

ROAD SAFETY AUDIT

Route 28 (Falmouth Road) at Strawberry Hill Road
Town of Barnstable

May 2015

Prepared For:
MassDOT



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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. A key objective of the RSA is to identify both short-term and long-term safety improvements that can be made at the subject intersections. This RSA evaluates the intersection of Route 28 and Strawberry Hill Road in Barnstable, MA, as shown in Figure 1.

Project Data

A Road Safety Audit was completed for the intersection of Route 28 at Strawberry Hill Road in the Town of Barnstable on April 24, 2015. The agenda for the RSA meeting held at the Barnstable Senior Center 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
Kevin Chiang	MassDOT - Boston Traffic
Richard Madsen	MassDOT – District 5 Projects
Patrick Tierney	Cape Cod Commission
Jo Anne Miller Buntich	Town of Barnstable - Growth Management
Michael Perry	Town of Barnstable - Highway Division
Clay Schofield	Town of Barnstable - Department of Public Works
Phil Viveiros	McMahon Associates
Alex Bulhoes	McMahon Associates

Within the email invitation sent on April 15, 2015 to each participant in the RSA, background material was provided. This information included turning movement counts, local speed regulations, collision diagrams, and MassDOT crash data summaries. During the RSA meeting, these materials were reviewed as a group before the team discussed potential safety issues and solutions for the intersection.

Project Location and Description

Study Area Roadways

As shown in Figure 1, Route 28 is generally a three-lane roadway west of the Strawberry Hill Road intersection and a two-lane roadway east of the intersection within the study area. It should be noted that Route 28 is designated as a North-South highway, with Route 28 North oriented to the west at this particular intersection. However, through the Town of Barnstable, Route 28 generally runs in an east-west direction and the intersection approaches will be classified as eastbound and westbound throughout the rest of this report. At its intersection with Strawberry Hill Road, Route 28 is a two-lane roadway in both

the eastbound and westbound directions; in addition, an exclusive left-turn lane is provided for both the eastbound and westbound approaches. The speed limit on Route 28 is posted as 45 miles per hour in both directions. Direct access to retail and residential land uses is provided by Route 28 while generally running parallel to Route 6. Route 28 also provides access to the Barnstable Municipal Airport at its intersection with Route 132, approximately 2 ¼ miles east of the Route 28 at Strawberry Hill Road intersection. In addition, Route 28 provides access to subdivisions on its northern side and to schools (Barnstable Intermediate School and Barnstable High School) and the Barnstable Senior Center on its southern side via a shared driveway. The Cape Cod Hospital also uses Route 28 as an emergency vehicle access corridor. Route 28 is classified as an urban principal arterial under MassDOT jurisdiction. Within the immediate vicinity of the study area intersection, Route 28 is approximately 34 feet wide with 11-foot travel lanes and shoulders measuring less than 1 foot on either side. There is a multi-use path located on the southern side of Route 28 for use by cyclists and pedestrians. While sidewalks are present directly adjacent to the CVS/pharmacy located at the northeast corner of the Strawberry Hill Road intersection, there are otherwise no sidewalks present along the northern side of Route 28.

Strawberry Hill Road is a two-lane urban minor arterial under Town of Barnstable jurisdiction that runs in a north-south direction through Barnstable. Strawberry Hill Road has a single lane of travel in either direction on the northbound approach with lane widths measuring 12 feet wide at the intersection with Route 28. At the southbound approach of the intersection with Route 28, there is also a left-turn lane present with varying lane widths. While sidewalks are present directly adjacent to the CVS/pharmacy located at the northeast corner of the Route 28 intersection, there are otherwise no sidewalks or shoulders present on either side of Strawberry Hill Road.

Study Area Intersections

The intersection of Route 28 at Strawberry Hill Road is a four-legged signalized intersection maintained by MassDOT. The eastbound and westbound approaches each consist of a left-turn lane and a shared through-right travel lane. The northbound approach consists of a single lane and the southbound approach consists of a left-turn lane and a shared through-right travel lane. The storage lengths provided for the left turn lanes on the westbound and eastbound approaches are approximately 250 feet and 300 feet, respectively. The southbound left turn lane provides a storage length of approximately 50 feet. The traffic signals for all four approaches are mounted on mast arms, either overhead or on the mast arm shaft. The multi-use path on the southern side of Route 28 traverses the southbound approach of the intersection at Strawberry Hill Road. The CVS in the northeast corner has access points onto both Route 28 and Strawberry Hill Road near the intersection. There is also a driveway for the Saint George Greek Orthodox Church located on the southbound approach of Strawberry Hill Road near the intersection. There are pedestrian crosswalks located at the northbound and westbound approaches, but there is no signal equipment in place for pedestrians at the intersection. There are also residential driveways located along the eastern side of Route 28 from the intersection. The intersection is also situated in a region that experiences a significant seasonal peak in traffic, with buses potentially stopping safely along Route 28 to the west of the intersection to pick up patrons that wave them down.

