ROAD SAFETY AUDIT

Washington Street (Route 138) at Central Street

Town of Stoughton

March 2016

Prepared For:
MassDOT

Prepared By:
McMahon Associates, Inc.
45 Bromfield Street, 6th Floor
Boston, MA 02108

Table of Contents

List of Appendices

List of Figures

List of Tables

Background

The Federal Highway Administration (FHWA) 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. This RSA evaluates the intersection of Washington Street (Route 138) and Central Street in Stoughton, Massachusetts, as shown in Figure 1.

A safety audit was scheduled for this high crash intersection as part of a proposed gas station redevelopment located at 372 Washington Street on the northeast corner of the study area intersection. The intersection of Central Street at Washington Street (Route 138) was also identified as a Highway Safety Improvement Program (HSIP) intersection for 2011-2013.

A key objective of the RSA is to identify both short-term and long-term safety improvements that can be made at the subject intersection and incorporated in potential improvements of this intersection.

Project Data

An RSA was completed for the intersection of Washington Street (Route 138) and Central Street in the Town of Stoughton on January 27, 2016. The agenda for the RSA meeting held at the Stoughton Police Station is provided in Appendix A of this report. As shown below in Table 1, the audit team consisted of a multidisciplinary team with representatives from state, regional and local agencies providing expertise in the engineering, planning, maintenance and emergency response fields. Contact information for the RSA attendees is provided in Appendix B of this report.

Table 1. Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Erin Fredette	McMahon Associates
Rebecca Hansen	McMahon Associates
Joyce Husseini	Schools and Transportation Task Force
Raymond Guarino	Old Colony Planning Council
Shawn Bailey	Old Colony Planning Council
Michael Blount	Town of Stoughton Police Department
John Mastera	MassDOT Highway Safety
Jason Walters	MassDOT District 5 - Projects
Robert Gregory	MassDOT District 5 Traffic
Douglas Campbell	Town of Stoughton Fire Department
Thomas Fitzgerald	Town of Stoughton Public Works Department
Craig Horsfall	Town of Stoughton Engineering
Marc Tisdelle	Town of Stoughton Engineering
John Diaz	Greenman – Pedersen, Inc.
Michael Chiverton	Global Partners

Within the email invitation sent on January 11, 2016 to each participant in the RSA, background material was provided. This information included a local crash data summary and corresponding collision diagram for the subject intersection. During the RSA meeting, these materials were reviewed as a group prior to the field visit to the intersection. During the RSA field visit, various safety issues were observed and identified. Following the RSA field visit, the team returned to discuss additional concerns and potential solutions for each of the existing safety issues identified during the audit.

Project Location and Description

Study Area Roadways

As shown in Figure 1, Washington Street (Route 138) extends in a north-south direction through the Town of Stoughton. Washington Street (Route 138) is classified as an urban principal arterial under MassDOT jurisdiction. North of Central Street, Washington Street (Route 138) is a two-way roadway, providing two lanes of travel in each direction. South of Central Street, Washington Street (Route 138) continues as a two-way roadway providing one travel lane in each direction. Washington Street (Route 138) is primarily abutted by commercial and retail land uses adjacent to the study area. Sidewalks are provided along both sides of the roadway near its intersection with Central Street and there are no bicycle facilities within the study area corridor. On-street parking is prohibited on both sides of Washington Street (Route 138) in the vicinity of the intersection.

Central Street is a two-way, two-lane roadway with one lane of travel in each direction that extends in an east-west direction through the Town of Stoughton. Central Street is classified as an urban minor arterial under Town of Stoughton jurisdiction and provides access to commercial and residential land uses.

Sidewalks are provided on both sides of the roadway near its intersection with Central Street. However, the sidewalk on the south side of Central Street, west of the intersection, terminates just west of the Walgreens property. There are no bicycle facilities and parking is prohibited along Central Street.

Study Area Intersections

The intersection of Washington Street (Route 138) and Central Street is a four-legged intersection under signal control. At the intersection, Washington Street (Route 138) provides an exclusive left-turn lane, a through lane and a shared through/right-turn lane in both the northbound and southbound directions of travel. The eastbound Central Street approach to the intersection provides a shared left-turn/through lane and a shared through/ right-turn lane. The westbound Central Street approach to the intersection provides a shared left-turn/ through lane, a through lane and a channelized right-turn lane (under yield control). Crosswalks are provided across each approach of the intersection, including the westbound channelized right turn lane.

The traffic volumes at the intersection of Washington Street (Route 138) and Central Street for both the weekday morning and weekday afternoon peak hours are provided in Appendix C.

Crash Data

Crash data was obtained from the Town of Stoughton for the most recent three-year period available. The data includes yearly crash summaries for the three-year period from 2012 to 2014. Based on this data, there were a total of 38 crashes reported from the beginning of 2012 through the end of 2014 at the intersection of Washington Street (Route 138) and Central Street. The crash rate based on the local crash data for the intersection of Washington Street (Route 138) and Central Street is shown to be 1.00 crashes per million entering vehicles. Of the crashes that occurred at the intersection of Washington Street (Route 138) and Central Street, 20 (53%) were angle collisions. The angle crashes that occurred at the intersection may be caused by insufficient clearance intervals for through and left turning vehicles. Additionally, there were 12 (32%) rear-end collisions distributed relatively evenly among each of the intersection approaches. There were also three sideswipe crashes, two head-on collisions, and one single vehicle crash. Of the reported 38 crashes, seven (18%) resulted in personal injury and there were no fatalities reported at the intersection. March was the month with the highest number of crashes, equaling 18% of the total collisions, and 34% of the total crashes occurred on a Monday. The data also indicated that 71% of the crashes occurred during daylight conditions, with 29% of crashes occurring between 4:00 PM and 6:00 PM.

A summary of the crash data and a detailed crash diagram are provided in Appendix D.

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Figure 1
Site Location Map
Route 138 at Central Street
Stoughton, Massachusetts

Road Safety Audit Observations and Potential Improvements

During the RSA meeting prior to the field visit, a brief introduction of the RSA process and a summary of traffic volumes and crash information were presented to the audit participants. Following this brief presentation, the members of the audit team were asked to discuss the existing issues that may affect safety at the intersection of Washington Street (Route 138) at Central Street. The audit team then visited the site as a group, at which time observations of various safety concerns and deficiencies were identified and documented.

Provided below is a list of the safety concerns and the potential enhancements that were identified during the RSA.

Safety Issue #1: Traffic Control

Observations:

Existing eastbound Central Street approach without dedicated turn lanes

There were multiple traffic control issues for the intersection of Washington Street (Route 138) and Central Street discussed during the RSA. Audit participants noted that the shared left-turn/through lanes in both the eastbound and westbound direction on Central Street often operate as de facto left turn lanes. It was discussed that through traffic often gets trapped behind vehicles waiting to make a permissive left turn, particularly in the westbound direction where there is a lag-left protected phase. Participants stated that the de facto left turn lanes often lead to elevated driver frustration, which might cause drivers to suddenly switch lanes or travel through the red light, thus increasing the potential for crashes. The audit team stated that there are no pavement markings or signage along either Central Street approach indicating lane designations and they also noted that the left turn only lane utilization sign was missing from the mast arm for the northbound approach on Washington Street.

