Vehicle 1 was stopped at yield sign. Vehicle 2 looked at oncoming traffic and inadvertently let off the brake, striking Vehicle 1. |
| 29 | 8/25/18 | Saturday | 10:55 PM | Angle | Dark - lighted roadway | Clear | Dry | No Improper Driving | PDO | Vehicle 3 struck Vehicle 2 and pushed laterally into Vehicle 1. Vehicle 3 fled scene. |
| 30 | 10/7/18 | Sunday | 7:28 PM | Head on | Dark - lighted roadway | Rain | Wet | Inattention | PDO | Two drivers, each turning left on a green, head-on collision. |
| 31 | 12/19/18 | Wednesday | 6:15 AM | Rear-end | Dawn | Clear | Dry | Illness | Possible Injury | Vehicle 2 made u-turn from Route 9 EB to Route 9 WB then was rear-ended by Vehicle 1 traveling WB on Route 9. Operator of Vehicle 1 was in medical distress. |
| 32 | 1/28/19 | Monday | 11:41 AM | Rear-end | Daylight | Clear | Dry | Inattention | Possible Injury | Vehicle 1 traveling from Elliot Street to Route 9 East when stopped at yield sign waiting to merge. Started and stopped because it was unsafe to proceed, as a result Vehicle 2 rear-ended Vehicle 1. |
| 33 | 1/28/19 | Monday | 6:20 PM | Sideswipe, same direction | Dark - lighted roadway | Clear | Dry | Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner | Possible Injury | Vehicles 1 and 2 were stopped on side of the road for unrelated crash. Vehicle 3 struck Vehicle 2, which struck operator of Vehicle 2 (outside of car exchanging information), knocking the operator to the ground. Operator of Vehicle 3 was arrested for OUI. |
| 34 | 2/21/19 | Thursday | 11:32 AM | Sideswipe, same direction | Daylight | Clear | Dry | Failure to keep in proper lane or running off road | PDO | Vehicle 1 (Tractor Trailer) was struck by Vehicle 2 as they were attempting to change lanes to avoid a disabled vehicle. |
| 35 | 3/4/19 | Monday | 4:10 PM | Sideswipe, same direction | Daylight | Unknown | Unknown | Unknown | PDO | Vehicle 1 was traveling in the middle lane and was struck by Vehicle 2 which was attempting to change lanes from the far right lane to the left lane. |
| 36 | 3/30/19 | Saturday | 9:23 AM | Sideswipe, same direction | Daylight | Clear | Dry | Failed to yield right of way | PDO | Crash resulted from a construction zone merge from two lanes to one lane. |
| 37 | 7/18/19 | Thursday | 5:44 AM | Sideswipe, same direction | Dawn | Clear | Dry | Failure to keep in proper lane or running off road | PDO | Vehicle 1 changed lanes abruptly to avoid traffic and struck Vehicle 2. |
| 38 | 7/24/19 | Wednesday | 10:13 PM | Rear-end | Dark - lighted roadway | Clear | Dry | Disregarded traffic signs, signals, road markings | Possible Injury | Abrupt stop at traffic light led to rear-end crash |
| 39 | 9/10/19 | Tuesday | 6:15 PM | Rear-end | Daylight | Clear | Dry | Followed too closely | PDO | Vehicle 1 (motorcycle) and Vehicle 2 in stop and go traffic. Vehicle 2 struck Vehicle 1. |
| 40 | 9/14/19 | Saturday | 12:11 PM | Rear-end | Daylight | Cloudy | Dry | Inattention | Possible Injury | Vehicle 1 thought Vehicle 2 (stopped at yield sign) was going to proceed with a break in traffic. Rear-ended Vehicle 2 as a result. Precautionary transport to Hospital because newborn was in the car. |
| 41 | 9/20/19 | Friday | 8:16 PM | Angle | Dark - lighted roadway | Clear | Dry | Made an improper turn | Possible Injury | Failure to yield while making left turn. |
| 42 | 9/21/19 | Saturday | 10:15 PM | Rear-end | Dark - lighted roadway | Clear | Dry | Cellular telephone | PDO | Distracted by cell phone and rear-ended another vehicle. |
| 43 | 10/15/19 | Tuesday | 5:56 PM | Rear-end | Dusk | Clear | Dry | Followed too closely | Possible Injury | Vehicle 1 yielded to ambulance. Vehicle 2 stopped behind Vehicle 1. Vehicle 3 struck Vehicle 2 and pushed it into Vehicle 1. |
| 44 | 12/7/19 | Saturday | 5:00 PM | Rear-end | Dark - lighted roadway | Clear | Dry | Other improper action | Possible Injury | Vehicle 1 slowed for traffic. Vehicle 2 struck Vehicle 1. |