Crash Data

Crash data was received from MassDOT for the three years between 2010 and 2012. Based on this data, there were a total of 16 crashes reported from the beginning of 2010 through the end of 2012 at the intersection of Route 28 and Strawberry Hill Road. Of the crashes that occurred, eight (50%) were angle collisions, including two crashes in the eastbound direction and three crashes in the westbound direction on Route 28. Additionally, there were six rear-end collisions, one single vehicle crash, and one pedestrian related crash reported at the intersection. Of the reported crashes, nine resulted in property damage and

seven resulted in personal injury; no fatalities were reported at the intersection. Based on the crash data, it appeared that neither driver age nor lighting conditions were significant factors in the observed crashes.

Detailed crash diagrams are provided in Appendix C.



Road Safety Audit Observations and Potential Improvements

During the RSA meeting, a brief introduction of the RSA process and a summary of the study area 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 Route 28 at Strawberry Hill Road. Provided below is a list of the safety concerns that were identified during the RSA along with potential enhancements that address these concerns.

Safety Issue #1: Traffic Control

Observations:

Traffic control at the intersection of Route 28 and Strawberry Hill Road is impacted by the traffic signal, access to nearby land uses, and the seasonal peak volumes. During the RSA discussion, there was a strong concern surrounding the speeding on Strawberry Hill Road, specifically from the southbound approach. According to the team, the speeding appeared to be a result of impatient drivers attempting to avoid impediment at a red light, and the issue is related to all four of the approaches. Upon review of the past three years of crash data, it becomes apparent that a number of the rear end crashes throughout the intersection could be a result of the traffic control. Another observation was made regarding the significant morning peak volume in the eastbound direction at the intersection. Although the intersection possesses exclusive left turn lanes in both the eastbound and westbound directions, there is a lack of a left-turn signal arrow in either direction. Given the seasonal peak volume on Route 28 in combination with the speed limit of 45 mph, the lack of a left turn signal arrow presents a safety concern.



Lack of Backplates on Existing Signal Heads

In regards to the signal visibility, it was mentioned that the solar glare, specifically in the eastbound and westbound directions, presented a safety concern. During the site visit, the RSA team witnessed that the signal heads are lacking backplates, which improve the visibility issues pertaining to solar glare. Crash data supports solar glare potentially being an issue, as 38% of crashes occurring at this intersection are during the 4 pm to 6 pm time frame, when solar glare is at a maximum. In addition, review of the crash data presented a recurring issue of rear-end crashes, which accounted for six (38%) of the total crashes. The significant amount of rear-end crashes in the eastbound and westbound directions appear to coincide with the fact that the signal heads are lacking backplates.

Audit members noticed a general lack of signage at all approaches to the intersection, particularly along the southbound approach, to warn of the traffic signal and the potential presence of pedestrian and bicyclists. Also, the emergency response was discussed during the RSA and the majority agreed that there is a need for emergency preemption equipment, particularly as the intersection borders two of the town's fire districts.

Enhancements:

- Evaluate speeding enforcement along the Route 28 corridor and at Strawberry Hill Road.
- Consider signal coordination between the study area intersection and the Route 28 intersections with West Main Street, the Senior Center Driveway, and Pitchers Way to help manage traffic flows throughout the corridor.
- Evaluate the existing signal timings, specifically the clearance intervals, and propose new timing plans catered to time of day and/or time of year.
- Check the functionality of signal detection on Route 28 and either repair as needed and/or consider dilemma zone detection for the intersection.
- Consider installation of left-turn signal arrows and protected left-turn phasing to minimize angle collisions at the intersection.
- Consider the implementation of a traffic circle at the intersection of Strawberry Hill Road and Wequaquet Lane, north of the Route 28 intersection to slow the southbound approach speeds.
- Install backplates with reflective borders for overhead signals to minimize the effects of solar glare.
- Install advance warning signage on all approaches.
- Consider incorporating emergency preemption to improve emergency response and decrease crash risks.

Safety Issue #2: Traffic Operations

Observations:

The intersection of Route 28 and Strawberry Hill Road is impacted by traffic operations on the Route 28 corridor. The RSA team mentioned the impact of the steep roadway grades on the northbound and southbound approaches of the intersection. The discussion pertained to the crown and gutter line on the southbound approach, as well as the uphill grade on the northbound approach of Strawberry Hill Road. During the field visit, the RSA team observed the influence of the grade on traffic operations along the Strawberry Hill Road approaches. A member of the RSA team also raised a concern regarding the excessive queuing that occurs beyond the left-turn lane on the westbound approach along Route 28. The traffic operations can be impacted in scenarios where the queuing exceeds the storage length of the left-turn lane, which can result in a safety issue.

Enhancements:

- Evaluate re-grading at the Strawberry Hill Road southbound approach of the intersection, in the area of the Route 28 gutter line, to improve operations.
- Consider extending the storage length of the left turn lane at the westbound approach of the intersection to avoid excessive queueing.
- Consider the implementation of a right-turn lane at the westbound approach of the intersection to improve traffic operations.
- Consider the implementation of a left-turn lane at the northbound approach of the intersection to improve traffic operations.

Safety Issue #3: Intersection Alignment / Visibility

Observations:

During the RSA discussion, some members of the team provided insight on the current alignment of the northbound and southbound approaches of Strawberry Hill Road at the intersection with Route 28. The concern focused on the offset of the roadway at the intersection and the perception of drivers that they may be directed toward the opposing lanes as they approach the intersection. Another discussion point related to the visibility of signal heads, specifically on the northbound and southbound approaches to the intersection, which is impacted by vegetation encroaching on the roadway.