As previously mentioned, the westbound Central Street approach operates with a lag-left phase. It was noted that this phasing is possibly creating a left-turn trap condition. In this situation, drivers taking a permissive left turn on yellow opposite the lagging protected left movement believe that the opposing through movement will also terminate concurrently with their desired left turn, but opposing vehicles traveling straight through the intersection during the continued green interval and strike the turning vehicles.

Another issue noted during the RSA was that there are currently no tracking markings within the intersection to indicate the path of which left turning vehicles should travel. During the site visit, it was observed that opposing left-turning vehicles on Central Street were traveling very close to each other, which could possibly lead to collisions within the intersection.

After a review of the crash data, the RSA team noted that there were a high number of angle crashes within the intersection. It was discussed that the current clearance interval timing may not be long enough to allow vehicles to clear the intersection before the next phase starts. In particular, it was noted that the southbound left turn from Washington Street to eastbound Central Street operates with protected-only lead left phasing; however, five crashes, including two resulting in personal injury, occurred from this movement. Given the lead left phasing, it is evident that the left turning vehicles are running the red light which indicates a lack of proper clearance. While on the site visit, it was discovered that the existing yellow time is four seconds and the all-red time is one second for each approach. The audit team also noted that there is currently no coordination plan in place for the signals along Central Street, including the Pearl Street and Pleasant Street intersections, which may lead to inefficient travel along the Central Street corridor.

Incorrect "Keep Right" sign at the westbound Central Street approach

While on the site visit, there were a few issues observed with the existing traffic control devices. It was noted that some of the back plates for the signal heads were damaged, which may impact the visibility of the signals. A participant also stated that the number of signal heads and their placement could also be contributing to driver confusion at the intersection. Another issue noted was that the "Keep Right" sign located within the westbound island does not meet current MUTCD standards. The audit team also discussed that some of the existing pavement markings were faded.

Enhancements:

- Restripe roadway to provide exclusive left turn lanes for both the eastbound and westbound Central Street approaches.
- Add pavement markings and "Left Lane Must Turn Left" signage to alert drivers of the lane designations along Central Street.
- Add lane utilization signage to both Central Street approaches to give drivers advanced warning of the turn lane restrictions.
- Replace missing lane utilization sign on the northbound Washington Street approach to alert drivers to the turn lane configuration.
- Evaluate changing the current lag-left phasing to dual left-leading for both the eastbound and westbound Central Street approaches.
- Update existing arrow signals on Central Street to display flashing yellow during the permissive left phase.
- Evaluate protected-only phasing for Central Street left turns.
- Install tracking pavement markings for Central Street left turns.
- Evaluate and update yellow and all-red clearance intervals for each intersection approach.
- Evaluate a coordinated signal system along Central Street including its intersection with Pearl Street, Washington Street, and Pleasant Street.
- Replace missing or damaged back plates with reflectorized back plates.

- Evaluate current signal head placement and quantity to minimize driver confusion.
- Update "Keep Right" sign located within the island of the westbound intersection approach to meet current MUTCD standards.
- Restripe faded pavement markings.

Safety Issue #2: Traffic Operations

Observations:
A representative from the Town of Stoughton Police Department stated that the intersection of Washington Street (Route 138) and Central Street is an intersection that experiences a high volume of drivers that travel through the intersection even after the signal head has changed to red. This is likely due to the fact that drivers become frustrated with the congestion within the intersection and also getting stuck behind vehicles waiting to make a permissive left turn. The crash data corroborates the suggestion that congestion might lead people to make unsafe maneuvers because the highest percentage of collisions (29%) occurred between the hours of 4 PM and 6 PM when traffic volumes are the highest.

RSA participants also noted that it is common for drivers to use the parking lots of adjacent businesses to avoid waiting at the intersection of Washington Street (Route 138) and Central Street. This statement was confirmed in the field when RSA participants noted a driver cutting through the CVS parking lot to travel northbound on Washington Street (Route 138) from Central Street. It was discussed that the lack of turning provisions along Central Street and the inefficiency of intersection operations could be a contributing factor to why people use cut-throughs instead of waiting at the signalized intersection.

During the RSA, the audit team stated that there was a high number of heavy vehicles utilizing the intersection and that any future design should incorporate provisions for heavy vehicle traffic.

Enhancements:
- Increase police enforcement at the intersection to prevent red light running.
- Improve turning operations at each intersection approach to minimize the number of vehicles using adjacent parking lots as cut-throughs.

Safety Issue #3: Roadway Geometry

Observations:
As previously discussed, although there are currently no left-turn lane indications for either of the Central Street approaches the shared left/through lanes often operate as de facto left turn lanes. A participant noted that the existing location of the left lanes creates a potential sight distance issue because left turners are not easily able to see around the opposing queued left turners, restricting their ability to observe opposing vehicles that are traveling straight through the intersection. This creates the potential for angle crashes, if a permissive left turner perceives a gap when there is not one.

Another issue that was identified during the RSA was that the existing configuration of Washington Street (Route 138) and Central Street limits the number of lanes for each of the approaches. In particular, the eastbound and westbound Central Street approaches experience high traffic volumes, especially during the weekday morning and weekday afternoon peak hours.

Audit participants also noted that the widths of the departing lanes on Central Street are very large and unmarked. Both the eastbound and the westbound departure lanes are measured to be approximately 34 feet at the intersection of Washington Street (Route 138) and Central Street, without any pavement markings clearly separating the two departing lanes in each direction. It was discussed that this lack of markings can cause confusion between drivers turning right on red from Washington Street (Route 138) onto Central Street and those traveling straight on Central Street. The transitions and tapers along both Central Street approaches and along Washington Street to the south of the intersection were discussed as areas that could contribute to driver confusion and, as a result, potential crashes.

Wide Central Street departure without lane separation pavement markings

Enhancements:

- Align opposing exclusive left turn lanes on Central Street directly opposite each other to enhance visibility and improve sight lines across the intersection.
- Evaluate restriping and/or narrowing of departing lanes on Central Street in conjunction with the exclusive left-turn lanes and single through lanes.
- Widen Central Street to allow one exclusive left turn lane and two through lanes in both the eastbound and westbound direction to reduce delay and queuing as a long term enhancement.
- Evaluate transitions and tapers along the corridor.

Safety Issue #4: Access Management

Observations:
Access management was highlighted as a major issue at the intersection of Washington Street (Route 138) and Central Street due to the large number of retail driveways that are adjacent to the intersection.

As part of the gas station redevelopment project, crash data was reviewed for the intersections of the two driveways, one along Central Street and one along Washington Street (Route 138). The intersection of Central Street and the gas station driveway was shown to experience five crashes between 2012 and 2014 and the intersection of Washington Street and the gas station driveway experience two crashes over the three year period. It was identified that a contributing factor to the crashes is the proximity of the driveways to the functional area of the intersection. RSA participants also discussed that vehicles making a left turn from the gas station driveways are more at risk for a crash, particularly when turning onto Washington Street (Route 138) and they have to cross three travel lanes to reach their destination.

