

# ROAD SAFETY AUDIT

Route 18 (Bedford Street) at  
Auburn Street (Route 14) and Temple Street (Route 27)  
Town of Whitman

March 3, 2015

Prepared For:  
MassDOT Highway Division



Prepared By:  
BETA Group, Inc.



ENGINEERING SUCCESS **TOGETHER**

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## Project Data

A Road Safety Audit for Bedford Street (Route 18) at Auburn Street (Route 14) and Temple Street (Route 27) in the Town of Whitman was held on January 20, 2015 at Whitman Town Hall in Whitman, MA. 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, legislative and emergency response expertise.

**Table 1. Participating Audit Team Members**

<b>Audit Team Member</b>	<b>Agency/Affiliation</b>
Lisa Schletzbaum	MassDOT Highway Division – Safety Section
Gregory Enos	Whitman Assistant Town Administrator
Raymond Guarino	OCPC
Jason Walters	MassDOT Highway Division – District 5
Barbara LaChance	MassDOT Highway Division – District 5 Traffic Operations
Edward C. Feeney	MassDOT Highway Division – District 5 Traffic
Daniel Salvucci	Whitman Board of Selectmen
Scott Benton	Whitman Police Chief
Robert Curran	Whitman Building Commissioner
Frank Lyman	Whitman Town Administrator
Greg Lucas	BETA Group, Inc.
Justin Curewitz	BETA Group, Inc.

## 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 intersections of Bedford Street (Route 18) with Auburn Street (Route 14) and Temple Street (Route 27) because both intersections have been identified as high crash locations within the Old Colony Planning Council (OCPC) region. The intersection of Bedford Street and Temple Street also ranks 145<sup>th</sup> on MassDOT's list of the Top 200 High Crash Locations Statewide from 2010-2012. A project has been initiated to make traffic and safety improvements to both intersections (MassDOT File No. 607860). The RSA is intended to identify potential short and long term safety improvements that can be made at each intersection, which can then be implemented through general maintenance for short term low cost improvements or incorporated into the future project to the greatest extent practicable.

## Project Description

Bedford Street (Route 18), shown in Figure 1, is an Urban Principal Arterial under State jurisdiction throughout the Town of Whitman. Route 18 follows a north-south alignment and is signed as a north-south route. Route 18 provides a connection to Abington, Weymouth and Route 3 to the north, and to East Bridgewater, Bridgewater and I-495 to the south.

Land use along Route 18 in the study area is primarily commercial, with residential homes along intersecting side streets. The study intersection of Bedford Street at Temple Street (Route 27) is approximately  $\frac{3}{4}$  mile north of the study intersection of Bedford Street at Auburn Street (Route 14). A signalized intersection at a Stop & Shop grocery store approximately  $\frac{1}{4}$  mile north of Auburn Street is not part of the study area.

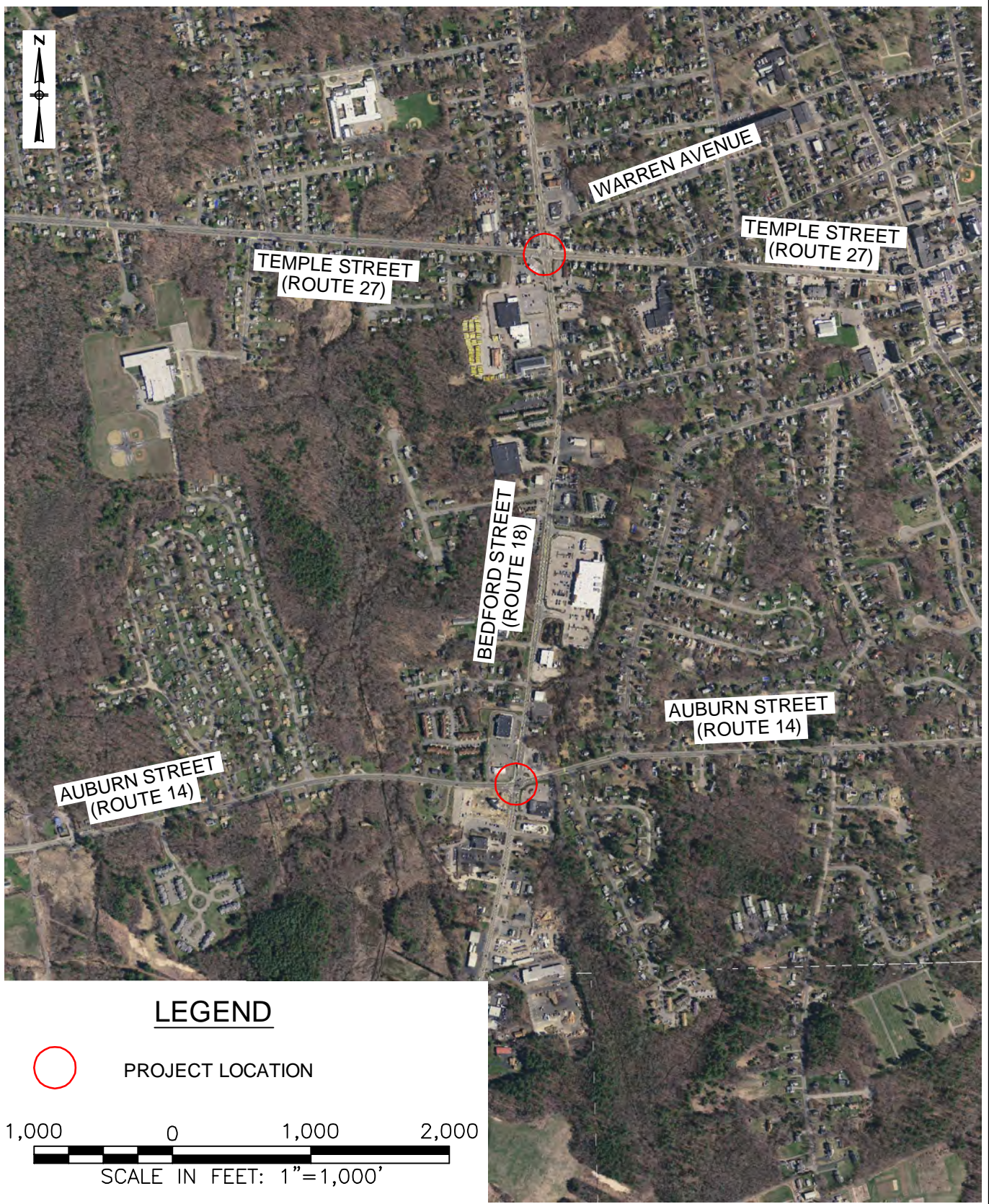
The two intersections are discussed in detail below.

### **Bedford Street (Route 18) at Auburn Street (Route 14)**

Bedford Street (Route 18) and Auburn Street (Route 14) form a four-legged intersection under traffic signal control. Auburn Street is classified as an Urban Minor Arterial and is under Town jurisdiction. The signal is owned and maintained by MassDOT. Auburn Street (Route 14) is a primary connection to Brockton to the west and Hanson to the east.

Land use in the area is commercial, with Wendy's restaurant on the northwest corner, Jay's Market on the northeast corner, CVS on the southeast corner and Mutual Bank on the southwest corner. Adjacent businesses impact operations at the intersection. Walgreens is adjacent to and shares a parking area with Wendy's on the northwest corner, while McDonald's restaurant is adjacent to and shares parking access with CVS on the southeast corner. Figure 2 provides a detailed view of adjacent commercial properties.





**LEGEND**



PROJECT LOCATION

1,000 0 1,000 2,000



SCALE IN FEET: 1"=1,000'



**Traffic and Safety  
Improvements  
Bedford Street (Route 18)**

Whitman, MA

**Figure 1**

Location Map





**Traffic and Safety  
Improvements  
Bedford Street (Route 18)**

Whitman, MA

**Figure 2**

Location Detail  
(Bedford Street at Auburn Street)

Bedford Street provides two lanes in each direction at Auburn Street, with turns accommodated within shared lanes. A solid white edge line is provided to delineate a shoulder, but widths are not sufficient to safely accommodate bicycles. The northbound and southbound approaches widen to two lanes at the intersection and merge back to a single lane departing the intersection. The northbound approach widens to two defined lanes just north of the shared CVS/McDonald's driveway, approximately 110 feet in advance of the northbound stop line. The roadway provides two lanes northbound departing the intersection



**Bedford Street at Auburn Street (looking south)**

for approximately 380 feet before merging back to a single lane. It was noted that drivers show aggressive tendencies when traveling through the intersection because they are aware of the impending merge and want to “beat” the driver in the adjacent lane. The southbound approach provides two defined lanes for approximately 225 feet in advance of the stop line. The roadway provides two defined lanes in the vicinity of the shared Wendy's/Walgreens driveway, which is approximately 100 feet in advance of the stop line. The roadway provides enough width for two lanes for approximately 100 feet departing the intersection southbound, but is not marked as such.

Auburn Street (Route 14) generally provides a single lane in each direction, but widens to provide a shared lane for left turns and through vehicles as well as a right turn lane eastbound at Bedford Street. The westbound Auburn Street approach widens to provide an exclusive left turn lane, and a shared lane for through vehicles and right turns. Arrow and ONLY markings are provided for the eastbound right turn lane and the westbound left turn lane. A solid white edge line is provided to delineate a shoulder, but widths are not sufficient to safely accommodate bicycles.

The traffic signal provides a phase for the Bedford Street approaches, a protected advance phase for the Auburn Street eastbound approach, and a concurrent phase for the Auburn Street approaches. The eastbound left turn is the only left turn which is afforded a protected phase. An exclusive pedestrian phase is activated by pedestrian pushbutton on all four corners of the intersection. No Turn on Red restrictions are signed for all four approaches.

Continuous sidewalks are provided along the east side of Bedford Street and along the north side of Auburn Street. Sidewalk on the southwest corner extends to a sidewalk leading to Mutual Bank, while sidewalk on the southeast corner does not extend along the CVS property on Auburn Street.

Crash data provided by the Whitman Police Department show 46 crashes occurred at the intersection for the three year period from 2011 through 2013. A crash data summary and a collision diagram are included in the Appendix. The most prevalent crash type were angle crashes, comprising 46% of all crashes. Angle



crashes occurred from all approaches; including four between a northbound left turning vehicle and a southbound through vehicle, and three between a southbound left turning vehicle and a northbound through vehicle. Angle crashes were common entering and exiting the commercial driveways adjacent to the intersection, including four vehicles turning left to exit the shared Wendy's/Walgreens driveway being struck by a southbound through vehicle, and one northbound entering vehicle also being struck by a southbound through vehicle. The crashes involving exiting vehicles were all identified as "courtesy crashes." A courtesy crash occurs when a vehicle stops, contrary to the rules of the road, to let another vehicle enter the traffic stream or turn across stopped traffic to a driveway or side street. On a two-lane approach like Bedford Street southbound, the vehicle in the lane closest to the curb stops to let the exiting vehicle go, but the exiting vehicle then collides with an unseen vehicle in the inside lane.

Two of three crashes involving vehicles exiting Jay's Market (former 7-11) were also identified as courtesy crashes on the two-lane Auburn Street westbound approach. One angle and two rear-end crashes involved vehicles entering and exiting Wendy's on Auburn Street, while three angle crashes involved vehicles entering or exiting the shared CVS/McDonald's driveway on Bedford Street.

Sixteen rear-end crashes occurred at the intersection, including four southbound, three northbound, three westbound and one eastbound. Rear-end crashes also occurred involving both southbound left-turning vehicles, and northbound right-turning vehicles. Also of note are sideswipe crashes indicating lane shifts or confusion over lane assignments. Two sideswipe crashes occurred northbound and one southbound.