Sight distance at the intersection was also raised as an issue by several RSA participants. From the northbound approach, the sight distance is impacted by vegetation on the southeast corner that is encroaching onto the roadway, as well as the uphill grade on the northbound approach. In regards to the southbound approach, there is a horizontal curve at the intersection of Strawberry Hill Road and Wequaquet Lane, which impacts the sight distance of drivers approaching the intersection.



Roadway Alignment and Grade from Strawberry Hill Road Northbound Approach

Enhancements:

- Evaluate lane and/or roadway alignment for both Strawberry Hill Road approaches of the intersection to improve sight distance and reduce the risk of head-on collisions.
- Install an Intersection Ahead (or Signal Ahead) warning sign on the southbound approach, prior to the horizontal curve.
- Consider trimming the vegetation within the roadway right-of-way on the Strawberry Hill Road northbound approach to improve visibility.
- Evaluate the feasibility of obtaining easements for vegetation trimming on private property along the northbound approach of the intersection to improve visibility.
- Evaluate existing right-of-way restrictions and proposed widening improvements where feasible to create a consistent cross section along Strawberry Hill Road, specifically the northbound approach of the intersection.

Safety Issue #4: Pedestrian and Bicycle Accommodations

Observations:

Observations made during the RSA indicate that the intersection is lacking pedestrian amenities, including pedestrian signals and sidewalks on the northern side of Route 28. Another observation was made regarding the lack of tactile pads on the existing handicapped ramps. It was also mentioned that the residential neighborhoods on the north side of Route 28 lack pedestrian connectivity due to the lack of pedestrian



Existing Crosswalk Markings and Ramp

amenities and the operations on Route 28 effectively acting as a barrier. There is a significant amount of the pedestrian movement across Route 28 to the east dedicated to the Barnstable Intermediate School and Barnstable High School.

During the discussion, it was also mentioned that there is a corridor study currently being conducted by the Cape Cod Commission along Route 28 in the vicinity of the intersection. Due to the intersection's close proximity to the Barnstable Senior Center and Barnstable High School, the safety implications involved with both inexperienced and older drivers were considered during the RSA. In addition, the crosswalk signage may need improvement to avoid compromising the safety of the pedestrians that are utilizing the crosswalks.

In regards to the mixed use path, the section that is located on the eastern side of the intersection exhibits poor conditions and the lack of curbing presents a safety concern. During the field visit, it was observed that the mixed use path stop sign height may present an issue for cyclists crossing the southern leg of the intersection. The group also recognized the lack of lighting along the mixed use path and raised that as a safety concern.



Mixed Use Path on Southeastern Corner of Route 28 and Strawberry Hill Road Intersection

Enhancements:

- Evaluate ramps for compliance with ADA standards.
- Install pedestrian signals and push button actuation at the signalized intersection.
- Evaluate the installation of crosswalks on the southbound and eastbound legs of the intersection.
- Construct sidewalks adjacent to the intersection to help guide pedestrians around the traffic signal and provide improved access to the church located in the northwestern quadrant of the intersection.
- Consider improvements of the mixed use path at the southeast corner of the intersection on Route 28.
- Evaluate crosswalk signage and pavement markings to ensure that they are visible.
- Evaluate “STOP” sign height on southwest side of the mixed use path.
- Evaluate lighting along the mixed use path to provide additional safety for pedestrians and cyclists.

Safety Issue #5: Roadway Conditions

Observations:

During the site visit portion of the RSA, the team observed the conditions of the existing roadway. In general, the pavement conditions at the intersection of Strawberry Hill Road at Route 28 did not appear to exhibit significant signs of distress. However, some of the observations were related to the conditions of the pavement markings on the approaches on Strawberry Hill Road. In addition, there was a portion of curbing that appeared to be damaged on the northeast corner of the intersection.

Throughout the discussion, one of the RSA team members presented a safety issue related to the snow plowing efforts at the intersection. The issue pertains to the placement of the snow bank on the southwest corner of the intersection during snow removal. In regards to safety, the snow bank must be placed further back to avoid impeding traffic on that particular leg of the intersection. It was noted that MassDOT performs plowing along Route 28, while the Town plows Strawberry Hill Road, which often leaves the intersection corners unplowed during snowstorms.



Curbing Damage on Northeastern Corner of Intersection

Enhancements:

- Evaluate existing pavement markings and consider re-striping the approaches from Strawberry Hill Road to ensure visibility.
- Repair or replace the damaged curbing on the northwest corner of the intersection.
- Encourage coordination between Barnstable Department of Public Works and MassDOT for snow plowing activities at the intersection.

Safety Issue #6: Access Management

Observations:

Throughout the Route 28 corridor, there are several driveways that provide access to commercial and residential land uses. According to members of the RSA team, efforts have been made to minimize the amount of access points along the corridor through the use of shared driveways. One particular driveway discussed during the audit was the “right-in, right-out” CVS driveway east of the intersection, which provides access from and to Route 28 in the westbound direction. The egress point of the driveway onto the corridor is currently restricted to right turns only by a sign and a scored median. However, the consensus amongst the RSA team was that left turns into and out of this driveway continue to occur, creating a potential safety risk. In general, the concerns in terms of access management related to the egress from the CVS driveway onto Route 28, as well as the frequency of driveways along the corridor.