Access management was also identified as an issue at the other site driveways including at CVS and Walgreens. The audit team noted that vehicles turning left from the CVS driveway onto Washington Street (Route 138) experience increased exposure because they need to cross three lanes of traffic. It was

identified that there is a likelihood that courtesy crashes occur at this location, when one through lane of traffic allows the left turner to make their movement but the other through lane collides with the turning vehicle. RSA participants also noted that vehicles frequently exit from the entrance-only Walgreens driveway onto Central Street which creates conflict between entering and exiting vehicles and makes it difficult for vehicles along Central Street to predict where they should expect other drivers to be exiting.

Enhancements:

- Relocate the Mobil gas station driveway on Washington Street away from the signalized intersection.
- Restrict vehicles exiting the gas station driveway from turning left onto Central Street or Washington Street.
- Coordinate with adjacent businesses to restrict the number of driveways and the types of turns out of driveways close to the intersection.

Safety Issue #5: Pedestrian and Bicycle Accommodations

Observations:

The intersection of Washington Street (Route 138) was identified as an area of high pedestrian activity as well as some bicycle activity. During the RSA, multiple issues were discussed regarding pedestrian and bicycle accommodations.

RSA participants noted that the current pedestrian signals and push buttons at the intersection are outdated and do not meet current standards. The pedestrian signal heads were also not consistent within the intersection, some with word indications for walk and don't walk and some with symbol indications. It was also noted that some of the lights on the pedestrian signal heads were burnt out.

Outdated pedestrian signal equipment with burnt out indicator bulbs

Another issue discussed was that the existing pedestrian phase timing might not meet current standards. Participants noted that during early release for the surrounding schools, the intersection is heavily utilized by students who are interested in accessing the businesses within the study area and there may not be enough time in the exclusive pedestrian phase for all pedestrians to cross safely.

The audit team also discussed that there are conflicts between pedestrians and vehicles turning right on red, specifically involving vehicles turning right from the northbound and southbound approaches on Washington Street. During the exclusive pedestrian phase, vehicles are allowed to turn right on red although they must yield to pedestrians within the crosswalks. It was noted that this creates the potential for collisions between vehicles and pedestrians if either party is not cognizant of the movements of the other.

The westbound channelized right turn was identified as another area where conflicts between pedestrians and vehicles could potentially occur. Vehicles that are turning north from the westbound approach might be looking to see if there are any oncoming vehicles rather than focusing on pedestrians that might be crossing the approach. The channelized right turn is not currently signalized for either the motorists or the

pedestrians. A participant noted that there are no advanced yield pavement markings or signs to indicate that a vehicle should be prepared to stop. In addition to the lack of yield markings, the RSA team noted that the current crosswalk striping was not visible to drivers at the westbound right approach or along any of the other intersection approaches.

Existing westbound channelized right turn approach

There were also some issues identified with the current sidewalk accommodations for pedestrians. Participants noted that some of the pedestrian ramps did not line up with the crosswalks, and were not ADA compliant. A member of the RSA team stated that some of the sidewalks within the corridor were in poor condition, specifically the sidewalk on the east side of Washington Street (Route 138) to the south of the intersection of Washington Street (Route 138) and Central Street. It was also discussed that there is currently no sidewalk to the west of Walgreens on the south side of Central Street, though there is a demand based on the trampled grass along that side of the roadway.

RSA participants noted that while minimal, there is some bicyclist activity along the corridor; however, there are no bicycle facilities in place along either Washington Street (Route 138) or Central Street.

Enhancements:

- Update outdated pedestrian signals and include pedestrian signal heads with countdown timers.
- Update outdated push buttons so that they are compliant with MassDOT standards.
- Replace burnt out bulbs on existing pedestrian signal heads.
- Evaluate the existing pedestrian phase to ensure sufficient crossing time for pedestrians.
- Limit right turns on red during the pedestrian phase by installing an illuminated “No Turn on Red” sign that is activated when the pedestrian phase is called.
- Install warning signage and pavement markings to the channelized westbound right turn to alert drivers to a potential pedestrian crossing.
- Consider adding a vehicle signal and a pedestrian signal for the westbound channelized right turn lane.
- Relocate the crosswalk across the channelized right turn approach so that one vehicle can queue in front of the crosswalk while waiting to merge onto Washington Street.
- Evaluate crosswalk striping to make it more visible to drivers.
- Update pedestrian ramps to be compliant with ADA standards.
- Repave sidewalks that are in poor condition adjacent to the intersection.
- Add a sidewalk along Central Street to the west of Walgreens.
- Consider adding bicycle pavement markings that are consistent along Central Street corridor.

Recommendations

After the site visit, audit participants returned to discuss the safety issues and consider various improvements. The audit participants were encouraged to consider both short and long-term improvements for each of the existing safety issues. Each improvement considered has been categorized as short-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		Costs	
Short-Term	<1 Year	Low	<$10,000
Mid-Term	1-3 Years	Medium	$10,001-$50,000
Long-Term	>3 Years	High	>$50,000

Summary of Road Safety Audit

A summary of the potential recommendations discussed by the RSA audit team are summarized in Table 3. The recommendations are summarized based on the potential safety payoff, time frame, approximate cost and responsible agency. The safety payoff is a subjective judgment of the potential effectiveness of the safety recommendations listed below.

Table 3. Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Washington Street (Route 138) at Central Street					
Traffic Control	Restripe roadway to provide exclusive left turn lanes for both the eastbound and westbound Central Street approaches	High	Short-Term	Low	Global Partners*
Traffic Control	Add pavement markings and "Left Lane Must Turn Left" signage to alert drivers of the lane designations along Central Street	Medium	Short-Term	Low	Global Partners*
Traffic Control	Add lane utilization signage to both Central Street approaches to give drivers advanced warning of the turn lane restrictions	Medium	Short-Term	Low	Global Partners*
Traffic Control	Evaluate changing the current lag-left phasing to dual left-lead phasing for eastbound and westbound Central Street approaches	High	Short-Term	Low	Global Partners*
Traffic Control	Update existing arrow signals on Central Street to display flashing yellow during the permissive left phase	Medium	Mid-Term	Low	MassDOT
Traffic Control	Evaluate protected-only phasing for Central Street left turns	Medium	Short-Term	Low	MassDOT
Traffic Control	Install tracking pavement markings for Central Street left turns	Medium	Short-Term	Low	Global Partners*
Traffic Control	Evaluate and update yellow and all-red clearance intervals for each intersection approach	Medium	Short-Term	Low	Global Partners*
Traffic Operations	Improve turning operations at each intersection approach to minimize the number of vehicles using adjacent parking lots as cut-throughs	Low	Short Term	Medium	Global Partners*
Roadway Geometry	Align opposing exclusive left turn lanes on Central Street directly opposite each other to enhance visibility	Medium	Long-Term	High	MassDOT
Roadway Geometry	Widen Central Street to allow one exclusive left turn lane and two through lanes in both the eastbound and westbound direction to reduce delay and queuing	Medium	Long-Term	High	MassDOT
Roadway Geometry	Evaluate narrowing of departing lanes on Central Street directly adjacent to Washington Street	Medium	Short-Term	Medium	Global Partners*
Roadway Geometry	Evaluate transitions and tapers associated with the conversion of the left lanes on Central Street to exclusive left-turn lanes	Medium	Short-Term	Medium	Global Partners*
Access Management	Relocate the Mobil gas station driveway on Washington Street away from the signalized intersection	High	Short-Term	High	Global Partners*
Access Management	Restrict vehicles exiting the gas station driveway from turning left onto Central Street or Washington Street	Medium	Short-Term	Medium	Global Partners*

