

ROAD SAFETY AUDIT

Route 151 Corridor

Town of Falmouth

June 8, 2018

Prepared For:
Massachusetts Department of Transportation (MassDOT)
Highway Division – District 5



Town of Falmouth, Massachusetts



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Table of Contents

Contents

Background	3
Project Data	3
Project Location and Description.....	5
Audit Observations and Potential Safety Enhancements.....	14
Summary of Road Safety Audit.....	31

List of Appendices

Appendix A.	RSA Meeting Agenda
Appendix B.	RSA Audit Team Contact List
Appendix C.	Detailed Crash Data
Appendix D.	Additional Information
Appendix E.	Road Safety Audit References

List of Figures

Figure 1: Locus Map – Nathan Ellis Highway (Route 151) / Currier Road	8
Figure 2: Locus Map – Nathan Ellis Highway (Route 151) / Sandwich Road	9
Figure 3: Locus Map – Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road.....	10

List of Tables

Table 1: Participating Audit Team Members.....	4
Table 2: Crash Rates by Intersection	11
Table 3: Crash Data Summary	12
Table 4: Estimated Time Frame and Costs Breakdown.....	31
Table 5: Potential Safety Enhancement Summary.....	32

Background

TEC, Inc. (TEC), in cooperation with the Town of Falmouth, Massachusetts and the Massachusetts Department of Transportation (MassDOT), is evaluating the existing traffic safety characteristics along Route 151, also signed as Nathan Ellis Highway, between Falmouth Woods Road and Currier Road in Falmouth, Massachusetts. TEC is conducting this safety evaluation as one of the first steps towards the design development of traffic and roadway safety improvements along the Route 151 corridor through Falmouth.

Road Safety Audit Justification

An RSA, as defined by the Federal Highway Administration (FHWA), is the *formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team*. The purpose of the RSA is to observe, identify, and report all safety issues and identify future opportunities for safety enhancement improvements for all roadway users. This includes identifying short-term, mid-term, and long-term safety improvements that can be implemented through general maintenance, immediate installation / removal, or could be potentially incorporated into future improvement projects. Enhancements or improvements, can take the form of one or more of the 4 E's; including Engineering, Education, Emergency Response, and Enforcement.

The U.S. Congress enacted the “Safe, Accountable, Flexible, Efficient, Transportation Act - A Legacy for Users” (SAFETEA-LU) in August 2005. This act provides guidance and funding for the implementation of a State Highway Safety Improvement Program (HSIP). As part of this Program, all states are required to develop a Strategic Highway Safety Plan (SHSP). The Massachusetts Department of Transportation (MassDOT) guidelines require an RSA be conducted where HSIP-eligible crash clusters are present within the study area of a transportation improvement project prior to commencing or finalizing a 25% Design. An intersection is defined as HSIP-eligible if the intersection is within the top five (5) percent of clusters in its respective Regional Planning Commission (RPC) boundaries based on Equivalent Property Damage Only (EPDO). EPDO rates crashes based on the crash severity.

Based on the published MassDOT database, the intersections of Nathan Ellis Highway (Route 151) / Currier Road and Nathan Ellis Highway (Route 151) / Sandwich Road are designated as 2013-2015 HSIP Crash Clusters. Furthermore, the Town of Falmouth has raised safety concerns at the intersection cluster of Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road. Therefore, all three locations have been included in this RSA.

Project Data

TEC of Andover, Massachusetts is the primary traffic safety investigation consultant in this RSA for the Nathan Ellis Highway (Route 151) corridor in Falmouth, Massachusetts. The RSA meeting was conducted on Thursday, May 3, 2018 at 9:00 AM, with the pre- and post-audit meetings held in Room 2 at the Gus Canty (Falmouth) Recreation Center, located at 790 Main Street in Falmouth, Massachusetts.

A copy of the RSA agenda can be found in Appendix A. TEC also conducted various field visits to the audit locations.

As presented below in Table 1, the audit team consisted of a cross-section of state, regional, and local engineering, enforcement, maintenance, and emergency response professionals and was assembled in conjunction with input from MassDOT’s Traffic Safety Management Unit. Contact information for all participating audit team members is provided in Appendix B.

Table 1: Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Ed Dunne	Falmouth Police Department
James Porter	Falmouth Police Department
Michael Small	Falmouth Fire Department
James McLoughlin	Falmouth Department of Public Works
Peter McConarty	Falmouth Department of Public Works
Raymond Jack	Falmouth Department of Public Works
Thomas Bolt	Falmouth Planning Department
Julian M. Suso	Town of Falmouth
David Nolan	Cape Cod Commission
Lev Malakhoff	Cape Cod Commission
Ted Rowan	Falmouth Bikeway Commission
Michelle Deng	MassDOT Traffic Safety
Kevin T. Fitzgerald	MassDOT Traffic Safety
Thomas Rebello	MassDOT District 5 Traffic
Faina Veinstein	MassDOT District 5 Projects
Phil MacClellan	Tata & Howard, Inc.
Patrick O’Neale	Tata & Howard, Inc.
Elizabeth Oltman	TEC, Inc.
Eindra (Elena) Aung	TEC, Inc.

Audit participants were provided with materials to review prior to the audit meeting. The materials included a summary of crash data, collision diagrams, and a summary of the type and severity of crashes (See Appendix). Participants were encouraged to visit the site prior to the audit and were urged to consider elements on MassDOT’s Safety Review Prompt List.

On the day of the audit, a pre-audit meeting was held to discuss the project’s background, the audit process, review the distributed materials, and discuss some of the issues that Team members had observed individually. Each participant was asked to provide his or her concerns and comments related to the safety issues at the study area intersections. The audit site walk consisted of field observations at the audit intersection. Handwritten notes and photographs documented the observations made by audit team members during the site walk. Following the audit site walk, a post-audit meeting was held where the Team confirmed the observations made in the field and offered solutions and potential countermeasures to enhance the safety of areas noted in the site walk and pre-audit meeting.

Project Location and Description

The RSA was conducted at three intersections along the Route 151 corridor, including:

- Nathan Ellis Highway (Route 151) / Currier Road
- Nathan Ellis Highway (Route 151) / Sandwich Road
- Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way/ Boxberry Hill Road

A study area location map for each of the three intersections along the Route 151 corridor is provided in Figures 1 through 3. A detailed description of the study area roadways and intersections is provided below:

Existing Geometry and Infrastructure Summary

Nathan Ellis Highway (Route 151)

Nathan Ellis Highway, signed as State Route 151, is an east-west urban principal arterial roadway under the jurisdiction of the Town of Falmouth. The roadway provides regional connection between Route 28 in the Town of Falmouth to the west and Route 28 in the Town of Mashpee to the east. Nathan Ellis Highway generally consists of one travel lane and striped shoulders in each direction with a cross-section of approximately 40-feet throughout the study area. Directional flow along Nathan Ellis Highway is separated by a marked centerline. Within the study area, sidewalks and formal bicycle accommodations are not provided. A speed limit of 50 miles per hour (MPH) is posted within the study area, with the exception of the vicinity of Nathan Ellis Highway (Route 151) / Sandwich Road, where a speed limit of 35 MPH is posted. Land uses along Nathan Ellis Highway are mixed residential, recreational and neighborhood commercial.

Sandwich Road

Sandwich Road is a north-south, urban principal arterial roadway under the jurisdiction of the Town of Falmouth. The roadway provides regional connection between the Town of Mashpee to the north and Town of Falmouth downtown to the south. Sandwich Road consists of one travel lane and striped shoulders in each direction with a cross-section of approximately 35-feet throughout the study area. Directional flow along Sandwich Road is separated by a double-yellow centerline. Within the study area, sidewalks are provided along the east side of Sandwich Road north of Route 151. Bicycle accommodations are not provided. A speed limit of 45 MPH is posted within the study area. Land uses along Sandwich Road are primarily residential.

Intersection: Nathan Ellis Highway (Route 151) / Currier Road

Currier Road intersects Nathan Ellis Highway (Route 151) to form a four-legged unsignalized intersection. Currier Road, which is under the Town of Falmouth jurisdiction, is classified as urban minor arterial south of Route 151 and as local roadway north of Route 151. The Currier Road northbound and southbound approaches operate under stop control while the Nathan Ellis Highway eastbound and westbound approaches are free-flowing. An overhead flashing beacon is provided at the intersection. The

Currier Road northbound and southbound approaches consist of a general-purpose lane with directional flow separated by a marked centerline. The Nathan Ellis Highway eastbound and westbound approaches consist of a single general-purpose lane with directional flow separated by a marked centerline. There are no sidewalks, crosswalks or formal bicycle accommodations provided at this intersection. Land uses at this intersection include a commercial use and the Cape Cod Fairgrounds.

Intersection: Nathan Ellis Highway (Route 151) / Sandwich Road

Sandwich Road intersects Nathan Ellis Highway (Route 151) to form a four-legged signalized intersection. The Sandwich Road southbound approach consists of a single general-purpose lane with directional flow separated by a marked centerline. The Sandwich Road northbound approach consists of a shared through / left turn lane and a channelized right turn lane with directional flow separated by a marked centerline. The eastbound approach of Nathan Ellis Highway consists of a shared through / left turn lane and a shared through / right turn lane with directional flow separated by a marked centerline. The westbound approach of Nathan Ellis Highway consists of an exclusive left turn lane and a shared through / right turn lane with directional flow separated by a marked centerline. Crosswalks are provided across the westbound approach of Nathan Ellis Highway and across the northbound channelized right turn lane. A sidewalk is provided along the east side of Sandwich Road north of Route 151. There are no pedestrian signal equipment or formal bicycle accommodations provided at this intersection. Land uses at this intersection include a residential use, a house of worship, and a convenience store/gas station.

Intersection: Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way / Boxberry Hill Road

Sam Turner Road and a dead end Cloverfield Way intersect Nathan Ellis Highway (Route 151) to form a four-legged unsignalized intersection. Sam Turner Road is classified as an urban collector roadway under the jurisdiction of the Town of Falmouth. Cloverfield Way is classified as a local roadway under the jurisdiction of the Town of Falmouth. The Sam Turner Road northbound and Cloverfield Way southbound approaches operate under stop control while the Nathan Ellis Highway eastbound and westbound approaches are free-flowing. Flashing beacons are provided at the intersection. The Cloverfield Way southbound approach consists of a single general-purpose lane with directional flow not delineated. Immediately to the north of the intersection along Cloverfield Way is an access driveway to a parking area for the Frances Crane Wildlife Management Area on the northeast corner of the intersection. The Sam Turner Road northbound approach consists of a single general-purpose lane with directional flow separated by a marked centerline. The Nathan Ellis Highway eastbound and westbound approaches consist of one general purpose lane in each direction separated by a marked centerline. There are no sidewalks, crosswalks or formal bicycle accommodations provided at this intersection. Land uses at this intersection include residential uses and open space.

Boxberry Hill Road intersects Nathan Ellis Highway (Route 151) approximately 125 feet to the east of Sam Turner Road to form a three-legged unsignalized intersection. Boxberry Hill Road is classified as an urban collector roadway under the jurisdiction of the Town of Falmouth. The Boxberry Hill Road northbound approach operates under stop control while the Nathan Ellis Highway eastbound and westbound approaches are free-flowing. Flashing beacons are provided at the intersection. The Boxberry Hill Road northbound approach consists of a wide general-purpose lane with directional flow separated

by a marked centerline. The Nathan Ellis Highway eastbound and westbound approaches consist of a single general-purpose lane with directional flow separated by a marked centerline. There are no sidewalks, crosswalks or formal bicycle accommodations provided at this intersection. Land uses at this intersection include residential uses and open space.



1" = 40'



Figure 1

Project Location Map &
Study Area Intersections





1" = 50'

Route 151 Corridor High Crash Locations - Falmouth, Massachusetts Road Safety Audit

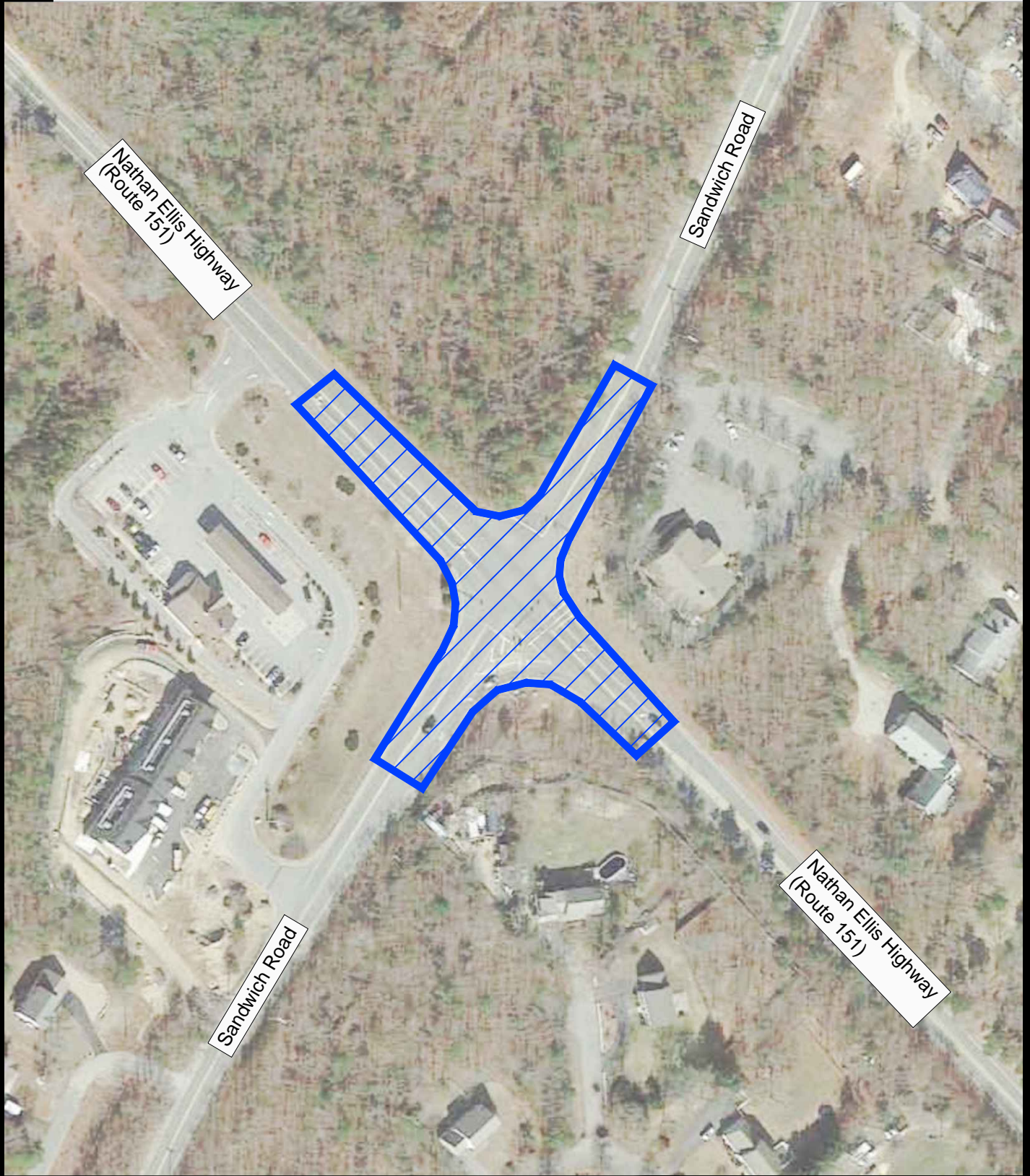


Figure 2

Project Location Map &
Study Area Intersections





1" = 50'

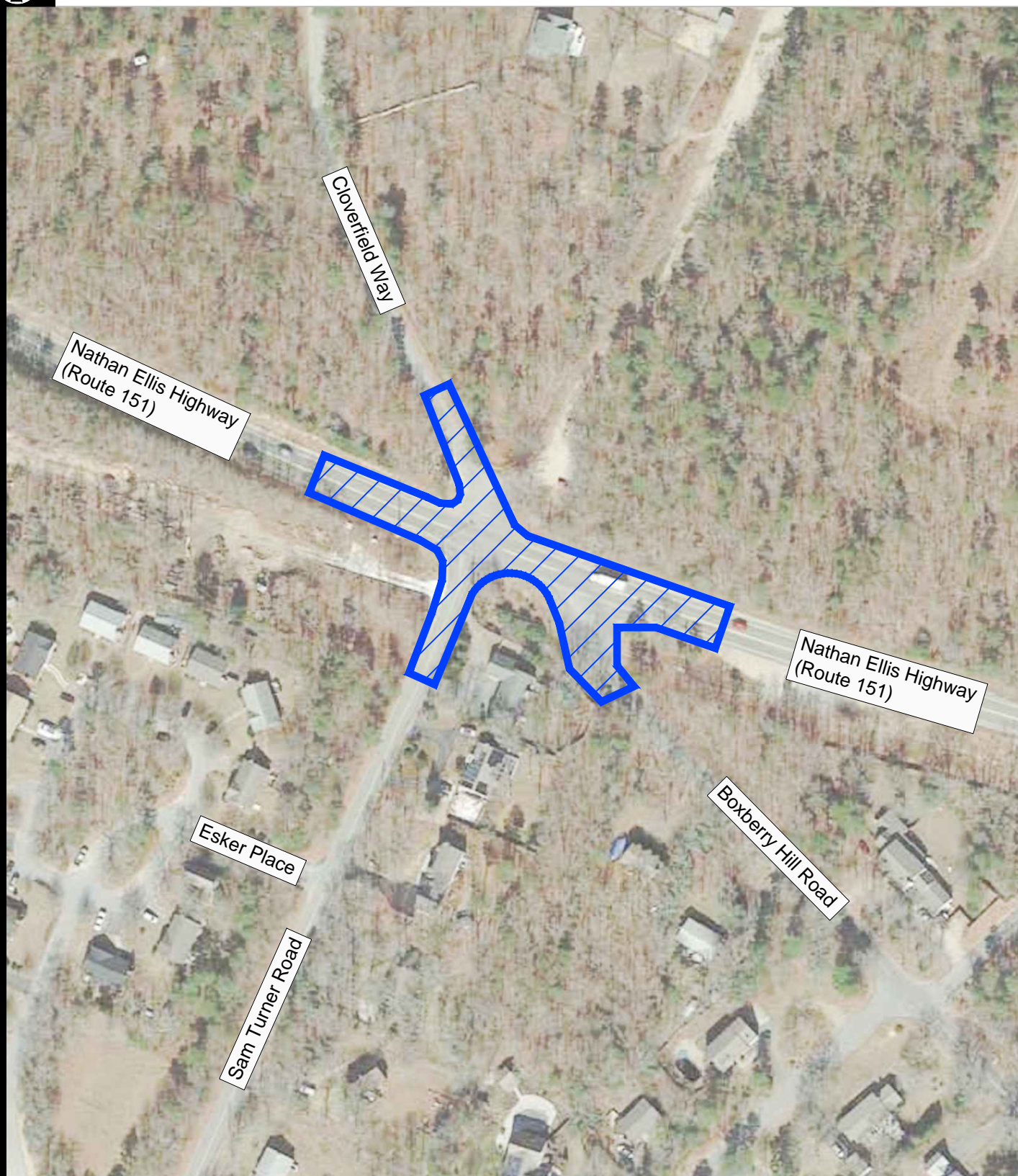


Figure 3

Project Location Map &
Study Area Intersections



General Crash History

Crash data for the Audit intersections were compiled and analyzed for the most-recent consecutive five-year period (2013-2017) on file with the Town of Falmouth Police Department and supplemented with crash reports provided by MassDOT. The motor vehicle crash data was reviewed to determine if any crash trends exist within the audit area.