Egress Point from CVS to Route 28

Enhancements:

- Implement a structural barrier on Route 28 and/or a raised driveway island at the CVS driveway access onto Route 28 to prevent left turn movements.
- Encourage the use of shared driveways and/or internal driveways along the Route 28 corridor to reduce amount of access point that could cause potential crashes.

Recommendations

After the discussing the various safety deficiencies within the study area, participants discussed potential solutions. 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, 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	\$10,001-\$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
Route 28 at Strawberry Hill Road					
Traffic Control	Evaluate speeding enforcement along the Route 28 corridor and at Strawberry Hill Road	Medium	Short-Term	Medium	Town of Barnstable
Traffic Control	Consider signal coordination between the study area intersection and the Route 28 intersections with West Main Street, the Senior Center Driveway, and Pitchers Way	Medium	Mid-Term	Medium	MassDOT
Traffic Control	Evaluate the existing signal timings, specifically the clearance intervals, and propose new timing plans	Medium	Short-Term	Low	MassDOT
Traffic Control	Check the functionality of signal detection on Route 28 and either repair as needed and/or consider dilemma zone detection	Medium	Mid-Term	Medium	MassDOT
Traffic Control	Consider installation of left-turn signal arrows and protected left-turn phasing	High	Mid-Term	High	MassDOT
Traffic Control	Consider the implementation of a traffic circle at the intersection of Strawberry Hill Road and Wequaquet Lane to slow southbound approach speeds	Medium	Long-Term	High	Town of Barnstable
Traffic Control	Install backplates with reflective borders for overhead signals	Medium	Short-Term	Low	MassDOT
Traffic Control	Install advance warning signage on all approaches.	Medium	Short-Term	Low	MassDOT/Town of Barnstable
Traffic Control	Consider incorporating emergency preemption	Medium	Mid-Term	Medium	MassDOT/Town of Barnstable
Traffic Operations	Evaluate re-grading at the Strawberry Hill Road southbound approach	Medium	Long-Term	High	MassDOT/Town of Barnstable

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Traffic Operations	Consider extending the storage length of the left turn lane at the westbound approach of the intersection	Medium	Mid-Term	High	MassDOT
Traffic Operations	Consider the implementation of a right turn lane on the westbound approach of the intersection	Medium	Long-Term	High	MassDOT
Traffic Operations	Consider the implementation of a left turn lane on the northbound approach of the intersection	Medium	Long-Term	High	MassDOT/Town of Barnstable
Intersection Alignment / Visibility	Evaluate lane and/or roadway alignment for both Strawberry Hill Road approaches of the intersection	High	Long-Term	High	MassDOT/Town of Barnstable
Intersection Alignment / Visibility	Install an Intersection Ahead (or Signal Ahead) warning sign on the southbound approach	Medium	Short-Term	Low	Town of Barnstable
Intersection Alignment / Visibility	Consider trimming the vegetation within the roadway right-of-way on the Strawberry Hill Road northbound approach	High	Short-Term	Low	Town of Barnstable
Intersection Alignment / Visibility	Evaluate the feasibility of obtaining easements for vegetation trimming on private property	High	Mid-Term	Medium	Town of Barnstable
Intersection Alignment / Visibility	Evaluate existing right-of-way restrictions and propose widening improvements to create a consistent cross section along Strawberry Hill Road	High	Long-Term	High	MassDOT/Town of Barnstable
Pedestrian Accommodations	Evaluate ramps for compliance with ADA standards	Medium	Mid-Term	Medium	MassDOT/Town of Barnstable
Pedestrian Accommodations	Install pedestrian signals and push button actuation	High	Mid-Term	Medium	MassDOT
Pedestrian Accommodations	Evaluate the installation of crosswalks across the southbound and eastbound approaches of the intersection	Medium	Mid-Term	Medium	MassDOT/

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
Pedestrian Accommodations	Construct sidewalks adjacent to the intersection to help guide pedestrians around the traffic signal and provide enhanced access to the church located in the northwestern quadrant of the intersection	Medium	Long-Term	High	MassDOT/Town of Barnstable
Pedestrian Accommodations	Consider improvements of mixed use path at the southeast corner of the intersection	Medium	Mid-Term	Medium	MassDOT/Town of Barnstable
Pedestrian Accommodations	Evaluate crosswalk signage and pavement markings to ensure that they are visible	Medium	Short-Term	Low	MassDOT/ Town of Barnstable
Pedestrian Accommodations	Evaluate “STOP” sign height on southwest side of the mixed use path	Low	Short-Term	Low	Town of Barnstable
Pedestrian Accommodations	Evaluate lighting along the mixed use path	Low	Mid-Term	Low	Town of Barnstable
Roadway Conditions	Evaluate existing pavement markings and consider re-striping the approaches from Strawberry Hill Road	Low	Short-Term	Low	Town of Barnstable
Roadway Conditions	Repair or replace the damaged curbing on the northwest corner of the intersection	Low	Short-Term	Medium	MassDOT
Roadway Conditions	Encourage coordination between Barnstable Department of Public Works and MassDOT for snow plowing activities	Low	Short-Term	Low	MassDOT/Town of Barnstable
Access Management	Implement a structural barrier on Route 28 and/or a raised driveway island at the CVS driveway on Route 28 to prevent left turn movements	High	Long-Term	High	MassDOT
Access Management	Encourage the use of shared driveways and/or internal driveways along the Route 28 corridor	Medium	Long-Term	High	Town of Barnstable