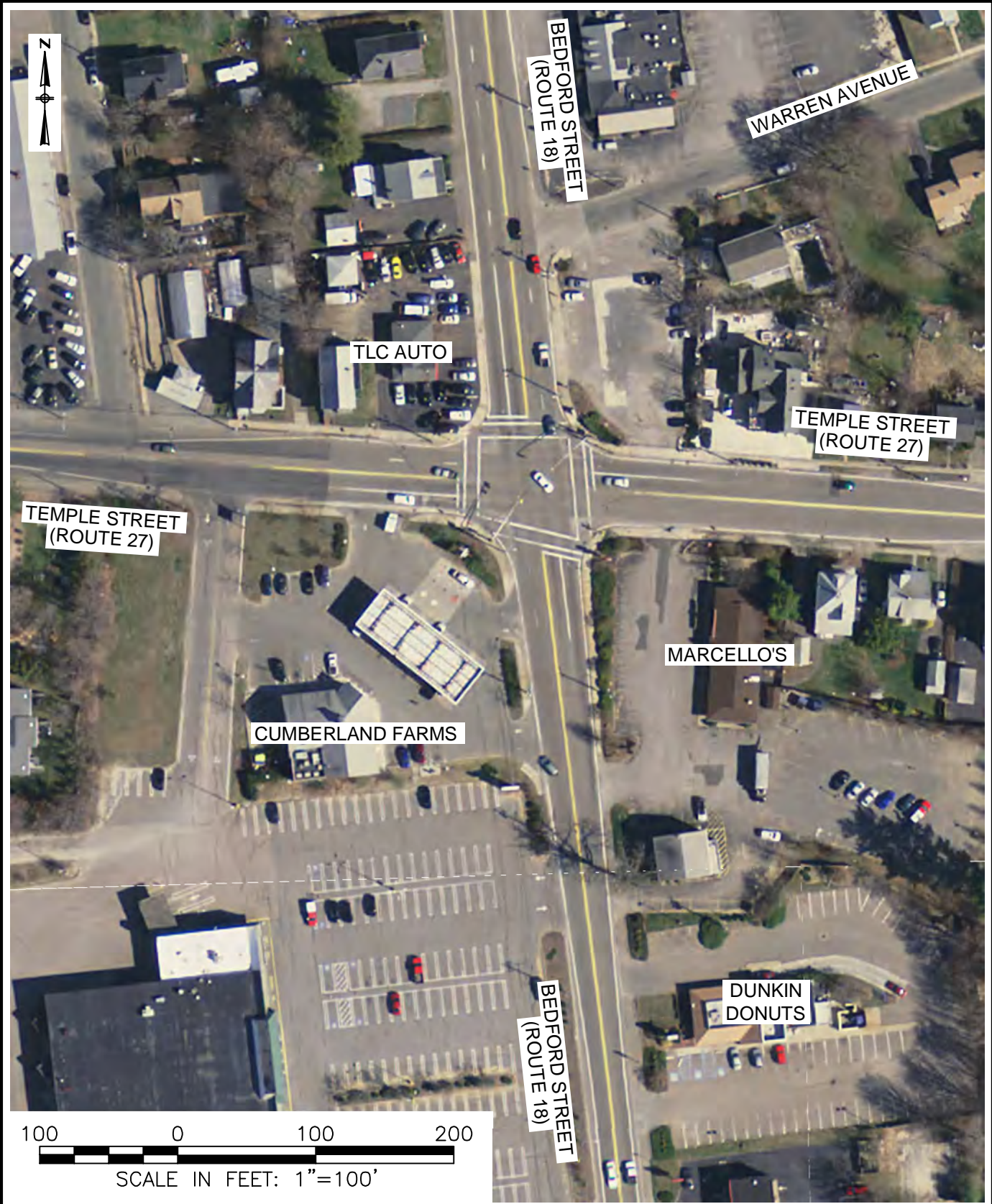
### **Bedford Street (Route 18) at Temple Street (Route 27)**

Bedford Street (Route 18) and Temple Street (Route 27) form a four-legged intersection under traffic signal control. The signal is owned and maintained by MassDOT. Temple Street is classified as an Urban Principal Arterial and is under MassDOT jurisdiction in the vicinity of the intersection. State jurisdiction of Temple Street ends approximately 1000 feet east of Bedford Street at West Street. Temple Street connects to Brockton to the west, and to Whitman Center ½ mile east of Bedford Street.

Land use in the area is commercial, with Cumberland Farms on the southwest corner of the intersection, Marcello's Restaurant on the southeast corner, TLC Auto Sales and Service on the northwest corner, and a vacant lot on the northeast corner. The vacant lot separates Temple Street from Warren Avenue, which intersects Bedford Street approximately 125 feet north of the intersection. Intersection operations are also impacted by a shopping plaza adjacent to Cumberland Farms, which has two driveways on Bedford Street and an access road intersecting Temple Street. Figure 3 provides a detailed view of adjacent commercial properties.

Bedford Street provides similar geometry at Temple Street as at Auburn Street, providing two lanes in each direction, with turns accommodated within shared lanes. A solid white edge line is provided to delineate a shoulder, but widths are not sufficient to safely accommodate bicycles. The northbound and southbound approaches both widen to two lanes at the intersection and merge back to a single lane departing the intersection. The northbound approach widens to two defined lanes north of the Marcello's driveway, approximately 65 feet from the northbound stop line. The roadway provides two lanes





**Traffic and Safety  
Improvements  
Bedford Street (Route 18)**

Whitman, MA

**Figure 3**

Location Detail  
(Bedford Street at Temple Street)

northbound departing the intersection for approximately 110 feet before merging back to a single lane in the vicinity of Warren Avenue, which intersects Bedford Street from the east. The southbound approach provides two defined lanes for approximately 320 feet in advance of the stop line. The roadway provides enough width for two cars to travel side by side immediately departing the intersection, but is not marked as such.



**Bedford Street at Temple Street (looking north)**

Temple Street (Route 27) generally provides a single lane in each direction, but widens to provide two shared lanes in each direction at Bedford Street. The two lane section extends approximately 100 feet eastbound and approximately 60 feet westbound departing the intersection before merging back into a single lane. A solid white edge line is provided to delineate a shoulder, but widths are not sufficient to safely accommodate bicycles.

The traffic signal provides a phase for the Bedford Street approaches, a protected advance phase for the Temple Street westbound approach, and a concurrent phase for the Temple Street approaches. An exclusive pedestrian phase is activated by pedestrian pushbutton on all four corners of the intersection. No Turn on Red restrictions are signed for all four approaches.

Continuous sidewalks are provided along both sides of both intersecting streets in the vicinity of the intersection. The sidewalk on the west side of Bedford Street south of the intersection does not extend beyond the Cumberland Farms property.

Crash data provided by the Whitman Police Department show 60 crashes occurred at the intersection for the three year period from 2011 through 2013. A crash data summary and a collision diagram are included in the Appendix. The most prevalent crash type were angle crashes, comprising 58% of all crashes. Of particular note are crashes involving left turning vehicles from Temple Street; six occurred between an eastbound left turning vehicle and a westbound through vehicle, while four occurred between a westbound left turning vehicle and an eastbound through vehicle. Six crashes occurred between an eastbound through vehicle and a northbound vehicle, while three involved an eastbound through vehicle and a southbound vehicle. Angle crashes were common entering and exiting the commercial driveways adjacent to the intersection. Three crashes involved vehicles exiting Cumberland Farms, two turning left onto Bedford Street and one turning right onto Temple Street. Three crashes involved left turns from the shopping plaza adjacent to Cumberland Farms onto Temple Street. One crash involved a vehicle turning right from Marcello's onto Bedford Street northbound.

Five crashes were identified as fixed-object crashes involving a northbound right turning vehicle. All five involved a right turning tractor-trailer striking the traffic signal post on the southeast corner. Rear-end crashes occurred on the northbound, southbound, and eastbound approaches. Three sideswipe crashes occurred on the northbound approach, two on the eastbound approach, one on the southbound approach, and one northbound departing the intersection.

## Audit Observations

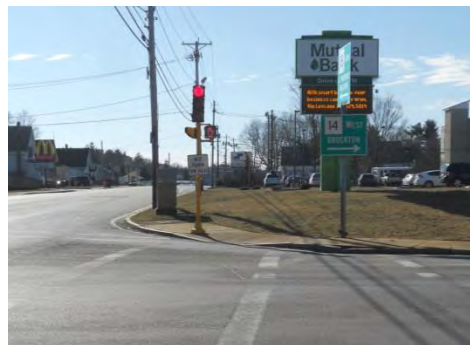
Following a brief introduction to the RSA process and a summary of existing geometry and crash information, the audit participants were asked to discuss safety issues at the intersections of Bedford Street (Route 18) with Auburn Street (Route 14) and Temple Street (Route 27). Audit participants then conducted a site visit as a group, at which time they offered observations on safety issues and concerns. A summary of those major safety considerations is as follows:

### **Bedford Street (Route 18) at Auburn Street (Route 14)**

- **Traffic Congestion** – A number of items related to traffic congestion were noted as safety issues.
  - The level of traffic traveling through the intersection is high, and Route 14 serves as a primary connector to Brockton from Whitman and East Bridgewater.
  - The lack of left turn lanes and/or protected movements for left turns was noted as both a safety and operational issue at the intersection. Crashes involving left turning vehicles on all approaches can be related to this issue, as the delay a driver experiences waiting for an acceptable gap under permissive operation can create frustration, increase aggression and increase the potential for red light violations and acceptance of inadequate gaps.
  - The existing No Turn on Red restrictions were noted as a safety concern because of the increased delay from vehicles that must wait to turn right instead of turning right on red. One audit participant recalled that MassDOT agreed approximately seven years ago to remove the No Turn on Red sign for the right turn lane on Auburn Street eastbound, but that the sign was never removed. Increased delay can increase frustration and aggression, as previously noted.
- **Access Management** – The proximity of businesses and commercial driveways causes access management to be of particular concern as it relates to safety.
  - The history of courtesy crashes at the shared Wendy's/Walgreens driveway on Route 18 is likely related to the four lane cross-section of Bedford Street at this location. Drivers traveling north are also considering the lane merge ahead, and potentially are less likely to pay attention to vehicles entering from the left. Four crashes at this driveway involved vehicles turning left to travel north on Bedford Street; all four were identified as courtesy crashes.
  - It was noted that Jay's Market has plans to add gas pumps. This location previously housed a 7-Eleven which had a gas island with two pumps, which were later removed. It was suggested that the addition of gas pumps and competitive gas pricing would increase traffic entering and exiting at this location. No crashes involved vehicles entering or exiting Jay's Market on Bedford Street, but three crashes involved vehicles exiting on Auburn Street, where exiting left-turning vehicles must cross a two lane approach.
  - Vehicles queued on Auburn Street westbound that wish to enter the CVS driveway will cross into oncoming traffic to bypass the queue and access the driveway. One crash occurred involving a vehicle entering this driveway.

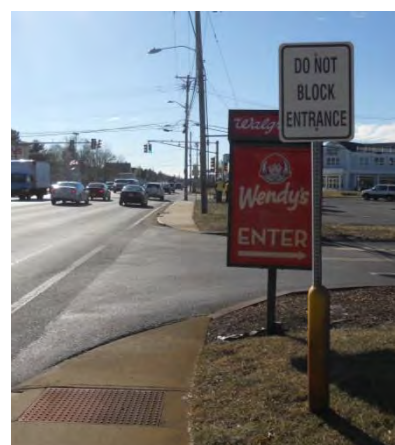


- Lane Designation and Alignment – The beginning and end points of the two lane segments on both Bedford Street and Auburn Street are not well signed and have faded pavement markings. Lane designation signage and merge signage are not consistently provided, and the length of the merge is inadequate. Traffic congestion also contributes to this issue by increasing driver aggression, causing more aggressive drivers to jump into the second lane as soon as it is available, and “racing” to the merge point when the two-lane segment ends. Sideswipe crashes on Bedford Street in both directions are potentially related to confusion over lane assignments.
- Truck Route – It was noted that Route 14 has been designated as a truck route. Signage at the Route 27/Route 58 intersection in Hanson encourages trucks to use Route 14 rather than Route 27 to access Brockton. Truck traffic can exacerbate other safety concerns relating to delay and queuing.
- Truck Turns – A southbound tractor trailer turning left onto Auburn Street was observed encroaching on the westbound left turn lane. It was suggested that the departure lane is not wide enough to accommodate a turning truck. No crashes appear to be attributed to this issue, although one southbound left turn crash involved a truck.
- Pavement Markings - Markings are generally faded along the corridor, including crosswalk markings. This reduces adherence and can create confusion over intended lane assignments, and reduces visibility and awareness of pedestrian crossings.
- Clearance Times – Yellow and red clearance times were noted to be potentially inadequate due to the history of red light running and vehicles remaining in the intersection during the clearance period. The issue of drivers remaining in the intersection is likely also related to previously noted congestion. The history of rear-end crashes on all four approaches can also be the result of inadequate clearance intervals.
- Pedestrian Clearance Times – It was suggested that pedestrian WALK intervals are inadequate at the intersection. Audit team members clarified that pedestrian signals are typically designed so that the Flashing Don’t Walk (FDW) interval is long enough to allow a pedestrian to cross the street at an assumed typical walking speed, as dictated in the Manual on Uniform Traffic Control Devices (MUTCD). It was noted that the assumed typical walking speed was reduced from 4 feet/second to 3.5 feet/second in the 2009 MUTCD, and that this signal was likely designed using the older standard. It was noted that there is senior housing nearby and that older pedestrians may be using the intersection.
- Pedestrian Accommodations –Pedestrian accommodations are limited at the intersection, especially on the southwest corner where the sidewalk does not extend beyond the Mutual Bank access sidewalk. Pedestrian accommodations, where currently provided, do not consistently meet current ADA standards.