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Pedestrian and Bicycle Accommodations	Update outdated pedestrian signal heads to include pedestrian signal heads with countdown timers	Medium	Short-Term	Medium	Global Partners*
Pedestrian and Bicycle Accommodations	Update outdated push buttons so that they are compliant with MassDOT standards	Medium	Short-Term	Medium	MassDOT
Pedestrian and Bicycle Accommodations	Evaluate the existing pedestrian phase to provide adequate crossing time for pedestrians	Medium	Short-Term	Low	Global Partners*
Pedestrian and Bicycle Accommodations	Limit right turns on red during the pedestrian phase by installing an illuminated “No Turn on Red” sign that is activated when the pedestrian phase is called	Medium	Long-Term	Medium	MassDOT
Pedestrian and Bicycle Accommodations	Install warning signage and pavement markings to the channelized westbound right turn to alert drivers to a potential pedestrian crossing	Low	Short-Term	Low	Global Partners*
Pedestrian and Bicycle Accommodations	Consider adding a vehicle signal and a pedestrian signal for the westbound channelized right turn lane	Medium	Long-Term	High	MassDOT
Pedestrian and Bicycle Accommodations	Relocate the crosswalk across the channelized right turn approach so that one vehicle can queue in front of the crosswalk while waiting to merge onto Washington Street	Medium	Mid-Term	Medium	MassDOT
Pedestrian and Bicycle Accommodations	Evaluate crosswalk striping to make it more visible to drivers	Low	Short-Term	Low	MassDOT
Pedestrian and Bicycle Accommodations	Update pedestrian ramps to be compliant with ADA standards	Low	Mid-Term	Medium	MassDOT
Pedestrian and Bicycle Accommodations	Consider adding bicycle pavement markings that are consistent along Central Street corridor	High	Mid-Term	Low	MassDOT/ Town of Stoughton

* Safety enhancements that note Global Partners as the responsible party will be implemented only as approved by MassDOT through the design review process.

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit

Route 138 (Washington Street) at Central Street, Stoughton, MA

Meeting Location: ***Stoughton Police Station***
26 Rose St, Stoughton, MA 02072
Wednesday, January 27, 2016
10:00 AM – 12:00 PM

Type of meeting:	**High Crash Location – Road Safety Audit**
Attendees:	**Invited Participants to Comprise a Multidisciplinary Team**
Please bring:	**Thoughts and Enthusiasm!!**
10:00 AM	**Welcome and Introductions**
10:15 AM	**Review of Site Specific Material** • Crash, Speed & Volume Summaries– provided in advance • Existing Geometries and Conditions
10:45 AM	**Site Visit** • Drive to the intersection of Route 138 and Central Street • As a group, identify areas for improvement
11:30 AM	**Post Visit Discussion / Completion of RSA** • Discuss observations and finalize findings • Discuss potential improvements and finalize recommendations
12:00 PM	**Adjourn for the Day – but the RSA has not ended**

Instructions for Participants:

- **Before attending the RSA on January 27, 2016, participants are encouraged to walk/drive through the corridor 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

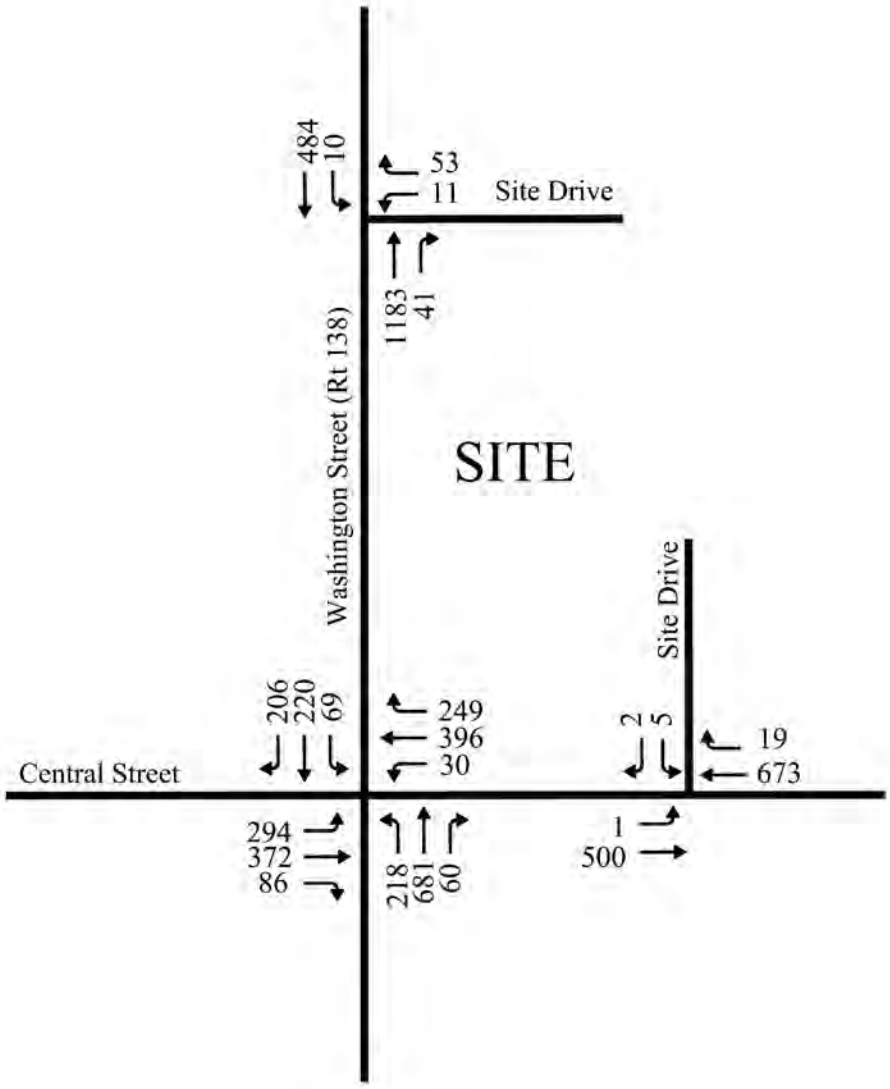
Date: January 27, 2016 Location: Stoughton Police Department, Stoughton, MA