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit

Falmouth Rd (Route 28) at Strawberry Hill Rd,
Barnstable, MA

Meeting Location: Barnstable Senior Center (Library Room)
825 Falmouth Road, Hyannis, MA
April 24, 2015
9:00 AM – 11:00 AM

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

9:00 AM Welcome and Introductions

9:15 AM Review of Site Specific Material

- Crash, Speed & Volume Summaries– provided in advance
- Existing Geometries and Conditions

10:00 AM Visit the Site

- Drive to LOCATION
- As a group, identify areas for improvement

10:30 AM Post Visit Discussion / Completion of RSA

- Discuss observations and finalize findings
- Discuss potential improvements and finalize recommendations

11:00 AM Adjourn for the Day – but the RSA has not ended

Instructions for Participants:

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

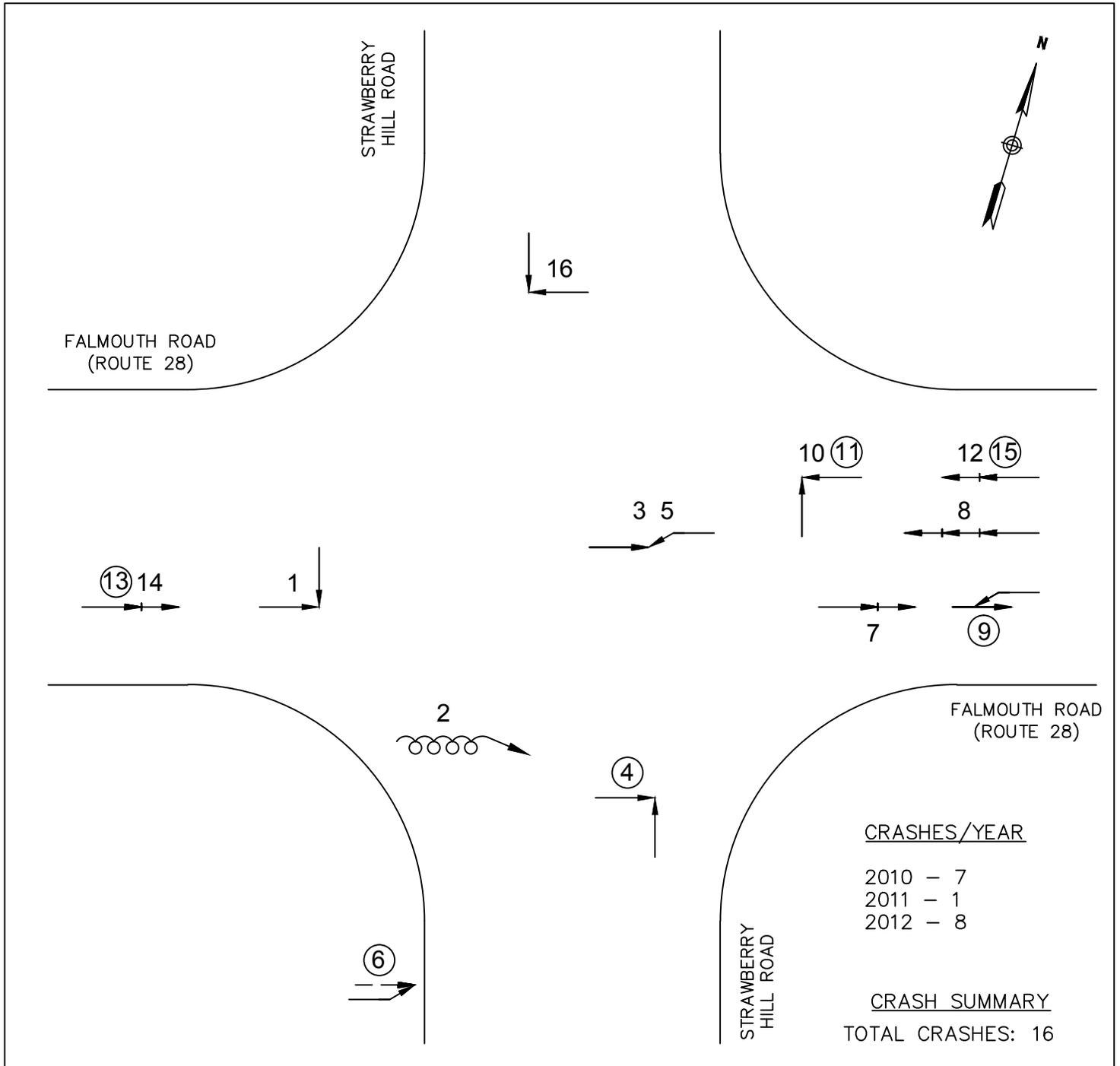
Appendix B. RSA Audit Team Contact List

Participating Audit Team Members