Summary based on Crash Reports obtained from the Newton Police & Massachusetts State Police

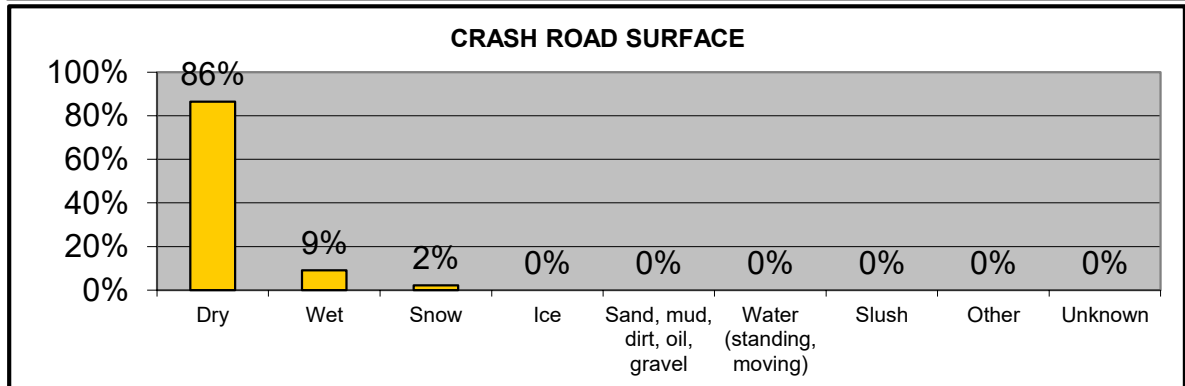
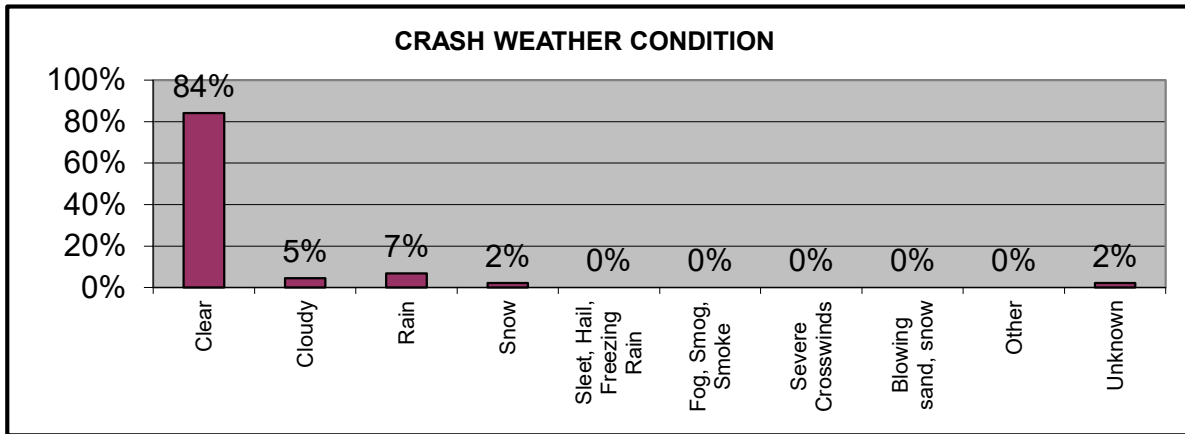
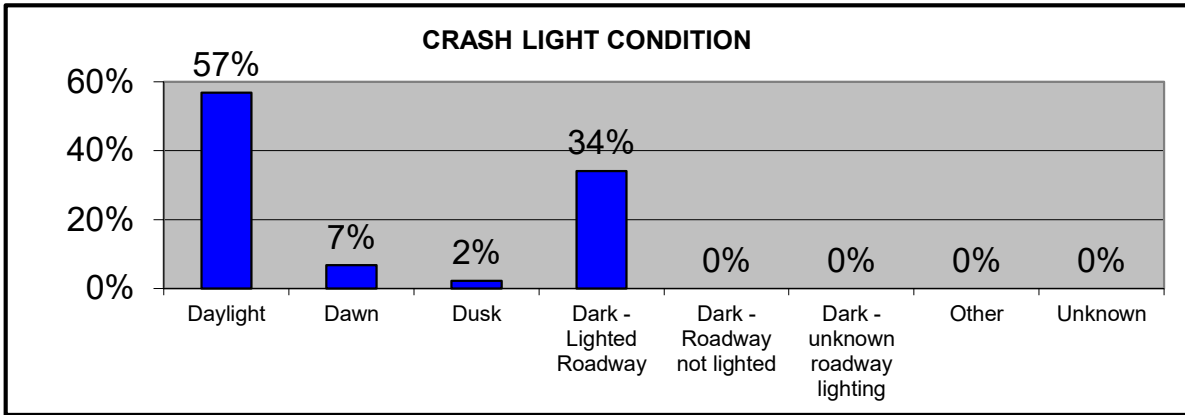
Crash Data Summary Tables and Charts