In addition to examining the number of crashes at the audit intersections, a crash rate was calculated to compare the occurrence of crashes to the volume of traffic passing through the Audit intersections. The crash rate per million entering vehicles (MEV) was calculated using the evening peak-hour volumes from the TMCs, and the K-factor (the relation of peak hour traffic to daily traffic) of 0.088 was obtained from ATR counts conducted along Route 151. The crash rates at the study intersections were compared to the statewide and district-wide averages published by MassDOT in February 2016 to determine the significance of the crash occurrence. The statewide average for signalized intersections is 0.77 and 0.58 for unsignalized intersections, and the District 5 average for signalized intersections is 0.76 and 0.58 for unsignalized intersections.

The crash rates per MEV for the audit intersections are provided in Table 2. A detailed breakdown of the reported collision is provided in Table 3.

Table 2: Crash Rates by Intersection

Intersection	Total Crashes	Crash Rate
Nathan Ellis Highway (Route 151) / Currier Road	37	1.09
Nathan Ellis Highway (Route 151) / Sandwich Road	68	1.68
Nathan Ellis Highway (Route 151) / Boxberry Hill Road	9	0.32
Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way	20	0.67

Table 3: Crash Data Summary

Parameter		Route 151 / Currier Road	Route 151 / Sandwich Road	Route 151 / Sam Turner Road / Cloverfield Way and Route 151 / Boxberry Hill Road
Crash Year:	2013	8	7	3
	2014	9	12	4
	2015	8	16	8
	2016	7	17	6
	2017	5	16	8
TOTAL		37	68	29
Annual Average		7.40	13.60	5.80
Crash Rate (MEV or MVMT) Occurrence Significance?		1.09 Yes	1.68 Yes	0.97 Yes
Type:	Angled	17	21	14
	Rear-End	9	36	8
	Sideswipe	6	4	2
	Head-on	0	4	1
	Single Vehicle	5	3	4
	Ped / Bike	0	0	0
	Not Reported	0	0	0
TOTAL		37	68	29
Surface Conditions:	Dry	26	54	17
	Wet	8	14	11
	Snow / Ice / Slush	3	0	1
	Other / Unknown	0	0	0
TOTAL		37	68	29
Severity:	Property Damage	23	49	16
	Non-Fatal Injury	13	19	13
	Fatal Injury	1	0	0
TOTAL		37	68	29
Day of Week:	Monday-Friday	27	52	23
	Saturday-Sunday	10	16	6
TOTAL		37	68	29
Time of Day:	6:00AM-9:00AM	2	7	5
	9:00AM-12:00PM	4	11	3
	12:00PM-3:00PM	3	8	6
	3:00PM-6:00PM	10	14	3
	6:00PM-9:00PM	14	22	8
	9:00PM-6:00AM	4	6	4
TOTAL		37	68	29

Nathan Ellis Highway (Route 151) / Currier Road

The intersection of Nathan Ellis Highway (Route 151) / Currier Road experienced an average of seven (7.4) crashes per year over the five-year (2013-2017) study period, yielding a crash rate of 1.09 crashes per MEV, approximately two times the statewide and District 5 averages for unsignalized intersections. Approximately 46 percent (17 of 37) of the crashes were angled crashes, 24 percent (9 of 37) were rear-end crashes, 16 percent (6 of 37) were sideswipe crashes, and 14 percent (5 of 37) were single vehicle crashes. There was one fatal injury at this intersection that occurred during the nighttime involving a vehicle travelling northbound on Currier Road and a vehicle travelling eastbound on Route 151. Approximately 19 percent of the crashes occurred in the month of July, and 14 percent of the crashes occurred during both February and December. The reported ages of the drivers skewed younger; under 21 and between 21 and 30. Of the reported crashes, approximately half of the crashes were attributed to either “failure to yield right-of-way” or “inattention/distracted.”

Nathan Ellis Highway (Route 151) / Sandwich Road

The intersection of Nathan Ellis Highway (Route 151) / Sandwich Road experienced an average of fourteen (13.6) crashes per year over the five-year (2013-2017) study period, yielding a crash rate of 1.68 crashes per MEV, more than two times the statewide and District 5 averages for signalized intersections. More than half of the reported crashes (36 of 68) were rear-end crashes and approximately 31 percent (21 of 68) of the crashes were angled crashes. Approximately 28 percent (19 of 68) of the crashes were non-fatal injury crashes. More than half of the crashes occurred during the evening commuting hours (3PM-6PM) and sunset time periods (6PM-9PM). Twenty-one (21) crashes at this intersection identified “inattention/distracted” as a contributing cause of the crash, sixteen (16) crashes were “failure to yield right-of-way” and twelve (12) crashes were “followed too closely.”

Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road

The intersection cluster of Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road experienced an average of six (5.80) crashes per year over the five-year (2013-2017) study period, yielding a crash rate of 0.97 crashes per MEV which is higher than the statewide and District 5 averages for unsignalized intersections. Approximately 48 percent (14 of 29) of the crashes were angled crashes and approximately 28 percent (8 of 29) were rear-end crashes. Approximately 45 percent (13 of 29) of the crashes were non-fatal injury crashes. Among the reported ages of the drivers, approximately 14 percent were between 31 and 40, and approximately 11 percent were over 70 and between 21 and 30 each. Of the reported crashes, over half of the crashes were attributed to “failure to yield right-of-way,” “following too closely” or “inattention/distracted.”

Audit Observations and Potential Safety Enhancements

The RSA Team's field observations and discussions show that the Team has several general concerns about existing conditions along the study corridor and intersections which may negatively impact safety. Several of these concerns require further evaluation and design work to develop appropriate safety enhancements. More specific safety challenges located within the audit area are also included. The following summary of safety related concerns has been divided into the three distinct Route 151 intersections previously identified.

Audit Observations and Potential Safety Enhancements: Nathan Ellis Highway (Route 151) / Currier Road

Summary of Safety Concerns

The RSA Team identified the following safety issues at the intersection of Nathan Ellis Highway (Route 151) / Currier Road prior to, during, and after the field visit:

- Driver Frustration Due to Vehicle Delays
- Intersection Geometry
- Insufficient, Deteriorated or Sub-Standard Pavement Markings and Signage
- Visibility
- Sub-Standard Multi-Modal Accommodations
- Vehicle Speeds

The following section provides a detailed summary of the identified safety concerns and potential safety enhancements along the corridor.

Safety Issue #1: Driver Frustration Due to Vehicle Delays

Specific Observations:

Currently, the northbound and southbound approaches of Currier Road are under stop control, and the eastbound and westbound approaches are free-flowing. An audit team member noted that vehicles on the northbound and southbound approaches to the intersection have significant delays during the peak hours due to the high vehicular volume and travel speed along Nathan Ellis Highway (Route 151). There is an overhead flashing beacon at the intersection; however, audit participants noted that the indicators are not L.E.D., reducing visibility by motorists. This issue is exacerbated as the stop sign is missing on the southbound Currier Road approach and the stop bars on both the northbound and southbound approaches are either faded or missing.



Image 1: Overhead flasher at Route 151 / Currier Road intersection

Approximately 46 percent (17 of 37) of the crashes were angled crashes, with 11 of those crashes attributed to “failure to yield”. One of the angled crashes caused a fatal injury at this intersection. When drivers are frustrated by long delays exiting a stop controlled side street, they may attempt to accept shorter gaps in traffic flow to perform their desired turning movement. This can be a factor in the type of angled crashes recorded at this intersection. Additionally, it is difficult to make left turns onto Currier Road from Route 151 due to the lack of turning lanes and gaps in traffic.

Potential Safety Enhancements:

1. Install new MUTCD-compliant 36” stop signs (R1-1) on both approaches of Currier Road at the intersection to provide improve visibility of traffic control for motorists.
2. Consider replacing the indicators within the current overhead flashing beacon with L.E.D. indicators for better visibility for motorists.
3. Evaluate the installation of traffic calming measures along Route 151, such as narrowing the travel lanes, to reduce travel speed and increase gaps in the traffic flow to allow for safer movements.
4. Evaluate the installation of a fully-actuated traffic signal at the intersection to reduce vehicle conflicts, reduce side street vehicle delays and reduce angled crashes. Evaluation should be confirmed against MUTCD signal warrants for traffic volume and safety.
5. Should a signal be warranted, establish actuated vehicle detection along all four intersection approaches to minimize delays and queues. Video detection should be considered.

6. Should a signal be warranted, provide L.E.D. signal indications, retro-reflective backplates, and tunnel visors on all signal housings to improve the signal visibility, especially during periods of solar glare.
7. Should a signal be warranted and additional pedestrian accommodations become essential in the future, provide pedestrian traffic signal infrastructure; including pedestrian signal countdown indications and accessible push buttons consistent with current MUTCD and ADA/AAB standards, with signage for each individual crossing to enhance pedestrian safety while crossing the intersection. Consider upgrading the pedestrian crossings across Route 151 with higher visibility treatments.
8. Evaluate the installation of a roundabout to improve the traffic flow, decrease the approach speed, minimize delays on the side streets and reduce turning movement conflicts at the intersection. Note that the construction of a roundabout may require the acquisition of private property on multiple corners of the intersection.

Safety Issue #2: Intersection Geometry

Specific Observations:

The intersection of Nathan Ellis Highway (Route 151) / Currier Road is situated on a large expanse of asphalt pavement, with large corner radii on all four corners of the intersection. During the audit, vehicle operators were observed performing right turn movements at high rates of speed due to the intersection geometry. An audit participant noted that wide corner radii are not necessary since trucks and heavy vehicles do not use Currier Road.

The wide corner radii also create a wide area for vehicles to turn from Currier Road. There were six (6) sideswipe crashes at this intersection that involved a vehicle attempting to pass a vehicle traveling in the same direction due to the wide curb radii and intersection geometry. Audit participants noted that vehicles attempting to turn right onto Nathan Ellis Highway from northbound Currier Road pull far to the right, allowing vehicles desiring to turn left or continue straight to also approach the stop bar, further restricting sight lines for both vehicles. The slight vertical curve of Route 151 to the west of the intersection also restricts the sight lines of the northbound vehicles looking left to exit Currier Road.



Image 2: Wide intersection geometry

Potential Safety Enhancements:

1. Consider reducing the corner radii of all four corners of the intersection to reduce travel speeds for turning vehicles and reduce the potential crossing distance for pedestrians. Evaluation of required large vehicle turning radii must be considered with this recommendation.

2. Evaluate the installation of traffic calming measures along Route 151, such as narrowing the travel lanes, to reduce travel speed.

Safety Issue #3: Insufficient, Deteriorated or Sub-Standard Pavement Markings and Signage

Specific Observations:

Audit participants noted that the existing pavement markings and signage at intersection are faded. The stop bars of northbound and southbound Currier Road are set far back from the intersection, which indicates a stop location to vehicles where foliage and trees restrict sightlines. Furthermore, the Currier Road southbound approach lacks a stop sign.



Image 3: Faded stop bar and missing stop sign on Southbound Currier Road

Potential Safety Enhancements:

1. Reapply all existing pavement markings, including stop bars and centerlines, to improve motorist and pedestrian safety.
2. Consider replacing existing pavement markings with thermoplastic markings which will last longer against snow plow damage and improve visibility during inclement weather.
3. Relocate the stop bars on the northbound and southbound approaches closer to the intersection to indicate where vehicles should stop to provide adequate sight distance.
4. Replace all existing signage at the intersection that are currently faded, damaged or non-compliant with MUTCD-compliant signs to provide clear and concise regulatory and warning messages. Consider adding an additional stop sign to the left side of Currier Road.
5. Install new 36” MUTCD-compliant stop signs (R1-1) on the northbound and southbound approaches. Consider installing double stop signs to maximize visibility for motorists.
6. Consider the replacement of the existing “Stop Ahead” signs (W3-1) on the Currier Road northbound and southbound approaches with retro-reflective signs.

Safety Issue #4: Visibility

Specific Observations:

Sightlines – Audit participants noted that due to the curvature of Route 151 and vegetation at the corners of the intersection of Nathan Ellis Highway (Route 151) / Currier Road, vehicles attempting to turn onto Route 151 from Currier Road encroach



Image 4: Restricted sightlines looking east from Southbound Currier Road

into the intersection in attempt to regain sightlines past the vegetation. The “Ashumet Holly Wildlife Sanctuary” sign located on the northwest corner of the intersection limits the sight distance of the vehicles travelling southbound on Currier Road.

Additionally, although the crash data does not indicate solar glare as a cause of the collisions, audit participants noted that the intersection experiences significant solar glare, primarily eastbound during the morning hours.

On-Street Lighting – There is one street luminaire provided at the intersection. The existing street luminaire is located approximately 120 feet east of the intersection on Nathan Ellis Highway. Audit participants noted that the current street light location is not ideal and the light does not provide adequate visibility of the intersection. There were seven (7) crashes at this intersection which occurred with ambient light conditions indicated as “dark-not lighted,” when lack of lighting could be an issue for motorists.

Potential Safety Enhancements:

1. Maintain corner sight lines by continuing to trim the vegetation within the intersection sight triangles to minimize intersection encroachment.
2. Consider relocating the “Ashumet Holly Wildlife Sanctuary” sign located on the northwest corner of the intersection outside of the intersection sight triangle to improve sightlines.
3. Consider installing additional overhead luminaires at the intersection to increase night time visibility.
4. Evaluate the warrants for the installation of a fully actuated traffic signal to eliminate the need to encroach into the intersection to improve sightlines.
5. If a traffic signal is warranted, provide LED signal indications, retro-reflective backplates, and tunnel visors on all signal housings to improve the signal visibility, especially during periods of solar glare.

Safety Issue 5: Sub-Standard Multi-Modal Accommodations

Specific Observations:

Pedestrian Accommodations and Accessible Crossings – Sidewalks are not provided on any approach to the intersection. Crosswalks are not provided on any of the intersection approaches. ADA/AAB compliant accessible curb ramps are not provided at the intersection. No pedestrian crashes were recorded at this intersection over the five-year study period. One pedestrian was counted at the intersection during a 12-hour period in April 2018.

The Cape Cod Fairgrounds are located at the northeast corner of the intersection. An audit participant noted that the intersection experiences a large pedestrian volume when events are held at the fairgrounds.

There are several crosswalks to the east of the intersection connecting the parking areas to the south of the roadway to the Fairgrounds. Falmouth Police are posted at the intersection and at the crosswalks to aid pedestrians crossing Nathan Ellis Highway during events.

Bicycle Accommodations – Formalized bicycle accommodations are not provided along Nathan Ellis Highway or Currier Road. No bicycle crashes were recorded at this intersection over the five-year study period. One bicycle was counted at the intersection during a 12-hour period in April 2018. Audit participants noted that the speeds along Nathan Ellis Highway exceed what is allowed for shared bicycle accommodations.

Potential Safety Enhancements:

1. Should a signal be warranted and additional pedestrian accommodations become essential in the future, provide pedestrian traffic signal infrastructure; including crosswalks, pedestrian signal countdown indications and accessible push buttons consistent with current MUTCD and ADA/AAB standards, with signage for each individual crossing to enhance pedestrian safety while crossing the intersection. Providing efficient crossing opportunities is anticipated to assist in locating pedestrian crossing maneuvers to a safe, defined location.
2. Construct ADA/AAB compliant accessible curb ramps to align with the crosswalk locations upon enhancements to the intersection.
3. Consider placing portable lights and signs at the intersection during events at the Fairgrounds to aid the Falmouth Police in crossing pedestrians.
4. Evaluate the opportunity to construct dedicated bicycle lanes along Nathan Ellis Highway or a multi-modal pathway adjacent to the roadway. With any future bicycle facilities, and should a signal be warranted, bicycle accommodations to facilitate crossing of Currier Road and Route 151 should be provided, such as bicycle detection or dedicated signals.