Date: April 24, 2015 Location: Barnstable Senior Center, Barnstable, MA

Audit Team Members	Agency/ Affiliation	Email Address	Phone Number
Kevin Chiang	MassDOT - Boston Traffic	kevin.chiang@dot.state.ma.us	978-368-9626
Richard Madsen	MassDOT – D5 Projects	richard.madsen@dot.state.ma.us	508-885-4241
Patrick Tierney	Cape Cod Commission	ptierney@capecodcommision.org	508-362-3828
Jo Anne Miller Buntich	Town of Barnstable Growth Management	joanne.buntich@town.barnstable.us	508-862-4735
Michael Perry	Town of Barnstable Highway Division	michael.perry@town.barnstable.ma.us	508-790-6330
Clay Schofield	Town of Barnstable Department of Public Works	clay.schofield@town.barnstable.ma.us	508-790-6400
Phil Viveiros	McMahon Associates	pviveiros@mcmahonassocaites.com	508-823-2245
Alex Bulhoes	McMahon Associates	abulhoes@mcmahonassociates.com	774-849-1767

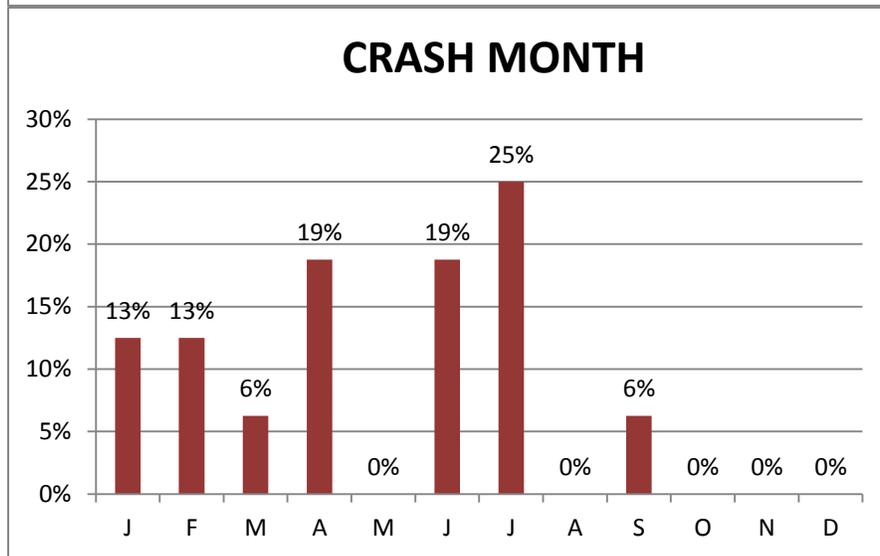
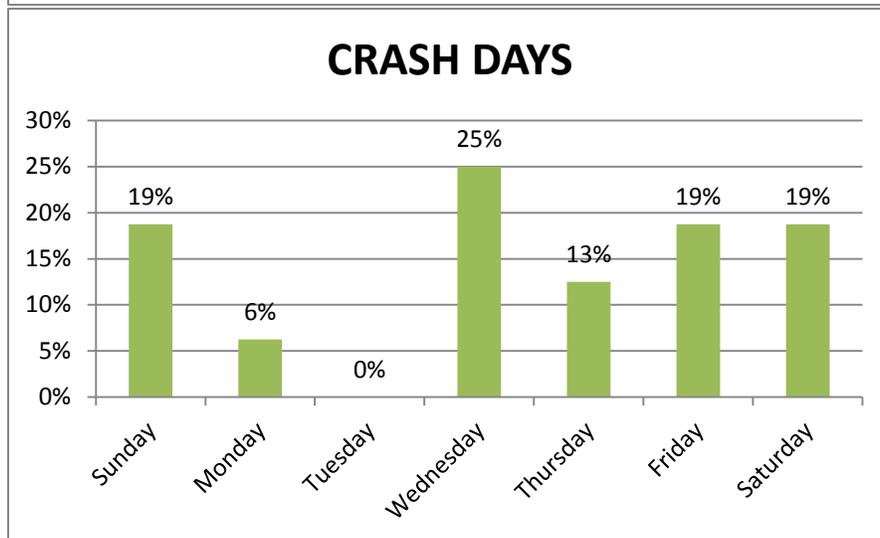
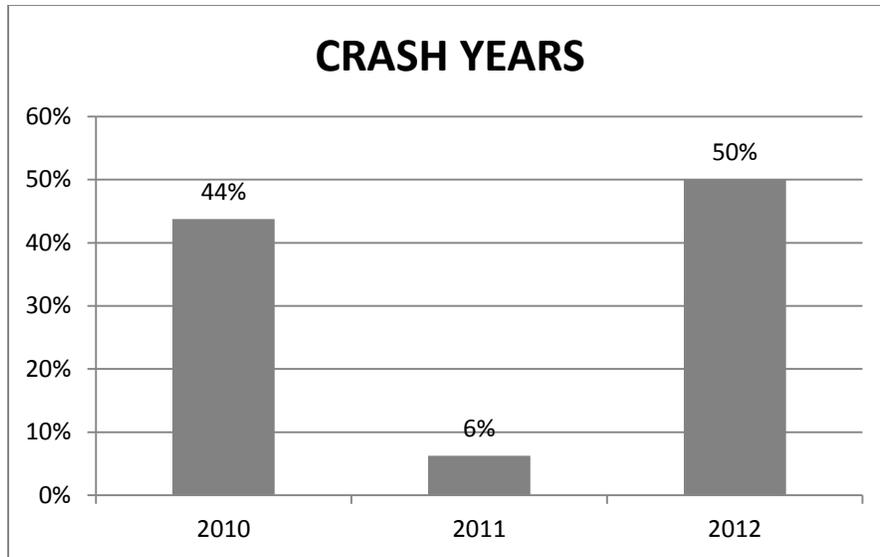
Appendix C. Detailed Crash Data