Route 9 (Boylston St) with Elliot St/Woodward St/Ramsdell St/Glenmore Ter - Newton, MA



Crash Data Summary Tables and Charts

Route 9 (Boylston St) with Elliot St/Woodward St/Ramsdell St/Glenmore Ter - Newton, MA



Appendix D. Speed Regulations

April 23, 1973
150-73

Bill Sullivan

CITY OF NEWTON
SPECIAL SPEED REGULATION NO. 785

Highway Location: NEWTON
Authority In Control: CITY OF NEWTON
Name of Highway: Tremont Street
Waverley Avenue
Woodward Street
Lowell Avenue
River Street
East Side Parkway
Algonquin Road
California Street
Newtonville Avenue
Cabot Street
Langley Road

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is

hereby Adopted
by the Board of Aldermen
of the City of Newton

That the following speed limits are established at which motor vehicles may be operated in the areas described:

TREMONT STREET - EASTBOUND

Beginning at Park Street

Thence easterly on Tremont Street
0.15 miles at 25 miles per hour
0.30 " " 35 " " " ending at the Boston
line; the total distance being 0.45 miles.

TREMONT STREET - WESTBOUND

Beginning at the Boston line

Thence westerly on Tremont Street
0.30 miles at 25 miles per hour
0.15 " " 25 " " " ending at Park
Street; the total distance 0.45 miles.

WAVERLEY AVENUE - NORTHBOUND

Beginning at a point 200 feet north of Ward Street

Thence northerly on Waverley Avenue

0.77 miles at 30 miles per hour

0.35 " " 25 " " " ending at Washington

Street; the total distance being 1.12 miles.

WAVERLEY AVENUE - SOUTHBOUND

Beginning at Washington Street

Thence southerly on Waverley Avenue

0.35 miles at 25 miles per hour

0.81 " " 30 " " " ending at Ward Street;

the total distance being 1.16 miles.

WOODWARD STREET - EASTBOUND

Beginning at a point 250 feet east of Beacon Street

Thence easterly on Woodward Street

0.25 miles at 25 miles per hour

0.58 " " 35 " " "

0.17 " " 25 " " " ending at Route 9;

the total distance being 1.00 miles.

