

ROAD SAFETY AUDIT

Scenic Highway, between Belmont Circle and East of
Nightingale Pond Road

Sandwich Road, between East of Bourne Rotary and
West of Midway Recreation Area

Cranberry Highway, between U.S. Route 6 Westbound
Exit 55 and East of Adams Street

Town of Bourne

June 21, 2022

Prepared For:
MassDOT



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Background

The Federal Highway Administration (FHWA) defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements, considering all roadway users.

This RSA is being conducted as part of the development of the Massachusetts Department of Transportation – Highway Division’s (MassDOT) Cape Cod Canal Area Transportation Improvements Program. The Program seeks to address the condition of the existing bridges crossing the Cape Cod Canal and potentially improve the surrounding roadway network, including multimodal improvements in the Canal Area.

In addition to the Cape Cod Canal Area Transportation Improvements Program, there are other planned roadway infrastructure projects under development within or adjacent to the RSA study area. The Scenic Highway corridor is scheduled to be reconstructed in the future by MassDOT from Nightingale Pond Road to Edgell Road (MassDOT Project 606082). Belmont Circle, just west of the Scenic Highway segments included in this audit, is currently under construction for multimodal improvements (MassDOT Project 606900).

The roadway segments listed below have been identified for inclusion in the audit based on historical data from 2013 through 2017, as being within the top five percent of segments with excess crash frequency, within the boundaries of the Cape Cod Commission. The selection of locations for evaluation in the RSA was also supplemented by a review of recent crash reports.

A Road Safety Audit was conducted for the following areas identified as having notable crash histories, all located in the Town of Bourne:

- Scenic Highway, between Belmont Circle and East of Nightingale Pond Road
- Sandwich Road, between East of Bourne Rotary and West of Midway Recreation Area
- Cranberry Highway, between U.S. Route 6 Westbound Exit 55 and East of Adams Street

The goal of the RSA is to identify safety issues at each location and provide potential short term, mid-term and long-term safety enhancement recommendations. These enhancements are then categorized by estimated measures of effectiveness, time frame to implement and estimated cost to address the issues.

Project Data

The Road Safety Audit was conducted on Tuesday June 21, 2022 beginning at 9:00 AM, with the pre-and post-Audit meeting held at the Town of Bourne Department of Public Works (DPW) facility located at 35 Ernest Valeri Road, Buzzards Bay, Massachusetts. As can be seen in Table 1, the Audit Team consisted of a cross-section of State, regional, and local engineering, planning, and emergency response professionals. The RSA agenda is provided in **Appendix A** and the RSA sign-in sheet, including attendees’ contact information, is provided in **Appendix B**.

Table 1: Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Matthew Quinn	Town of Bourne Department of Public Works
Jennifer Copeland	Town of Bourne Town Planner
Timothy Lydon	Town of Bourne Engineering Department
Joe Carrara	Town of Bourne Fire Department
Jon Stowe	Town of Bourne Police Department
Colleen Medeiros	Cape Cod Commission
Sergeant Cory Medeiros	Massachusetts State Police – Bourne Barracks
Richard Bilski	MassDOT – District 5 Projects Section
Shaun Handy	MassDOT – District 5 Projects Section
Dan Reutzel	MassDOT – District 5 Projects Section
David Soares	MassDOT – District 5 Traffic Section
Ana Fill	MassDOT (Boston) – Traffic Safety Section
Michelle Deng	MassDOT (Boston) – Traffic Safety Section
Joshua Coombs	MassDOT (Boston) – Traffic Safety Section (Intern)
Marcus Hardy	MassDOT (Boston) – Traffic Safety Section (Intern)
Emma Loughlin	HNTB
Elena Aung	HNTB
Evan Drew	Stantec
Peter Calves	Stantec
Peter Vasiliou	Stantec

RSA participants were encouraged to conduct their own field reconnaissance prior to the day of the RSA to consider elements on MassDOT’s Safety Review Prompt List (provided to the participants in advance).

Before the Audit field walk, a pre-Audit meeting was convened at the Bourne DPW facility. At the pre-Audit meeting, the RSA team reviewed the existing conditions of study area roadways and intersections, presented collision diagrams and crash trends for the locations, and reviewed potential safety deficiencies to look out for during the Audit field walk.

The Audit field walk consisted of field observations of the Audit locations. Handwritten notes and digital photographs documented the observations made by the Audit team members during the field walk.