**Sidewalk end on southwest corner**

- Bicycle Accommodation – Accommodation is not provided for bicycles at the intersection. Shoulders, where provided, are of an inadequate width for accommodation.
- Speeding – Speeding is a safety concern at the intersection and on the intersection approaches.
- Northbound Left Lane Queue – The lack of a protected movement for the Bedford Street northbound left turn results in queued vehicles waiting for a gap in southbound traffic. Northbound through vehicles were observed favoring the right lane, although through movements are allowed from both lanes, creating a de facto left turn lane on this approach. Sideswipe and rear-end crashes on this approach may be related to this issue. Sideswipe crashes may be the result of drivers changing lanes to avoid queued vehicles in the left lane, while rear-end crashes can occur when through drivers do not anticipate stopped vehicles during a green indication.
- Signal Visibility – The Bedford Street southbound and Auburn Street westbound approaches have only one overhead signal, reducing signal visibility for approaching drivers. It was also noted that signs, utility poles and other roadside obstructions reduce visibility for post-mounted signals.
- Approach Alignment – The Auburn Street eastbound approach does not align with the departure lanes. Audit participants noted that the approach directly aligns with the mast arm on the southeast corner, although it should be noted that no crashes involved vehicles striking the mast arm.
- Sign Clutter – Multiple signs relating to intersection control and guidance are provided on all approaches to the intersection. The number of signs creates a visual clutter that reduces the driver’s ability to receive all the information presented when approaching the intersection.
- Private Signs – Audit participants noticed that private signs have been attached to sign posts for regulatory signs at the intersection, resulting in signs that are below the standard 7 foot horizontal clearance, as can be seen at right.
- Wendy’s Signage – The enter and exit signs for Wendy’s on each side of the shared Wendy’s/Walgreens driveway are low and can potentially obstruct an exiting driver’s view of approaching traffic. It is unknown if any crashes involving exiting drivers were related to this issue. It was also noted that a “Do Not Block Entrance” sign is provided approaching this driveway from the north, which is potentially confusing because the driveway accommodates both entering and exiting traffic.
- Preemption Operation – It was suggested that emergency preemption equipment provided at the intersection does not activate in enough time to clear the intersection for a northbound emergency vehicle. A northbound preemption activation was observed on the day of the audit.



**Low Wendy’s Signage**

- **Missing Sign** – During the field visit audit participants noticed the stub of a sign post adjacent to Wendy’s on the northwest corner. A review of Google Street View suggests that this sign was a hospital sign with directional arrow and a supplemental plaque for “Signature Healthcare Brockton Hospital”, which is located on Route 123 in Brockton and is accessible from Route 14.
- **Damaged Pole** – A utility pole adjacent to the missing sign shows signs of a vehicle strike and is leaning away from the roadway. It was suggested that the lean is due to the vehicle strike, although the angle of the wires could also create tension that pulls the pole away from the roadway. A review of historical Google Street View imagery reveals that the pole has been leaning since 2008.



**Missing Sign Post and  
Damaged Pole**

### **Bedford Street (Route 18) at Temple Street (Route 27)**

Many safety issues noted for the intersection of Bedford Street and Temple Street are similar to those noted for the intersection Bedford Street and Auburn Street. Issues common to both intersections are repeated here for clarity and comprehensiveness.

- **Traffic Congestion** – A number of items related to traffic congestion were noted as safety issues.
  - The level of traffic traveling through the intersection is high, and Route 27 serves as a primary connector from Brockton to the center of Whitman.
  - The lack of left turn lanes and/or protected movements for left turns was noted as both a safety and operational issue at the intersection. The lack of an eastbound left turn phase was specifically questioned. Crashes involving left turning vehicles on all approaches can be related to this issue, as a driver waiting for an acceptable gap under permissive operation creates frustration, increases aggression and increases the potential for red light violations and acceptable of inadequate gaps.
  - The existing No Turn on Red restrictions were noted as a safety concern because of the increased delay from vehicles that must wait to turn right instead of turning right on red. Increased delay can increase frustration and aggression, as previously noted.
- **Access Management** – The proximity of businesses and commercial driveways causes access management to be of particular concern as it relates to safety.
  - Vehicles entering and exiting Marcello’s from Route 18 were noted as a safety concern. One crash involved a vehicle exiting Marcello’s turning right onto Bedford Street northbound.



- Visibility exiting the plaza driveway on Temple Street was also noted as a safety concern. This driveway intersects Temple Street at a point where westbound vehicles departing the intersection are merging back into a single lane, but eastbound vehicles are shifting into the two lane approach section. Trees and a utility pole on the west side of the driveway also impact an exiting driver's visibility. Three crashes involved exiting drivers at this location.



**Plaza Exit on Temple Street**

- Lane Designation and Alignment – The beginning and end points of the two lane segments on both Bedford Street and Temple Street are not well signed and have faded pavement markings. Lane designation signage and merge signage are not consistently provided. Traffic congestion also contributes to this issue by increasing driver aggression, causing more aggressive drivers to jump into the second lane as soon as it is available, and “racing” to the merge point when the two-lane segment ends. Sideswipe crashes on Bedford Street and on Temple Street are potentially related to confusion over lane assignments.
- Truck Turns – Five crashes involved a northbound right turning tractor trailer striking the signal post on the southeast corner of the intersection, suggesting that an adequate turning radius is not provided for this movement.
- Pavement Markings - Markings are generally faded along the corridor, including crosswalk markings. This reduces adherence and can create confusion over intended lane assignments, and reduces visibility and awareness of pedestrian crossings.
- Red Light Running & Clearance Times – The intersection experiences a notable amount of red light running, especially on the Temple Street eastbound approach. This may be due to a combination of factors, including traffic congestion leading to driver frustration and aggression, but also from inadequate yellow and red clearance times. The history of rear-end crashes on all four approaches can also be the result of inadequate clearance intervals.
- Visibility – It was noted that visibility is impacted by vegetation at multiple locations.
  - As previously noted, trees impact visibility for drivers exiting the plaza driveway on Temple Street west of the intersection.
  - Shrubs on both the north and south corners of the vacant lot between Warren Avenue and Temple Street impact visibility. Shrubs at the northern end of the property potentially block visibility for drivers exiting Warren Avenue, although no crashes occurred involving exiting vehicles. Shrubs at the southern end of the property overgrow the sidewalk and can impact visibility relating to pedestrian activity.

- Pedestrian Accommodations – It was noted that pedestrians do not always cross at the intersection crosswalks, choosing instead to cross the intersection approaches around both queued and moving vehicles. It was suggested that the intersection accommodations do not afford an adequate level of safety, causing the pedestrian to choose a different path.
- Bicycle Accommodation – Accommodation is not provided for bicycles at the intersection. Shoulders, where provided, are of an inadequate width for accommodation. Two bicyclists were observed cutting through Marcello’s parking lot on the day of the audit.
- Cut-Through Traffic – It was suggested that the traffic congestion experienced at the intersection causes drivers to cut-through intersecting side streets to travel between Whitman Center and Route 18.
- Speeding – Speeding is a safety concern at the intersection and on the intersection approaches.
- Signal Visibility – The existing traffic signal provides just one overhead signal and one post-mounted signal for each direction. It was noted that signs, utility poles and other roadside obstructions reduce visibility for post-mounted signals. It was also noted that the overhead signal for the eastbound approach is tilted slightly, further degrading visibility for approaching drivers. The overhead signal head for the eastbound and northbound approaches are free swinging, which are more susceptible to movement due to wind.
- Sign Clutter – Multiple signs relating to intersection control and guidance are provided on all approaches to the intersection. The number of signs creates a visual clutter that reduces the driver’s ability to receive all the information presented when approaching the intersection.
- Inconsistent Signage – It was noted that the D6/D8 guide signage legends on Temple Street westbound approaching Route 18 are inconsistent. The first sign includes Route 18 north on the larger (D6) top sign, and Route 18 south on the smaller (D8) bottom sign. The second sign includes Route 18 south on the larger sign and Route 18 north on the smaller sign. Due to the proximity of the signs, a driver could process part of the legend of the first sign, then process the rest of the legend of the second sign without realizing that the directions have swapped. This could create confusion over direction, destination, or both.



**Temple Street Westbound Route 18 Signage  
(First sign in foreground, second sign in background)**



**Detail of second  
sign**

- Street Name Signs – No street name signs are provided at the intersection.
- Signal Equipment – An audit participant suggested that the back loop on the Temple Street westbound approach is not working. A vehicle was observed stopped a distance behind the stop line, which did not call the green phase for the approach. It was also noted during the field visit that a pedestrian signal head on the southwest corner is misaligned.
- Pavement Rutting – Pavement condition was noted as a potential safety issue. Rutting is most significant on the northbound approach.
- Signal Coordination – The potential for signal coordination between the two study intersections was debated by the audit team. The MUTCD suggests that “traffic control signals within 1/2 mile of one another along a major route or in a network of intersecting major routes should be coordinated, preferably with interconnected controller units.” Route 14 and Route 27 are approximately ¾ mile apart and have a significant number of businesses and side streets between them that interrupt continuous flow, suggesting that coordination would not be beneficial at these locations.



## Potential Safety Enhancements

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		Costs	
Short-term	<1 year	Low	<\$10,000
Mid-term	1–3 years	Medium	\$10,000–\$50,000
Long-term	>3 years	High	>\$50,000

### **Bedford Street (Route 18) at Auburn Street (Route 14)**

- Conduct a detailed traffic study of the intersection to determine the appropriate design lane configuration, signal phasing and reconstruction strategies. A traffic study is the first step towards improvements aimed at addressing congestion, traffic signal improvements, and geometric improvements. The feasibility and appropriateness of protected left turn movements will be considered for all approaches. The study should also consider the impact of truck traffic on the intersection operation. This is a short term, medium cost improvement that will be completed as part of planned improvements.
- Review the appropriateness of No Turn on Red restrictions at the intersection. The project design will consider the need for turn restrictions during the red indication, and implement restrictions only where they are determined to be necessary for safe operation. This is a mid-term, low cost improvement that will be completed as part of the project design.
- Review the Auburn Street eastbound right turn restriction to determine if it can be removed. Audit participants noted that MassDOT agreed to remove this restriction several years ago. MassDOT District personnel should review the appropriateness of the existing restriction. This is a short-term, low cost improvement.
- Consider a median on Bedford Street as part of planned improvements. A median was suggested to assist in delineation of travel lanes, but also to prohibit left turns from adjacent commercial driveways. This would require drivers exiting Wendy's or Jay's Market to turn right onto Bedford Street, or to use the Auburn Street driveways and turn left at the traffic signal. It was suggested that blocking left turns from the shared Wendy's/Walgreens driveway could relocate those lefts to the northern Walgreens driveway. This is a mid-term, low cost improvement that will be considered as part of the project design process.
- Consider a right-in, right-out configuration for the shared Wendy's/Walgreens driveway. Restricting left turns in and out at this location would eliminate conflicts that contribute to the crash history of the

intersection. As noted above, restricting left turns from the shared driveway could relocate those lefts to the northern Walgreens driveway. This restriction would require coordination with the property owner(s). This is a mid-term, low cost improvement that will be considered as part of the project design process.

- Consider closure or turn restrictions of Jay’s Market driveways on Bedford Street. This potential modification will be reviewed in conjunction with project improvements and in conjunction with local review relating to the potential gas pump expansion. This is a short-term, low cost improvement.
- Consider a painted island on the westbound Auburn Street approach with a break for the CVS driveway. This potential improvement will be considered as part of project improvements. It was noted that intersection improvements could increase approach capacity, which would reduce queues and eliminate the need for vehicles to bypass the existing queue to enter CVS.
- Review existing two lane segments to determine if pavement markings delineating lanes need to be extended. Vehicles have been observed forming two lanes before the beginning of the marked two-lane section. A cursory review suggests that markings are properly placed, suggesting that driver behavior is due to driver aggression; however, markings should be reviewed as a short-term, low cost improvement in conjunction with reapplication of pavement markings.
- Review lane designations in conjunction with long term improvements to determine if existing queue storage is adequate, and if the limits of the two lane segments on all approaches need to be extended. This is a long-term improvement that will be considered as part of the project design process.
- Review truck turning paths, and consider the need for widening and/or realignment. This is of specific concern for the Bedford Street southbound left turn, but should be reviewed for all turning movements. Review of turning paths is a short-term improvement, while widening and/or realignment is a long-term, potentially high cost improvement.
- Reapply pavement markings, including crosswalk markings. This will increase adherence to intended lane assignments and increase visibility of crosswalk locations. The audit team suggested that ladder-style crosswalk markings are more visible for approaching vehicles and should be considered at this location. This is a short-term, medium cost improvement.
- Study clearance times, and update if necessary. The existing yellow and all red clearance times should be determined from the existing traffic signal controller and compared to minimum requirements calculated based on the latest ITE and MassDOT guidance. If existing clearance times are insufficient, clearance times should be increased accordingly. This change in clearance times could reduce the number of rear-end crashes occurring at the intersection. This is a short-term, low cost improvement.
- Review pedestrian clearance times, and update if necessary. Pedestrian clearance times should be calculated based on the latest MUTCD and MassDOT guidance. This is a short-term, medium cost improvement.