WOODWARD STREET - WESTBOUND

Beginning at Route 9

Thence westerly on Woodward Street

0.17 miles at 25 miles per hour

0.58 " " 35 " " "

0.30 " " 25 " " " ending at Beacon Street;

the total distance being 1.05 miles.

LOWELL AVENUE - NORTHBOUND

Beginning at Commonwealth Avenue

Thence northerly on Lowell Avenue

0.73 miles at 30 miles per hour

0.58 " " 25 " " " ending at Crafts Street;

the total distance being 1.31 miles.

LOWELL AVENUE - SOUTHBOUND

Beginning at Crafts Street

Thence southerly on Lowell Avenue

0.58 miles at 25 miles per hour

0.73 " " 30 " " "

Avenue; the total distance being 1.31 miles. ending at Commonwealth

RIVER STREET - NORTHBOUND

Beginning at Waltham Street

Thence northerly on River Street

0.40 miles at 25 miles per hour

0.41 " " 30 " " "

Street; the total distance being 0.81 miles. ending at Lexington

RIVER STREET - SOUTHBOUND

Beginning at Lexington Street

Thence southerly on River Street

0.41 miles at 30 miles per hour

0.40 " " 25 " " "

the total distance being 0.81 miles. ending at Waltham Street;

EAST SIDE PARKWAY - NORTHBOUND

Beginning at Cabot Street

Thence northerly on East Side Parkway

0.35 miles at 25 miles per hour ending at Newtonville

Avenue; the total distance being 0.35 miles.

EAST SIDE PARKWAY - SOUTHBOUND

Beginning at a point 250 south of Newtonville Avenue

Thence southerly on East Side Parkway

0.30 miles at 25 miles per hour ending at Cabot Street;

the total distance being 0.30 miles.

ALGONQUIN ROAD - NORTHBOUND

Beginning at Commonwealth Avenue

Thence northerly on Algonquin Road

0.34 miles at 25 miles per hour ending at Woodchester

Drive; the total distance being 0.34 miles.

ALGONQUIN ROAD - SOUTHBOUND

Beginning at Woodchester Drive

Thence southerly on Algonquin Road

0.34 miles at 25 miles per hour ending at Commonwealth Avenue; the total distance being 0.34 miles.

LIFORNIA STREET - NORTHBOUND

Beginning at Crafts Street

Thence northerly on California Street

0.51 miles at 30 miles per hour

0.14 " " 20 " " "

0.50 " " 30 " " "

line; the total distance being 1.15 miles. ending at the Watertown

CALIFORNIA STREET - SOUTHBOUND

Beginning at the Watertown line

Thence southerly on California Street

0.50 miles at 30 miles per hour

0.14 " " 20 " " "

0.51 " " 30 " " "

the total distance being 1.15 miles. ending at Crafts Street;

NEWTONVILLE AVENUE - EASTBOUND

Beginning at Walnut Street

Thence easterly on Newtonville Avenue

1.13 miles at 25 miles per hour ending at Centre Street; the total distance being 1.13 miles.

NEWTONVILLE AVENUE - WESTBOUND

Beginning at Centre Street

Thence westerly on Newtonville Avenue

1.13 miles at 25 miles per hour ending at Walnut Street; the total distance being 1.13 miles.

CABOT STREET - EASTBOUND

Beginning at Walnut Street

Thence easterly on Cabot Street

0.27 miles at 30 miles per hour

0.39 " " 25 " " "

0.25 " " 20 " " "

the total distance being 0.91 miles. ending at Centre Street;

CABOT STREET - WESTBOUND

Beginning at Centre Street

Thence westerly on Cabot Street

0.25 miles at 20 miles per hour

0.39 " " 25 " " "

0.27 " " 30 " " "

the total distance being 0.91 miles. ending at Walnut Street;

LANGLEY ROAD - NORTHBOUND

Beginning at a point 200 feet north of Route 9

Thence northerly on Langley Road

0.14 miles at 25 miles per hour

0.61 " " 30 " " "

0.16 " " 25 " " "

the total distance being 0.91 miles. ending at Beacon Street;

LANGLEY ROAD - SOUTHBOUND

Beginning at Centre Street

Thence southerly on Langley Road

0.27 miles at 25 miles per hour

0.61 " " 30 " " "

0.18 " " 25 " " "

the total distance being 1.06 miles. ending at Route 9;

Operation of a motor vehicle at a rate of speed in excess of these limits shall be prima facie evidence that such speed is greater than is reasonable and proper.