Following the Audit field walk, the post-Audit meeting reconvened at the Bourne DPW facility where the Team confirmed the observations made in the field, identified deficiencies and offered solutions to remedy safety deficiencies noted in the field walk and Pre-Audit meeting.

Project Location and Description

The Road Safety Audit study area included three major roadway segments, which includes seven intersections. Of the intersections, one is signalized, while the remainder are stop-controlled intersections and access driveways.

Scenic Highway (Main Street / U.S. Route 6)

Scenic Highway, also known as U.S. Route 6, runs in a north-easterly to south-westerly direction between Belmont Circle and the Sagamore Bridge along the north side of the Cape Cod Canal in the Town of Bourne. Scenic Highway is under the jurisdiction of MassDOT and is classified as an urban principal arterial for most of its length. The westerly section of Scenic Highway between Belmont Circle and Nightingale Pond Road is classified as an urban minor arterial. Scenic Highway is also a National Highway System (NHS) Roadway. In addition to carrying through traffic on the north side of the Cape Cod Canal, Scenic Highway provides access to residential, commercial, and recreational areas.

In the segment evaluated as part of the RSA, Scenic Highway consists of two travel lanes in each direction, separated by a raised median island between Belmont Circle and Nightingale Pond Road and then a double yellow center line east of Nightingale Pond Road. The posted speed limit for Scenic Highway along the segment under evaluation varies between 20 to 35 miles per hour. MassDOT speed regulations and a speed limit summary diagram are provided in **Appendix D**.

Sandwich Road

Sandwich Road runs in a north-easterly south-westerly direction between its intersection with Shore Road and Trowbridge Road and Cranberry Highway along the south side of the Cape Cod Canal. Sandwich Road is under the jurisdiction of MassDOT. Sandwich Road is classified as a local road between its intersection with Shore Road and Trowbridge Road and the Sandwich Road Connector. Between the Sandwich Road Connector and the Mid-Cape Connector (a significant portion of its overall length), Sandwich Road is classified as an urban principal arterial roadway. Between Mid-Cape Connector and Cranberry Highway, Sandwich Road is classified as an urban minor arterial roadway and provides access to residential, commercial, and recreational areas.

Sandwich Road is generally one lane in each direction; within the RSA study area a southwest-bound left turn lane is provided at Upper Cape Cod Regional Technical School. The posted speed limit along Sandwich Road varies from 35 to 45 miles per hour. MassDOT speed regulations and a speed limit summary diagram are provided in **Appendix D**.