- Provide countdown pedestrian signal heads in conjunction with planned improvements. Countdown heads display the time remaining in the Flashing Don't Walk interval, and can help pedestrians decide whether they have adequate time to cross the street. This is a long-term, low cost improvement.
- Implement educational programs for neighboring senior citizens regarding pedestrian safety. An educational program can clarify that the Walk phase means it is safe to enter the intersection, and that a pedestrian that enters at the beginning of the Flashing Don't Walk phase will have adequate time to cross the street. Education is a short-term, low cost improvement that should be implemented only after pedestrian intervals have been reviewed for compliance with current standards.
- Reconstruct sidewalks and provide ADA compliant wheelchair ramps. Sidewalk reconstruction will be completed long-term in conjunction with planned improvements. Sidewalk should be extended to the limits of work on all legs of the intersection where feasible, in conformance with MassDOT's Healthy Transportation Policy and Complete Streets guidelines.
- Widen shoulders. The intersecting roadways should be widened to provide minimum 5-foot shoulders where feasible as part of the planned improvements. This mid-term, high cost improvement will provide additional pavement width for turning vehicles and will meet MassDOT's standard for bicycle accommodation.
- Continue to enforce speeding and red light running in the vicinity of the intersection. Enforcement is a short-term and ongoing improvement, the cost of which is reduced enforcement elsewhere in Town.
- Upgrade signals to provide overhead signals with retroreflective backplates, and add supplemental heads where appropriate to increase visibility. This is a long-term, high cost improvement assumed to be incorporated into the proposed project. The upgraded signal should be fully actuated with detection on all approaches.
- Realign the Auburn Street eastbound through movement to the greatest extent practical as part of planned improvements. Through alignments on all approaches should be reviewed to maintain a consistent alignment. This is a long-term improvement.
- Review signs and remove inappropriate, incorrect or ambiguous signage. Despite recommendations for increased signage for specific safety concerns, it was noted that existing signage is sometimes cluttered and ineffective. A complete review of existing signage should be done as part of the project. This is a long-term improvement.
- Remove private signs for Emmanuel Baptist Church. These signs do not provide the required horizontal clearance and contribute to overall sign clutter. This is a short-term, low cost improvement.
- Remove and/or relocate low Wendy's enter and exit signs. Sight triangles should be reviewed to determine if the signs can be relocated to eliminate the visibility obstruction. This is a short-term, low cost improvement that should be coordinated with the property owner.
- Replace "Do Not Block Entrance" sign with "Do Not Block Driveway" sign. This short-term, low cost improvement is recommended to deliver a clearer message to approaching drivers.



- Review preemption equipment locations in conjunction with planned improvements. Detectors should be located to maximize early detection. This is a long-term, low cost improvement.
- Replace sign for Brockton Hospital. The missing sign on the northwest corner of the intersection should be replaced in kind. This is a short-term, low cost improvement.
- Review utility pole locations and condition in conjunction with planned improvements. This is a long-term, potentially high cost improvement if pole replacements and/or relocations are required. This improvement must be coordinated with the affected utility companies.

### **Bedford Street (Route 18) at Temple Street (Route 27)**

- Conduct a detailed traffic study of the intersection to determine the appropriate design lane configuration, signal phasing and reconstruction strategies. A traffic study is the first step towards improvements aimed at addressing congestion, traffic signal improvements, and geometric improvements. The feasibility and appropriateness of protected left turn movements will be considered for all approaches. The study should also quantify cut-through traffic currently avoiding the intersection, and consider its impact if redirected through the intersection. This is a short term, medium cost improvement that will be completed as part of planned improvements. Improving capacity at the intersection can also reduce cut-through traffic on side streets.
- Review the appropriateness of No Turn on Red restrictions at the intersection. The project design will consider the need for turn restrictions during the red indication, and implement restrictions only where they are determined to be necessary for safe operation. This is a mid-term, low cost improvement that will be completed as part of the project design.
- Consider a right-in, right-out configuration for the Cumberland Farms driveway closest to the intersection on Bedford Street. Restricting left turns in and out at this location would eliminate conflicts that contribute to the crash history of the intersection. This restriction would require coordination with the property owner(s). This is a mid-term, low cost improvement that will be considered as part of the project design process.
- Review sight triangles for the plaza driveway on Temple Street. Trim or remove vegetation and relocate utility pole if necessary. This is a mid-term, low cost improvement that will be considered as part of the design process.
- Review the Temple Street cross-section at the plaza driveway, and consider shortening the two-lane segment so that vehicles departing the plaza only need to cross one lane of approach traffic. This long-term improvement will be considered along with other operational improvements at the intersection.
- Trim shrubs bordering the vacant lot between Temple Street and Warren Avenue. This is a short-term, low cost improvement.
- Review existing two lane segments to determine if pavement markings delineating lanes need to be extended. Vehicles have been observed forming two lanes before the beginning of the marked two-

lane section. Markings should be reviewed as a short-term, low cost improvement in conjunction with reapplication of pavement markings.

- Review lane designations in conjunction with long term improvements to determine if existing queue storage is adequate, and if the limits of the two lane segments on all approaches need to be extended. This is a long-term improvement that will be considered as part of the project design process.
- Review truck turning paths, and consider the need for widening and/or realignment. This is of specific concern for the Bedford Street northbound right turn, but should be reviewed for all turning movements. Review of turning paths is a short-term improvement, while widening and/or realignment is a long-term, potentially high cost improvement.
- Reapply pavement markings, including crosswalk markings. This will increase adherence to intended lane assignments and increase visibility of crosswalk locations. The audit team suggested that ladder-style crosswalk markings are more visible for approaching vehicles and should be considered at this location. This is a short-term, medium cost improvement.
- Study clearance times, and update if necessary. The existing yellow and all red clearance times should be determined from the existing traffic signal controller and compared to minimum requirements calculated based on the latest ITE and MassDOT guidance. If existing clearance times are insufficient, clearance times should be increased accordingly. This change in clearance times could reduce the number of rear-end crashes occurring at the intersection. This is a short-term, low cost improvement.
- Review pedestrian clearance times, and update if necessary. Pedestrian clearance times should be calculated based on the latest MUTCD and MassDOT guidance. This is a short-term, low cost improvement.
- Provide countdown pedestrian signal heads in conjunction with planned improvements. Countdown heads display the time remaining in the Flashing Don't Walk interval, and can help pedestrians decide whether they have adequate time to cross the street. This is a long-term, low cost improvement.
- Reconstruct sidewalks and provide ADA compliant wheelchair ramps. Sidewalk reconstruction will be completed long-term in conjunction with planned improvements. Sidewalk should be extended to the limits of work on all legs of the intersection where feasible, in conformance with MassDOT's Healthy Transportation Policy and Complete Streets guidelines.
- Widen shoulders. The intersecting roadways should be widened to provide minimum 5-foot shoulders where feasible as part of the planned improvements. This mid-term, high cost improvement will provide additional pavement width for turning vehicles and will meet MassDOT's standard for bicycle accommodation.
- Continue to enforce speeding and red light running in the vicinity of the intersection. Enforcement is a short-term and ongoing improvement, the cost of which is reduced enforcement elsewhere in Town.

- Upgrade signals to provide overhead signals with retroreflective backplates, and add supplemental heads where appropriate to increase visibility. This is a long-term, high cost improvement assumed to be incorporated into the proposed project. The upgraded signal should be fully actuated with detection on all approaches.
- Review signs and remove inappropriate, incorrect or ambiguous signage. Despite recommendations for increased signage for specific safety concerns, it was noted that existing signage is sometimes cluttered and ineffective. A complete review of existing signage should be done as part of the project. This is a long-term improvement.
- Install street name signs at the intersection. Street name signs should be provided for both Bedford Street and Temple Street. This is a short-term, low cost improvement.
- Determine if loops on Temple Street are working properly, and repair if necessary. This is a short-term, low cost improvement.
- Rehabilitate pavement. Pavement should be rehabilitated at the intersection. The appropriate method of pavement rehabilitation should be determined based on the results of subsurface exploration. This is a long-term, high cost improvement assumed to be included in the planned reconstruction project.

## Summary of Road Safety Audit

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. Each recommendation has a responsibility assigned to it stating whether MassDOT or the Town of Whitman would be responsible for implementing the recommended improvement. The term “Project” refers to improvements that are assumed to be included or could reasonably be accommodated as part of planned improvements.



**Table 3. Potential Safety Enhancement Summary**

Safety Issue	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
<b>Bedford Street (Route 18) at Auburn Street (Route 14)</b>					
Traffic Congestion, Lane Designation and Alignment, NB Left Lane Queue, Truck Route	Conduct a detailed traffic study of the intersection to determine the appropriate design lane configuration, signal phasing and reconstruction strategies.	Project	High	Short-term	Medium*
Traffic Congestion	Review the appropriateness of No Turn on Red restrictions at the intersection.	Project	Medium	Mid-term	Low*
Traffic Congestion	Review the Auburn Street eastbound right turn restriction to determine if it can be removed.	MassDOT	Low	Short-term	Low
Access Management	Consider a median on Bedford Street as part of planned improvements.	Project	High	Short-term	TBD*
Access Management	Consider a right-in, right-out configuration for the shared Wendy's/Walgreens driveway.	Project/ Property Owner	Medium	Mid-term	Low*
Access Management	Consider closure or turn restrictions of Jay's Market driveways on Bedford Street.	Project/Town	Medium	Short-term (Town) Mid-term (Project)	Low*
Access Management	Consider a painted island on the westbound Auburn Street approach, with a break for the CVS driveway.	Project	Medium	Mid-term	Low*
Lane Designation and Alignment	Review existing two lane segments to determine if pavement markings delineating lanes need to be extended.	MassDOT	Medium	Short-term	Low
Lane Designation and Alignment	Review lane designations in conjunction with long-term improvements to determine if existing queue storage is adequate, and if the limits of the two lane segments on all approaches need to be extended.	Project	Medium	Long-term	TBD*
Truck Turns	Review truck turning paths, and consider the need for widening and/or realignment.	Project	Medium	Short-term (Study)	Low*
		Project	Medium	Long-term (Implementation)	TBD*
Pavement Markings	Reapply pavement markings, including crosswalk markings.	MassDOT	Medium	Short-term	\$15,000

**Table 3. Potential Safety Enhancement Summary**

Safety Issue	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
Clearance Times	Study clearance times, and update if necessary.	MassDOT	Medium	Short-term	\$2,000
Pedestrian Clearance Times	Review pedestrian clearance times, and update if necessary.	MassDOT	Medium	Short-term	\$2,000
Pedestrian Accommodations	Provide countdown pedestrian heads in conjunction with planned improvements.	Project	Low	Long-term	Medium*
Pedestrian Accommodations	Implement educational programs for neighboring senior citizens regarding pedestrian safety.	Town	Medium	Short-term	Low
Pedestrian Accommodations	Reconstruct sidewalks and provide ADA compliant wheelchair ramps.	Project	Medium	Long-term	High*
Bicycle Accommodation	Widen shoulders. Minimum 5-foot shoulders should be provided.	Project	Medium	Long-term	High*
Speeding	Continue to enforce speeding and red light running in the vicinity of the intersection.	Town	High	Short-term	\$0 (Reduced enforcement elsewhere)
Signal Visibility	Upgrade signals to provide overhead signals with retroreflective backplates, and add supplemental heads where necessary to increase visibility.	Project	Medium	Long-term	High*
Approach Alignment	Realign the Auburn Street eastbound through movement to the greatest extent practical as part of planned improvements.	Project	Medium	Long-term	TBD*
Sign Clutter	Review signs and remove inappropriate, incorrect or ambiguous signage.	Project	Medium	Long-term	Low*
Sign Clutter/Private Signs	Remove private signs for Emmanuel Baptist Church. Existing signs do not provide adequate horizontal clearance.	MassDOT	Low	Short-term	\$500
Wendy's Signage	Remove and/or relocate low Wendy's enter and exit signs.	MassDOT	Medium	Short-term	\$2,500
Wendy's Signage	Replace "Do Not Block Entrance" sign with "Do Not Block Driveway" sign.	MassDOT	Low	Short-term	\$250
Preemption Operation	Review preemption equipment locations in conjunction with planned improvements.	Project	Medium	Long-term	Low*
Missing Sign	Replace sign for Brockton Hospital.	MassDOT	Low	Short-term	\$500