The provisions of this regulation shall not, however, abrogate in any sense Chapter 90, Section 14, of the General Laws (Ter. Ed).

Date of Passage MAR 5 1973

Wendell R. Bauckman

Edul J. Bhal

Wesley J. Lewis

Richard M. Hall

Michael J. Galloway

James J. Camp

David W. Johnson

David Koh

Walter Jefferson

Richard J. Bullwinkel

Joseph W. Down

Henry T. Small

G.B. Concan

Board of Aldermen

Attest Joseph H. Karle
City Clerk

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 785

The Department of Public Works and the Registrar of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interests.

Standard signs must be erected at the beginning of each zone.

DATE: April 23, 1973

FOR THE DEPARTMENT OF PUBLIC WORKS

BY: V. Cantone
Traffic Engineer

David J. Lucey
Registrar of Motor Vehicles

CITY OF NEWTON
SPECIAL SPEED REGULATION NO. 5012

Mr. Sullivan

Highway Location: NEWTON

Authority In Control: CITY OF NEWTON

Name of Highway: AUBURN ST., DERBY ST., ELLIOT ST.,
GORDON RD., MILL ST., PAUL ST.,
TYLER TER., WEBSTER ST., RESERVOIR AVE.,
OTIS STREET.

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is

hereby Adopted
by the Board of Aldermen
of the City of Newton

That the following speed limits are established at which motor vehicles may be operated in the areas described:

AUBURN STREET-EASTBOUND

Beginning at Washington Street
Thence easterly on Auburn Street
0.84 miles at 25 miles per hour
0.52 " " 30 " " " ending at Commonwealth
Avenue; the total distance being 1.36 miles.

AUBURN STREET-WESTBOUND

Beginning at Commonwealth Avenue
Thence westerly on Auburn Street
0.52 miles at 30 miles per hour
0.84 " " 25 " " " ending at Washington
Street; the total distance being 1.36 miles.

DERBY STREET-NORTHBOUND

Beginning at Waltham Street
Thence northerly on Derby Street
0.76 miles at 25 miles per hour ending at the Waltham
City Line; the total distance being 0.76 miles.

DERBY STREET-SOUTHBOUND

Beginning at the Waltham City Line
Thence southerly on Derby Street
0.76 miles at 25 miles per hour ending at Waltham
Street; the total distance being 0.76 miles.

NO. 5012

ELLIOT STREET-EASTBOUND

Beginning at the Needham Town Line
Thence easterly on Elliot Street

~~0.49 miles at 25 miles per hour~~

0.46 " " 30 " " " ending at Route 9; the

total distance being 0.95 miles.

ELLIOT STREET-WESTBOUND

Beginning 100 feet west of Route 9
Thence westerly on Elliot Street

~~0.44 miles at 30 miles per hour~~

0.49 " " 25 " " " ending at the Needham

Town Line; the total distance being 0.93 miles.

GORDON ROAD-NORTHBOUND

Beginning at Beacon Street
Thence northerly on Gordon Road

0.35 miles at 25 miles per hour ending at Chestnut
Street; the total distance being 0.35 miles.

GORDON ROAD-SOUTHBOUND

Beginning at Chestnut Street
Thence southerly on Gordon Road

0.35 miles at 25 miles per hour ending at Beacon Street;
the total distance being 0.35 miles.

MILL STREET-EASTBOUND

Beginning at Walnut Street
Thence easterly on Mill Street

0.24 miles at 30 miles per hour

0.47 " " 25 " " " ending at Centre Street;

the total distance being 0.71 miles.