Cranberry Highway

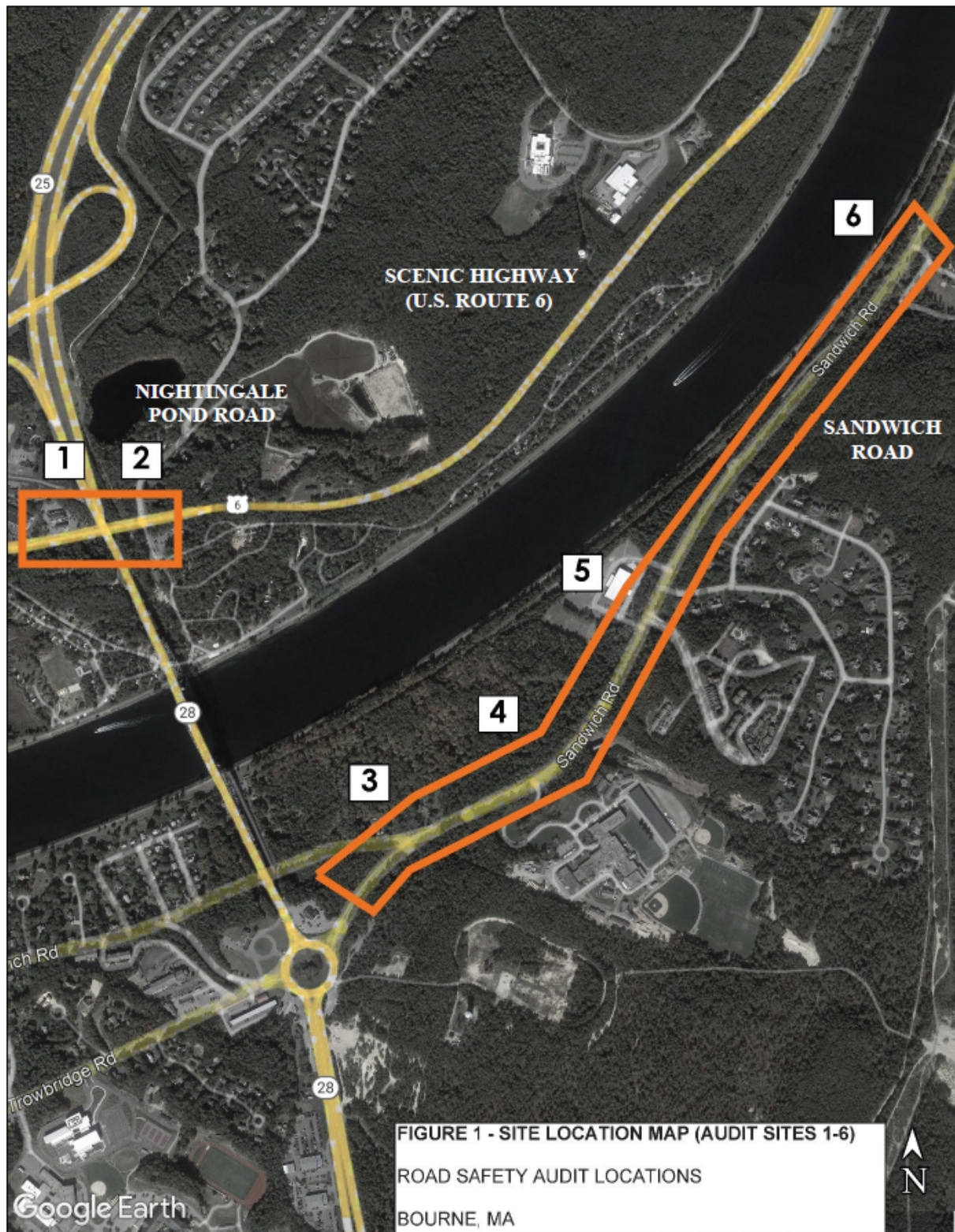
Cranberry Highway runs in an east-west direction from the U.S. Route 6 ramps, just south of the Sagamore Bridge, to Sandwich Road, at a length of approximately 4,000 feet. Cranberry Highway is under the jurisdiction of MassDOT and is classified as an urban minor arterial roadway. Cranberry Highway provides access to residential and commercial properties, as well as providing a connection from U.S. Route 6 to Sandwich Road and Massachusetts Route 130 into the Town of Sandwich.

Cranberry Highway in the RSA area is generally two lanes in each direction. The posted speed limit for Cranberry Highway is 40 miles per hour, excluding ramp speed limits entering and exiting U.S. Route 6. A speed limit summary diagram is shown in **Appendix D**.

Scenic Highway, Sandwich Road, and Cranberry Highway provide access for two populations of motorists. The first is the local population traveling between the residential, commercial, recreational and educational facilities. The second is the regional and seasonal traffic associated with Cape Cod as a tourism and recreational destination for populations “off-Cape” who pass through the Town of Bourne and the vehicular, bicycle, and pedestrian connections that are the Bourne Bridge and Sagamore Bridge.

The segments of Scenic Highway, Sandwich Road and Cranberry Highway have been organized into Audit Sites:

- Scenic Highway: Audit Sites #1 & #2
- Sandwich Road: Audit Sites #3, #4, #5 & #6
- Cranberry Highway: Audit Site #7





The following sections describe each of the individual audit sites.

Scenic Highway, between Belmont Circle and East of Nightingale Pond Road

Audit Site 1 – Scenic Highway (Main Street), just east of Belmont Circle

This audit site consists of an 1,100-foot segment of Scenic Highway from Belmont Circle, east towards Nightingale Pond Road. Portions of Scenic Highway east of Belmont Circle are sometimes referred to as Main Street. The segment consists of commercial developments along the north side of Scenic Highway that include a Speedway gas station with a convenience market and Dunkin' Donuts and the Bourne Bridge Crossing Shopping Center, which includes a PetSmart and a Starbucks, with access driveways only allowing right-in or right-out access along Scenic Highway westbound.

At the time of the Audit, a new gas station was being constructed on the south side of Scenic Highway, with right-in, right-out access for the eastbound direction of Scenic Highway. Scenic Highway is two-lanes in each direction, separated by a raised median island and the posted speed limit is generally 35 miles per hour, with a segment posted at 20 miles per hour westbound from the Bourne Bridge to Belmont Circle. Sidewalks are provided on both sides of Scenic Highway through this section. Within the RSA study area of Scenic Highway, there is no on-street parking and there are no bicycle accommodations.