**Table 3. Potential Safety Enhancement Summary**

Safety Issue	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
Damaged Pole	Review utility pole locations and condition in conjunction with planned improvements.	Project	Low	Long-term	TBD*
<b>Bedford Street (Route 18) at Temple Street (Route 27)</b>					
Traffic Congestion, Lane Designation and Alignment, Cut-Through Traffic	Conduct a detailed traffic study of the intersection to determine the appropriate design lane configuration, signal phasing and reconstruction strategies.	Project	High	Short-term	Medium*
Traffic Congestion	Review the appropriateness of No Turn on Red restrictions at the intersection.	Project	Medium	Mid-term	Low*
Access Management	Consider a right-in, right-out configuration for the Cumberland Farms driveway closest to the intersection on Bedford Street.	Project/ Property Owner	Medium	Mid-term	Low*
Access Management/ Visibility	Review sight triangles for the plaza driveway on Temple Street. Trim or remove vegetation and relocate utility pole if necessary.	Project	Medium	Mid-term	Low*
Access Management/ Visibility	Review the Temple Street cross-section at the plaza driveway, and consider shortening the two-lane segment so that vehicles departing the plaza only need to cross one lane of approach traffic.	Project	Medium	Long-term	TBD*
Visibility	Trim shrubs bordering the vacant lot between Temple Street and Warren Avenue.	MassDOT	Medium	Short-term	\$2,500
Lane Designation and Alignment	Review existing two lane segments to determine if pavement markings delineating lanes need to be extended.	MassDOT	Medium	Short-term	Low
Lane Designation and Alignment	Review lane designations in conjunction with long-term improvements to determine if existing queue storage is adequate, and if the limits of the two lane segments on all approaches need to be extended.	Project	Medium	Long-term	TBD*
Truck Turns	Review truck turning paths, and consider the need for widening and/or realignment.	Project	Medium	Short-term (Study)	Low*
		Project	Medium	Long-term (Implementation)	TBD*
Pavement Markings	Reapply pavement markings, including crosswalk markings.	MassDOT	Medium	Short-term	\$15,000

**Table 3. Potential Safety Enhancement Summary**

Safety Issue	Safety Enhancement	Responsibility	Safety Payoff	Time Frame	Cost
Clearance Times	Study clearance times, and update if necessary.	MassDOT	Medium	Short-term	\$2,000
Pedestrian Clearance Times	Review pedestrian clearance times, and update if necessary.	MassDOT	Medium	Short-term	\$2,000
Pedestrian Accommodations	Provide countdown pedestrian heads in conjunction with planned improvements.	Project	Low	Long-term	Medium*
Pedestrian Accommodations	Reconstruct sidewalks and provide ADA compliant wheelchair ramps.	Project	Medium	Long-term	High*
Bicycle Accommodation	Widen shoulders. Minimum 5-foot shoulders should be provided.	Project	Medium	Long-term	High*
Speeding	Continue to enforce speeding and red light running in the vicinity of the intersection.	Town	High	Short-term	\$0 (Reduced enforcement elsewhere)
Signal Visibility	Upgrade signals to provide overhead signals with retroreflective backplates, and add supplemental heads where necessary to increase visibility.	Project	Medium	Long-term	High*
Sign Clutter	Review signs and remove inappropriate, incorrect or ambiguous signage.	Project	Medium	Long-term	Low*
Street Name Signs	Install street name signs at the intersection.	MassDOT	Medium	Short-term	\$500
Signal Equipment	Determine if loops on Temple Street are working properly, and repair if necessary.	MassDOT	Low	Short-term	\$2,500
Pavement Rutting	Rehabilitate pavement.	Project	Medium	Long-term	High*

\* Improvements to be incorporated into the proposed project are assumed to be included as part of the overall project cost.



## Appendix A. RSA Meeting Agenda

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# Agenda

## Road Safety Audit

Whitman, MA

Bedford Street (Route 18) at

Auburn St (Route 14) & Temple St (Route 27)

Meeting Location: Whitman Town Hall, Selectmen's Room

54 South Avenue, Whitman, MA

Tuesday, January 20, 2015

9:30 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!!

**9:30 AM** Welcome and Introductions

**9:45 AM** Discussion of Safety Issues

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

**10:30 AM** Site Visit

- Drive to the intersections of Bedford St at Auburn St and Temple St
- As a group, identify areas for improvement

**11:00 AM** Discussion of Potential Improvements

- Discuss observations and finalize safety issue areas
- 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 20th, 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

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## Participating Audit Team Members

Date: January 20, 2015

Location: Whitman – Bedford St (Route 18) at Auburn St (Route 14) and Temple St (Route 27)

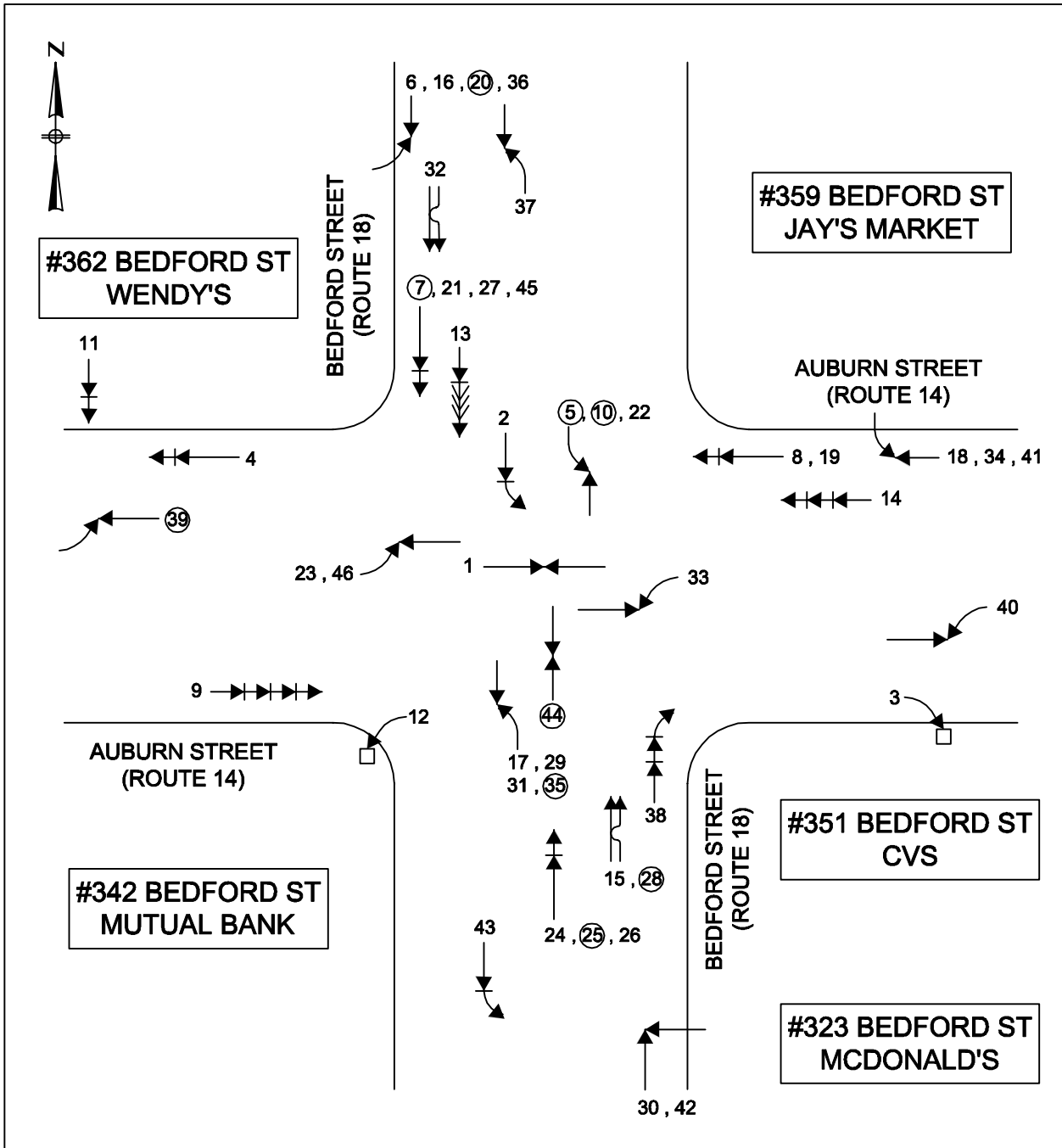
<b>Audit Team Member</b>	<b>Agency/Affiliation</b>	<b>Email Address</b>	<b>Phone Number</b>
Greg Lucas	BETA	GLucas@BETA-Inc.com	781-255-1982
Justin Curewitz	BETA	JCurewitz@BETA-Inc.com	781-255-1982
Lisa Schletzbaum	MassDOT – Safety	Lisa.schletzbaum@state.ma.us	857-368-9634
Gregory Enos	Town of Whitman	Gregory.enos@whitman-ma.gov	781-618-9788
Raymond Guarino	OCPC	rguarino@ocpcrpa.org	508-583-1833
Jason Walters	MassDOT D5 Projects	Jason.Walters@state.ma.us	508-884-4370
Barbara LaChance	MassDOT D5 Traffic	Barbara.Lachance@dot.state.ma.us	508-884-4260
Edward C. Feeney	MassDOT D5 Traffic	Edward.Feeney@state.ma.us	580-884-4242
Daniel Salvucci	Whitman BOS	dlsalvucci@comcast.net	781-447-5078
Scott Benton	Whitman Police	Sbenton@whitman-ma.gov	781-447-1212
Robert Curran	Building Commissioner	Bob. Curran @whitman-ma.gov	781-618-9770
Frank Lyman	Town Administrator	fjl@whitman-ma.gov	781-618-9701



## Appendix C. Detailed Crash Data

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**COLLISION DIAGRAM**



Intersection: Bedford Street (Route 18) at  
 Auburn Street (Route 14)

Date Range: January 2011 - December 2013

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	
○ Fatal Accident	
○ Injury Accident	