Safety Issue #6: Vehicle Speeds

Specific Observations:

Audit participants expressed concerns over vehicle speeds within the audit area. Excessive speed was noted as the contributing factor in three (3) crashes over the five year study period. Based on the traffic counts conducted in April 2018, the 85th percentile speed along Nathan Ellis Highway (Route 151) was measured at 55 miles per hour (MPH). Majority of the vehicles travelling along Route 151 were measured to be travelling at a speed greater than the posted 50 MPH speed limit. An audit participant noted that due to the vehicles speed along Route 151, the vehicles from side streets such as Currier Road experience delays merging onto Route 151 or performing crossing maneuvers due to minimal gap times.

Potential Safety Enhancements:

1. Consider strategic placement of dynamic speed radar signage along Route 151 approaches to inform drivers of their current speed as compared to the posted speed limit.
2. Consider installing reduce speed flashers along Route 151 approaches with advanced warning signage in a location where light pollution will not adversely affect residents.
3. Consider the installation of vertical granite curbing and sidewalks along Route 151 and Currier Road to provide vertical separation from the roadway and change the characteristic of a high speed location.
4. Consider increasing police enforcement of speeding at and in the vicinity of the intersection.



Audit Observations and Potential Safety Enhancements – Nathan Ellis Highway (Route 151) / Sandwich Road

Summary of Safety Concerns

The RSA Team identified the following safety issues at the intersection of Nathan Ellis Highway (Route 151) / Sandwich Road prior to, during, and after the field visit:

- Intersection Alignment and Geometry
- Deteriorated or Sub-Standard Signage and Pavement Markings
- Intersection Signal Control
- Sub-Standard Multi-Modal Accommodations

The following section provides a detailed summary of the identified safety concerns and potential safety enhancements at the intersection.

Safety Issue #1: Intersection Alignment and Geometry

Specific Observations:

The Nathan Ellis Highway (Route 151) eastbound and westbound through travel lanes are currently offset, with the eastbound approach providing a shared through / left turn lane and a shared through / right turn lane and the westbound approach providing a dedicated left turn lane and a shared through / right turn lane. With this alignment, vehicles do not have a direct path to access the



Image 5: Vehicles traveling through Eastbound Route 151 in two lanes

available receiving lanes. Audit participants noted that the inconsistent approach geometry can be confusing to motorists. Further, vehicles travelling eastbound are able to use both lanes to perform a through movement, however, there is only one wide receiving lane, which can cause conflicts for two eastbound vehicles traveling through at the same time.

There were sixteen (16) angled crashes involving a vehicle making a westbound left turn conflicting with a vehicle travelling through eastbound. It is possible that the current intersection geometry, with offset left-turn lanes, could be one of the contributing factors of these crashes.

Currently, westbound left turns from Route 151 into the gas station located on the southwest corner of the intersection are restricted; however, audit participants noted during the RSA that many motorists continue to perform that prohibited left turn movement. This behavior could be due to the difficulty of performing a left turn movement at the signalized intersection.

The northbound approach of Sandwich Road provides a shared through / left turn lane and a wide (18-foot) channelized right turn lane. Audit participants noted that northbound through vehicles will use the striped gore area for the channelized right turn lane to bypass left turning vehicles, rather than wait within the left turn queue. This movement is unexpected by vehicles making southbound left turn movements, causing conflicts between turning vehicles. A total of three (3) crashes during the five-year period are angled crashes between vehicles northbound on Sandwich Road and vehicles turning left from southbound Sandwich Road.



Image 6: Sight distance along Eastbound Route 151 from Northbound Sandwich Road

Immediately west of the Nathan Ellis Highway (Route 151) / Sandwich Road intersection, Nathan Ellis Highway has a sag and crest vertical curvature. This geometry causes eastbound vehicles to briefly “disappear” from view when viewed from the intersection. The posted speed limit along Nathan Ellis Highway is 35 MPH at this intersection, changing from the corridor posted speed limit of 50 MPH. Audit participants noted that vehicles do not observe the change in speed limit and most continue to travel at a speed greater than 35 MPH. There were ten (10) rear-end crashes involving vehicles travelling eastbound on Route 151, with five (5) attributed to “inattention” and two (2) to “following too closely,” which may be a result of the roadway geometry and prevailing speeds.

The combination of the vertical curvature of the roadway and the vehicle speeds along eastbound Nathan Ellis Highway, vehicles attempting to merge onto Route 151 eastbound from the Sandwich Road northbound approach may believe that the right-of-way is clear, resulting in the northbound vehicles stopping abruptly when the oncoming traffic emerge from the curve. There were nineteen (19) rear-end crashes at the Sandwich Road northbound channelized right turn lane over the five-year study period. The presence of the vertical curve and high vehicle speeds on Route 151 could be part of the contributing factors of these crashes.

Potential Safety Enhancements:

1. Evaluate feasibility and need to reconstruct the vertical profile of Nathan Ellis Highway (Route 151) west of the intersection to remove the sag and crest vertical curves along the roadway. This would increase the visibility of the vehicles approaching the intersection and improve sight distances for the northbound right turn movement. This improvement may require profile alterations to the driveways and side street approaches within the limits of corridor profile reconstruction.
2. Include the Sandwich Road northbound channelized right-turn as part of the traffic signal at the intersection per new MassDOT standards if any changes are made at the intersection to eliminate most of the northbound rear-end crashes.
3. Provide pedestrian signal indicators and pedestrian push buttons for the existing crosswalk to increase pedestrian safety at this crossing area.
4. Consider reconstructing the southeast corner of the intersection to remove the channelized right turn lane to improve sight distances by eliminating the need for motorists to look far over their left shoulder to obtain adequate sight distance to perform this movement as well as protect pedestrians at this intersection and reduce the crossing distance. Evaluation of right turning volume and large vehicle turning radii must be considered with this recommendation.
5. Consider strategic placement of dynamic speed radar signage along Route 151 approaches to inform drivers of their current speed as compared to the posted speed limit.
6. Consider installing reduce speed flashers along Route 151 approaches along with advanced warning signage in a location where light pollution will not adversely affect residents.
7. Consider reconfiguring the eastbound and westbound approaches of Nathan Ellis Highway to provide a consistent geometry. Dedicated left turn lanes, if warranted, on each approach is an expected geometry by motorists, minimizing driver confusion, reduce angled crashes and improving the safety and efficiency of the intersection.
8. Consider widening Nathan Ellis Highway to ensure adequate alignment for vehicles traveling through both eastbound and westbound to improve vehicle safety.
9. Evaluate the intersection operation and determine the appropriate lane designations necessary on all approaches to ensure the intersection operates efficiently for all movements, improving vehicular safety.
10. Consider increasing police enforcement of speeding at and in the vicinity of the intersection.

Safety Issue #2: Deteriorated or Sub-Standard Signage and Pavement Markings

Specific Observations:

Audit participants noted that some of the existing pavement markings at the intersection, especially the northbound approach, are faded and difficult to see. Poor pavement markings can mislead motorists and cause unnecessary confusion. Audit participants noted that the stop bar on northbound Sandwich Road is faded. Three yield signs were provided for the channelized right turn lane; however, no yield pavement markings are provided. Further, the westbound approach stop bar appears to be too close to the crosswalk.



Image 7: Lack of yield markings on northbound right turn

Potential Safety Enhancements:

1. Reapply all existing pavement markings, including lane markings, stop bars and centerlines, to improve motorist and pedestrian safety.
2. Apply yield markings on the northbound channelized right turn movement to reinforce the yield nature of this movement and improve pedestrian safety.
3. Consider installing a MUTCD-compliant “No Turn on Red” sign for the southbound right turning vehicles due to the high vehicle speeds on Route 151.
4. Consider replacing existing pavement markings with thermoplastic markings which will last longer against snow plow damage and improve visibility during inclement weather
5. Ensure the westbound stop bar is located at least four feet away from striped crosswalk to reduce the potential for pedestrian collisions.
6. Replace all existing signage at the intersection that are currently faded, damaged or non-compliant with MUTCD-compliant signs to provide clear and concise regulatory and warning messages.

Safety Issue #3: Intersection Signal Control

Specific Observations:

Audit participants observed during the RSA field visit that the traffic signal at the southwest corner of the intersection shows a red ball indication with the left turn yellow arrow indication and green ball indication, which is not the correct display and is confusing to motorists. This may indicate a wiring conflict. Currently, the intersection utilizes loop detectors. An audit participant noted that there can be a high volume of motorcycles during the summer months in Falmouth. Motorcycles travelling through the intersection

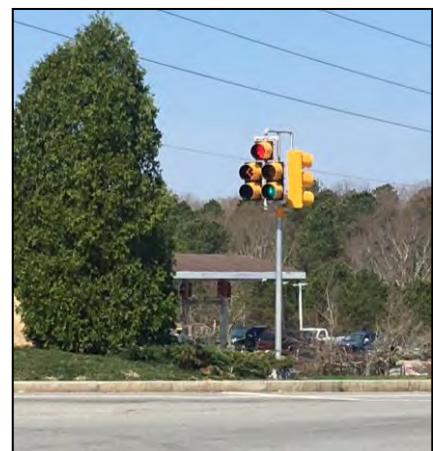


Image 8: Faulty traffic signal indications at the southwest corner of the intersection

cannot be detected by the loop detectors causing motorcyclist and motorist frustration. Motorcycles tend to run red lights when the detectors do not confirm a vehicle is present.

Potential Safety Enhancements:

1. Repair the traffic signal at the southwest corner of the intersection to provide correct signal indications during the left turn protected phase to eliminate driver confusion.
2. Evaluate the need to include a protected/permitted or fully protected eastbound/westbound left turn phasing with any proposed changes in geometry to provide standardized signal timings for motorists.
3. Evaluate installing video detection cameras at the intersection to provide a more efficient detection than loop detection.

Safety Issue #4: Sub-Standard Multi-Modal Accommodations

Specific Observations:

Pedestrian Accommodations – There is a crosswalk striped across the Route 151 westbound approach. The crosswalk lacks pedestrian signals, pedestrian push buttons, pedestrian phasing and ADA/AAB-compliant access ramps. Without pedestrian signal equipment at this signalized intersection, there is no safe way for pedestrians to utilize this crosswalk and cross Nathan Ellis Highway. No pedestrian crashes were recorded at this intersection.



Image 9: Crosswalk across the westbound approach with no ADA ramps or pedestrian signal equipment

Bicycle Accommodations – Bicycle accommodations are not provided along Route 151 and Sandwich Road. It was observed during the RSA that bicyclists utilize Route 151 and it is signed as a bicycle route along portions of its length. An audit participant noted that the loop detection at the intersection does not detect motorcycles. It can be concluded that the loop detectors would not detect bicycles as well.

Potential Safety Enhancements:

1. Provide pedestrian traffic signal infrastructure at the signalized intersection; including pedestrian signal countdown indications and accessible push buttons consistent with current MUTCD and ADA/AAB standards, with signage for each individual crossing to enhance pedestrian safety while crossing the intersection. The channelized right-turn lane will need to be signalized as part of this enhancement.
2. If new pedestrian signal equipment is installed, evaluate the timing of the intersection to determine whether concurrent or exclusive pedestrian phasing is necessary.

3. Evaluate installing video detection cameras at the intersection to provide a more efficient detection than loop detection.

Audit Observations and Potential Safety Enhancements Intersection Cluster: Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road

Summary of Safety Concerns

The RSA Team identified the following safety issues at the intersection cluster of Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road prior to, during, and after the field visit:

- Traffic Control and Intersection Geometry
- Visibility
- Vehicle Speeds
- Insufficient, Deteriorated or Sub-Standard Pavement Markings and Signage
- Sub-standard Multi-Modal Accommodations

The following section provides a detailed summary of the identified safety concerns and potential safety enhancements at the intersections.

Safety Issue #1: Traffic Control and Intersection Geometry

Specific Observations:

Currently, the northbound and southbound approaches of Sam Turner Road, Cloverfield Way and Boxberry Hill Road are under stop control, and the eastbound and westbound Nathan Ellis Highway (Route 151) approaches are free-flowing. There is an overhead flasher and post-mounted flashers present for the approaches to the intersection cluster. Audit participants noted that the red flasher on the post for Cloverfield Way can be seen from the Route 151 eastbound approach, causing driver confusions. Furthermore, the post-mounted flasher for the Nathan Ellis Highway (Route 151) / Boxberry Hill Road is not ideally located, as the flasher heads for eastbound and westbound approaches are far from the road and are currently covered by the overgrown vegetation



Image 10: Red post mounted flasher seen from two directions

along Route 151. Audit participants noted that the indicators are not L.E.D., reducing visibility by motorists. Two (2) crashes during the five-year study period involved vehicles not stopping at the stop signs.

Immediately to the north of the intersection along Cloverfield Way is an access driveway to a parking area for the Frances Crane Wildlife Management Area on the northeast corner of the intersection. Audit participants noted that this parking area is heavily used seasonally and can contribute to conflicting turning movements at the intersection.

Boxberry Hill Road intersects Nathan Ellis Highway (Route 151) approximately 125 feet to the east of the Sam Turner Road / Cloverfield Way intersection. Audit participants noted that the close proximity of the two unsignalized intersections causes conflicts between turning vehicles. Vehicles will attempt to make turning movements from both Boxberry Hill Road and either Sam Turner Road or Cloverfield Way at the same time to use one of the few gaps in traffic along Route 151, potentially conflicting with each other. Further, motorists using their signal indicators prior to turning into the side streets from Route 151 can cause confusion as to which side street they are turning into. Nine (9) angled crashes during the five-year study period involved left turns exiting Sam Turner Road and colliding with through vehicles along Nathan Ellis Highway. An audit participant noted the significant number of crashes at the intersection that are under the reporting threshold but attended by the Falmouth Police Department.



Image 11: Vehicles at both northbound approaches waiting to make left turns

Potential Safety Enhancements:

1. Consider replacing the existing flashers with L.E.D. flashers with tunnel visors for better visibility.
2. Consider relocating the post-mounted flasher at the south side of the intersection of Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way to eliminate driver confusions.
3. Consider relocating the post-mounted flasher at the north side of the intersection of Nathan Ellis Highway (Route 151) / Boxberry Hill Road for better visibility.
4. Consider working with the Francis Crane Wildlife Management Area to create a larger parking area on the northeast corner of the intersection to prevent on-street parking along Nathan Ellis Highway and minimize uncontrolled pedestrian crossing movements.
5. Evaluate the installation of a fully-actuated traffic signal at the intersection cluster to reduce vehicle conflicts and reduce angled crashes. Evaluation should be confirmed against MUTCD signal warrants for traffic volume and safety.
6. Should a signal be warranted, consider realigning the intersection approaches.

7. Should a signal be warranted, establish actuated vehicle detection along all five intersection approaches to minimize delays and queues. Video detection should be considered.
8. Should a signal be warranted, provide L.E.D. signal indications, retro-reflective backplates, and tunnel visors on all signal housings to improve the signal visibility, especially during periods of solar glare.
9. Should a signal be warranted and additional pedestrian accommodations become essential in the future, provide pedestrian traffic signal infrastructure; including pedestrian signal countdown indications and accessible push buttons consistent with current MUTCD and ADA/AAB standards, with signage for each individual crossing to enhance pedestrian safety while crossing the intersection.
10. Evaluate the installation of a roundabout to improve the traffic flow, decrease the approach speed, minimize delays on the side streets and reduce turning movement conflicts at the intersection cluster. Note that the construction of a roundabout may require the acquisition of private property on multiple corners of the intersection cluster.

Safety Issue #2: Visibility

Specific Observations:

Sightlines – Audit participants noted that due to the vegetation along Route 151, vehicles attempting to turn onto Route 151 from the side streets of Sam Turner Road, Cloverfield Way and Boxberry Hill Road encroach into their respective intersections in attempt to regain sightlines past the vegetation. Additionally, utility poles along Route 151 further restrict the sightlines of the vehicles on Boxberry Hill Road.

On-Street Lighting – There are no street luminaires provided at or in the vicinity of this intersection cluster. An audit participant noted that the intersection cluster is dangerous to drive through at night due to the lack of street lighting. There were four (4) crashes at this intersection which occurred with ambient light conditions indicated as “dark-not lighted,” when lack of lighting could be an issue for motorists.



Image 12: Wide intersection approaches

Potential Safety Enhancements:

1. Continue to maintain the vegetation along Route 151 to enhance the sight lines of the side streets.
2. Consider replacing the indicators within the current overhead flashing beacon with L.E.D. indicators for better visibility.

3. Consider installing overhead lighting luminaires at the intersection cluster to increase night time visibility.
4. Consider installing new retro-reflective signage for improved visibility for existing signage that are faded or no longer compliant with current MUTCD standards.
5. Evaluate the installation of a fully actuated traffic signal to eliminate the need to encroach into the intersection to improve sightlines. Evaluation should be confirmed against MUTCD signal warrants for traffic volume and safety.
6. Evaluate the installation of a roundabout to improve the traffic flow, decrease the approach speed, minimize delays on the side streets and reduce turning movement conflicts at the intersection cluster. Note that the construction of a roundabout may require the acquisition of private property on multiple corners of the intersection cluster.