At the time of this Audit, road work associated with the Belmont Circle reconstruction project (MassDOT Project 606900) was ongoing, and the east limit of the construction project overlaps with the west limit of this Audit site. The Belmont Circle project will include a Pedestrian Hybrid Beacon Signal for a crossing across Scenic Highway just east of Belmont Circle, an enhancement to the crosswalk that is within the Audit area.

Audit Site 2 – Scenic Highway near Intersection with Nightingale Pond Road and Andy Olivia Drive

This audit site consists of a four-leg, signalized intersection of Scenic Highway and Nightingale Pond Road and Andy Olivia Drive. Scenic Highway is two lanes in each direction and the posted speed limit is generally 35 miles per hour, though the westbound traffic transitions from a previous posted speed limit of 50 miles per hour east of this intersection, on a downhill grade. Nightingale Pond Road is a local roadway that consists of a shared left/through lane and a dedicated right turn lane approaching the intersection. Andy Olivia Drive is a driveway that consists of a single lane for all movements for its approach to Scenic Highway.

The northeast corner of the intersection abuts a residential property, the southeast corner abuts the Bourne Scenic Park (operated by the Bourne Recreation Authority), and the southwest corner abuts a natural gas station. There are sidewalks on both sides of Scenic Highway on the west side of the intersection, and no sidewalks on the east side of the intersection. Additionally, there is a sidewalk along the west side of Nightingale Pond Road to its intersection with Deseret Drive, where the sidewalk continues along the west side of that roadway. There is a crosswalk of the west leg of the intersection, with pedestrian-actuated push buttons and is controlled by the intersection's signal. There are no parking areas provided

along Scenic Highway and there are no bicycle accommodations on Scenic Highway in the RSA study area.

Sandwich Road, between East of Bourne Rotary and West of Midway Recreation Area

Audit Site 3 – Sandwich Road at Sandwich Road Connector

This audit site consists of a three-leg, unsignalized “Y” intersection of Sandwich Road and Sandwich Road Connector, where the Sandwich Road eastbound approach to the Connector is stop-controlled, while the intersecting approaches of Sandwich Road Connector eastbound and Sandwich Road westbound are free-flowing. The area surrounding the intersection is mostly undeveloped, with some residences along the north side of Sandwich Road. Sandwich Road is one lane in each direction, with traffic flows separated by a painted double yellow center line and the speed limit is generally posted at 40 miles per hour along the corridor. Sandwich Road Connector is classified as a principal arterial with one lane in each direction (with traffic flows separated by a painted double yellow center line) and the speed limit is generally posted at 40 miles per hour. The Sandwich Road Connector roadway provides access between Sandwich Road and the Bourne Rotary. At the westbound approach to the intersection, there is a right turn bypass lane for westbound Sandwich Road traffic to bypass the intersection and continue on Sandwich Road, while through traffic continues through the intersection onto the Sandwich Road Connector. There are no existing sidewalks or bicycle accommodations in the vicinity of the intersection. There are no parking areas provided along Sandwich Road or Sandwich Road Connector.

Audit Site 4 – Sandwich Road at Upper Cape Cod Regional Technical School

This audit site consists of the unsignalized three-leg intersection of Sandwich Road and the Upper Cape Cod Regional Technical School Driveway, where the School Driveway approach is stop-controlled, and Sandwich Road is free-flowing. Post-mounted beacon signals are provided for all the approaches to the intersection. The north side of the intersection consists of undeveloped land, while the south side consists of the Upper Cape Cod Regional Technical School property. The School Driveway ascends at a steady grade to the School from Sandwich Road. Sandwich Road is one lane per direction, with a dedicated left turn lane provided on the westbound approach to the intersection and a posted speed limit of 40 miles per hour in each direction, although the posted speed limit eastbound increases to 45 miles per hour exiting the intersection. The directions of travel on Sandwich Road are separated by a painted double yellow centerline. There are no existing sidewalks or bicycle accommodations in the vicinity of the intersection. There are no parking areas provided in the vicinity of the intersection.

While Upper Cape Cod Technical School is a vocational high school for Grade 9 through 12, the school also includes adult and continuing education programs and a practical nursing program, which makes the traffic operations into and out of the school atypical to traditional high schools. In addition to traffic associated with the education programs, the Bourne Braves of the summertime Cape Cod Baseball League play home games at the school field, adding additional traffic into and out of the driveway during the summer and during times of the day not normally identified with traditional school driveways.