## Crash Data Summary Table

Bedford Street (Route 18) at Auburn Street (Route 14), Whitman, MA

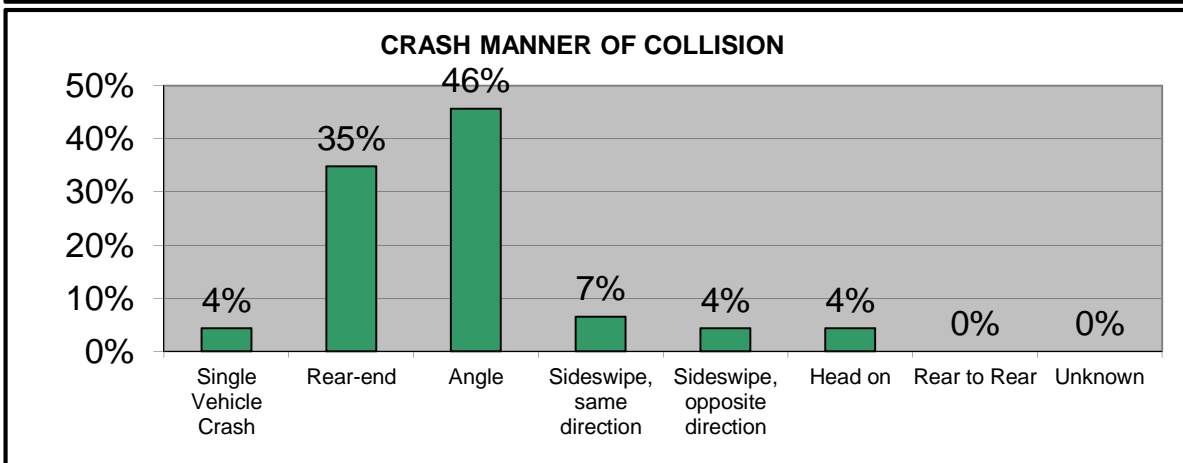
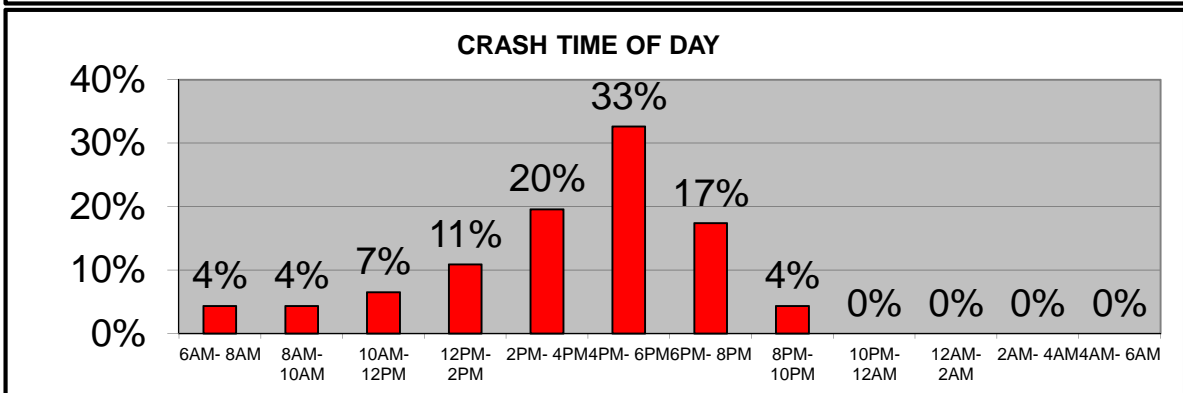
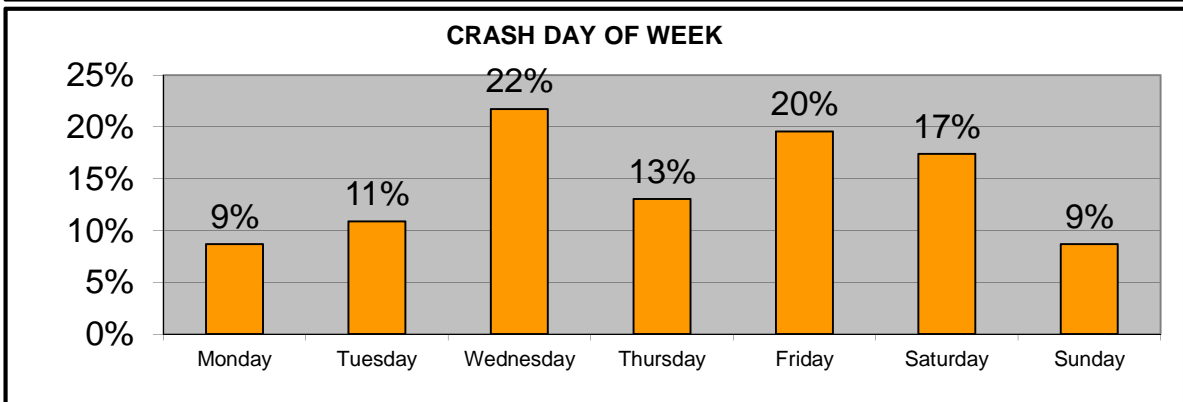
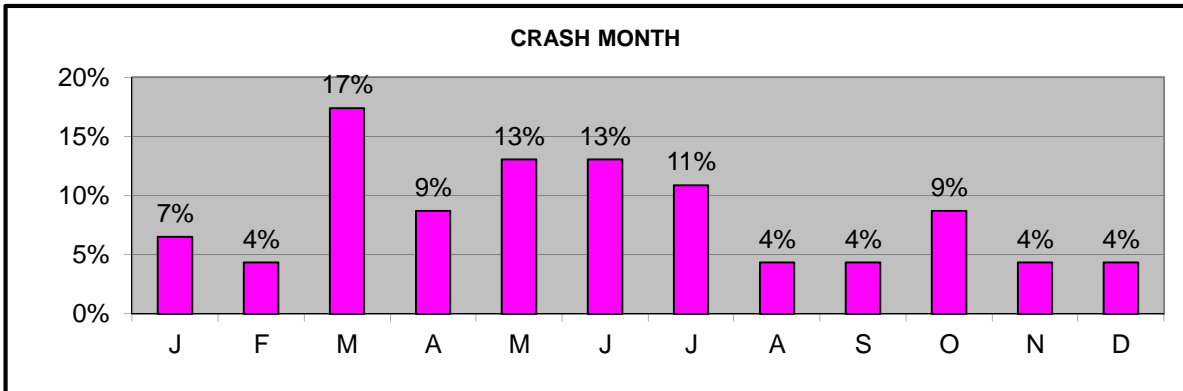
January 2011 - December 2013

Crash Diagram Ref #	Crash Date m/d/y	Crash Day	Time of Day	Manner of Collision Type	Light Condition Type	Weather Condition Type	Road Surface Type	Driver Contributing Code Type	Ages				Comments
									D1	D2	D3	D4	
1	1/15/11	Saturday	4:34 PM	Head on	Daylight	Cloudy	Ice	Inattention	29	47			Driver was in wrong lane headed EB and struck WB vehicle
2	1/20/11	Thursday	3:00 PM	Rear-end	Daylight	Clear	Dry	No Improper Driving	47	51			Driver stopped abruptly to avoid vehicle running red light WB
3	2/5/11	Saturday	5:30 PM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.	69	68			In an attempt to avoid vehicle exiting CVS, vehicle swerved into snowbank
4	2/7/11	Monday	8:03 AM	Rear-end	Daylight	Clear	Ice	Inattention	21	43			Vehicle jammed on brakes for vehicle turning into Wendy's
5	3/11/11	Friday	7:01 PM	Angle	Dark - lighted roadway	Cloudy	Dry	Visibility Obstructed	54	25			Truck obstructed view of vehicle causing the crash
6	3/14/11	Monday	4:15 PM	Angle	Daylight	Rain	Wet	No Improper Driving	19	31			Courtesy Crash*
7	3/15/11	Tuesday	5:47 PM	Rear-end	Daylight	Clear	Dry	Illness	47	54			
8	3/30/11	Wednesday	4:36 PM	Rear-end	Daylight	Clear	Dry	Inattention	62	53			
9	4/1/11	Friday	5:56 PM	Rear-end	Daylight	Rain	Wet	Driving too fast for conditions	50	21	48	47	
10	4/24/11	Sunday	7:29 PM	Angle	Dark - lighted roadway	Cloudy	Dry	Failed to yield right of way	42	16			Operator was on permit as of December 2010
11	4/30/11	Saturday	1:47 PM	Rear-end	Daylight	Cloudy	Dry	No Improper Driving	47	30			Rear-end happened while exiting the Wendy's parking lot
12	5/18/11	Wednesday	9:40 PM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Unknown					Unknown vehicle struck traffic control box and left the scene
13	5/25/11	Wednesday	3:10 PM	Angle	Daylight	Clear	Dry	Inattention	20	56			Thought the vehicle was in park at the red light; backed up into vehicle
14	5/25/11	Wednesday	4:11 PM	Rear-end	Daylight	Clear	Dry	Operating defective equipment	50	20	44		Driver stated that his antilock brakes did not work causing the crash
15	5/26/11	Thursday	2:42 PM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	42	50			Vehicle tried to change lanes and did not see other vehicle
16	6/4/11	Saturday	2:14 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	57	21			Courtesy Crash*
17	8/20/11	Saturday	1:53 PM	Sideswipe, opposite direction	Daylight	Rain	Wet	Inattention	71	80			
18	9/2/11	Friday	3:37 PM	Angle	Daylight	Clear	Dry	Unknown	33	40			Exiting the 7-Eleven Parking Lot
19	10/8/11	Saturday	6:01 PM	Rear-end	Daylight	Clear	Dry	Distracted	50	22			
20	10/27/11	Thursday	12:21 PM	Angle	Dusk	Rain	Wet	Visibility Obstructed	59	34			Courtesy Crash*
21	12/16/11	Friday	3:10 PM	Rear-end	Daylight	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	30	27			
22	3/17/12	Saturday	4:28 PM	Angle	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	23	52			
23	4/3/12	Tuesday	5:12 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	19	32			
24	5/24/12	Thursday	3:18 PM	Rear-end	Daylight	Clear	Dry	Inattention	41	20			
25	6/6/12	Wednesday	10:50 AM	Rear-end	Daylight	Rain	Wet	Inattention	53	34			
26	6/24/12	Sunday	5:30 PM	Rear-end	Daylight	Cloudy	Dry	Followed too closely	59	24			
27	6/25/12	Monday	7:29 PM	Rear-end	Daylight	Cloudy	Dry	No Improper Driving	45	18			
28	7/3/12	Tuesday	7:11 AM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	44	36			Vehicle tried to change lanes and did not see other vehicle
29	10/31/12	Wednesday	7:01 PM	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	65	21			
30	1/18/13	Friday	6:34 PM	Angle	Dark - lighted roadway	Clear	Dry	Inattention	28	46			Vehicle exiting the CVS Parking lot
31	3/9/13	Saturday	8:35 PM	Angle	Dark - lighted roadway	Cloudy	Dry	No Improper Driving	26				Hit and run
32	3/13/13	Wednesday	2:16 PM	Sideswipe, same direction	Daylight	Clear	Dry	Unknown	25	27			Vehicle was pulling over for emergency vehicle and sideswiped vehicle
33	3/27/13	Wednesday	9:59 AM	Angle	Daylight	Clear	Dry	Visibility Obstructed	32	18			Courtesy Crash*
34	5/16/13	Thursday	4:22 PM	Angle	Daylight	Clear	Dry	No Improper Driving	68	56			Courtesy Crash*
35	6/7/13	Friday	4:16 PM	Sideswipe, opposite direction	Daylight	Rain	Wet	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	16	52			
36	6/10/13	Monday	6:08 PM	Angle	Dusk	Rain	Wet	Visibility Obstructed	51	22			Courtesy Crash*
37	7/24/13	Wednesday	4:21 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	23	43			Vehicle attempting to enter Wendy's
38	7/25/13	Thursday	5:41 PM	Rear-end	Daylight	Rain	Wet	careless, negligent, or aggressive	32	24	42		
39	7/26/13	Friday	7:16 PM	Angle	Daylight	Rain	Wet	Failed to yield right of way	22	40			Vehicle attempting to enter Wendy's
40	7/30/13	Tuesday	11:28 AM	Angle	Daylight	Clear	Dry	Unknown	44	36			Vehicle attempting to enter CVS
41	8/11/13	Sunday	3:25 PM	Angle	Daylight	Clear	Dry	Visibility Obstructed	20	26			Courtesy Crash*
42	9/6/13	Friday	5:14 PM	Angle	Daylight	Clear	Dry	No Improper Driving	21	39			Courtesy Crash*
43	10/25/13	Friday	11:42 AM	Rear-end	Daylight	Cloudy	Dry	Cellular telephone	49	18			Using ipod and did not see vehicle waiting to turn into McDonalds
44	11/3/13	Sunday	12:55 PM	Head on	Daylight	Clear	Dry	Inattention	82	51	22		Attempting to take left turn to Auburn St WB and struck head on
45	11/27/13	Wednesday	12:42 PM	Rear-end	Daylight	Rain	Wet	Unknown	67	46			
46	12/3/13	Tuesday	7:33 AM	Angle	Dawn	Cloudy	Dry	Unknown	28	66			

\*Courtesy Crash - A term used to describe a crash that occurs subsequent to a non-involved mainline driver who gives the right of way, contrary to the rules of the road, to another driver.