MILL STREET-WESTBOUND

Beginning at Centre Street
Thence westerly on Mill Street

0.47 miles at 25 miles per hour

0.24 " " 30 " " " ending at Walnut Street;

the total distance being 0.71 miles.

PAUL STREET-EASTBOUND

Beginning at Centre Street
Thence easterly on Paul Street
0.21 miles at 25 miles per hour ending at Cypress
Street; the total distance being 0.21 miles.

PAUL STREET-WESTBOUND

Beginning at Cypress Street
Thence westerly on Paul Street
0.21 miles at 25 miles per hour ending at Centre
Street; the total distance being 0.21 miles.

TYLER TERRACE-EASTBOUND

Beginning at Pleasant Street
Thence easterly on Tyler Terrace
0.26 miles at 30 miles per hour ending at Centre Street;
the total distance being 0.26 miles.

TYLER TERRACE-WESTBOUND

Beginning at Centre Street
Thence westerly on Tyler Terrace
0.26 miles at 30 miles per hour ending at Pleasant
Street; the total distance being 0.26 miles.

WEBSTER STREET-EASTBOUND

Beginning at Rowe Street
Thence easterly on Webster Street
0.76 miles at 25 miles per hour ending at Waltham Street;
the total distance being 0.76 miles.

WEBSTER STREET-WESTBOUND

Beginning at Waltham Street
Thence westerly on Webster Street
0.76 miles at 25 miles per hour ending at Rowe Street;
the total distance being 0.76 miles.

RESERVOIR AVENUE-NORTHBOUND (ONE WAY)

Beginning at Hammond Street
Thence northerly on Reservoir Avenue
0.26 miles at 30 miles per hour ending at Beacon Street;
the total distance being 0.26 miles.

OTIS STREET-EASTBOUND

Beginning at Chestnut Street
Thence easterly on Otis Street

0.85 miles at 25 miles per hour ending at Walnut Street;
the total distance being 0.85 miles.

OTIS STREET-WESTBOUND

Beginning at Walnut Street
Thence westerly on Otis Street

0.85 miles at 25 miles per hour ending at Chestnut Street;
the total distance being 0.85 miles.

Operation of a motor vehicle at a rate of speed in excess of these limits shall be prima facie evidence that such speed is greater than is reasonable and proper.

The provisions of this regulation shall not, however, abrogate in any sense Chapter 90, Section 14, of the General Laws (Ter. Ed).

Date of Passage

Date of Passage: Feb. 5, 1979

Mark A. Whole
Robert L. Sanderson
Joseph P. Pasquale
Thomas M. Galt
Rodney D. Barker

Cynthia S. Creed
Daniel M. Budy
Ernest F. Dwyer
Edith H. Sullivan
Joseph M. McMonroe
 Board of Aldermen

Attest Joseph H. Karlin
City Clerk Joseph H. Karlin

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 5012

The Department of Public Works and the Registrar of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interests.

Standard signs must be erected at the beginning of each zone.

DATE: March 13, 1979

FOR THE DEPARTMENT OF PUBLIC WORKS

Ed Thomas Curran
Chief Deputy Registrar

BY: [Signature]

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 7480

Highway Location: BROOKLINE TO FRAMINGHAM

Authority In Control: COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

Name of Highway: BROOKLINE - STATE HIGHWAY - ROUTE 9
 NEWTON - " " " "
 WELLESLEY - " " " "
 NATICK - " " " "
 FRAMINGHAM - " " " "

In accordance with the provisions of Section 18 Chapter 90 of the General Laws (Ter. Ed.) the following Special Speed Regulation is hereby promulgated:

Special Speed Regulation numbered 490, 490-A, 490-B, 490-C, 490-D, 490-E and 490-G dated November 4, 1969, October 9, 1970, December 9, 1970, October 23, 1973, February 15, 1980, October 2, 1981 and October 26, 1982 respectively are hereby amended by striking out the Regulations in their entireties and inserting in place thereof the following revisions and addenda.

The following designated speed limits are established at which motor vehicles may be operated in the areas described.