Audit Site 5 – Sandwich Road, in the area of Gallo Arena, Harbor Lights Road, and Weatherdeck Drive

This audit site consists of a 500-foot segment of Sandwich Road along the frontage of Gallo Arena, including separate, unsignalized “T” intersections with the Arena’s separate entrance and exit driveways, with Harbor Lights Road, and with Weatherdeck Drive. The Gallo Arena, an ice rink operated by the Bourne Recreation Authority, occupies the north side of Sandwich Road along this segment, with two one-way driveways. The west driveway of Gallo Arena is entry only and the east driveway of Gallo Arena is exit only, with separate lanes for right-turning and left-turning exiting traffic. The south side of the segment is primarily wooded aside from the “T” intersections of Harbor Lights Road and Weatherdeck Drive. Both Harbor Lights Road and Weatherdeck Drive provide one entry lane and one exit lane separated by a landscaped median. These roadways are the only access points for their respective residential neighborhoods. Sandwich Road is one lane per direction, and the speed limit is 45 miles per hour in both directions. The directions of travel on Sandwich Road are separated by a painted double yellow centerline. There are no sidewalks, bicycle accommodations, or parking areas provided along Sandwich Road through this segment.

Audit Site 6 – Sandwich Road in the vicinity of the Midway Recreation Area

This audit site consists of the Sandwich Road segment in the vicinity of a three-way, stop-controlled “T” intersection of Sandwich Road and Tech Drive at the Midway Recreation Area. The north side of the intersection consists of undeveloped land, while the south side consists of the Midway Recreation Area. Sandwich Road is one lane in each direction and the posted speed limit is generally 45 miles per hour. Tech Drive is a two-way driveway, with a single lane intersection approach lane accommodating all movements. There are no sidewalks, bicycle accommodations, or parking areas provided on Sandwich Road through this segment.

Cranberry Highway

Audit Site 7 – Cranberry Highway, between U.S. Route 6 Westbound Exit 55 and east of Adams Street

This audit site consists of the segment of Cranberry Highway between the U.S. Route 6 Westbound Exit 55 ramps east through its intersection with Adams Street to the vicinity of the Stop & Shop gas station and convenience store at 80 Cranberry Highway. The intersection of Cranberry Highway at Adams Street is a four-way, unsignalized intersection, where both approaches of Adams Street are stop-controlled. The properties abutting the Adams Street legs of the intersection are residential. East of the intersection consists of small-scale commercial businesses on both sides of Cranberry Highway. West of the intersection leads to the U.S. Route 6 westbound ramps. There is a parallel service road on the north side of Cranberry Highway, west of Adams Street, which provides access to several small parcels and a Christmas Tree Shops retail store location.

Cranberry Highway is two lanes in each direction east of Adams Street and the posted speed limit is generally 40 miles per hour. West of Adams Street, Cranberry Highway is marked as two eastbound lanes and one westbound lane. The directions of travel on Cranberry Highway are separated by a painted double yellow centerline. Adams Street is functionally classified as a minor arterial north of the intersection and classified as a local roadway south of the intersection. North of the intersection, Adams Street is one way southbound (towards the intersection), while it is two-way south of the intersection. This one-way configuration is recent, having been reconfigured from two-way in 2015, so the crashes reviewed as part of this RSA at the intersection occurred shortly after this conversion. There are bicycle lanes on Adams Street north of the intersection and the only sidewalks in the vicinity of the intersection are on the east side of Adams Street north of the intersection.

Marconi Street intersects Cranberry Highway right where the Route 6 westbound off ramp discharges onto Cranberry Highway. Marconi Street is a two lane, two-way roadway with the approach lane under stop control, while Cranberry Highway and the U.S. Route 6 westbound off-ramp is free-flowing. Marconi Street is a local residential street that also connects to Adams Street south of the intersection.