Audit Team Members	Agency/ Affiliation	Email Address	Phone Number
Erin Fredette	McMahon Associates	efredette@mcmahonassociates.com	617-556-0020
Rebecca Hansen	McMahon Associates	rhansen@mcmahonassociates.com	617-556-0020
Joyce Husseini	Schools and Transportation Task Force	gisjoyce@gmail.com	617-338-0063
Raymond Guarino	Old Colony Planning Council	rguarino@ocpcrpa.org	508-583-1833
Shawn Bailey	Old Colony Planning Council	sbailey@ocpcrpa.org	508-583-1833
Michael Blount	Town of Stoughton Police Department	mblount@stoughtonpd.org	781-344-2424
John Mastera	MassDOT Highway Safety	john.mastera@state.ma.us	857-368-9648
Jason Walters	MassDOT D5 - Projects	jason.walters@state.ma.us	508-884-4370
Robert Gregory	MassDOT D5 Traffic	robert.gregory@state.ma.us	508-884-4242
Douglas Campbell	Town of Stoughton Fire Department	campbell@stoughton-ma.gov	781-603-3167
Thomas Fitzgerald	Town of Stoughton Public Works Department	tfitzgerald@stoughton-ma.gov	781-344-2112
Craig Horsfall	Town of Stoughton Engineering	chorsfall@stoughton-ma.gov	781-344-3114
Marc Tisdelle	Town of Stoughton Engineering	mtisdelle@stoughton-ma.gov	781-344-3114
John Diaz	Greenman – Pedersen, Inc.	jdiaz@gpinet.com	978-570-2953
Michael Chiverton	Global Partners	mchiverton@globalp.com	508-498-3364

Appendix C. Intersection Volume Data

J:\Analysis\Bohler\Stoughton Gas\Report\Graphics\Stoughton_Schematic_2015-06-10.dwg 01/20/16

SCHEMATIC-
NOT TO SCALE

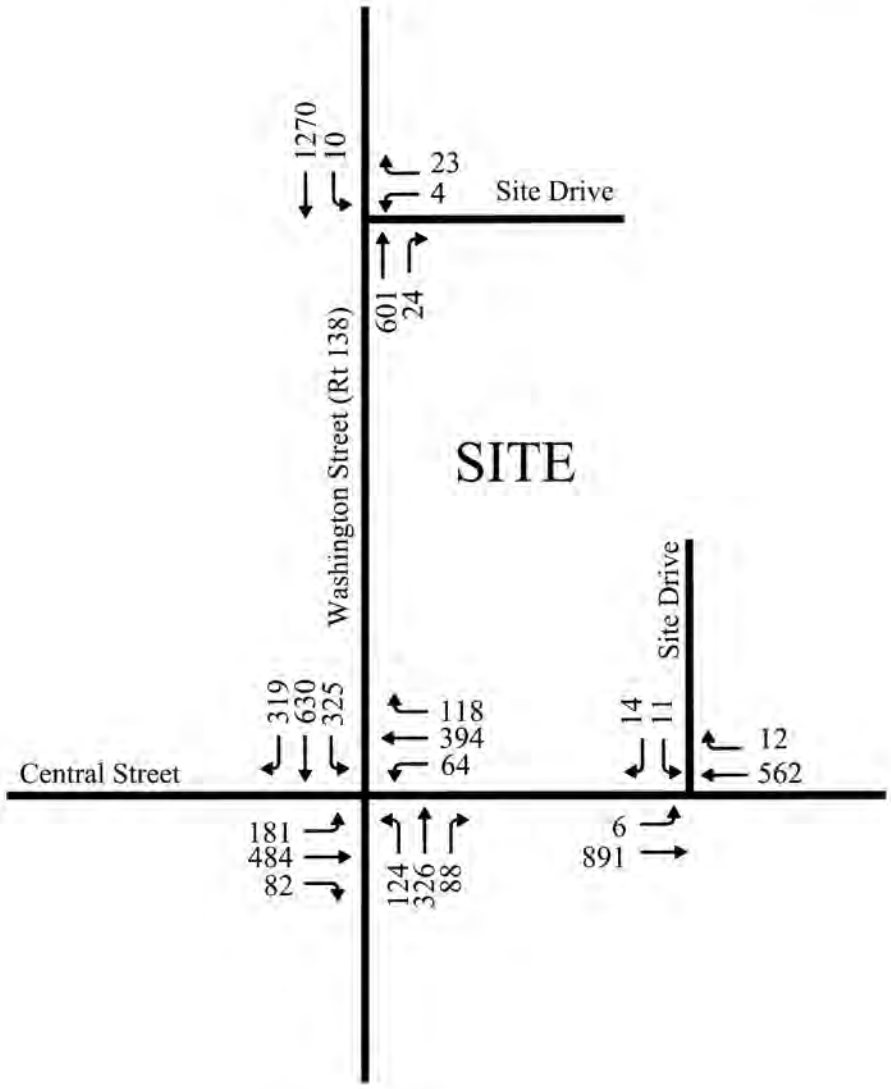


McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

2014 Existing Weekday Morning
Peak Hour Traffic Volumes
Gas Station Redevelopment
Stoughton, Massachusetts

J:\Analysis\Bohler\Stoughton Gas\Report\Graphics\Stoughton_Schematic_2015-06-10.dwg 01/20/16