Safety Issue #3: Vehicle Speeds

Specific Observations:

Audit participants noted that high vehicle speeds along Nathan Ellis Highway at this intersection. Based on the traffic counts conducted in April 2018, the 85th percentile speed along Nathan Ellis Highway (Route 151) was measured at 55 miles per hour (MPH). The majority of the vehicles travelling along Route 151 were measured to be travelling at a speed greater than the posted 50 MPH speed limit. An audit participant noted that due to the vehicles speed along Route 151, the vehicles from Sam Turner Road, Cloverfield Way and Boxberry Hill Road find it difficult to turn onto Route 151 and may accept smaller gaps than necessary to perform their turning movement. This can be a factor in the type of angled crashes recorded at this intersection.

Potential Safety Enhancements:

1. Evaluate the installation of traffic calming measures along Route 151, such as the narrowing the travel lanes, to reduce travel speed and increase gaps in the traffic flow.
2. Consider strategic placement of dynamic speed radar signage along Route 151 approaches to inform drivers of their current speed as compared to the posted speed limit.
3. Consider installing reduce speed flashers along Route 151 approaches along with advanced warning signage in a location where light pollution will not adversely affect residents.
4. Consider increasing police enforcement of speeding at and in the vicinity of the intersection.

Safety Issue #4: Insufficient, Deteriorated or Sub-Standard Pavement Markings and Signage

Specific Observations:

Pavement Markings – Audit participants noted that the existing pavement markings at the intersection cluster are faded especially on Sam Turner Road, Cloverfield Way and Boxberry Hill Road. All three side street approaches lack stop bars.

Signage – Audit participants noted that some of the existing signs at the intersection cluster are faded, damaged, or not MUTCD-compliant, which is detracting from their effectiveness. The stop sign on Sam Turner Road is partially blocked by vegetation. Street name signs within the audit area are not consistent; some of them have small black letters on white background and some are larger white on green signs. An audit participant noted that the location of Cloverfield Way street name sign can be confusing for the motorists, as it is located between Cloverfield Way and Boxberry Hill Road.

The “Stop Ahead” sign on Sam Turner Road is not consistent with current MUTCD standards and differs from the sign on Boxberry Hill Road. The “Intersection Ahead” signs on the Nathan Ellis Highway eastbound and westbound approaches are located approximately 350 feet in advance of the intersection cluster. It was noted by an audit participant that this sign should be placed approximately 1000 feet in advance of the intersection cluster. At the time of the RSA, a “Dangerous Intersection” sign was located on the westbound approach of the intersection cluster. It was noted by a MassDOT representative that this sign is not a standard MUTCD sign.

Potential Safety Enhancements:

1. Reapply all existing pavement markings, including stop bars and centerlines, to improve motorist and pedestrian safety.
2. Reapply stop bars at Sam Turner Road, Cloverfield Way and Boxberry Hill Road approaches to define vehicle stop locations and provide adequate sight distance.
3. Replace the “Stop Ahead” word sign on the northbound Sam Turner Road approach with a “Stop Ahead” symbol sign (W1-3) to provide consistent signage.
4. Trim the vegetation from the existing stop sign locations to maximize visibility.
5. Replace all existing signs within the vicinity of the audit area that are currently faded, damaged or non-compliant with new MUTCD-compliant signs to provide clear and



Image 13: Missing stop bar on Northbound Sam Turner Road approach



Image 14: Dangerous Intersection sign on Westbound Route 151

concise regulatory and warning messages. Consider installation of double stop signs at the stop control approaches. Provide retro-reflective signs where necessary.

6. Provide town-wide consistent retro-reflective street name signs at all side streets in appropriate locations to minimize motorist confusion.
7. Relocate the existing “Intersection Ahead” (W2-1 modified) signs to approximately 1000 feet in advance of the intersection cluster to be in compliance with MUTCD advance warning sign standards. Consider replacing these signs with a retro-reflective signs.
8. Remove the “Dangerous Intersection” sign from the westbound approach to be in compliance with MassDOT standards.

Safety Issue #5: Sub-Standard Multi-Modal Accommodations

Specific Observations:

Pedestrian and Transit Accommodations – Immediately to the north of the intersection along Cloverfield Way is an access driveway to a parking area for the Frances Crane Wildlife Management Area on the northeast corner of the intersection. Audit participants noted that this parking area is heavily used seasonally. Further, audit participants noted that a dirt shoulder area along eastbound Nathan Ellis Highway is used as a parking area by visitors to the Wildlife Management Area seasonally as well, with pedestrians crossing Nathan Ellis Highway at the intersection.



Image 15: Dirt parking area on eastbound Nathan Ellis Highway

Audit participants observed this dirt area being used as a bus pick-up and drop-off location by area residents. No bus stop signage is provided at the intersection. No pedestrian crashes were recorded at this intersection.

Bicycle Accommodations – Formalized bicycle accommodations are not provided along Nathan Ellis Highway or the side streets at this intersection. No bicycle crashes were recorded at this intersection over the five-year study period.

Potential Safety Enhancements:

1. Should a signal or roundabout be warranted, provide pedestrian infrastructure; including crosswalks, pedestrian signal countdown indications and accessible push buttons consistent with current MUTCD and ADA/AAB standards, and/or signage for each individual crossing to enhance pedestrian safety while crossing the intersection. Providing efficient crossing opportunities is anticipated to assist in locating pedestrian crossing maneuvers to a safe, defined location.

2. Construct ADA/AAB compliant accessible curb ramps to align with the crosswalk locations upon enhancements to the intersection.
3. Evaluate the opportunity to construct dedicated bicycle lanes along Nathan Ellis Highway or a multi-modal pathway adjacent to the roadway. With any future bicycle facilities, and should a signal be warranted, bicycle accommodations to facilitate crossing of the side streets and Route 151 should be provided, such as bicycle detection or dedicated signals.

Summary of Road Safety Audit

Each improvement considered has been categorized as short-term, mid-term, or long-term. Additionally, a cost category has been assigned to each improvement based on the definitions shown in Table 4. Table 5 includes a summary of the potential safety enhancements. Safety benefit estimates are subjective, based on engineering experience and the relative percentage of crashes that may be reduced by the enhancement based on known and documented crash reduction factors (such as FHWA documented crash reduction factors).

Note that some costs are noted with two cost thresholds. This is included as some enhancements may require additional measures to ensure regulatory compliance. In addition, some enhancements are defined to mitigate multiple safety issues. For those enhancements identified for multiple issues, the enhancement has only been listed once in Table 5.

Table 4: 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

Table 5: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Currier Road					
Driver Frustration Due to Vehicle Delays	Install new MUTCD-compliant 36” stop signs (R1-1) on both approaches of Currier Road. Consider installing double stop signs.	High	Short-Term	Low	Town
	Consider replacing the indicators within the current overhead flashing beacon with L.E.D. indicators.	High	Short-Term	Low	Town
	Evaluate the installation of traffic calming measures along Route 151 such as narrowing the travel lanes.	Medium	Long-Term	High	Town
	Evaluate the installation of a fully-actuated traffic signal at the intersection. Evaluation should be confirmed against MUTCD signal warrants.	High	Long-Term	High	Town
	Should a signal be warranted, establish actuated vehicle detection along all four intersection approaches. Video detection should be considered.	Medium	Long-Term	High	Town
	Should a signal be warranted, provide L.E.D. signal indications, retro-reflective backplates, and tunnel visors on all signal housings.	Medium	Long-Term	High	Town
	Should a signal be warranted and additional pedestrian accommodations become essential in the future, provide traffic signal infrastructure; including pedestrian signal countdown indications, crosswalks and accessible push buttons consistent with current MUTCD and ADA/AAB standards, with signage for each individual crossing. Consider upgrading the pedestrian crossings across Route 151 with higher visibility treatments.	High	Long-Term	High	Town
	Evaluate the installation of a roundabout. Note that the construction of a roundabout may require the acquisition of private property on multiple corners of the intersection.	High	Long-Term	High	Town
Intersection Geometry	Consider reducing the corner radii of all four corners of the intersection. Evaluation of required large vehicle turning radii must be considered with this recommendation.	Low	Long-Term	Medium	Town

Table 5 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Currier Road					
Insufficient, Deteriorated or Sub-Standard Pavement Markings and Signage	Reapply all existing pavement markings, including stop bars and centerlines.	High	Short-Term	Low	Town
	Consider replacing existing pavement markings with thermoplastic markings.	Medium	Long-Term	Medium	Town
	Relocate the stop bars on the northbound and southbound approaches closer to the intersection.	High	Short-Term	Low	Town
	Replace all existing signage at the intersection that are currently faded, damaged or non-compliant with new retro-reflective MUTCD-compliant signs. Consider adding an additional stop sign to the left side of Currier Road.	Medium	Short-Term	Low	Town
	Consider the replacement of the existing “Stop Ahead” signs (W3-1) on the Currier Road northbound and southbound approaches with retro-reflective signs.	High	Short-Term	Low	Town
Visibility	Maintain corner sight lines by continuing to trim the vegetation within the intersection sight triangles.	Medium	Continuous	Low	Town
	Consider relocating the “Ashumet Holly Wildlife Sanctuary” sign located on the northwest corner of the intersection outside of the intersection sight triangle.	Medium	Short-Term	Low	Town
	Consider installing additional overhead luminaires at the intersection.	Medium	Long-Term	Medium	Town
Sub-Standard Multi-Modal Accommodations	Construct ADA/AAB compliant accessible curb ramps in future conditions with the addition of pedestrian infrastructure.	Medium	Long-Term	Medium	Town
	Consider placing portable lights and signs at the intersection during events at the Fairgrounds.	Medium	Short-Term	Medium	Town

Table 5 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Currier Road					
Sub-Standard Multi-Modal Accommodations	Evaluate the opportunity to construct dedicated bicycle lanes along Nathan Ellis Highway or multi-modal pathway adjacent to the roadway. With any future bicycle facilities, and should a signal be warranted, bicycle accommodations to facilitate crossing of Currier Road and Route 151 should be provided, such as bicycle detection or dedicated signal.	Medium	Long-Term	High	Town
Vehicle Speeds	Consider strategic placement of dynamic speed radar signage along Route 151 approaches.	Low	Short-Term	Medium	Town
	Consider installing reduce speed flashers along Route 151 approaches with advanced warning signage in a location where light pollution will not adversely affect residents.	Low	Mid-Term	Medium	Town
	Consider the installation of vertical granite curbing and sidewalks along Route 151 and Currier Road.	Low	Long-Term	High	Town
	Consider increasing police enforcement of speed at and in the vicinity of the intersection.	Low	Short-Term	Medium	Town Police

Table 5 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Sandwich Road					
Intersection Alignment and Geometry	Evaluate feasibility and need to reconstruct the vertical profile of Route 151 west of the intersection to remove the sag and crest vertical curves along the roadway. This improvement may require profile alterations to the driveways and side street approaches within the limits of corridor profile reconstruction.	High	Long-Term	High	Town
	Include the Sandwich Road northbound channelized right-turn as part of the traffic signal at the intersection per new MassDOT standards if any changes are made at the intersection.	High	Long-Term	High	Town
	Provide pedestrian signal indicators and pedestrian push buttons for the existing crosswalk.	Medium	Mid-Term	Medium	Town
	Consider reconstructing the southeast corner of the intersection to remove the channelized right-turn lane. Evaluation of right turning volume and larger vehicle turning radii must be considered with this recommendation.	High	Long-Term	Medium to High	Town
	Consider strategic placement of dynamic speed radar signage along Route 151 approaches.	Low	Short-Term	Medium	Town
	Consider installing reduce speed flashers along Route 151 approaches along with advanced warning signage in a location where light pollution will not adversely affect residents.	Low	Mid-Term	Medium	Town
	Consider reconfiguring the eastbound and westbound approaches of Nathan Ellis Highway. Dedicated left-turn lanes, if warranted, on each approach is an expected geometry by motorists.	High	Long-Term	High	Town
	Consider widening Nathan Ellis Highway.	Medium	Long-Term	High	Town
	Evaluate the intersection operation and determine the appropriate lane designations necessary on all approaches.	High	Long-Term	High	Town
	Consider increasing police enforcement of speeding at and in the vicinity of the intersection	Low	Short-Term	Medium	Town Police

Table 5 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Sandwich Road					
Deteriorated or Sub-Standard Signage and Pavement Markings	Reapply all existing pavement markings, including lane markings, stop bars and centerlines.	High	Short-Term	Low	Town
	Apply yield marking on the northbound channelized right-turn movement.	High	Short-Term	Low	Town
	Consider installing a MUTCD-compliant “No Turn on Red” sign for the southbound right turning vehicles.	Medium	Short-Term	Low	Town
	Consider replacing existing pavement markings with thermoplastic markings.	Medium	Long-Term	Medium	Town
	Ensure the westbound stop bar is located at least four feet away from striped crosswalk.	Medium	Short-Term	Low	Town
	Replace all existing signage at the intersection that are currently faded, damaged or non-compliant with MUTCD-compliant signs.	High	Short-Term	Low	Town
Intersection Signal Control	Repair the traffic signal at the southwest corner of the intersection.	High	Short-Term	Low	Town
	Evaluate the need to include a protected/permitted or fully protected eastbound/westbound left turn phasing with any proposed changes in geometry.	Medium	Long-Term	Medium	Town
	Evaluate installing video detection cameras at the intersection.	Medium	Long-Term	High	Town
Sub-Standard Multi-Modal Accommodations	Provide pedestrian traffic signal infrastructure at the signalized intersection; including pedestrian signal countdown indications and accessible push buttons consistent with current MUTCD and ADA/AAB standards, with signage for each individual crossing. The channelized right-turn lane will need to be signalized as part of this enhancement.	High	Long-Term	High	Town
	If new pedestrian signal equipment is installed, evaluate the timing of the intersection.	Medium	Long-Term	Low	Town

Table 5 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road					
Traffic Control and Intersection Geometry	Consider replacing the existing flashers with L.E.D. flashers with tunnel visors.	High	Short-Term	Low	Town
	Consider relocating the post-mounted flasher at the south side of the intersection of Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way.	High	Short-Term	Medium	Town
	Consider relocating the post-mounted flasher at the north side of the intersection of Nathan Ellis Highway (Route 151) / Boxberry Hill Road.	High	Short-Term	Medium	Town
	Consider working with the Francis Wildlife Management Area to create a larger parking area on the northeast corner of the intersection.	Low	Long-Term	Low to Medium	Town/Francis Wildlife Management Area
	Evaluate the installation of a fully-actuated traffic signal at the intersection cluster. Evaluation should be confirmed against MUTCD signal warrants for traffic volume and safety.	High	Long-Term	High	Town
	Should a signal be warranted, consider realigning the intersection approaches.	High	Long-Term	Medium	Town
	Should a signal be warranted, establish actuated vehicle detection along all five intersection approaches. Video detection should be considered.	Medium	Long-Term	High	Town
	Should a signal be warranted, provide L.E.D. signal indications, retro-reflective backplates and tunnel visors on all signal housings.	Medium	Long-Term	High	Town
	Should a signal be warranted and additional pedestrian accommodations become essential in the future, provide pedestrian traffic signal infrastructure; including pedestrian signal countdown indications and accessible push buttons consistent with current MUTCD and ADA/AAB standards, with signage for each individual crossing.	High	Long-Term	High	Town

Table 5 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road					
Traffic Control and Intersection Geometry	Evaluate the installation of a roundabout. Note that the construction of a roundabout may require the acquisition of private property on multiple corners of the intersection cluster.	High	Long-Term	High	Town
Visibility	Continue to maintain the vegetation along Route 151.	Medium	Continuous	Low	Town
	Consider installing overhead lighting luminaires at the intersection cluster.	Medium	Short-Term	Medium	Town
	Consider installing new retro-reflective signage for existing signage that are faded or no longer compliant with current MUTCD standards.	High	Short-Term	Low	Town
Vehicle Speeds	Evaluate the installation of traffic calming measures along Route 151 such as the narrowing the travel lanes.	Medium	Long-Term	High	Town
	Consider strategic placement of dynamic speed radar signage along Route 151 approaches.	Low	Long-Term	High	Town
	Consider installing reduce speed flashers along Route 151 approaches along with advanced warning signage in a location where light pollution will not adversely affect residents.	Low	Mid-Term	Medium	Town
	Consider increasing police enforcement of speeding at and in the vicinity of the intersection.	Low	Short-Term	Medium	Town Police
Insufficient, Deteriorated or Sub-Standard Pavement Markings and Signage	Reapply all existing pavement markings, including stop bars and centerlines.	High	Short-Term	Low	Town
	Reapply stop bars at Sam Turner Road, Cloverfield Way and Boxberry Hill Road approaches.	High	Short-Term	Low	Town
	Replace the “Stop Ahead” word sign on the northbound Sam Turner Road approach with “Stop Ahead” symbol sign (W1-3).	Medium	Short-Term	Low	Town