Traffic Data

Existing traffic volume data for 2019 has been established as the base year for the Cape Cod Canal Area Transportation Improvement Program. A summary of the data is contained in **Appendix D** and includes daily traffic volumes for the Bourne and Sagamore Bridges, Scenic Highway east of Nightingale Pond Road, Sandwich Road east of the Bourne Rotary, Sandwich Road east of Gallo Arena, Sandwich Road west of Mid-Cape Connector, and Cranberry Highway west of Adams Street. Automatic Traffic Recorders (ATRs) collected Average Daily Traffic (ADT) volumes for those locations, taken on days throughout the year. The data also includes turning movement traffic volumes for the intersections in the Audit area. 2019 Summer Weekday morning, Summer Weekday afternoon, and Summer Saturday MIDDAY peak hour turning movement volumes are provided at the following locations:

- Scenic Highway at Nightingale Pond Road/Andy Olivia Drive
- Sandwich Road at Sandwich Road Connector
- Sandwich Road at Upper Cape Cod Regional Technical School Driveway
- Sandwich Road at Tech Drive
- Sandwich Road at Harbor Lights Road
- Cranberry Highway at Adams Street

Figures of the assembled traffic volumes can be found in **Appendix D**.

Crash History

The selection of the sites evaluated as part of the RSA was based upon several factors, including an evaluation of MassDOT's Network Screening Tool, which is a module of the online MassDOT IMPACT Crash Portal. The Network Screening Tool is based on excess average crash frequency with an Empirical Bayes (EB) adjustment for collectors and arterials, i.e. identifying roadway segments in Massachusetts that exceed the average crash frequency as expected when compared to similar types of roadways. To identify roadway segments for evaluation as part of this RSA, roadway segments that were in the top 5 percent (within the boundaries of the Cape Cod Commission planning area) of excess crash frequency were screened. Once the screened areas were identified, crash reports were obtained from MassDOT to further confirm and refine the roadway segments to be evaluated.

As a result of the outlined process, the following roadway segments were identified for completion of the RSA: Scenic Highway, east of Belmont Circle through the intersection of Nightingale Pond Road/Andy Olivia Drive; Sandwich Road from Sandwich Road Connector through Tech Drive/Midway Recreation Area; and Cranberry Highway from the U.S. Route 6 westbound ramps through the Adams Street intersection.

Individual detailed crash reports provided by MassDOT for the study area, between January 2017 through December 2019, were reviewed. The individual crash reports typically provide detailed information about the circumstances surrounding a crash and may provide insight into possible causes of crashes. Using the crash reports and correlating the information with the MassDOT IMPACT crash database, Stantec prepared collision diagrams for the seven audit areas. The collision diagrams provide a visual representation of the different types, number and locations of the crashes along each segment. The collision diagrams include a summary table with relevant details of each crash. Supplementing each collision diagram are graphs that depict the proportions of the various crash parameters, including the manner of collision, time of day, day of week, month, weather, severity, among other parameters. The collision diagrams and associated information are included in **Appendix C**.

Audit Site 1 – Scenic Highway (Main Street), just east of Belmont Circle

A total of seven crashes were identified along the roadway segment for the period under examination (2017-2019). Of those crashes, none resulted in an injury. The most common manner of collision was the rear end type, which comprised 43 percent of the identified crashes. The second most common manner of collision was the angle type, which comprised 29 percent of the identified crashes. The majority of crashes (57 percent) occurred during daylight hours, as well as with dry pavement (71 percent), and in clear/cloudy weather conditions (85 percent). As may be expected for Cape Cod due to its destination for tourism and summer recreation and associated increase in traffic volumes, August is the month of the year with the most crashes (29 percent). Five of the seven crashes for the segment were related to the Speedway gas station entrance and exit driveways. One of the seven crashes involved the mid-block pedestrian crossing near Belmont Circle where a vehicle had stopped for a pedestrian and was rear-ended.

Audit Site 2 – Scenic Highway near Intersection with Nightingale Pond Road and Andy Olivia Drive

A total of 26 crashes were identified along the segment for the period under evaluation. Of those crashes, four resulted in an injury. The most common manner of collision was the rear end type, which comprised 54 percent of the identified crashes. The second most common manner of collision was the angle type, which comprised 27 percent of the identified crashes. Most crashes (96 percent) occurred during daylight hours, as well as with dry pavement (81 percent), and in clear/cloudy weather conditions (96 percent). As may be expected for Cape Cod due to its destination for tourism and summer recreation and associated increase in traffic volumes, July is the month of the year with the most crashes (23 percent).