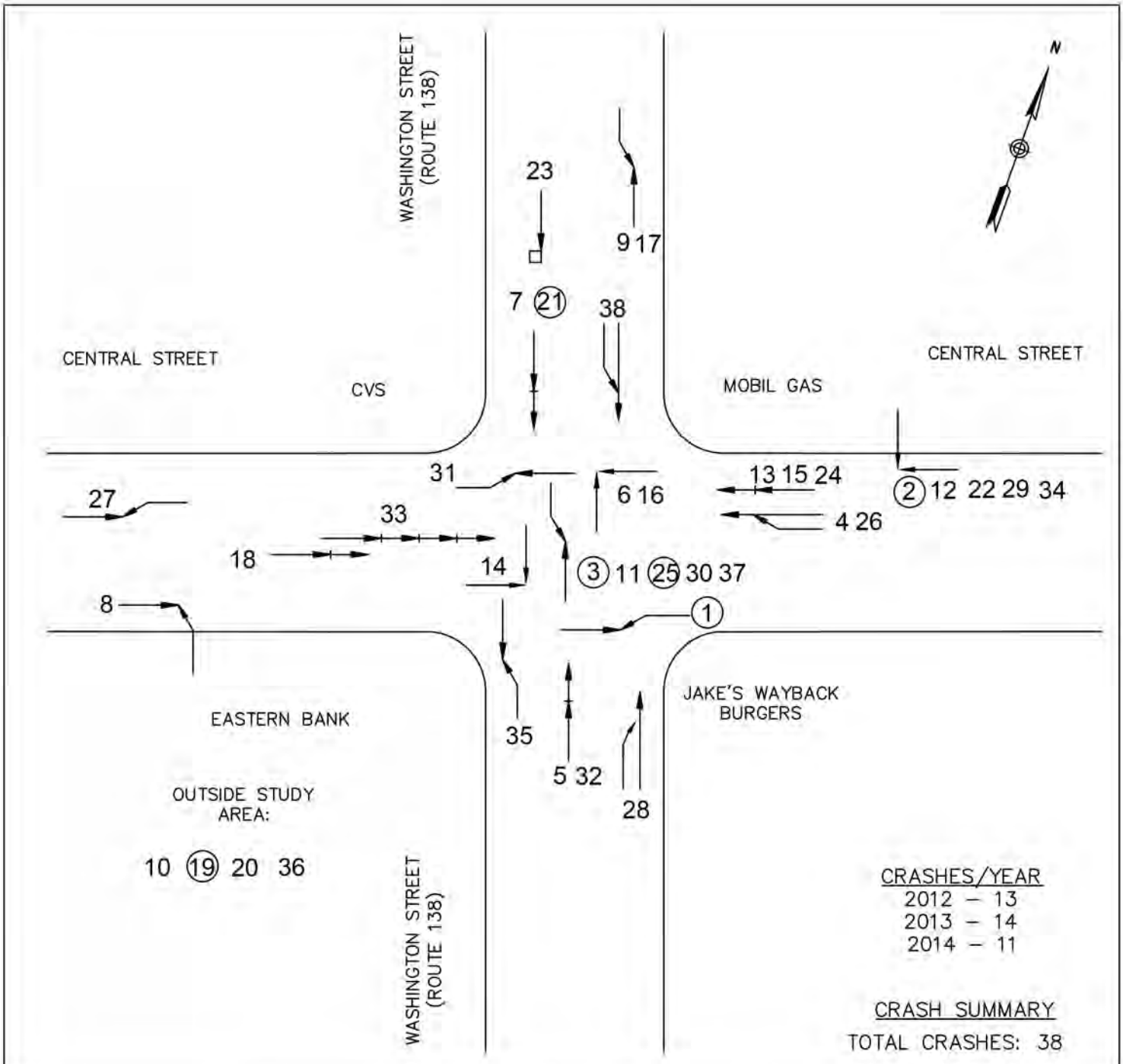
SCHEMATIC-
NOT TO SCALE



McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

2014 Existing Weekday Afternoon
Peak Hour Traffic Volumes
Gas Station Redevelopment
Stoughton, Massachusetts

Appendix D. Detailed Crash Data



SYMBOL	ACCIDENT TYPE
MOVING VEHICLE	REAR END
BACKING VEHICLE	HEAD ON
NON–INVOLVED VEHICLE	SIDE–SWIPE
PEDESTRIAN	OUT OF CONTROL
PARKED VEHICLE	LEFT TURN
FIXED OBJECT	RIGHT ANGLE
FATAL ACCIDENT	
INJURY ACCIDENT	

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

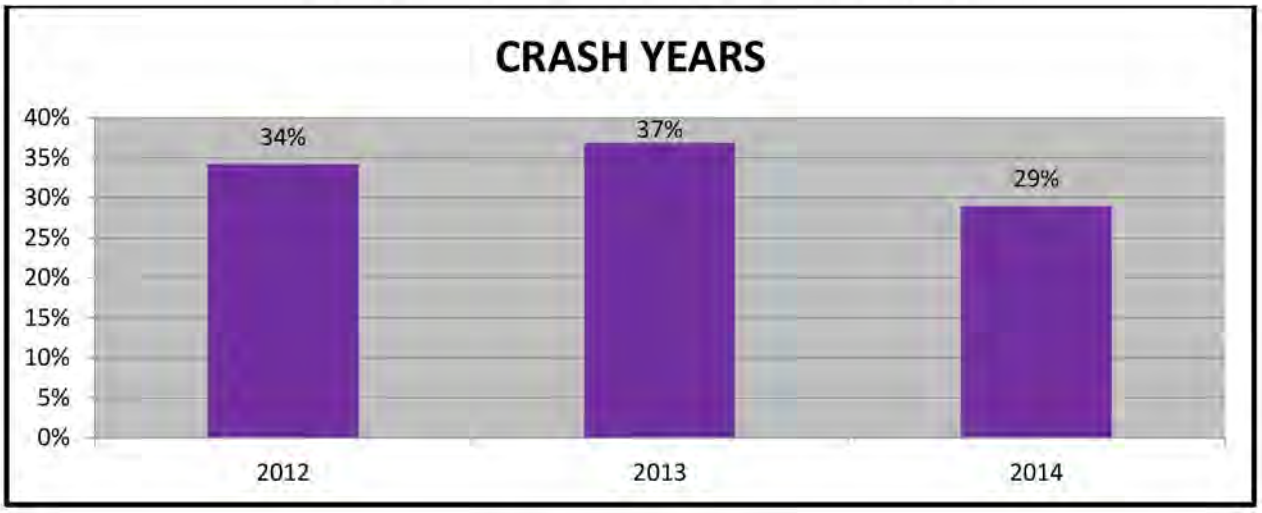
Crash Diagram 2012-2014
Washington Street (Route 138) at Central Street
Stoughton, Massachusetts

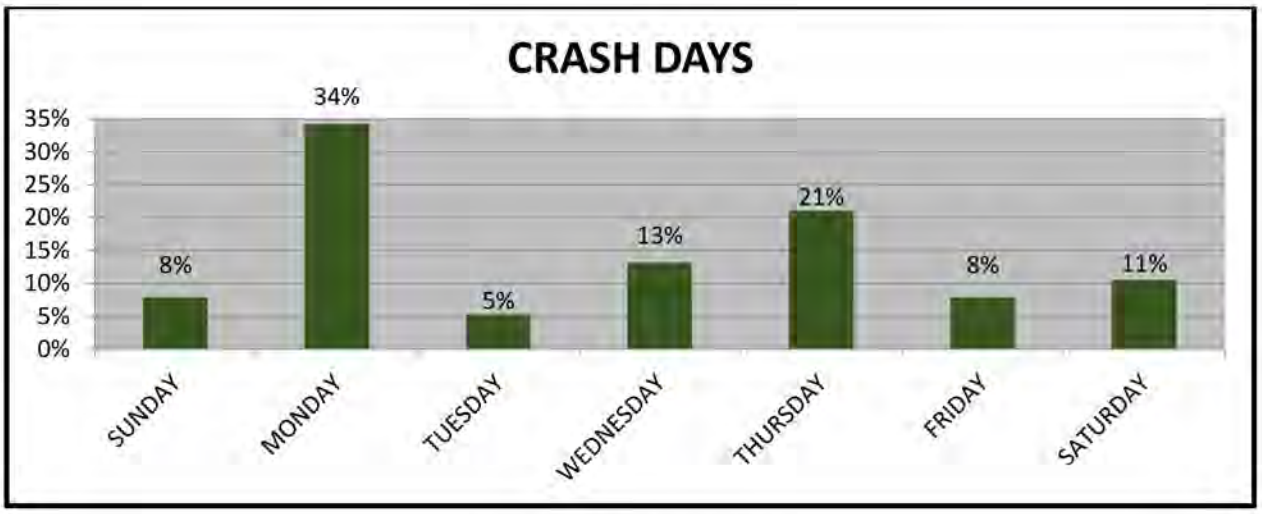
Washington Street (Route 138) at Central Street