Table 5 Continued: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way and Nathan Ellis Highway (Route 151) / Boxberry Hill Road					
Insufficient, Deteriorated or Sub-Standard Pavement Markings and Signage	Trim the vegetation from the existing stop sign locations.	Medium	Continuous	Low	Town
	Replace all existing signs within the vicinity of the audit area that are faded or no longer compliant with current MUTCD standards. Consider double stop signs at the stop control approaches.	Medium	Short-Term	Low	Town
	Provide town-wide consistent retro-reflective street name signs at all side streets in appropriate locations.	Medium	Short-Term	Low	Town
	Relocate the existing “Intersection Ahead” (W2-1 modified) signs to approximately 1000 feet in advance of the intersection cluster. Consider replacing these signs with a retro-reflective signs.	Medium	Short-Term	Low	Town
	Remove the “Dangerous Intersection” sign from the westbound approach.	Low	Short-Term	Low	Town
Sub-Standard Multi-Modal Accommodations	Construct ADA/AAB compliant accessible curb ramps in future conditions with the addition of pedestrian infrastructure.	Medium	Long-Term	Medium	Town
	Evaluate the opportunity to construct dedicated bicycle lanes along Nathan Ellis Highway or multi-modal pathway adjacent to the roadway. With any future bicycle facilities, and should a signal be warranted, bicycle accommodations to facilitate crossing of Currier Road and Route 151 should be provided, such as bicycle detection or dedicated signal.	Medium	Long-Term	High	Town

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit

LOCATION

Meeting Location:
Gus Canty (Falmouth) Recreation Center, Room 2
790 Main Street
Falmouth, Massachusetts
Thursday, May 3, 2018
9:00 AM – 12:00 PM

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

9:00 AM **Welcome and Introductions**

- Introductions

9:10 AM **Review of Site Specific Material**

- Crash Summaries – provided in advance
 - Nathan Ellis Highway (Route 151) / Sandwich Road
 - Nathan Ellis Highway (Route 151) / Currier Road
 - Nathan Ellis Highway (Route 151) / Sam Turner Road / Cloverfield Way
 - Nathan Ellis Highway (Route 151) / Boxberry Hill Road
- Existing Geometries and Conditions

10:00 AM **Visit the Site**

- Conduct Field Visit
- As a group, identify areas for improvement

11:00 AM **Post Visit Discussion / Completion of RSA**

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

12:00 PM **Adjourn for the Day – but the RSA has not ended**

Instructions for Participants:

- Before attending the RSA on May 3, participants are encouraged to drive through the RSA locations and complete / consider elements on the RSA Prompt List, with a focus on safety.
- All participants will be actively involved throughout the RSA process. Participants are encouraged to come with thoughts and ideas; however, remember 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: May 3, 2018

Location: Falmouth, Massachusetts

Audit Team Members	Agency/Affiliation	Email Address
Ed Dunne	Falmouth Police Department	edunne@falmouthpolice.us
James Porter	Falmouth Police Department	jporter@falmouthpolice.us
Michael Small	Falmouth Fire Department	msmall@falmouthfire.us
James McLoughlin	Falmouth Department of Public Works	jim.mcloughlin@falmouthmass.us
Peter McConarty	Falmouth Department of Public Works	pmcconarty@falmouthmass.us
Raymond Jack	Falmouth Department of Public Works	rjack@falmouthmass.us
Thomas Bolt	Falmouth Planning Department	thomas.bolt@falmouthmass.us
Julian M. Suso	Town of Falmouth	jsuso@falmouthmass.us
David Nolan	Cape Cod Commission	david.nolan@capecodcommission.org
Lev Malakhoff	Cape Cod Commission	lmalakhoff@capecodcommission.org
Ted Rowan	Falmouth Bikeway Commission	ted.rowan@gmail.com
Michelle Deng	MassDOT Traffic Safety	michelle.deng@state.ma.us
Kevin T. Fitzgerald	MassDOT Traffic Safety	kevin.t.fitzgerald@state.ma.us
Thomas Rebello	MassDOT District 5 Traffic	thomas.rebello@state.ma.us
Faina Veinstein	MassDOT District 5 Projects	faina.veinstein@state.ma.us
Phil MacClellan	Tata & Howard, Inc.	pmacclellan@tataandhoward.com
Patrick O'Neale	Tata & Howard, Inc.	poneale@tataandhoward.com
Elizabeth Oltman	TEC, Inc.	oltman@theengineeringcorp.com
Eindra (Elena) Aung	TEC, Inc.	eaung@theengineeringcorp.com

Appendix C. Detailed Crash Data

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Currier Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
							V1	V2	V3	V4				
1	1/28/2013	3:31 PM	Monday	Daylight	Rain	Snow	N/A	N/A			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling WB on Route 151. MV2 slowed to make a left turn onto Currier Rd SB lane. MV1 rear-ended MV2. MV2 left the scene.
2	7/5/2013	3:26 PM	Friday	Daylight	Clear	Dry	N/A	N/A			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: attempting to turn right from Currier Road SB lane onto Route 151 WB lane. MV2 failed to yield and collided with MV1.
3	7/6/2013	2:10 PM	Saturday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Rear-end	Inattention / Distracted	MV1: stopped in traffic on Route 151 EB lane; MV2: travelling EB on Route 151. MV2 rear-ended MV1 just west of Currier Road.
4	7/15/2013	7:36 PM	Monday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling EB on Route 151. MV1 slowed down for traffic as it approached Currier Road. MV2 was travelling directly behind MV1 and rear-ended MV1.
5	9/11/2013	3:21 PM	Wednesday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: turning left onto Route 151 WB lane from Currier Road after stopping at the STOP-sign; MV2: travelling SB on Currier Road after stopping at the STOP-sign. MV1 arrived at the intersection before MV2. MV2 crossed the intersection without checking properly and struck MV1.
6	12/7/2013	8:53 PM	Saturday	Dark - Not Lighted	Clear	Dry	N/A	N/A			Non-fatal Injury	Sideswipe	Erratic / Aggressive / Reckless Driving	MV1: travelling EB on Route 151 and about to make a right-turn onto Currier Road; MV2: travelling WB on Route 151. MV2 crossed the centerline and sideswiped the driver's side of MV1. This is a hit and run crash.
7	12/15/2013	1:23 AM	Sunday	Dark - Not Lighted	Snow	Snow	N/A				Property Damage Only	Single Vehicle	Excessive Speed	MV1: travelling EB on Route 151. Near #1132 Route 151, MV1 lost control, spun around crossing the centerline and struck a tree on the side of the road.
8	12/17/2013	8:04 PM	Tuesday	Dark - Not Lighted	Rain	Wet	N/A	N/A			Property Damage Only	Rear-end	Inattention / Distracted	MV1: travelling WB on Route 151; MV2: waiting to turn left onto Currier Road from Route 151 WB lane. MV1 did not see MV2 stopped in the road and rear-ended MV2.
9	2/21/2014	4:15 PM	Friday	Daylight	Fog, Smog, Smoke	Wet	N/A	N/A			Property Damage Only	Sideswipe	Excessive Speed	MV1: stopped in traffic between two vehicles on Route 151 WB lane; MV2: travelling WB on Route 151. Due to the heavy fog, MV2 did not notice the vehicles stopped at the intersection and drove around the vehicle behind MV1 in order to pass it. When MV2 attempted to get back in the lane, MV2 sideswiped MV1.
10	3/8/2014	6:55 PM	Saturday	Dark - Lighted	Clear	Dry	N/A	N/A			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: stopped at the STOP-sign on Currier Road NB lane to continue travelling straight ahead; MV2: travelling WB on Route 151. MV1 struck MV2 when MV1 attempted to cross the intersection.
11	5/3/2014	4:09 PM	Saturday	Daylight	Clear	Dry	N/A	N/A			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling NB on Currier Road; MV2: travelling EB on Route 151. MV1 pulled out of Currier Road in the path of MV2. MV2 was not able to stop in time and struck MV1.
12	6/22/2014	10:51 AM	Sunday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Angled	Inattention / Distracted	MV1: travelling EB on Route 151; MV2: exiting Currier Road NB lane. MV2 failed to use caution after stopping and struck MV1.
13	6/24/2014	6:01 PM	Tuesday	Daylight	Clear	Dry	N/A	N/A			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling SB on Currier Road; MV2: attempting to turn left onto Route 151 from Currier Road NB lane. MV2 struck MV1 when MV2 made the turn. MV1 arrived at this STOP-control intersection first.
14	6/29/2014	1:18 AM	Sunday	Dark - Lighted	Clear	Dry	N/A	N/A			Non-fatal Injury	Single Vehicle	Erratic / Aggressive / Reckless Driving	MV1: travelling WB on Route 151. When MV1 made a left-turn onto Currier Road SB lane, MV1 left the roadway and struck a utility pole of on the southwest corner of the intersection.
15	6/30/2014	5:14 PM	Monday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling SB on Currier Road. MV1 struck MV2 when MV2 travelled straight through the intersection without giving way to the right of way vehicle.
16	9/11/2014	8:18 AM	Thursday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: waiting to turn left onto Route 151 EB lane from Currier Road SB lane; MV2: attempting to turn left onto Currier Road NB lane from Route 151. MV1 thought MV2 was giving way and made the turn. MV1 and MV2 collided at the intersection.

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Currier Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
17	2/10/2015	7:53 PM	Tuesday	Dark - Not Lighted	Cloudy	Snow	N/A	N/A			Property Damage Only	Sideswipe	Swerving / Avoiding	MV1 and MV2: travelling EB on Route 151. MV2 was behind MV1. MV1 was in the process of making a right turn onto Currier Road when MV2 passed MV1 on the right side. MV2 sideswiped MV1.
18	2/25/2015	4:38 PM	Wednesday	Daylight	Clear	Wet	N/A	N/A			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling WB on Route 151. A vehicle in front of MV1 stopped abruptly at the intersection of Currier Road. MV1 slammed its brakes in order to avoid a crash. MV2 could not stop in time and rear-ended MV1.
19	2/27/2015	6:49 AM	Friday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Rear-end	Inattention / Distracted	MV1: waiting to turn left into #1132 Route 151; MV2: travelling EB on Route 151. MV2 did not stop and struck MV1.
20	9/21/2015	3:48 PM	Monday	Daylight	Clear	Dry	56	25			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling EB on Route 151. MV1 slowed down for traffic as it approached Currier Road. MV2 was travelling directly behind MV1 and rear-ended MV1.
21	10/24/2015	6:24 PM	Saturday	Dark - Lighted	Clear	Dry	28	54			Non-fatal Injury	Rear-end	Followed Too Closely	MV1 and MV2: travelling WB on Route 151. MV2 slowed down in traffic and came to a stop. MV1 was not able to stop in time and rear-ended MV2.
22	10/26/2015	11:44 AM	Monday	Daylight	Clear	Dry	23	25			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route151; MV2: travelling NB on Currier Road. MV2 failed to yield for MV1 causing MV1 to struck MV2.
23	12/17/2015	12:47 PM	Thursday	Daylight	Rain	Wet	20	66			Non-fatal Injury	Angled	Inattention / Distracted	MV1: travelling WB on Route 151; MV2: travelling NB on Currier Road. MV2 entered the intersection and collided with MV1.
24	3/16/2016	12:25 PM	Wednesday	Daylight	Clear	Dry	77	29			Non-fatal Injury	Angled	Disregarded Traffic Controls	MV1: travelling WB on Route 151; MV2: travelling NB on Currier Road. MV2 entered the intersection without stopping at the STOP-sign and collided with MV1.
25	7/2/2016	6:11 PM	Saturday	Daylight	Clear	Dry	23	25			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: attempting to make a left-turn from Currier Road onto Route 151 EB lane. MV1 struck MV2 when MV2 made the turn without yielding.
26	7/11/2016	10:16 AM	Monday	Daylight	Cloudy	Dry	48	43			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: attempting to make a left-turn from Route 151 onto Currier Road SB lane; MV2(ambulance): travelling WB on Route 151 with its sirens on. MV2 started to go around MV1. MV1 made the turn and collided with MV2.
27	7/19/2016	3:48 PM	Tuesday	Daylight	Clear	Dry	52	19			Non-fatal Injury	Rear-end	Followed Too Closely	MV1 and MV2: travelling EB on Route 151. Near #1132 Route 151, MV2 rear-ended MV1.
28	11/1/2016	5:01 PM	Tuesday	Daylight	Clear	Dry	24	19			Property Damage Only	Sideswipe	Unknown	MV1: travelling WB on Route 151 MV2: making a left-turn from Currier Road onto Route 151 WB lane. MV1 and MV2 collided at the intersection.
29	12/28/2016	9:29 PM	Wednesday	Dark - Not Lighted	Clear	Dry	32	23			Fatal Injury	Angled	Erratic / Aggressive / Reckless Driving	MV1: travelling NB on Currier Road; MV2: travelling EB on Route 151. MV1 pulled out of Currier Road in the path of MV2. MV2 was not able to stop in time and struck MV1.
30	1/6/2017	5:13 PM	Friday	Dark - Unknown	Clear	Wet	24	18			Non-fatal Injury	Angled	Failure to Keep in Proper Lane	MV1: travelling EB on Route 151; MV2: turning left from Currier Road onto Route 151 WB lane. MV2 lost control of the vehicle, crossed into EB lane and struck MV1.
31	5/14/2017	3:23 PM	Sunday	Dark - Lighted	Rain	Wet	16				Property Damage Only	Single Vehicle	Excessive Speed	MV1: travelling EB on Route 151 and also attempting to turn right onto Currier Road. MV1 was too fast for the road conditions. MV1 went off road and struck the trees at the southeast corner of the intersection.
32	8/25/2014	4:59 PM	Monday	Daylight	Clear	Dry	49				Property Damage Only	Single Vehicle	Erratic / Aggressive / Reckless Driving	MV1: turning right onto Currier Road from Route 151 WB lane. While turning, MV1 struck an unknown object which busted the tires. Due to the tires, MV1 veered into the left lane striking the shoulder and veered back into the right lane and drove through the fence on the right side of the road.
33	11/16/2015	5:12 PM	Monday	Dark - Lighted	Clear	Dry	21	24			Property Damage Only	Sideswipe	Other	MV1: travelling NB on Currier Road; MV2: travelling SB on Currier Road. Just north of the intersection, MV1 sideswiped MV2.

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Currier Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

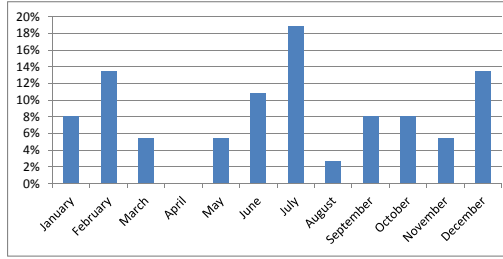
Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
34	7/27/2016	12:05 AM	Wednesday	Dark - Not Lighted	Clear	Dry	29	20			Property Damage Only	Angled	Inattention / Distracted	MV1: travelling NB on Currier Road; MV2: travelling WB on Route 151. When MV1 entered the intersection, it got struck by MV2. The operator of MV1 claimed to stop at the STOP-sign and only continue when there was no oncoming vehicles on Route 151. MV2 might have been speeding as well.
35	1/13/2017	7:28 PM	Friday	Dark - Lighted	Clear	Dry	40	23			Property Damage Only	Sideswipe	Failure to Keep in Proper Lane	MV1 and MV2: travelling EB on Route 151. MV2 slowed down to make a turn. MV2 seems to not have the directional signal on. MV1 attempted to pass MV2 on the right. When MV2 made a right-turn, MV1 and MV2 collided.
36	2/8/2017	9:39 AM	Wednesday	Daylight	Cloudy	Wet	32				Property Damage Only	Single Vehicle	Erratic / Aggressive / Reckless Driving	MV1: travelling NB on Currier Road. Just south of the intersection, MV1 ran off the road and struck a street sign. MV1 continued driving into the woods, re-entered the roadway then fled the scene.
37	10/25/2017	5:45 PM	Wednesday	Dark - Lighted	Rain	Wet	45	19			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling NB on Currier Road; MV2: travelling EB on Route 151. MV1 continued travelling NB without yielding for MV2 and got struck by MV2.