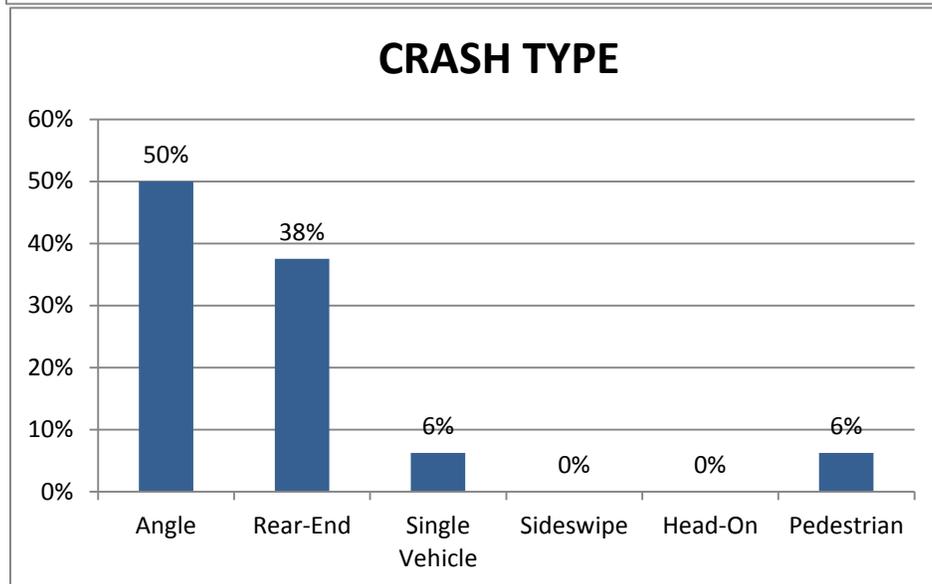
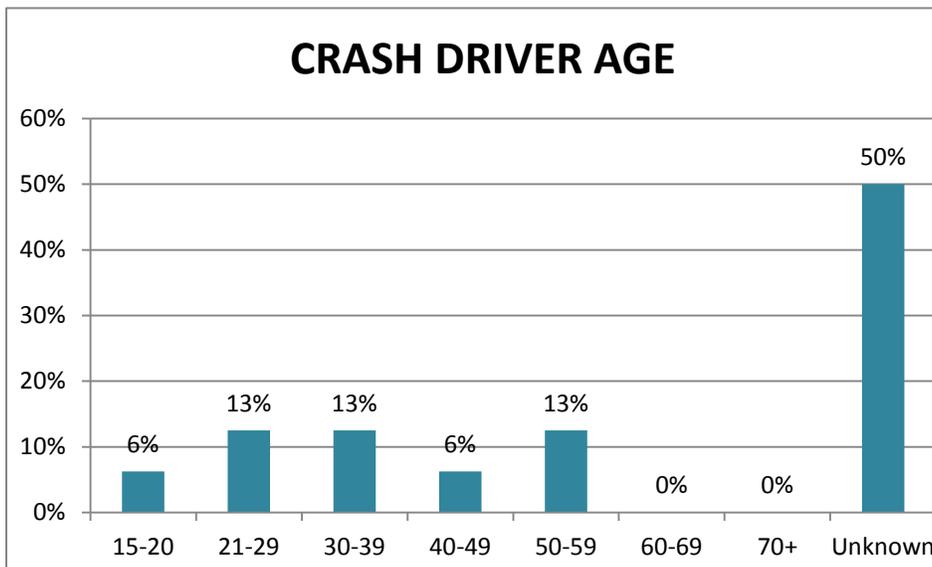
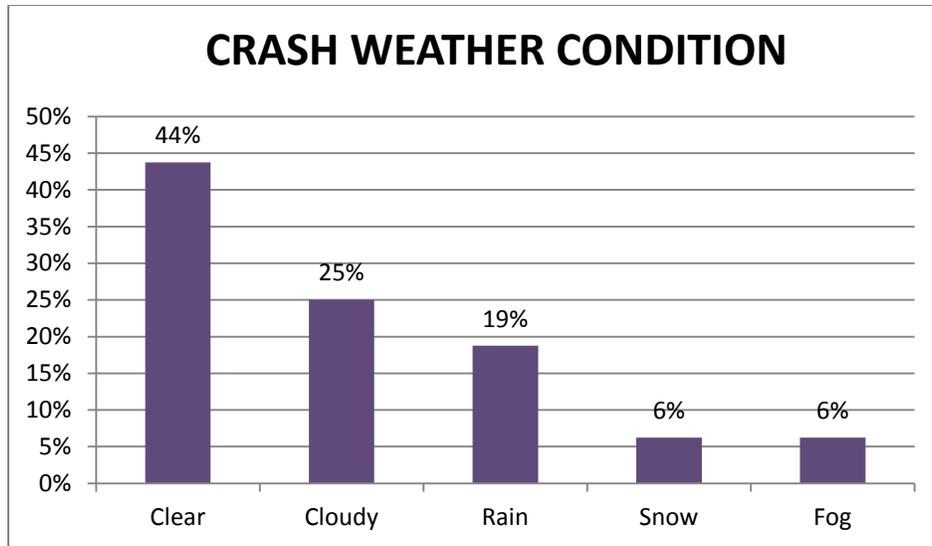