WESTBOUND

Beginning in Brookline 123 feet west of the beginning of State Highway
Thence westerly in Brookline

| | | |
|---------------|-------------------|------------------------|
| 0.49 miles at | 30 miles per hour | |
| 0.32 " " | 35 " " | " " |
| 0.42 " " | 45 " " | " " |
| 0.42 " " | 35 " " | " " |
| 1.08 " " | 40 " " | " " to the Newton Line |

Thence westerly in Newton

| |
|---------------------------------|
| 0.01 miles at 40 miles per hour |
| 0.63 " " 45 " " " |
| 0.19 " " 40 " " " |
| 0.64 " " 50 " " " |
| 0.55 " " 45 " " " |
| 0.32 " " 40 " " " |

0.73 " " 45 " " " to the Wellesley

line. Thence westerly in Wellesley

| |
|---------------------------------|
| 1.91 miles at 50 miles per hour |
| 0.71 " " 40 " " " |
| 2.47 " " 50 " " " |
| 0.11 " " 40 " " " |

missing 72/65

to the Natick Line

Thence westerly in Natick

| |
|---------------------------------|
| 0.63 miles at 40 miles per hour |
| 1.52 " " 45 " " " |
| 1.32 " " 40 " " " |

to the Framingham

Line. Thence westerly in Framingham

| |
|---------------------------------|
| 0.39 miles at 40 miles per hour |
| 0.87 " " 50 " " " |
| 0.42 " " 45 " " " |
| 0.80 " " 50 " " " |
| 0.60 " " 45 40 " " " |
| 0.41 " " 50 " " " |
| 0.94 " " 45 " " " |
| 0.96 " " 55 50 " " " |

ending at the Southborough Town Line; the total distance being 19.86 miles

EASTBOUND

Beginning at the Framingham Town Line

Thence easterly in Framingham

| |
|---------------------------------|
| 0.02 miles at 55 miles per hour |
| 0.40 " " 45 " " " |
| 0.54 " " 50 " " " |
| 0.94 " " 45 " " " |
| 0.41 " " 50 " " " |
| 0.63 " " 45 40 " " " |
| 0.77 " " 50 " " " |
| 0.42 " " 45 " " " |
| 0.87 " " 50 " " " |
| 0.39 " " 40 " " " |

to the Natick Line

Thence easterly in Natick

| |
|---------------------------------|
| 1.32 miles at 40 miles per hour |
| 1.61 " " 45 " " " |
| 0.54 " " 40 " " " |

to the Wellesley

missing
0.38 (at 40)
0.30 @ 45

Line. Thence easterly in Wellesley
 0.14 miles at 40 miles per hour
 2.44 " " 50 " " "
 0.74 " " 40 " " "
 1.88 " " 50 " " " to the Newton Line

Thence easterly in Newton
 0.73 miles at 45 miles per hour
 0.32 " " 40 " " "
 0.56 " " 45 " " "
 0.63 " " 50 " " "
 0.83 " " 40 " " " to the Brookline

Line. Thence easterly in Brookline
 1.08 miles at 40 miles per hour
 0.42 " " 35 " " "
 0.42 " " 45 " " "
 0.32 " " 35 " " "
 0.51 " " 30 " " " ending at the end
 of State Highway in Brookline; the total distance being 19.88
 miles.

Operation of a motor vehicle at a rate of speed in excess of these limits shall be prima facie evidence that such speed in greater than is reasonable and proper.

The provisions of this regulation shall not, however, abrogate in any sense, Section 14 of Chapter 90.

The Department of Public Works and the Registrar of Motor Vehicles, acting jointly do hereby certify in writing, that this regulation is consistent with the public interest.

Standard sign must be erected at the beginning of each zone.

DATE: June 11, 1990

FOR THE DEPARTMENT OF PUBLIC WORKS

BY: Robert L. Shea
 Traffic Engineer

FOR THE REGISTRY OF MOTOR VEHICLES

BY: William T. Hutch
 Chief Deputy Registrar