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Currier Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

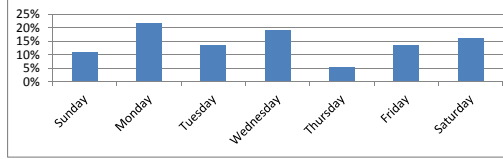
Route 151 @ Currier Road

37

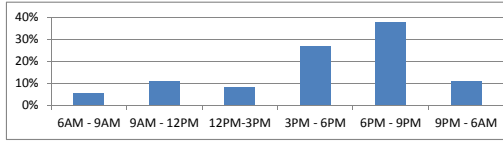
Month	#	%
January	3	8%
February	5	14%
March	2	5%
April	0	0%
May	2	5%
June	4	11%
July	7	19%
August	1	3%
September	3	8%
October	3	8%
November	2	5%
December	5	14%



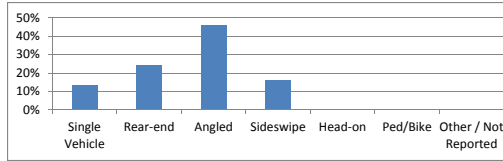
Day of Week	#	%
Sunday	4	11%
Monday	8	22%
Tuesday	5	14%
Wednesday	7	19%
Thursday	2	5%
Friday	5	14%
Saturday	6	16%



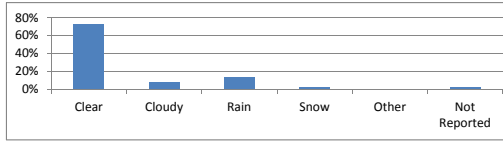
Time of Day	#	%
6AM - 9AM	2	5%
9AM - 12PM	4	11%
12PM-3PM	3	8%
3PM - 6PM	10	27%
6PM - 9PM	14	38%
9PM - 6AM	4	11%



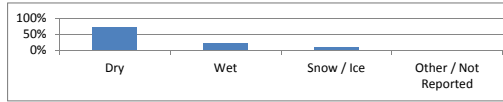
Manner of Collision	#	%
Single Vehicle	5	14%
Rear-end	9	24%
Angled	17	46%
Sideswipe	6	16%
Head-on	0	0%
Ped/Bike	0	0%
Other / Not Reported	0	0%



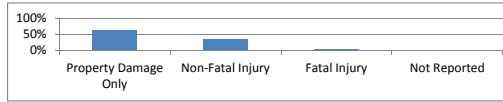
Weather Conditions	#	%
Clear	27	73%
Cloudy	3	8%
Rain	5	14%
Snow	1	3%
Other	0	0%
Not Reported	1	3%



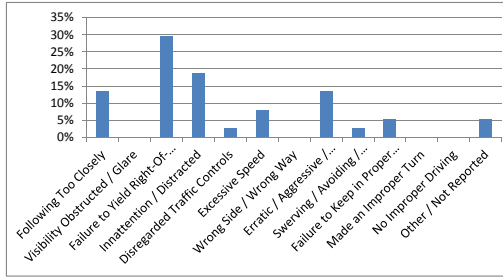
Road Surface	#	%
Dry	26	70%
Wet	8	22%
Snow / Ice	3	8%
Other / Not Reported	0	0%



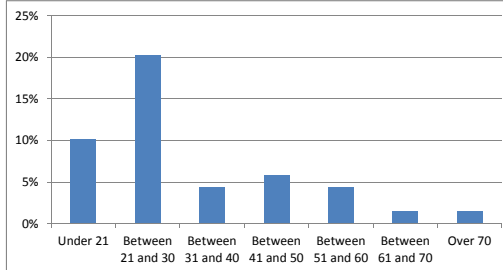
Crash Severity	#	%
Property Damage Only	23	62%
Non-Fatal Injury	13	35%
Fatal Injury	1	3%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	5	14%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	11	30%
Inattention / Distracted	7	19%
Disregarded Traffic Controls	1	3%
Excessive Speed	3	8%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	5	14%
Swerving / Avoiding / Over-Steering / Over-Correcting	1	3%
Failure to Keep in Proper Lane	2	5%
Made an Improper Turn	0	0%
No Improper Driving	0	0%
Other / Not Reported	2	5%



Age	#	%
Under 21	7	10%
Between 21 and 30	14	20%
Between 31 and 40	3	4%
Between 41 and 50	4	6%
Between 51 and 60	3	4%
Between 61 and 70	1	1%
Over 70	1	1%

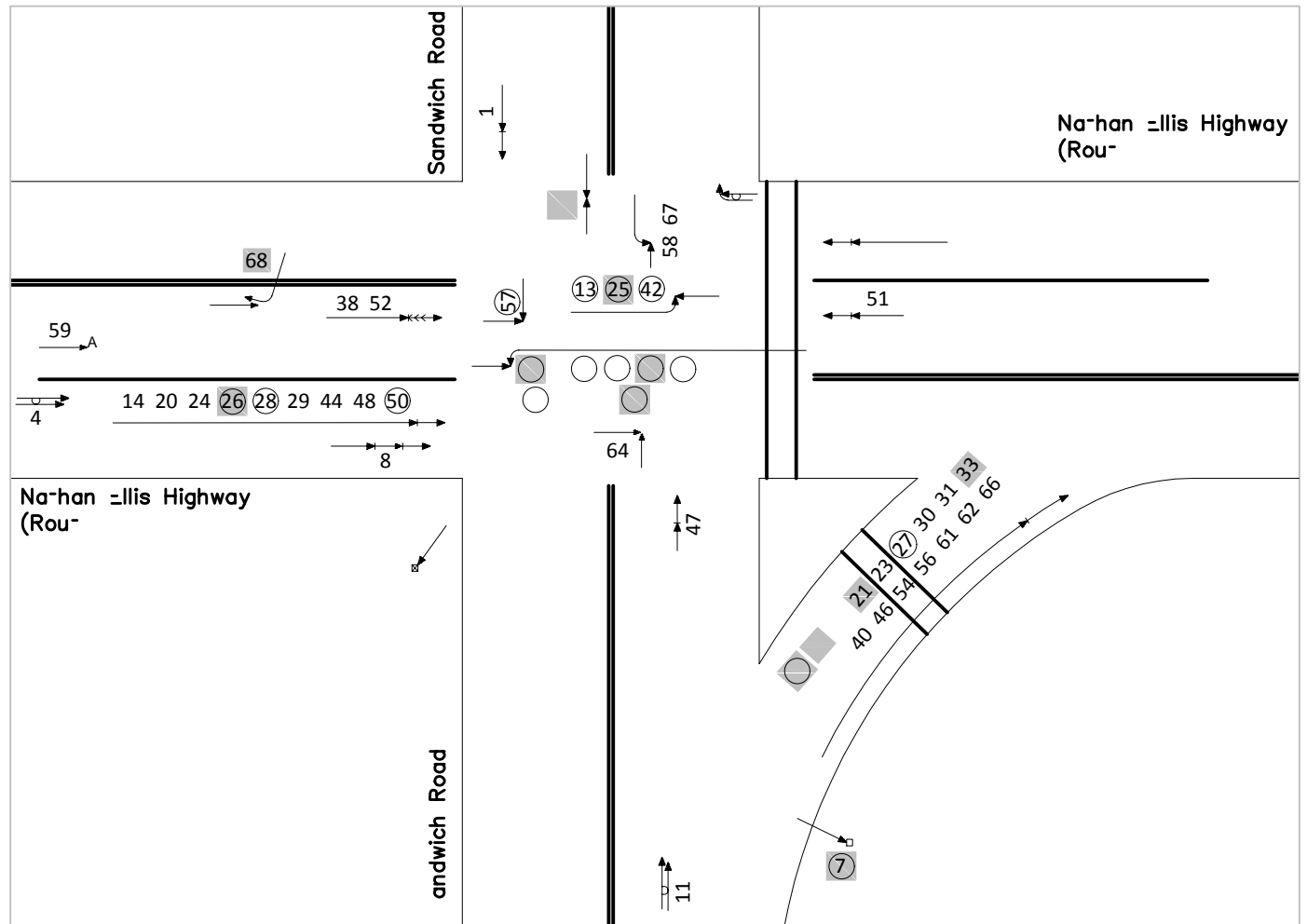




Not to Scale

Nathan Ellis Highway (Route 151) Corridor Safety Improvements - Falmouth, MA
Road Safety Audit

LOCATION: Nathan Ellis Highway (Route 151) @ Sandwich Road
 CITY/STATE: Falmouth, Massachusetts
 TIME PERIOD: 2013 - 2017
 PREPARED BY: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
 SOURCE: Town of Falmouth Police Department, Massachusetts Department of Transportation (MassDOT)



LEGEND			SHOW FOR COLLISION
→	VEHICLE PATH	☐	FIXED OBJECT
←←	BACKING VEHICLE	⊠	MOVEABLE OBJECT
↔	SIDESWIPE COLLISION	▨	PARKED VEHICLE
→P	PEDESTRIAN COLLISION	○	PERSONAL INJURY
→C	CYCLIST COLLISION	○	FATALITY
→→	REAR-END COLLISION	A	ANIMAL
↔↔	HEAD-ON COLLISION		
↘	ANGLED COLLISION		
→☐	FIXED OBJECT COLLISION		
→○	OVERTURNED VEHICLE		
↘↘	OUT-OF-CONTROL VEHICLE		

1. Approximate location of collision,
 2. Direction of collision,
 3. Type of collision and vehicles involved,
 4. Time, Day, Date
 5. Any other pertinent factors mentioned on the report.
 NOTE: Shaded number indicates crash occurred under "nighttime" conditions.

SUMMARY OF CRASHES ON DIAGRAM [no fatal collisions]								
	REAR-END	SIDESWIPE	HEAD-ON	ANGLED	SINGLE VEH	PED/BIKE	OTHER / UNK	TOTAL
PROPERTY DAMAGE ONLY	31	4	1	11	2	0	0	49
NON-FATAL INJURY	5	0	3	10	1	0	0	19
UNKNOWN / NOT REPORTED	0	0	0	0	0	0	0	0
TOTAL	36	4	4	21	3	0	0	68

Figure RSA-2

Collision Diagram
2013 - 2017
Collision Data



Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Sandwich Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
							V1	V2	V3	V4				
1	1/21/2013	12:01 PM	Monday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Rear-end	Followed Too Closely	MV1: travelling SB on Sandwich Road; MV2: slowed to turn right onto Route 151 WB lane from Sandwich Road. MV1 rear-ended MV2.
2	5/25/2013	7:48 PM	Saturday	Dusk	Rain	Wet	N/A	N/A			Non-fatal Injury	Head-on	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151. MV2 struck MV1 when MV1 made a left-turn onto Sandwich Road SB lane. MV1 caught on fire.
3	8/17/2013	12:40 PM	Saturday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: travelling WB on Route 151. MV2 attempted to make a left-turn onto Sandwich Road SB lane and collided with MV1.
4	5/6/2014	4:00 PM	Tuesday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Sideswipe	Followed Too Closely	MV1 and MV2: travelling WB on Route 151. MV2 travelling behind MV1. MV1 stopped in traffic when it was sideswiped by MV2 that was changing to the left-turn only lane.
5	5/26/2014	2:01 PM	Monday	Daylight	Cloudy	Wet	N/A	N/A			Property Damage Only	Rear-end	Followed Too Closely	MV1: stopped in traffic on Route 151 WB lane at the intersection of Sandwich Road; MV2: travelling WB on Route 151. MV2 was unable to stop in time and rear-ended MV1.
6	5/28/2014	4:29 PM	Wednesday	Daylight	Cloudy	Wet	N/A	N/A			Property Damage Only	Rear-end	Failure to Yield Right-of-Way	MV1 and MV2: attempting to turn right from Sandwich Road NB lane onto Route 151 EB lane. MV1 was behind MV2. MV2 moved to begin merging but stopped again for the oncoming traffic on Route 151 EB lane. MV1 was unable to stop in time and rear-ended MV2.
7	6/22/2014	1:10 AM	Sunday	Dark - Lighted	Clear	Dry	N/A				Non-fatal Injury	Single Vehicle	Erratic / Aggressive / Reckless Driving	MV1: travelling EB on Route 151 while attempting to take a right turn onto Sandwich Road. When MV1 made the turn, MV1 ran over the island, struck the utility pole, signage and the curb on the southeast corner of the intersection.
8	6/22/2014	7:16 AM	Sunday	Daylight	Clear	Dry	N/A	N/A	N/A		Property Damage Only	Rear-end	Inattention / Distracted	MV1: travelling EB on Route 151; MV2 and MV3: stopped on Route 151 EB lane at the intersection of Sandwich Road. MV1 was unable to stop and rear-ended MV3 which pushed MV3 into MV2.
9	6/22/2014	9:49 AM	Sunday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Rear-end	Unknown	MV1: stopped in traffic on Route 151 WB lane at the intersection of Sandwich Road; MV2: travelling WB on Route 151. MV2 was unable to stop in time and rear-ended MV1.
10	7/29/2014	7:21 AM	Tuesday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Rear-end	Inattention / Distracted	MV1: stopped at the red light on Route 151 WB lane; MV2: travelling WB on Route 151. MV2 did not see the stopped vehicles and rear-ended MV1.
11	9/18/2014	5:19 PM	Thursday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Sideswipe	Erratic / Aggressive / Reckless Driving	MV1 and MV2: travelling NB on Sandwich Road. The operator of MV1 noticed MV2 swerving. MV1 pulled to the right but MV2 sideswiped MV1.
12	11/29/2014	4:21 PM	Saturday	Dusk	Cloudy	Dry	N/A	N/A			Non-fatal Injury	Rear-end	Inattention / Distracted	MV1 and MV2: attempting to turn right from Sandwich Road NB lane onto Route 151 EB lane. MV2 was behind MV1. MV1 moved to begin merging but there was a vehicle travelling EB on Route 151. MV1 stopped to yield the right of way vehicle. MV2 was unable to stop and lightly rear-ended MV1.
13	2/19/2015	9:38 AM	Thursday	Daylight	Cloudy	Wet	N/A	N/A			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151. MV1 struck MV2 when MV2 made a left-turn onto Sandwich Road.
14	4/17/2015	4:42 PM	Friday	Daylight	Cloudy	Wet	N/A	N/A			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling EB on Route 151. MV1 stopped at the red light and was rear-ended by MV2.
15	6/30/2015	10:13 PM	Tuesday	Dark - Lighted	Clear	Dry	29	56			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to check for the oncoming traffic on Route 151 and was rear-ended by MV2.
16	7/9/2015	2:49 PM	Thursday	Daylight	Clear	Dry	52	70			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151. MV2 struck MV1 when MV1 made a left-turn onto Sandwich Road SB lane.

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Sandwich Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
17	9/29/2015	3:11 PM	Tuesday	Daylight	Clear	Dry	78	39			Non-fatal Injury	Head-on	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: travelling WB on Route 151. MV2 attempted to make a left-turn onto Sandwich Road SB lane and collided with MV1.
18	10/6/2015	2:36 PM	Tuesday	Daylight	Clear	Dry	51	40			Property Damage Only	Rear-end	Erratic / Aggressive / Reckless Driving	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
19	10/17/2015	8:55 PM	Saturday	Dark - Lighted	Clear	Dry	50	53			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: attempting to turn left onto Sandwich Road SB lane from Route 151 WB lane; MV2: travelling EB on Route 151. MV2 struck MV1 when MV1 made the turn without yielding.
20	11/10/2015	9:13 AM	Tuesday	Daylight	Clear	Dry	84	56			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling EB on Route 151. MV1 stopped at the red light and was rear-ended by MV2.
21	12/15/2015	5:13 PM	Tuesday	Dark - Lighted	Clear	Dry	36	35			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling NB on Sandwich Road. MV1 yielded to merge onto Route 151 EB lane and was rear-ended by MV2.
22	1/4/2016	4:22 PM	Monday	Dusk	Rain	Wet	28	35	85		Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: attempting to turn left onto Sandwich Road from Route 151 WB lane; MV2: travelling EB on Route 151; MV3: stopped at the lights on Sandwich Road NB lane. MV2 collided with MV1 when MV1 made the turn. Additionally, MV2 struck MV3.
23	2/26/2016	4:48 PM	Friday	Daylight	Clear	Dry	65	26			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
24	3/9/2016	10:22 PM	Wednesday	Dark - Not Lighted	Clear	Dry	21	38			Non-fatal Injury	Rear-end	Other	MV1: stopped at the lights on Route 151 EB lane; MV2: travelling EB on Route 151. MV2 rear-ended MV1.
25	3/10/2016	7:52 PM	Thursday	Dark - Not Lighted	Cloudy	Wet	22	53			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151. MV1 struck MV2 when MV2 made a left-turn onto Sandwich Road.
26	5/4/2016	4:45 PM	Wednesday	Daylight	Rain	Wet	56	27			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling EB on Route 151 side by side. MV1 stopped to allow a vehicle from WB lane turn left. MV2 was in the left lane and attempted to go around the vehicle stopped in front from the right side. MV2 rear-ended MV1.
27	6/30/2016	6:43 PM	Thursday	Daylight	Clear	Dry	55	30			Non-fatal Injury	Rear-end	Followed Too Closely	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 was stopped and waiting to enter Route 151. MV2 proceeded forward and rear-ended MV1. The operator of MV2 claimed that the accident occurred due to sun glare.
28	7/26/2016	6:46 PM	Tuesday	Daylight	Clear	Dry	29	26			Non-fatal Injury	Rear-end	Inattention / Distracted	MV1 and MV2: travelling EB on Route 151. MV1 stopped at the red light and was rear-ended by MV2.
29	7/27/2016	5:02 PM	Wednesday	Daylight	Clear	Dry	31	48			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling EB on Route 151. MV1 stopped at the red light and was rear-ended by MV2.
30	8/5/2016	7:53 PM	Friday	Daylight	Clear	Dry	44	62			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
31	8/22/2016	4:19 PM	Monday	Daylight	Clear	Dry	59	53			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV2 stopped to check for the oncoming traffic on Route 151 and was rear-ended by MV1.
32	8/22/2016	11:32 AM	Monday	Daylight	Clear	Dry	46	57			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151. MV2 struck MV1 when MV1 made a left-turn onto Sandwich Road SB lane.
33	10/25/2016	5:44 PM	Tuesday	Dusk	Clear	Dry	79	61			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV2 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV1.
34	12/15/2016	1:13 PM	Thursday	Daylight	Clear	Dry	67	37			Non-fatal Injury	Angled	Inattention / Distracted	MV1: travelling EB on Route 151; MV2: travelling WB on Route 151. MV2 attempted to make a left-turn onto Sandwich Road SB lane and collided with MV1.