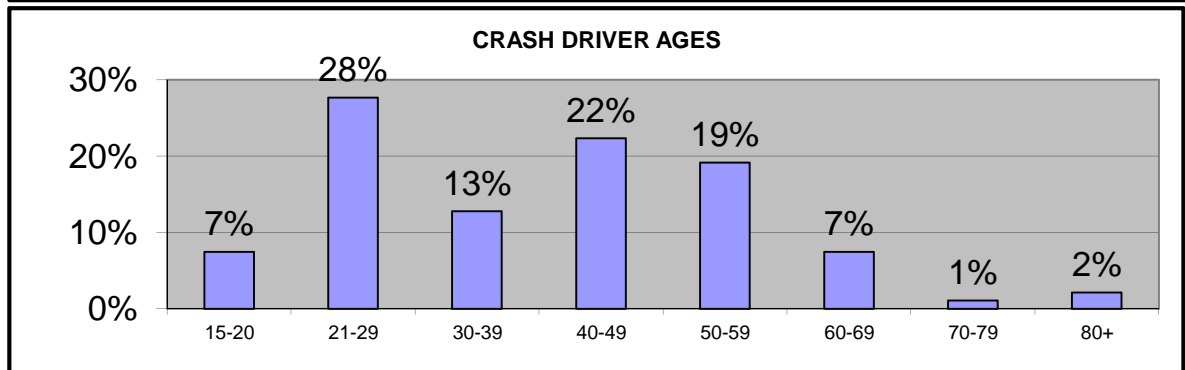
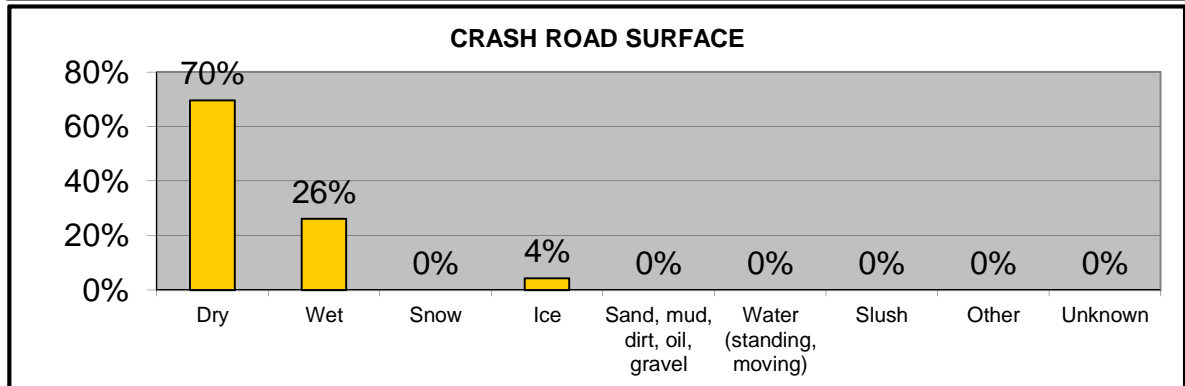
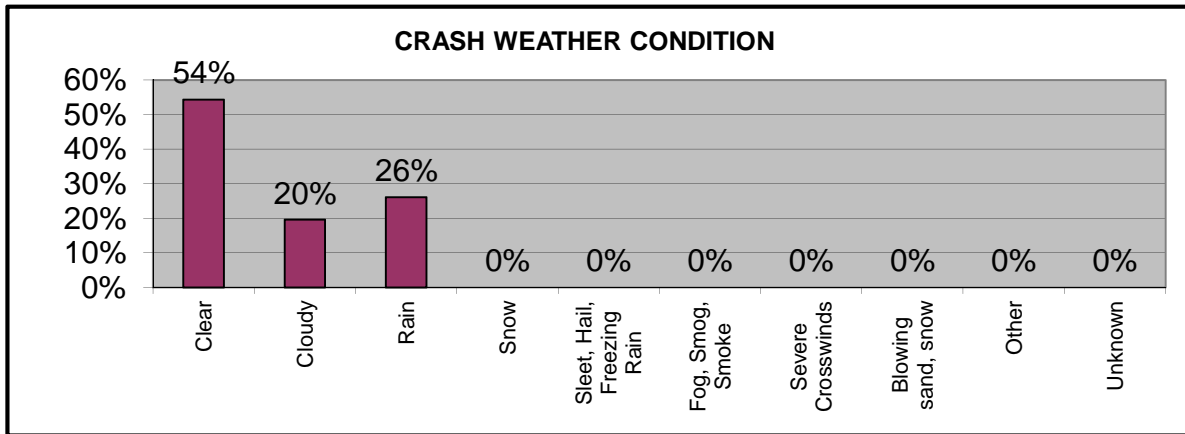
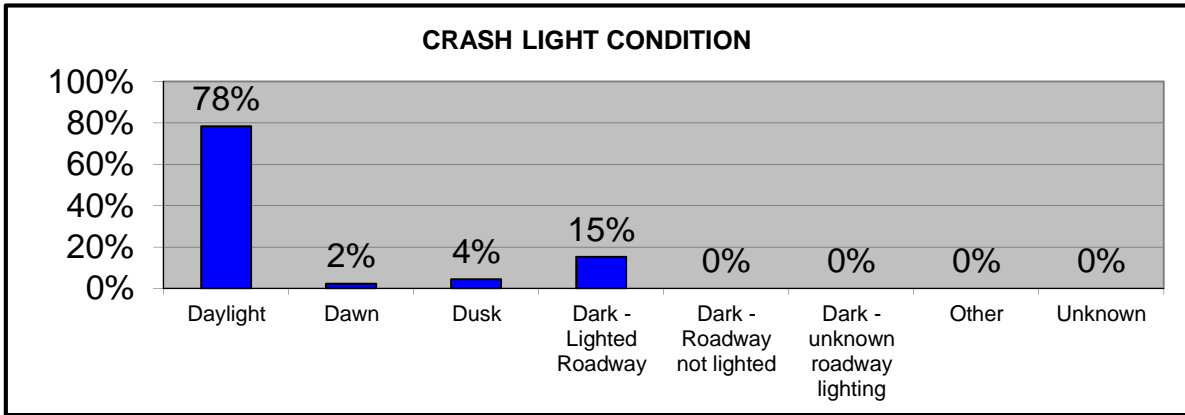
Summary based on Crash Reports obtained from the Whitman Police Department

**Crash Data Summary Tables and Charts**  
 Bedford Street (Route 18) at Auburn Street (Route 14), Whitman, MA

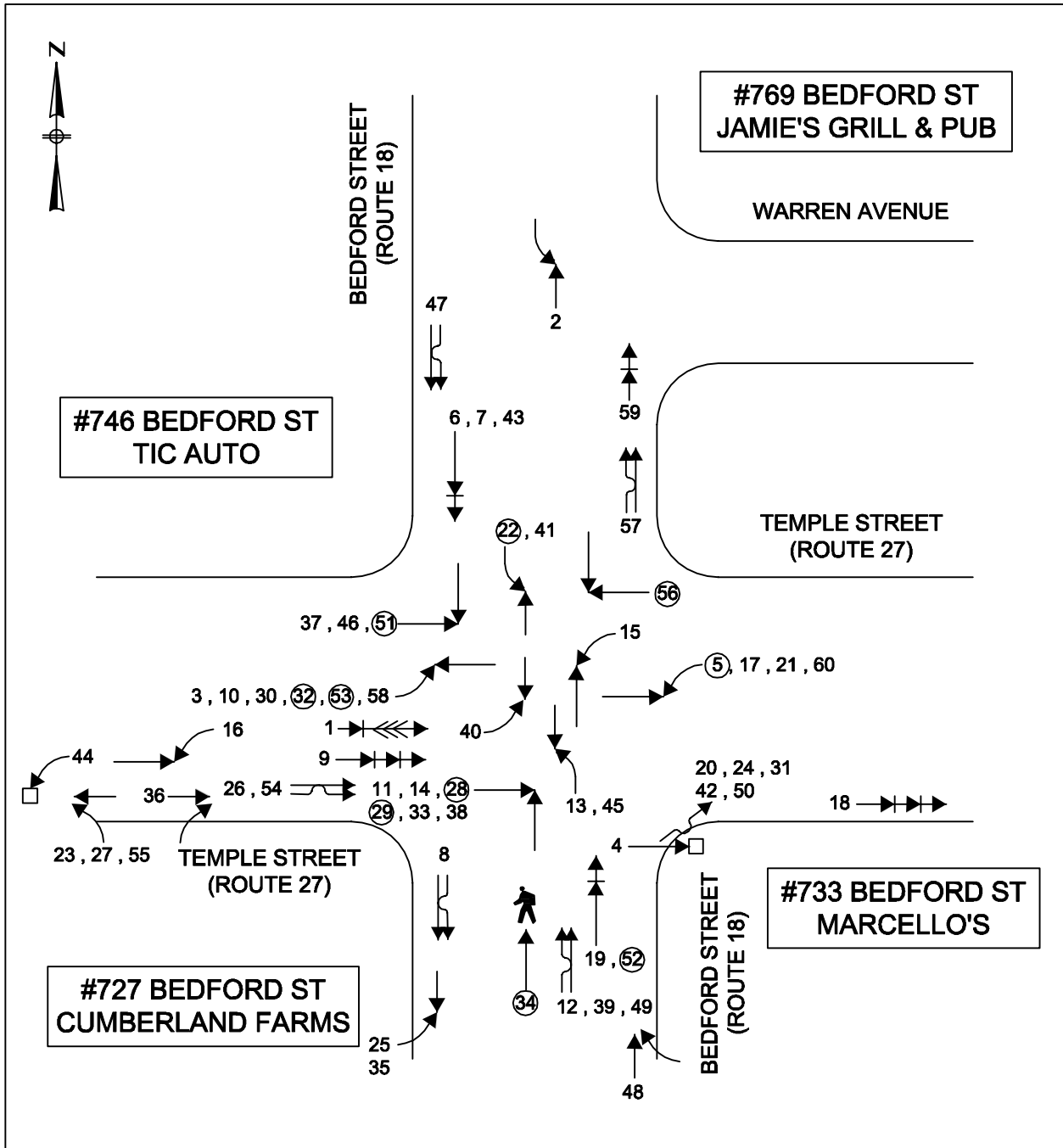




**Crash Data Summary Tables and Charts**  
 Bedford Street (Route 18) at Auburn Street (Route 14), Whitman, MA



**COLLISION DIAGRAM**



Intersection: Bedford Street (Route 18) at  
 Temple Street (Route 27)/Warren Avenue

Date Range: January 2011 - December 2013

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	
○ Fatal Accident	
○ Injury Accident	