SYMBOL	ACCIDENT TYPE
 MOVING VEHICLE  BACKING VEHICLE  NON-INVOLVED VEHICLE  PEDESTRIAN  PARKED VEHICLE  FIXED OBJECT  FATAL ACCIDENT  INJURY ACCIDENT	 REAR END  HEAD ON  SIDE-SWIPE  OUT OF CONTROL  LEFT TURN  RIGHT ANGLE

Falmouth Road (Route 28) at Strawberry Hill Road

Number	Crash Date	Crash Day	Crash Time	Crash Severity	Manner of Collision	Driver Behavior	Driver Age Striking Veh	Ambient Conditions	Weather Condition	Roadway Condition	Comments
1	1/31/2010	Sunday	2:37 PM	Property damage	Angle	Red light running	Unknown	Daylight	Clear	Dry	Veh 1 ran red light and struck Veh 2
2	4/14/2010	Wednesday	5:49 PM	Property damage	Single vehicle crash	Operating vehicle in reckless manner	Unknown	Daylight	Clear	Dry	Veh 1 entered roadway from bike path at high speed, went airborne, struck the curb and stopped
3	4/25/2010	Sunday	11:14 AM	Property damage	Angle	Red light running	Unknown	Daylight	Rain	Wet	Veh 1 ran the red light, struck the left-turning Veh 2, causing Veh 2 to spin and strike stopped Veh 3
4	6/3/2010	Thursday	4:53 PM	Non-fatal injury	Angle	Red light running	Unknown	Daylight	Cloudy	Dry	Veh 1 ran the red light and struck Veh 2
5	7/10/2010	Saturday	5:28 PM	Property damage	Angle	Failed to yield right of way	Unknown	Daylight	Cloudy	Dry	Veh 1 turned left in front of Veh 2 traveling straight, Veh 2 then struck Veh 1
6	7/10/2010	Saturday	9:55 PM	Non-fatal injury	Pedestrian	Inattention	Unknown	Dark	Fog	Dry	During an altercation at 1107 Falmouth Rd, a vehicle turning left out of the residence struck an involved party
7	7/16/2010	Friday	7:08 PM	Property damage	Rear-end	Inattention	Unknown	Daylight	Clear	Dry	Veh 1 stopped for turning traffic after intersection, Veh 2 was travelling behind Veh 1 and failed to stop
8	3/16/2011	Wednesday	12:17 PM	Property damage	Rear-end	Loss of vehicle control	Unknown	Poor visibility	Rain	Wet	Veh 1 and Veh 2 were stopped, Veh 3 struck Veh 2, Veh 2 then struck Veh 1
9	1/21/2012	Saturday	4:16 PM	Non-fatal injury	Angle	Loss of vehicle control	58	Daylight	Snow	Snow	Veh 1 began swerving due to snow and struck Veh 2 which was traveling in the opposite direction
10	2/8/2012	Wednesday	11:14 AM	Non-fatal injury	Angle	Red light running	28	Daylight	Clear	Dry	Veh 1 ran red light and struck Veh 2
11	2/9/2012	Thursday	11:48 AM	Non-fatal injury	Angle	Red light running	56	Daylight	Clear	Dry	Veh 1 ran red light and struck Veh 2
12	4/16/2012	Monday	5:39 PM	Property damage	Rear-end	Inattention	18	Daylight	Clear	Dry	Veh 1 approaching red light when struck by following Veh 2
13	6/8/2012	Friday	5:50 PM	Non-fatal injury	Rear-end	Inattention	26	Daylight	Clear	Dry	Both vehicles were travelling in the same direction, Veh 1 struck Veh 2 from behind
14	6/13/2012	Wednesday	6:13 PM	Property damage	Rear-end	Inattention	39	Daylight	Rain	Wet	Veh 1 slowed for yellow light, Veh 2 struck Veh 1 from behind
15	7/27/2012	Friday	9:59 PM	Non-fatal injury	Rear-end	Inattention	46	Dark	Cloudy	Dry	Veh 1 was stopped for approximately 30 seconds, was struck by Veh 2 from behind
16	9/30/2012	Sunday	9:46 PM	Property damage	Angle	Mechanical failure (brakes)	34	Dark	Cloudy	Dry	Veh 1's brakes failed when approaching intersection, struck Veh 2 traveling through intersection





Crash Data Summary Tables and Charts
 Falmouth Road at Strawberry Hill Road Barnstable, MA