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Sandwich Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
35	3/23/2017	6:22 PM	Thursday	Daylight	Clear	Dry	25	64	50		Property Damage Only	Angled	Made an Improper Turn	MV1: travelling EB on Route 151; MV2: attempting to turn left onto Sandwich Road from Route 151 WB lane; MV3: slowing down at the intersection on Route 151 EB lane. MV1 attempted to pass MV3 on the right and struck by the turning MV2. The collision pushed MV1 into MV3.
36	5/21/2017	3:39 PM	Sunday	Daylight	Clear	Dry	49	78			Non-fatal Injury	Angled	Inattention / Distracted	MV1: travelling EB on Route 151; MV2: attempting to make a left-turn onto Sandwich Road SB lane from Route 151 WB lane. MV1 struck MV2 when MV2 made the turn.
37	6/1/2017	7:37 PM	Thursday	Daylight	Clear	Dry	39	56			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV2 stopped to yield for the oncoming traffic on Route 151. MV1 was only looking at the vehicles on Route 151 and not the vehicle in front. MV1 rear-ended MV2.
38	6/30/2017	8:31 AM	Friday	Daylight	Clear	Dry	90	27			Property Damage Only	Angled	Erratic / Aggressive / Reckless Driving	MV1 and MV2: stopped at red light on Route 151 EB lane at the intersection of Sandwich Road. For unknown reasons, MV1 backed up and struck MV2. MV1 left the scene. This is a hit and run crash.
39	7/13/2017	11:05 AM	Thursday	Daylight	Clear	Dry	34	33	40		Property Damage Only	Rear-end	Followed Too Closely	MV1, MV2 and MV3: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV3 stopped to yield for the oncoming traffic on Route 151. MV1 rear-ended MV2 pushing MV2 into MV3.
40	8/14/2017	11:51 AM	Monday	Daylight	Clear	Dry	26	19			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
41	9/8/2017	7:45 AM	Friday	Daylight	Clear	Dry	50	60			Property Damage Only	Angled	No Improper Driving	MV1: travelling EB on Route 151; MV2: travelling WB on Route 151. MV2 attempted to make a left-turn onto Sandwich Road SB lane and collided with MV1.
42	4/5/2013	5:52 PM	Friday	Daylight	Clear	Dry	58	22	48		Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151; MV3: stopped on Sandwich Road SB lane. MV2 made a left-turn onto Sandwich Road without yielding for MV2. MV1 and MV2 collided. After the initial impact with MV1, MV2 spun and struck MV3.
43	5/23/2013	5:31 PM	Thursday	Dusk	Cloudy	Dry	20	21			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151 attempting to turn left onto Sandwich Road SB lane; MV2: travelling EB on Route 151. MV2 struck MV1 when MV1 made the turn without yielding.
44	10/6/2013	6:46 PM	Sunday	Dark - Lighted	Cloudy	Wet	69	20			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling EB on Route 151. MV1 slowed down to make a left-turn onto Sandwich Road and was rear-ended by MV2.
45	11/22/2013	4:36 PM	Friday	Dark - Lighted	Rain	Wet	35	35			Non-fatal Injury	Head-on	Swerving / Avoiding	MV1: travelling NB on Sandwich Road; MV2: travelling SB on Sandwich Road attempting to turn left onto Route 151. MV2 stopped to left MV1 go. The operator of MV1 thought that MV2 was making the left-turn. MV1 swerved left to go around MV2. Since MV2 was also waiting for MV1 to go, MV1 and MV2 collided head-on at the intersection.
46	5/9/2014	10:41 AM	Friday	Daylight	Cloudy	Dry	61	20			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
47	6/22/2014	12:18 PM	Sunday	Daylight	Clear	Dry	47	31			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road. MV2 stopped at the intersection. MV1 did not stop and rear-ended MV2.
48	12/18/2014	10:05 PM	Thursday	Dark - Not Lighted	Clear	Dry	40	27	49		Property Damage Only	Rear-end	Other	MV1: stopped at the red light on Route 151 EB lane; MV2: travelling EB on Route 151; MV3: travelling NB on Sandwich Road. MV2 did not stop and rear-ended MV1 pushing MV1 into MV3.
49	1/30/2015	10:03 PM	Friday	Dark - Lighted	Snow	Wet	29				Property Damage Only	Single Vehicle	Erratic / Aggressive / Reckless Driving	MV1: travelling SB on Sandwich Road. MV1 went off the road and struck the snow embankment at the southwest corner of the intersection.
50	7/15/2015	4:53 PM	Wednesday	Daylight	Clear	Dry	71	33			Non-fatal Injury	Rear-end	Inattention / Distracted	MV1 and MV2: travelling EB on Route 151. MV1 slowed or stopped in traffic and was rear-ended by MV2.

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Sandwich Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
51	7/17/2015	8:20 AM	Friday	Daylight	Clear	Dry	65	54			Property Damage Only	Rear-end	Other	MV1: stopped on Route 151 WB lane; MV2: travelling WB on Route 151. MV2 did not stop and rear-ended MV1.
52	9/19/2015	7:44 PM	Saturday	Dark - Lighted	Clear	Dry	73	22			Property Damage Only	Rear-end	Unknown	MV1 and MV2: stopped at red light on Route 151 EB lane at the intersection of Sandwich Road. MV1 backed up and struck MV2. The operator of MV1 stated MV1 was too far over the STOP-bar and that's the reason for backing up.
53	10/17/2015	8:36 PM	Saturday	Dark - Lighted	Clear	Dry	85	23			Property Damage Only	Sideswipe	Made an Improper Turn	MV1 and MV2: travelling WB on Route 151. MV2 turned right from the left-turn only lane onto Sandwich Road and collided with MV1 in the process.
54	10/22/2015	11:59 AM	Thursday	Daylight	Clear	Dry	72	38			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
55	10/29/2015	6:56 PM	Thursday	Dusk	Clear	Dry	51	72			Non-fatal Injury	Angled	Inattention / Distracted	MV1: travelling EB on Route 151; MV2: attempting to turn left onto Sandwich Road from Route 151 WB lane. MV2 made the turn without yielding and collided with MV1.
56	3/16/2016	4:56 PM	Wednesday	Daylight	Clear	Dry	24	70			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV2 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV1.
57	11/13/2016	11:55 AM	Sunday	Daylight	Clear	Dry	67	91			Non-fatal Injury	Angled	Disregarded Traffic Controls	MV1: travelling EB on Route 151; MV2: travelling SB on Sandwich Road. MV2 ran the red light and struck MV1.
58	11/16/2016	5:08 PM	Wednesday	Dusk	Clear	Dry	59	27			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling NB on Sandwich Road; MV2: travelling SB on Sandwich Road attempting to turn left onto Route 151. MV2 made the turn without yielding and struck MV1.
59	11/24/2016	9:54 PM	Thursday	Dark - Not Lighted	Rain	Wet	27				Property Damage Only	Single Vehicle	No Improper Driving	MV1: travelling EB on Route 151. Just west of the intersection, a deer ran out onto the roadway. MV1 was unable to stop on time and struck the deer.
60	1/15/2017	12:27 PM	Sunday	Daylight	Clear	Dry	56	91			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: attempting to turn left onto Sandwich Road from Route 151 WB lane. MV2 made the turn without yielding and collided with MV1.
61	2/3/2017	8:37 AM	Friday	Daylight	Clear	Dry	47	50			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV2 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV1.
62	2/3/2017	4:04 PM	Friday	Daylight	Clear	Dry	35	49			Property Damage Only	Rear-end	Inattention / Distracted	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
63	2/9/2017	7:00 AM	Thursday	Daylight	Cloudy	Dry	40	47			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: waiting to turn left onto Sandwich Road from Route 151 WB lane; MV2: waiting at the lights to travel EB on Route 151. When the lights turn green, MV1 made the turn without yielding and got struck by MV2.
64	6/18/2017	10:22 AM	Sunday	Daylight	Rain	Wet	56	54			Property Damage Only	Angled	Disregarded Traffic Controls	MV1: travelling EB on Route 151; MV2: travelling NB on Sandwich Road. MV1 ran the red light and struck MV2.
65	7/27/2017	6:27 PM	Thursday	Daylight	Cloudy	Wet	20	57	60		Property Damage Only	Head-on	No Improper Driving	MV1: travelling EB on Route 151; MV2: turning left from Route 151 WB lane onto Sandwich Road; MV3: stopped at red light on Sandwich Road NB lane. MV1 struck MV2 at the intersection. MV1 then continued and struck MV3.
66	10/4/2017	6:01 PM	Wednesday	Daylight	Clear	Dry	67	21			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling NB on Sandwich Road and attempting to merge onto Route 151 EB lane. MV1 stopped to yield for the oncoming traffic on Route 151 and was rear-ended by MV2.
67	11/4/2017	11:55 AM	Saturday	Daylight	Clear	Dry	27	19			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling NB on Sandwich Road; MV2: attempting to turn left onto Route 151 from Sandwich Road SB lane. MV2 made the turn without yielding and got struck by MV1.
68	12/25/2017	7:36 PM	Monday	Dark - Lighted	Clear	Dry	38	24			Property Damage Only	Sideswipe	Erratic / Aggressive / Reckless Driving	MV1: turning right onto Route 151 from Sandwich Road SB lane; MV2: stopped at the red light on Route 151 EB lane. MV1 failed to negotiate the turn properly, crossed the centerline and struck MV2.

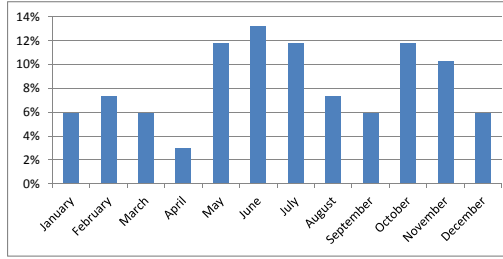
Crash Data Summary Tables

Nathan Ellis Highway (Route 151) @ Sandwich Road - Falmouth, Massachusetts
01/01/2013 - 12/31/2017

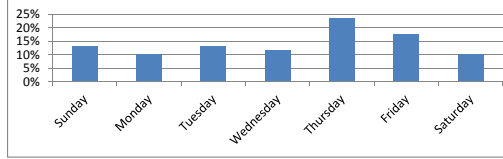
Route 151 @ Sandwich Road

68

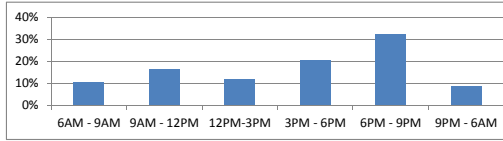
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January	4	6%
February	5	7%
March	4	6%
April	2	3%
May	8	12%
June	9	13%
July	8	12%
August	5	7%
September	4	6%
October	8	12%
November	7	10%
December	4	6%



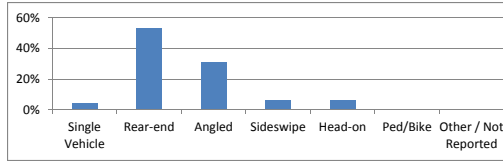
Day of Week	#	%
Sunday	9	13%
Monday	7	10%
Tuesday	9	13%
Wednesday	8	12%
Thursday	16	24%
Friday	12	18%
Saturday	7	10%



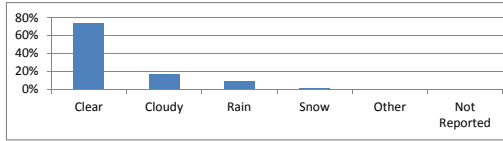
Time of Day	#	%
6AM - 9AM	7	10%
9AM - 12PM	11	16%
12PM-3PM	8	12%
3PM - 6PM	14	21%
6PM - 9PM	22	32%
9PM - 6AM	6	9%



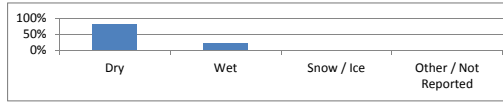
Manner of Collision	#	%
Single Vehicle	3	4%
Rear-end	36	53%
Angled	21	31%
Sideswipe	4	6%
Head-on	4	6%
Ped/Bike	0	0%
Other / Not Reported	0	0%



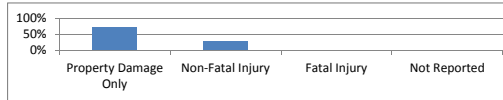
Weather Conditions	#	%
Clear	50	74%
Cloudy	11	16%
Rain	6	9%
Snow	1	1%
Other	0	0%
Not Reported	0	0%



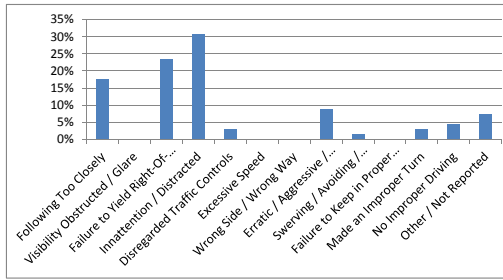
Road Surface	#	%
Dry	54	79%
Wet	14	21%
Snow / Ice	0	0%
Other / Not Reported	0	0%



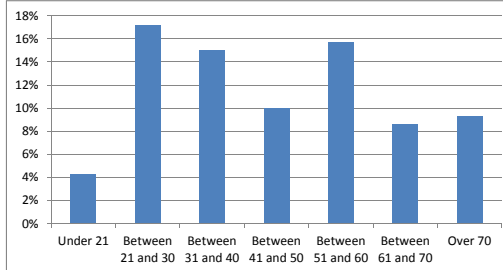
Crash Severity	#	%
Property Damage Only	49	72%
Non-Fatal Injury	19	28%
Fatal Injury	0	0%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	12	18%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	16	24%
Inattention / Distracted	21	31%
Disregarded Traffic Controls	2	3%
Excessive Speed	0	0%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	6	9%
Swerving / Avoiding / Over-Steering / Over-Correcting	1	1%
Failure to Keep in Proper Lane	0	0%
Made an Improper Turn	2	3%
No Improper Driving	3	4%
Other / Not Reported	5	7%



Age	#	%
Under 21	6	4%
Between 21 and 30	24	17%
Between 31 and 40	21	15%
Between 41 and 50	14	10%
Between 51 and 60	22	16%
Between 61 and 70	12	9%
Over 70	13	9%

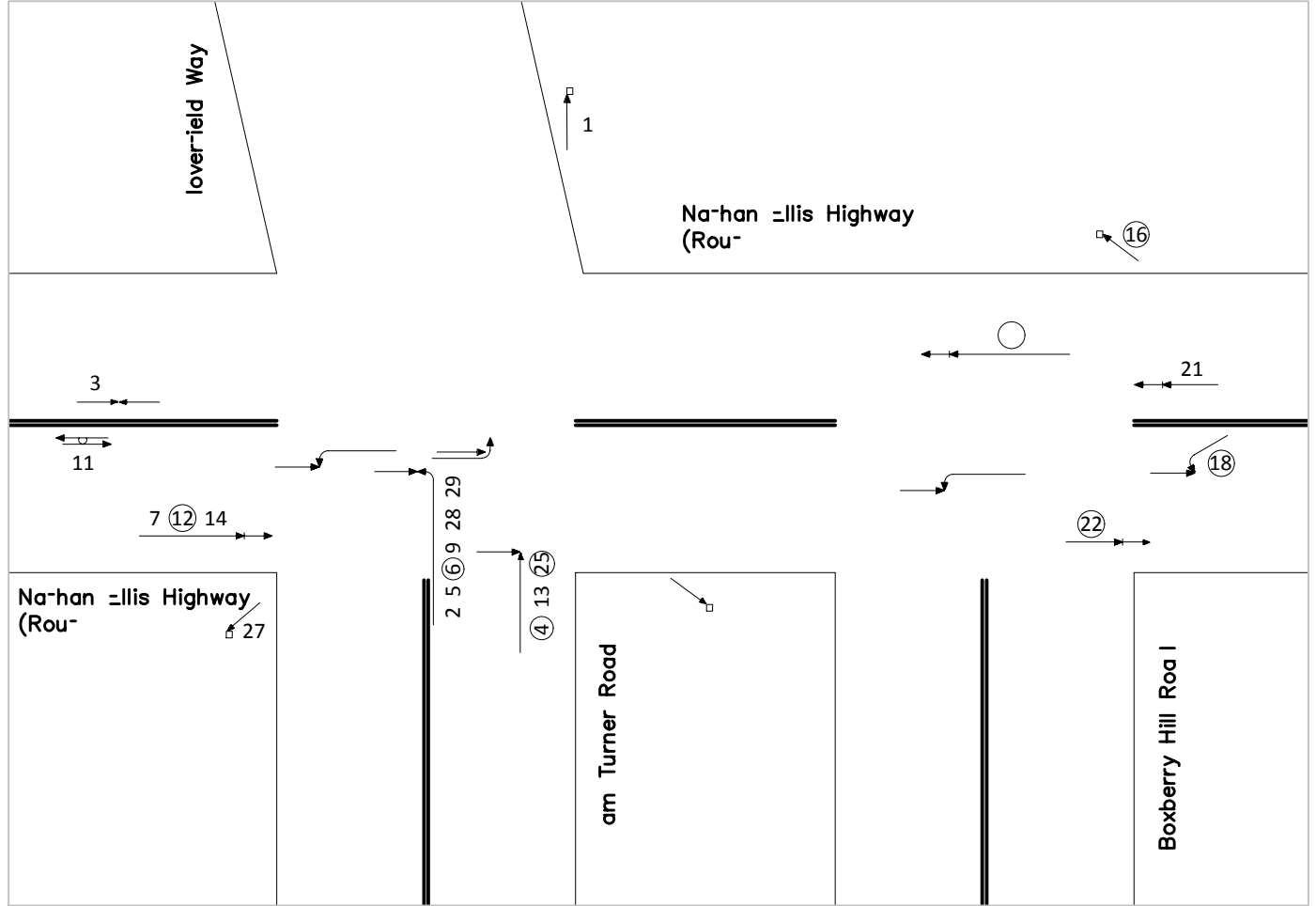




Not to Scale

**Nathan Ellis Highway (Route 151) Corridor Safety Improvements - Falmouth, MA
Road Safety Audit**

LOCATION: Nathan Ellis Highway (Route 151) @ Sam Turner Road / Cloverfield Way
Nathan Ellis Highway (Route 151) @ Boxberry Hill Road
CITY/STATE: Falmouth, Massachusetts
TIME PERIOD: 2013 - 2017
PREPARED BY: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
SOURCE: Town of Falmouth Police Department