## Crash Data Summary Table

Bedford Street (Route 18) at Temple Street (Route 27)/Warren Avenue, Whitman, MA

January 2011 - December 2013

Crash Diagram Ref #	Crash Date m/d/y	Crash Day	Time of Day	Manner of Collision Type	Light Condition Type	Weather Condition Type	Road Surface Type	Driver Contributing Code Type	Ages			Comments
									D1	D2	D3	
1	1/10/11	Monday	8:13 PM	Angle	Dark - lighted roadway	Clear	Dry	Other improper action	36	38		
2	1/11/11	Tuesday	4:49 PM	Angle	Dusk	Clear	Dry	Failed to yield right of way	19	35		Driver stated his visibility was obstructed
3	1/19/11	Wednesday	5:42 PM	Angle	Dark - lighted roadway	Rain	Wet	Inattention	21	24		
4	1/22/11	Saturday	11:10 AM	Single Vehicle Crash	Daylight	Clear	Snow	No Improper Driving	47			Sidewalk plow struck traffic signal post, knocking it down
5	2/4/11	Friday	5:59 PM	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	20	35		Followed vehicle in front too closely and did not see oncoming car
6	4/2/11	Saturday	10:25 AM	Rear-end	Daylight	Clear	Dry	Inattention	56	31		
7	4/18/11	Monday	1:41 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	45	17		
8	5/1/11	Sunday	8:42 PM	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	44	39		Vehicle was cut off by passing vehicle
9	5/4/11	Wednesday	1:05 PM	Rear-end	Daylight	Cloudy	Dry	Followed too closely	62	25	57	
10	5/10/11	Tuesday	2:47 PM	Angle	Daylight	Cloudy	Dry	Unknown	18	21		
11	5/26/11	Thursday	5:22 PM	Angle	Daylight	Clear	Dry	No Improper Driving	43	22		Vehicle was stopped in middle of intersection to take left when light turned green for opposing traffic
12	6/26/11	Sunday	12:17 PM	Sideswipe, same direction	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	66	22	44	Vehicle tried to merge between two vehicles, striking both of them
13	7/8/11	Friday	8:44 PM	Angle	Dark - lighted roadway	Rain	Wet	Inattention	37	17		
14	8/29/11	Monday	4:09 PM	Angle	Daylight	Clear	Dry	No Improper Driving	82	18		Signal were not working due to power outage; barrels w/stop signs used
15	9/6/11	Tuesday	10:31 AM	Angle	Daylight	Rain	Wet	Unknown	58	25		Both vehicles stated they had green light
16	9/9/11	Friday	1:39 PM	Angle	Daylight	Clear	Dry	Inattention	37	24		Turning into Cumberland Farms (#727 Bedford Rd)
17	9/18/11	Sunday	11:41 AM	Angle	Daylight	Cloudy	Dry	Unknown	62	48		
18	9/30/11	Friday	6:51 PM	Rear-end	Dark - lighted roadway	Clear	Dry	Inattention	48	48	17	Slowed to allow vehicle out of parking lot
19	11/14/11	Monday	3:34 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	49	53		
20	12/3/11	Saturday	8:02 PM	Single Vehicle Crash	Dark - lighted roadway	Clear	Dry	No Improper Driving	46			Tractor-Trailer struck traffic signal post, knocking it down
21	12/4/11	Sunday	10:10 AM	Angle	Daylight	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	22	73		
22	12/19/11	Monday	7:26 PM	Head on	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	64	28		
23	12/28/11	Wednesday	1:18 PM	Angle	Daylight	Cloudy	Dry	Failed to yield right of way	49	43		Vehicle attempting to turn left out of the Johnny Foodmaster parking lot
24	1/26/12	Thursday	8:43 AM	Single Vehicle Crash	Daylight	Clear	Dry	Over-correcting/over-steering	35			Tractor-Trailer struck traffic signal post, knocking it down
25	2/17/12	Friday	9:31 AM	Angle	Daylight	Rain	Wet	Unknown	35	20		Turning out of Cumberland Farms (#727 Bedford Rd) headed northbound
26	3/1/12	Thursday	7:29 PM	Sideswipe, same direction	Dark - lighted roadway	Rain	Wet	Failed to yield right of way	62	20		Vehicle decided to go through intersection instead of turning right
27	5/12/12	Saturday	1:25 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	79	20		Vehicle attempting to turn left out of the Johnny Foodmaster parking lot
28	6/3/12	Sunday	1:46 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	34	41	39	Vehicle traveling at high rate of speed EB and ran red light
29	6/8/12	Friday	3:26 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	22	29		Vehicle traveling EB ran red light
30	6/15/12	Friday	4:51 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	17	84		
31	9/17/12	Monday	2:51 PM	Single Vehicle Crash	Daylight	Clear	Dry	Unknown	26			Tractor-Trailer struck traffic signal post, knocking it down
32	9/25/12	Tuesday	2:57 PM	Angle	Daylight	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	40	51		
33	9/28/12	Friday	4:34 PM	Angle	Daylight	Rain	Wet	Unknown	22	44		
34	10/2/12	Tuesday	9:02 PM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	No Improper Driving	44	23		Pedestrian ran into drivers side mirror, claims it was his fault
35	10/3/12	Wednesday	6:17 PM	Angle	Dusk	Rain	Wet	Failed to yield right of way	31	46		Turning out of Cumberland Farms (#727 Bedford Rd) headed northbound
36	10/11/12	Thursday	2:23 PM	Angle	Daylight	Clear	Dry	No Improper Driving	48			Thought school bus was turning into parking lot rather than SB on Bedford
37	10/14/12	Sunday	8:41 PM	Angle	Dark - lighted roadway	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	34	37		OUI (3rd offense), ran red light and fled the scene into the woods
38	10/23/12	Tuesday	11:20 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	57	71		Ran red light
39	12/3/12	Monday	8:18 AM	Sideswipe, same direction	Daylight	Clear	Dry	No Improper Driving	22			Hit and run
40	12/30/12	Sunday	7:41 PM	Angle	Dark - lighted roadway	Clear	Dry	road markings	33	16		
41	12/31/12	Monday	2:43 PM	Angle	Daylight	Clear	Wet	Failed to yield right of way	52	38		
42	2/4/13	Monday	7:56 AM	Single Vehicle Crash	Dawn	Snow	Snow	Made an improper turn	55			Tractor-Trailer struck traffic signal post, knocking it down
43	2/11/13	Monday	8:37 AM	Rear-end	Daylight	Snow	Snow	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.	25	43		Vehicle skidded and swerved to avoid collision but could not due to slippery road conditions
44	2/19/13	Tuesday	5:38 AM	Single Vehicle Crash	Dark - lighted roadway	Clear	Dry	road markings	19			Lost control of vehicle and hit snow bank
45	2/24/13	Sunday	6:59 PM	Angle	Dark - lighted roadway	Snow	Wet	Failed to yield right of way	18	40		
46	3/8/13	Friday	1:35 PM	Angle	Daylight	Snow	Snow	Inattention	36	58		Could not see the signals due to weather conditions and ran red light
47	4/5/13	Friday	9:57 PM	Sideswipe, same direction	Dusk	Clear	Dry	Inattention	45	52		Attempted to change lanes, but did not see vehicle in blind spot

## Crash Data Summary Table

Bedford Street (Route 18) at Temple Street (Route 27)/Warren Avenue, Whitman, MA

January 2011 - December 2013

Crash Diagram Ref #	Crash Date <i>m/d/y</i>	Crash Day	Time of Day	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>	Ages			Comments
									D1	D2	D3	
48	4/11/13	Thursday	8:17 PM	Angle	Dark - lighted roadway	Clear	Dry	Inattention	21	39		Turning out of Marcello's (#733 Bedford Rd) headed northbound
49	5/5/13	Sunday	4:20 PM	Sideswipe, same direction	Daylight	Clear	Dry	Other improper action	37	52		Driver did not think they swiped other vehicle; reported when they got home
50	5/23/13	Thursday	3:59 PM	Single Vehicle Crash	Daylight	Cloudy	Dry	No Improper Driving	63			Tractor-Trailer struck traffic signal post, knocking it down
51	8/12/13	Monday	7:22 PM	Angle	Daylight	Clear	Dry	careless, negligent, or aggressive	41	44		Motorcycle rider was thrown from vehicle
52	8/20/13	Tuesday	4:32 PM	Rear-end	Daylight	Clear	Dry	Inattention	33	29		
53	8/24/13	Saturday	4:49 PM	Angle	Daylight	Cloudy	Dry	Failed to yield right of way	17	19		
54	9/4/13	Wednesday	3:29 PM	Sideswipe, same direction	Daylight	Clear	Dry	Inattention	18	47		Attempted to change lanes, but did not see wehcile in blind spot
55	9/23/13	Monday	6:26 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	19	51		Courtesy Crash*
56	9/24/13	Tuesday	10:59 PM	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	23	27		Ran red light
57	10/18/13	Friday	1:59 PM	Sideswipe, same direction	Daylight	Clear	Dry	No Improper Driving	61			Driver did not see horse trailer and collided when changing lanes
58	11/6/13	Wednesday	4:10 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	30	77	58	
59	12/4/13	Wednesday	6:42 AM	Rear-end	Daylight	Cloudy	Dry	Other improper action	48	23		Rear ended Vehicle at the Lane drop north of the intersection
60	12/11/13	Wednesday	5:16 PM	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	58	44		

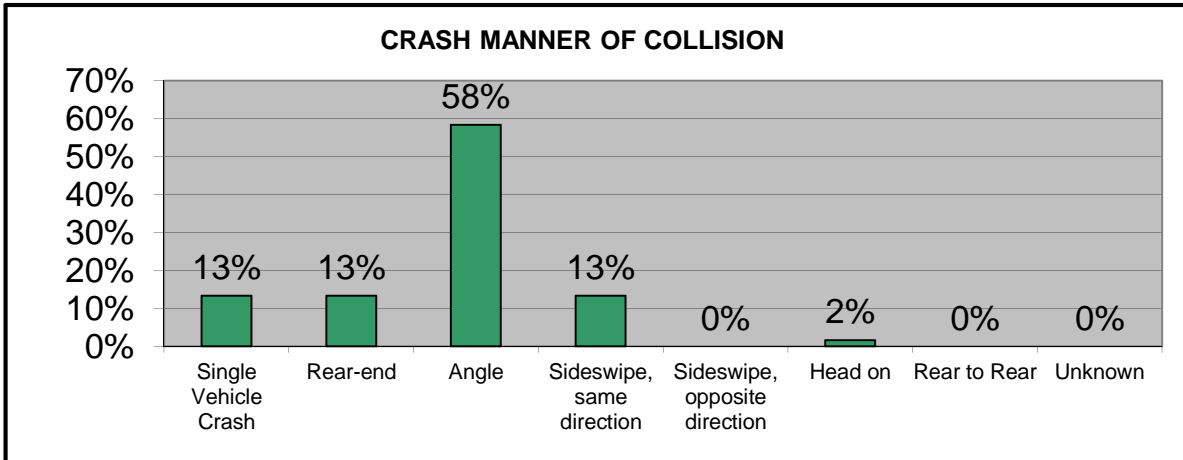
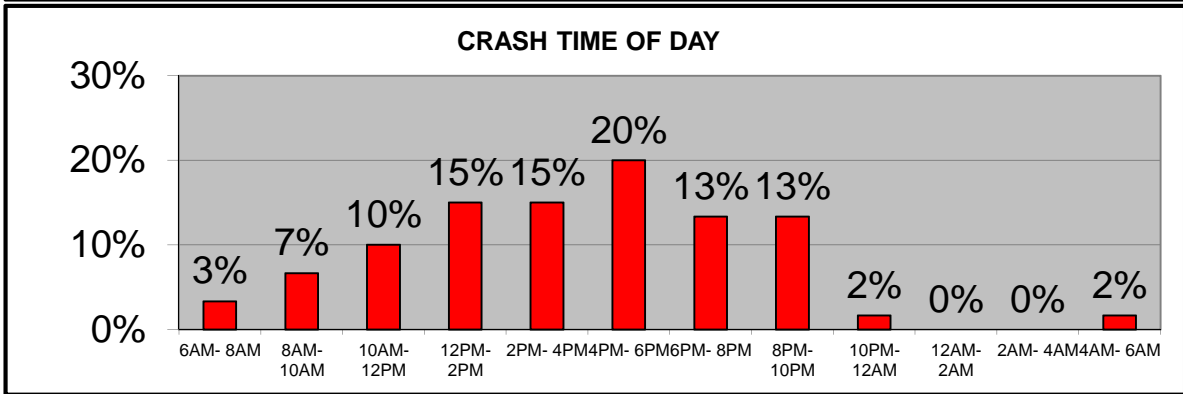
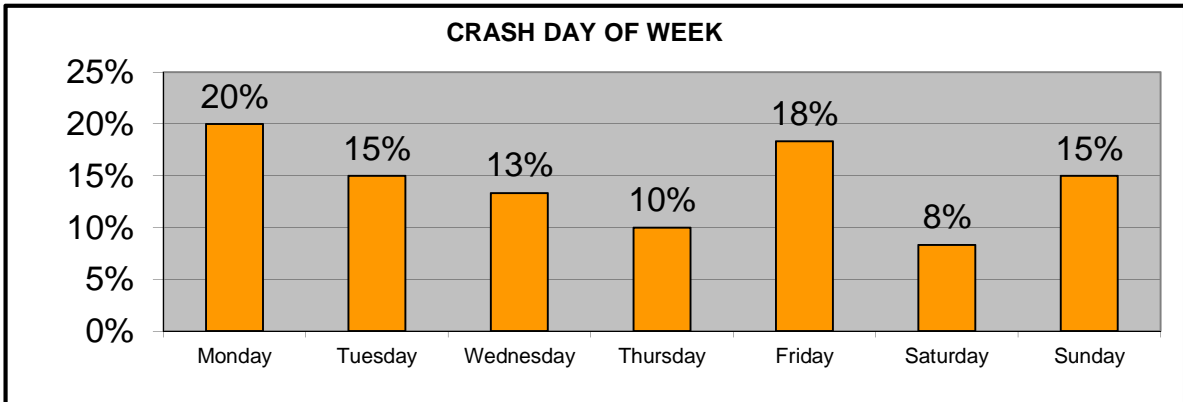
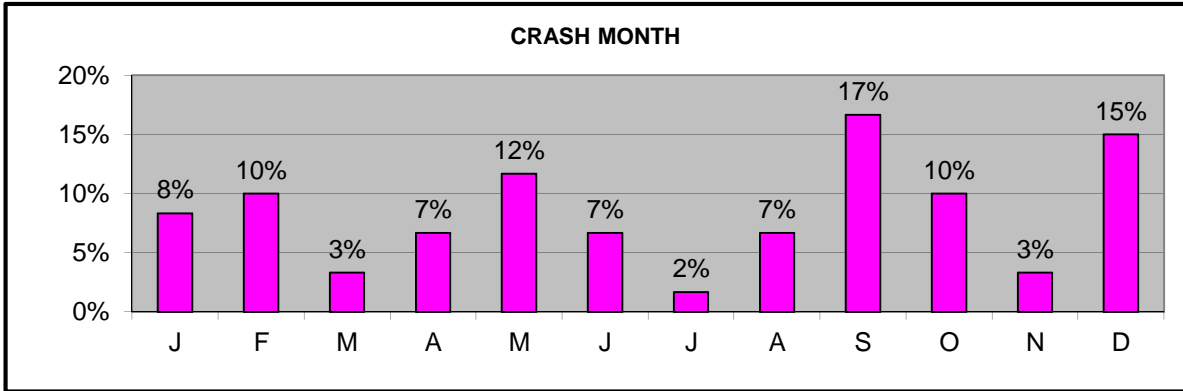
\*Courtesy Crash - A term used to describe a crash that occurs subsequent to a non-involved mainline driver who gives the right of way, contrary to the rules of the road, to another driver.

Summary based on Crash Reports obtained from the Whitman Police Department



### Crash Data Summary Tables and Charts

Bedford Street (Route 18) at Temple Street (Route 27)/Warren Avenue, Whitman, MA



### Crash Data Summary Tables and Charts

Bedford Street (Route 18) at Temple Street (Route 27)/Warren Avenue, Whitman, MA