Audit Site 3 – Sandwich Road at Sandwich Road Connector

A total of 27 crashes were identified for the intersection for the period under evaluation. Of those crashes, four resulted in an injury, with one unknown. The most common manner of collision was the angle type, which comprised 74 percent of the identified crashes. The second most common manner of collision was the rear-end type, which comprised 15 percent of the identified crashes. Most crashes (81 percent) occurred during daylight hours, as well as with dry pavement (81 percent), and in clear/cloudy weather conditions (86 percent). As may be expected for Cape Cod due to its destination for tourism and summer recreation and associated increase in traffic volumes, July is the month of the year with the most crashes (26 percent).

Audit Site 4 – Sandwich Road at Upper Cape Cod Regional Technical School

A total of nine crashes were identified for the intersection for the period under evaluation. Of those crashes, three resulted in an injury. The most common manner of collision was the angle type and the rear end type, which each comprised 44 percent of the identified crashes. Most crashes (89 percent) occurred during daylight hours, as well as with dry pavement (67 percent), and in clear/cloudy weather conditions (78 percent). October is the month of the year with the most crashes (33 percent), with July as the second highest month (22 percent). The intersection includes the driveway for a high school and continuing and vocational education programs, so it was notable that two of the nine crashes (22 percent) involved individuals under the age of 20 years old.

Audit Site 5 – Sandwich Road, in the area of Gallo Arena, Harbor Lights Road, and Weatherdeck Drive

A total of 21 crashes were identified for the segment for the period under evaluation. Of those crashes, four resulted in an injury. The most common manner of collision was the rear end type, which comprised 48 percent of the identified crashes. The second most common manner of collision were single vehicle crashes, which comprised 24 percent of the identified crashes. Most crashes (57 percent) occurred during daylight hours (but with a significant minority at night), as well as with dry pavement (90 percent), and in clear/cloudy weather conditions (90 percent). September has the highest percent of crashes of any month (24 percent), with both June and July with the next highest (14 percent each).

Audit Site 6 – Sandwich Road in the vicinity of the Midway Recreation Area

A total of five crashes were identified for the segment for the period under evaluation. Of those crashes, two resulted in an injury. Two of the crashes were rear end type collisions and each of the remaining three crashes were identified as a head on type, single vehicle type, and sideswipe – opposite direction type, respectively. Three of the five crashes (60 percent) occurred during daylight hours, and four of the five crashes (80 percent) occurred during clear/cloudy weather conditions. As may be expected for Cape Cod due to its destination for tourism and summer recreation and associated increase in traffic volumes, four of the five crashes (80 percent) occurred between the months of June and September.

Audit Site 7 – Cranberry Highway, between U.S. Route 6 Westbound Exit 55 and east of Adams Street

A total of 17 crashes were identified for the segment for the period under evaluation. Of those crashes, five resulted in an injury, with one unknown. The most common manner of collision was the angle type, which comprised 35 percent of the identified crashes. The second most common manner of collision was the sideswipe (same direction), which comprised 29 percent of the identified crashes. Most crashes (71 percent) occurred during daylight hours, as well as with dry pavement (82 percent). All crashes occurred in clear or cloudy weather conditions. Notably, Tuesday was the day of the week with the most crashes (35 percent of all crashes) with the remainder of days of the week seeing three crashes or less per day of week (12 percent or less).

Audit Observations and Potential Safety Enhancements

During the pre-Audit meeting, Audit field walk, and post-Audit meeting, Audit participants were solicited for their observations of the Scenic Highway, Sandwich Road and Cranberry Highway corridors under evaluation. Audit participants conducted a visit to each corridor as a group, at which time they offered observations on safety concerns and deficiencies. During the post-Audit meeting, the safety concerns and deficiencies were recorded, and safety enhancements considered. A summary of those major safety considerations is as follows:

Audit Site 1 – Scenic Highway (Main Street), just East of Belmont Circle

Observations

Lighting

1. It was noted that there is not sufficient street lighting along the segment, aside from indirect lighting from the Speedway Gas Station. Non-uniform street lighting can make it difficult for a driver's eyes to adjust to see properly at night and maintain drivers' expectations along the roadway. It was noted that three of the seven of crashes (Crashes #3, #5, and #6) happened during low-light conditions, including dawn, dusk, and nighttime (dark-not lighted) periods of the day.