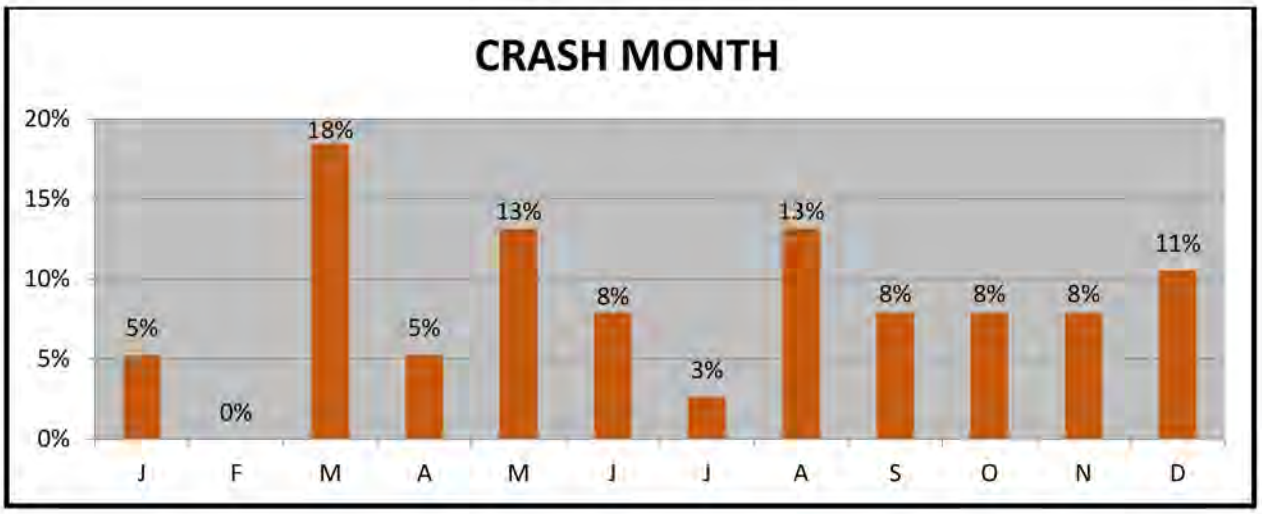
Number	Crash Date	Crash Day	Crash Time	Crash Severity	Manner of Collision	Movement V1	Movement V2	Movement V3	Movement V4	Driver Age Striking Veh	Ambient Conditions	Weather Condition	Roadway Condition
1	1/3/2012	Tuesday	4:32 PM	Non-fatal injury	Angle	WBL	EBT	NBT		49	Dusk	Clear	Dry
2	1/25/2012	Wednesday	4:48 PM	Non-fatal injury	Angle	WBT	SBR			32	Daylight	Clear	Dry
3	3/8/2012	Thursday	1:04 AM	Non-fatal injury	Head On	SBT	NBT			66	Dark - lighted roadway	Clear	Dry
4	4/11/2012	Wednesday	4:17 PM	Property damage only (none	Sideswipe	WBT	WBT			20	Daylight	Clear	Dry
5	5/10/2012	Thursday	3:45 PM	Property damage only (none	Rear-end	NBT	NBT			46	Daylight	Rain	Dry
6	7/8/2012	Sunday	8:07 PM	Property damage only (none	Angle	WBT	NBT			38	Daylight	Clear	Dry
7	8/6/2012	Monday	4:04 PM	Property damage only (none	Rear-end	SBT	SBT			22	Daylight	Clear	Dry
8	8/6/2012	Monday	4:09 PM	Property damage only (none	Angle	EBT	NBL			42	Daylight	Clear	Dry
9	9/8/2012	Saturday	9:37 PM	Property damage only (none	Rear-End	SBL	NBT			23	Dark - lighted roadway	Rain	Wet
10	9/28/2012	Friday	11:10 AM	Property damage only (none	Rear-end	SBT	SBT			75	Daylight	Rain	Wet
11	10/1/2012	Monday	7:36 PM	Property damage only (none	Sideswipe	EBT	WBT			34	Dark - lighted roadway	Clear	Dry
12	12/3/2012	Monday	7:05 AM	Property damage only (none	Angle	WBT	SBR			22	Daylight	Cloudy	Wet
13	12/3/2012	Monday	2:37 PM	Property damage only (none	Rear-end	WBR	WBR			19	Daylight	Clear	Dry
14	3/7/2013	Thursday	9:35 AM	Property damage only (none	Angle	SBT	EBT			31	Daylight	Snow	Snow
15	3/14/2013	Thursday	6:52 AM	Property damage only (none	Rear-end	WBR	WBR			52	Daylight	Clear	Dry
16	4/6/2013	Saturday	5:34 PM	Property damage only (none	Angle	WBT	NBT			27	Dusk	Clear	Dry
17	5/2/2013	Thursday	10:35 AM	Property damage only (none	Angle	SBL	WBR			30	Daylight	Clear	Dry
18	5/13/2013	Monday	9:52 PM	Property damage only (none	Rear-end	EBL	EBT			22	Dark - lighted roadway	Clear	Dry
19	5/21/2013	Tuesday	11:22 AM	Non-fatal injury	Head On	EBT	WBT			46	Daylight	Clear	Dry
20	6/3/2013	Monday	8:06 AM	Property damage only (none	Rear-end	WBT	WBT			29	Daylight	Rain	Wet
21	6/17/2013	Monday	12:01 AM	Non-fatal injury	Rear-end	SBR	SBT			Unknown	Dark - lighted roadway	Clear	Dry
22	6/20/2013	Thursday	5:24 PM	Property damage only (none	Angle	SBR	WBT			50	Daylight	Clear	Dry
23	8/7/2013	Wednesday	11:46 AM	Property damage only (none	Single Vehicle Crash	SBT				Unknown	Daylight	Clear	Dry
24	8/11/2013	Sunday	1:02 PM	Property damage only (none	Rear-end	WBR	WBR			24	Daylight	Clear	Dry
25	8/16/2013	Friday	2:29 PM	Non-fatal injury	Angle	NBT	SBL			40	Daylight	Cloudy	Dry
26	10/26/2013	Saturday	5:11PM	Property damage only (none	Sideswipe	EBT	EBT			43	Daylight	Clear	Dry
27	12/16/2013	Monday	8:00 AM	Non-fatal injury	Angle	EBT	WBL			Unknown	Daylight	Clear	Wet
28	3/7/2014	Friday	11:06 PM	Property damage only (none	Angle	NBT	NBR			Unknown	Dark - lighted roadway	Clear	Dry
29	3/17/2014	Monday	5:19 PM	Property damage only (none	Angle	WBT	SBL			59	Daylight	Clear	Dry
30	3/27/2014	Thursday	1:22 PM	Property damage only (none	Angle	SBL	NBT			28	Daylight	Clear	Dry
31	3/31/2014	Monday	4:51 PM	Property damage only (none	Angle	EBL	WBT			25	Daylight	Rain	Wet
32	5/8/2014	Thursday	5:34 PM	Property damage only (none	Rear-End	NBT	NBT			42	Daylight	Cloudy	Dry
33	9/24/2014	Wednesday	2:46 PM	Property damage only (none	Rear-end	WBT	WBT	WBT	WBT	55	Daylight	Cloudy	Dry
34	10/8/2014	Wednesday	2:18 PM	Property damage only (none	Angle	WBT	SBL			41	Daylight	Clear	Dry
35	11/8/2014	Saturday	10:43 PM	Property damage only (none	Angle	NBL	SBT			Unknown	Dark - lighted roadway	Clear	Dry
36	11/10/2014	Monday	7:29 PM	Property damage only (none	Angle	SBR	WBT			17	Dark - lighted roadway	Clear	Dry
37	11/30/2014	Sunday	8:40 PM	Property damage only (none	Angle	SBL	NBT			56	Dark - lighted roadway	Clear	Dry
38	12/15/2014	Monday	12:38 PM	Property damage only (none	Angle	SBL	SBT			88	Daylight	Clear	Dry