LEGEND			SHOW FOR COLLISION
→	VEHICLE PATH	↔	1. Approximate location of collision, 2. Direction of collision, 3. Type of collision and vehicles involved, 4. Time, Day, Date 5. Any other pertinent factors mentioned on the report. NOTE: Shaded number indicates crash occurred under "nighttime" conditions.
←←	BACKING VEHICLE	↘	
↔↔	SIDESWIPE COLLISION	→□	
→P	PEDESTRIAN COLLISION	→○	
→C	CYCLIST COLLISION	→○	
→R	REAR-END COLLISION	→○	
↔↔	HEAD-ON COLLISION	□	
↘	ANGLED COLLISION	▣	
→□	FIXED OBJECT COLLISION	▨	
→○	OVERTURNED VEHICLE	○	
↘↘	OUT-OF-CONTROL VEHICLE	○	
		A	ANIMAL

SUMMARY OF CRASHES ON DIAGRAM [no fatal collisions]

	REAR-END	SIDESWIPE	HEAD-ON	ANGLED	SINGLE VEH	PED/BIKE	OTHER / UNK	TOTAL
PROPERTY DAMAGE ONLY	2	2	1	8	3	0	0	16
NON-FATAL INJURY	6	0	0	6	1	0	0	13
UNKNOWN / NOT REPORTED	0	0	0	0	0	0	0	0
TOTAL	8	2	1	14	4	0	0	29

Figure RSA-3

**Collision Diagram
2013 - 2017
Collision Data**



Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Sam Turner Road and Cloverfield Way- Falmouth, Massachusetts
 Nathan Ellis Highway (Route 151) @ Boxberry Hill Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age				Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
							V1	V2	V3	V4				
1	6/11/2013	4:26 AM	Tuesday	Dark - Unknown	Rain	Dry	N/A				Property Damage Only	Single Vehicle	Inattention / Distracted	MV1: travelling NB on Sam Turner Road. MV1 failed to stop at the STOP-sign at the intersection of Route 151. MV1 travelled across Route 151 and came to rest on top of a boulder at the beginning of Cloverfield Way (northeast corner of the intersection).
2	7/27/2013	9:16 AM	Saturday	Daylight	Clear	Dry	N/A	N/A			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: attempting to turn left onto Route 151 WB lane from Sam Turner Road; MV2: travelling EB on Route 151. When MV1 entered the intersection, MV2 could not stop in time and struck MV1.
3	11/26/2014	5:35 PM	Wednesday	Dark - Not Lighted	Rain	Wet	N/A	N/A			Property Damage Only	Head-on	Failure to Keep in Proper Lane	MV1: travelling EB on Route 151; MV2: travelling WB on Route 151. MV1 crossed the centerline into WB lane. MV2 was unable to avoid MV1 and collided with MV1.
4	12/24/2014	4:18 PM	Wednesday	Dark - Lighted	Rain	Wet	N/A	N/A			Non-fatal Injury	Angled	Unknown	Mv1: travelling EB on Route 151 behind a vehicle turning right onto Sam Turner Road; MV2: attempting to travel straight through from Sam Turner Road NB lane to Cloverfield Way. MV1 went around the right turning vehicle in front. MV2 pulled into the intersection and collided with MV1.
5	2/7/2015	9:59 PM	Saturday	Dark - Not Lighted	Clear	Dry	N/A	N/A			Property Damage Only	Angled	Erratic / Aggressive / Reckless Driving	MV1: travelling EB on Route 151; MV2: attempting to take a left out of Sam Turner Road. MV1 collided with MV2 when MV2 made the turn.
6	2/18/2015	4:47 PM	Wednesday	Daylight	Cloudy	Wet	N/A	N/A			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: attempting to take a left out of Sam Turner Road. MV1 collided with MV2 when MV2 made the turn.
7	3/5/2015	7:14 AM	Thursday	Daylight	Cloudy	Snow	N/A	N/A	N/A		Property Damage Only	Rear-end	Followed Too Closely	MV1: attempting to turn right onto Sam Turner Road; MV2: travelling EB on Route 151; MV3: stopped on Sam Turner Road at the intersection. MV2 rear-ended MV1 pushing MV1 into MV3.
8	4/14/2015	8:58 AM	Tuesday	Daylight	Cloudy	Dry	N/A	N/A			Property Damage Only	Sideswipe	Failure to Keep in Proper Lane	MV1: stopped on Route 151 EB lane waiting to turn left onto Cloverfield Way; MV2: travelling EB on Route 151 behind MV1. MV2 passed MV1 on its left side and collided with MV1 when MV1 made the turn.
9	6/12/2015	5:32 PM	Friday	Daylight	Clear	Dry	34	20			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: stopped on Sam Turner Road attempting to turn left onto Route 151 WB lane. MV1 struck MV2 when MV2 made the turn without yielding for MV1.
10	8/28/2015	4:35 PM	Friday	Daylight	Clear	Dry	37	20			Non-fatal Injury	Rear-end	Followed Too Closely	MV1: stopped in traffic on Route 151 WB lane as the vehicle in front is attempting to turn left onto Sam Turner Road; MV2: travelling WB on Route 151. MV2 was unable to stop in time and rear-ended MV1.
11	9/9/2016	8:27 PM	Friday	Dark - Lighted	Clear	Dry	52	32			Property Damage Only	Sideswipe	Inattention / Distracted	MV1: travelling EB on Route 151; MV2: travelling WB on Route 151. MV2 crossed the centerline into EB lane. MV1 was unable to avoid MV2 and collided with MV2.
12	1/12/2017	8:55 AM	Thursday	Daylight	Clear	Wet	24	38			Non-fatal Injury	Rear-end	Followed Too Closely	MV1 and MV2: travelling EB on Route 151. MV2 was slowing down to stop in traffic at the intersection and was rear-ended by MV1.
13	8/3/2017	11:07 AM	Thursday	Daylight	Clear	Dry	19	71			Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: travelling NB on Sam Turner Road. MV2 entered the intersection and was struck by MV1.
14	10/22/2017	12:02 PM	Sunday	Daylight	Clear	Dry	75	52			Property Damage Only	Rear-end	Followed Too Closely	MV1 and MV2: travelling EB on Route 151. MV1 slowed/stopped for traffic at the intersection of Sam Turner Road and was rear-ended by MV2.
15	11/29/2017	12:10 PM	Wednesday	Daylight	Clear	Dry	62	41			Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151 towing a trailer. MV1 made a left-turn onto Sam Turner Road without yielding and collided with MV1. Due to the crash, MV2 and its trailer rolled over and came to rest on its side.

Crash Data Summary Tables
 Nathan Ellis Highway (Route 151) @ Sam Turner Road and Cloverfield Way- Falmouth, Massachusetts
 Nathan Ellis Highway (Route 151) @ Boxberry Hill Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

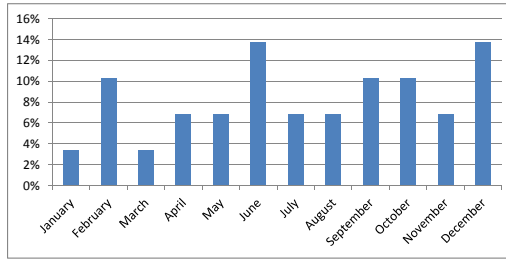
Collision Diagram	Crash Date	Crash Time	Day of Week	Ambient Light	Weather Condition	Road Surface	Operator's Age			Crash Severity	Manner of Collision	Driver Contributing Codes	Detailed Narrative (from Crash Report)
16	6/6/2013	5:21 PM	Thursday	Daylight	Clear	Dry	N/A			Non-fatal Injury	Single Vehicle	Inattention / Distracted	MC1 (motorcycle): travelling WB on Route 151. A vehicle in front stopped abruptly to make a left-turn onto Boxberry Hill Road. MC1 swerved right to avoid an accident. While doing so, another vehicle attempted to go around the stopped vehicle. MC1 had to go off road and had to lay the motorcycle down.
17	4/5/2014	1:13 AM	Saturday	Dark - Lighted	Rain	Wet	N/A			Property Damage Only	Single Vehicle	Erratic / Aggressive / Reckless Driving	MV1: travelling EB on Route 151. MV1 veered off the right side of road striking two guide wires just west of Sam Turner Road. MV1 continued travelling, flipped over due to the embankment and landed on its roof on Boxberry Hill Road.
18	7/6/2014	2:14 PM	Sunday	Daylight	Clear	Dry	N/A	N/A		Non-fatal Injury	Angled	Made an Improper Turn	MV1: travelling EB on Route 151; MV2: travelling WB on Route 151. MV2 made a U-turn just east of Boxberry Hill Road and collided with MV1.
19	6/30/2015	8:52 PM	Tuesday	Dark - Lighted	Clear	Dry	48	76	30	Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: stopped at the STOP-sign on Boxberry Hill Road NB lane; MV2: travelling WB on Route 151 attempting to turn left onto Boxberry Hill Road; MV3: travelling EB on Route 151. MV3 struck MV2 when MV2 made the turn without yielding. The collision pushed MV2 into MV1.
20	10/1/2015	5:46 PM	Thursday	Daylight	Rain	Wet	45	38		Property Damage Only	Angled	Failure to Yield Right-of-Way	MV1: travelling WB on Route 151; MV2: travelling EB on Route 151. MV1 made a left-turn onto Boxberry Hill Road SB lane without yielding and struck MV2.
21	5/31/2016	5:40 PM	Tuesday	Daylight	Clear	Dry	55	23		Property Damage Only	Rear-end	Followed Too Closely	MV1: stopped on Route 151 WB lane waiting to turn left onto Boxberry Hill Road; MV2: travelling WB on Route 151. MV2 rear-ended MV1.
22	2/10/2017	2:45 PM	Friday	Daylight	Clear	Wet	81	54		Non-fatal Injury	Rear-end	Failure to Yield Right-of-Way	MV1: pulling onto Route 151 EB lane from Boxberry Hill Road; MV2: travelling EB on Route 151. MV1 did not stop before entering the intersection and was struck by MV2.
23	5/25/2017	7:08 AM	Thursday	Daylight	Rain	Wet	22	17		Non-fatal Injury	Rear-end	Erratic / Aggressive / Reckless Driving	MV1 and MV2: travelling WB on Route 151. MV1 stopped due to the vehicle in front. MV2 failed to stop and rear-ended MV1.
24	9/22/2017	7:03 AM	Friday	Dusk	Cloudy	Wet	16	37		Non-fatal Injury	Rear-end	Inattention / Distracted	MV1 and MV2: travelling WB on Route 151. MV2 slowed down and came to a stop due to a school bus at the intersection of Cloverfield Way. MV1 was not paying attention to the road and struck MV2.
25	9/28/2016	10:43 AM	Wednesday	Daylight	Clear	Wet	61	69		Non-fatal Injury	Angled	Inattention / Distracted	MV1: travelling EB on Route 151; MV2: travelling NB on Sam Turner Road. MV2 entered the intersection and was struck by MV1.
26	12/5/2016	12:09 PM	Monday	Daylight	Cloudy	Wet	31	89		Non-fatal Injury	Angled	Failure to Yield Right-of-Way	MV1: travelling EB on Route 151; MV2: attempting to make a left-turn onto Sam Turner Road from Route 151 WB lane. MV1 struck MV2 when MV2 made the turn without yielding.
27	12/8/2016	1:35 PM	Thursday	Daylight	Clear	Dry	28			Property Damage Only	Single Vehicle	Other	MV1: travelling WB on Route 151. MV1 left the roadway and made contact with the utility pole on the southwest corner of the intersection.
28	12/25/2016	5:49 AM	Sunday	Dark - Not Lighted	Clear	Dry	N/A	36		Property Damage Only	Angled	Disregarded Traffic Controls	MV1: travelling NB on Sam Turner Road; MV2: travelling EB on Route 151. MV1 failed to stop at the STOP-sign and began to make a left-turn onto Route 151. MV2 struck MV1. MV1 fled the scene.
29	10/16/2017	6:10 PM	Monday	Dark - Lighted	Clear	Dry	24	77		Property Damage Only	Angled	Inattention / Distracted	MV1: travelling NB on Sam Turner Road; MV2: travelling EB on Route 151. MV1 pulled out from Sam Turner Road and got struck by MV2.

Crash Data Summary Tables

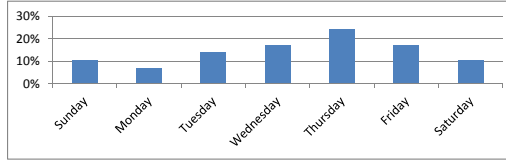
Nathan Ellis Highway (Route 151) @ Sam Turner Road and Cloverfield Way - Falmouth, Massachusetts
 Nathan Ellis Highway (Route 151) @ Boxberry Hill Road - Falmouth, Massachusetts
 01/01/2013 - 12/31/2017

Route 151 @ Sam Turner Road and Cloverfield Way 29

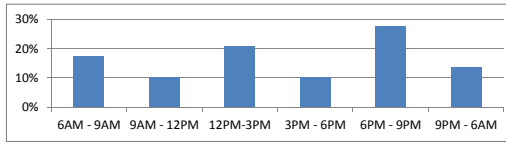
Month	#	%
January	1	3%
February	3	10%
March	1	3%
April	2	7%
May	2	7%
June	4	14%
July	2	7%
August	2	7%
September	3	10%
October	3	10%
November	2	7%
December	4	14%



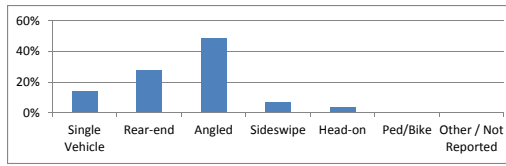
Day of Week	#	%
Sunday	3	10%
Monday	2	7%
Tuesday	4	14%
Wednesday	5	17%
Thursday	7	24%
Friday	5	17%
Saturday	3	10%



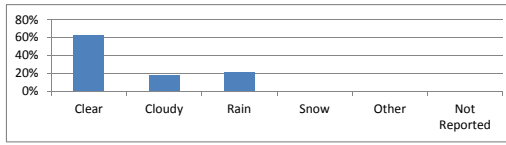
Time of Day	#	%
6AM - 9AM	5	17%
9AM - 12PM	3	10%
12PM-3PM	6	21%
3PM - 6PM	3	10%
6PM - 9PM	8	28%
9PM - 6AM	4	14%



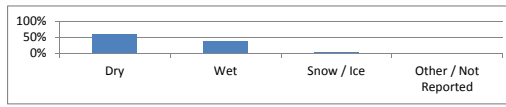
Manner of Collision	#	%
Single Vehicle	4	14%
Rear-end	8	28%
Angled	14	48%
Sideswipe	2	7%
Head-on	1	3%
Ped/Bike	0	0%
Other / Not Reported	0	0%



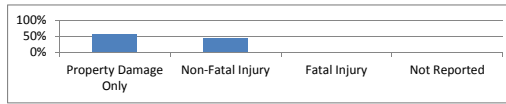
Weather Conditions	#	%
Clear	18	62%
Cloudy	5	17%
Rain	6	21%
Snow	0	0%
Other	0	0%
Not Reported	0	0%



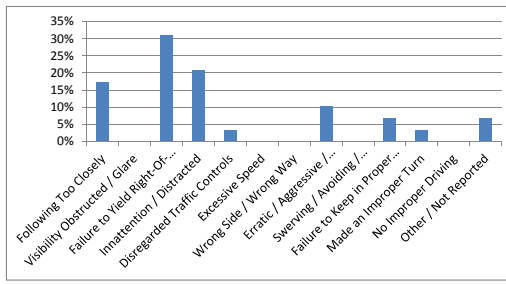
Road Surface	#	%
Dry	17	59%
Wet	11	38%
Snow / Ice	1	3%
Other / Not Reported	0	0%



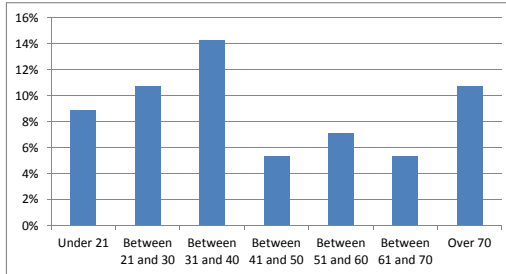
Crash Severity	#	%
Property Damage Only	16	55%
Non-Fatal Injury	13	45%
Fatal Injury	0	0%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	5	17%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	9	31%
Inattention / Distracted	6	21%
Disregarded Traffic Controls	1	3%
Excessive Speed	0	0%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	3	10%
Swerving / Avoiding / Over-Steering / Over-Correcting	0	0%
Failure to Keep in Proper Lane	2	7%
Made an Improper Turn	1	3%
No Improper Driving	0	0%
Other / Not Reported	2	7%



Age	#	%
Under 21	5	9%
Between 21 and 30	6	11%
Between 31 and 40	8	14%
Between 41 and 50	3	5%
Between 51 and 60	4	7%
Between 61 and 70	3	5%
Over 70	6	11%



Appendix E. Road Safety Audit References

Road Safety Audit References

Massachusetts Traffic Safety Toolbox, Massachusetts Highway Department,
www.mhd.state.ma.us/safetytoolbox.

Road Safety Audits, A Synthesis of Highway Practice. NCHRP Synthesis 336. Transportation Research Board, National Cooperative Highway Research Program, 2004.

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