Crash Data Summary Charts

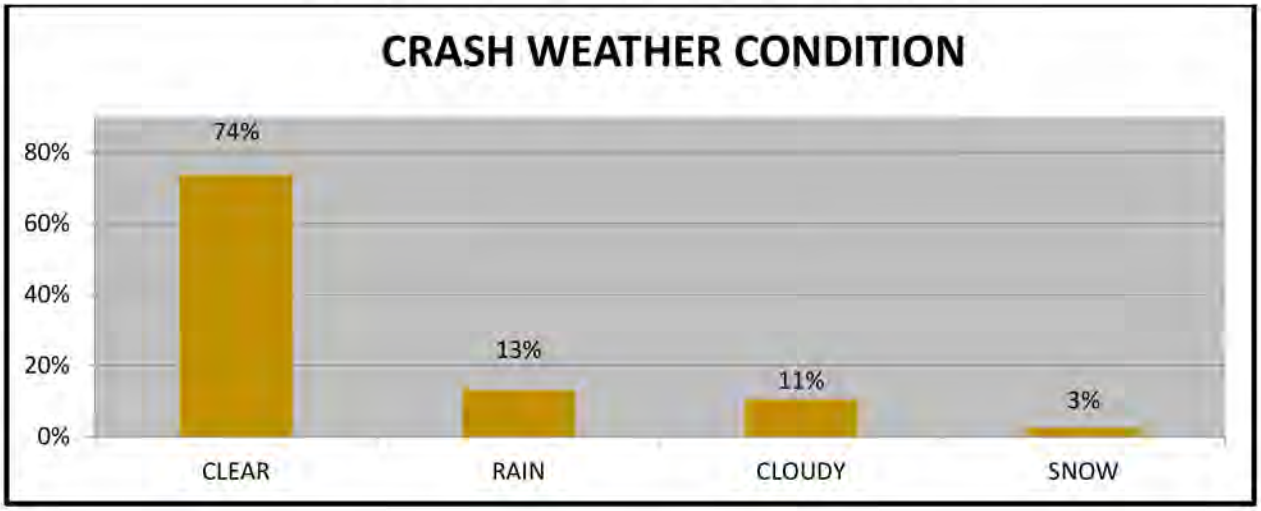
Rte 138/Washington St at Central St, Stoughton, MA

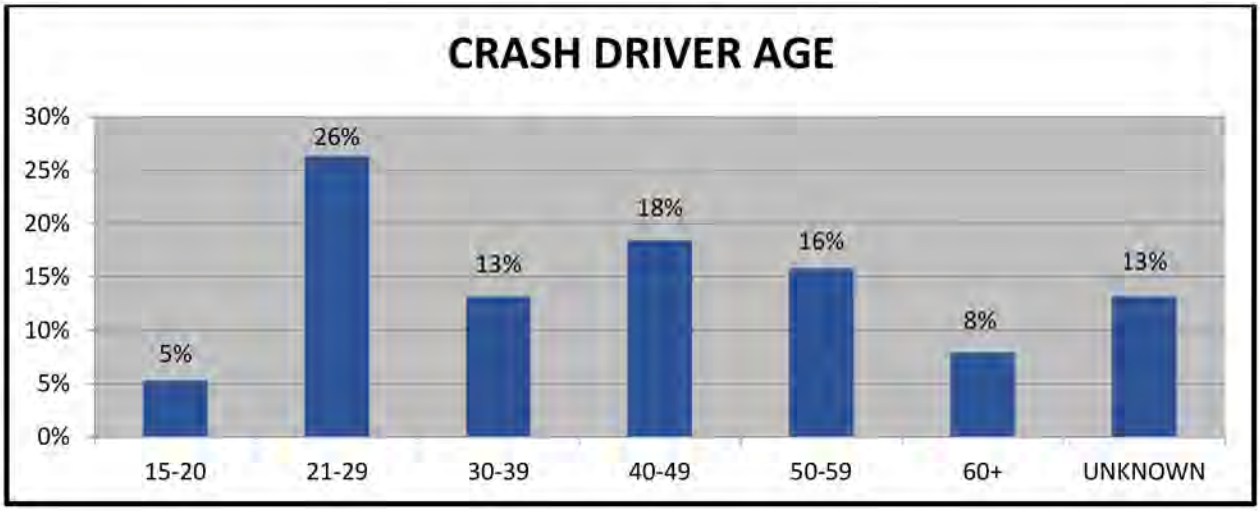


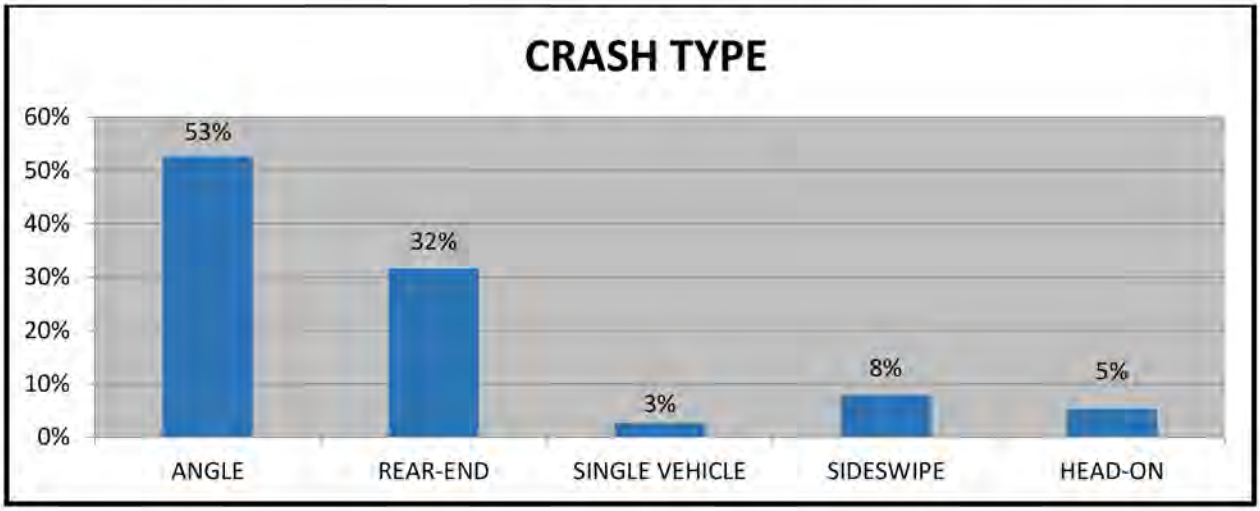




Crash Data Summary Charts
Rte 138/Washington St at Central St, Stoughton, MA







Crash Data Summary Charts

Rte 138/Washington St at Central St, Stoughton, MA