Image 1: Lack of shoulder or right turn lane by the Speedway Gas Station

Traffic Signs

2. It was observed that the only entrance signing for the Speedway gas station/Dunkin' site were the Dunkin's "Enter" signs, which were observed to be poorly placed and sized in such a way that by the time they could be read, drivers were potentially entering the site from the exit driveway or making sudden stops in order to enter the site. Although none were recorded in the period reviewed, this can lead to rear end crashes due to sudden stops and can lead to sideswipe crashes due to sudden lane changes.
3. It was noted that there were no existing guide signs on Scenic Highway westbound approaching Belmont Circle to provide guidance to approaching motorists as to the appropriate lane positioning entering the Circle to make subsequent maneuvers onto the other legs of Belmont Circle. Due to the unique lane assignments entering and circulating Belmont Circle and the combination of both local and seasonal roadway users, the lack of lane use guidance may cause confusion among drivers trying to access the Circle and influence their behaviors on the approach. The additional driveways along the Scenic Highway approach to the Circle with limited signing and access spacing requires additional decision making prior to entering the major

interchange of roadways provided at Belmont Circle. Of the seven crashes analyzed for the Audit, three crashes (Crashes #2, #3, and #4) involved vehicles that were changing lanes (to be in the appropriate approach lane) in the short segment of Scenic Highway in front of the Speedway Gas Station / Dunkin's.

Access Management

4. It was noted that vehicles queuing to use the gas pumps at the Speedway Gas Station often form a queue long enough to block the gas station entrance driveway and subsequently the potential for queuing into and blocking the right lane for westbound through traffic on Scenic Highway. This has the potential to cause rear end crashes, as westbound through vehicles may not expect vehicles to be stopped in the westbound right lane.
5. At the time of the preparation of this Audit report, a residential and commercial development was under construction along the south side of Scenic Highway, similar to the existing Speedway gas station on the north side. The proposed access is proposed to be right-in and right-out driveways, which may have the potential to result in similar safety issues as exhibited for the gas station on the north side of Scenic Highway. Audit attendees noted that, unless properly mitigated, similar issues could occur for this new development and its driveways.
6. It was observed that it was difficult for vehicles to exit from the Speedway gas station property into the relatively high-speed of vehicle platoons along Scenic Highway westbound, originating from the upstream traffic signal at the intersection with Nightingale Pond Road. This can lead to exiting drivers behaving more aggressively and accepting shorter gaps in movements onto Scenic Highway, potentially increasing the risk of angle and same direction sideswiping crashes while reentering the roadway. Of the seven reported crashes in the analyzed period, two crashes involved vehicles entering Scenic Highway from the gas station (Crashes #3 and #6).
7. It was noted by the local members of the Audit team that there were often near misses due to weaving during periods of heavy traffic along the Scenic Highway westbound travel lanes in the 250 feet between the Speedway Gas Station/Dunkin' driveway exit and the Bourne Bridge Crossing Shopping Center entrance-only driveway. There were no crashes reported in the analysis period explicitly described as occurring in this type of situation, however, this activity was noted by local RSA team members during the Audit field visit.

Multimodal

8. It was noted that there are curb ramps at the driveways on the north side of Scenic Highway on this segment that likely do not meet current accessibility standards. This could make the driveways potentially hazardous due to the lack of detectable warning panels and other accessibility features for people with mobility limitations that are attempting to use the sidewalks and cross the driveway openings. This issue was not represented in the crash data, but it was noted by members of the Audit team.

9. It was noted during the Audit that vegetation along the south side of Scenic Highway encroached on the existing sidewalk, which in places is already narrower than allowed for in current standards. This encroachment, with no buffer to the Scenic Highway eastbound travel way, could encourage pedestrians to walk in the roadway.
10. It was noted by members of the Audit team that there will be a gap in the bicycle network formed between the south side of Belmont Circle and Bourne Scenic Park when the Belmont Circle Project (under construction at the time of this report - MassDOT Project #606900) and the future Scenic Highway Median Project (in preliminary design), are completed. This gap of approximately 1,500 feet would result in a segment between the two ends of the proposed multiuse paths where cyclists may transition to riding within the vehicular travel ways on Scenic Highway in either direction. This could increase the chances of conflicts between vehicles and bicyclists if bicyclists enter the vehicle travel ways of Scenic Highway. Bicyclists may also walk or ride bicycles on the existing sidewalks, with limited width. This may increase the chances of conflicts between pedestrians and bicyclists, as the existing sidewalks are not as wide as a multi-use path.
11. Crash #7 was a rear end crash resulting from the lead vehicle traveling eastbound from Belmont Circle onto Scenic Highway stopping for a pedestrian in the crosswalk at the west end of this segment. Sudden stopping by vehicles for pedestrians in crosswalks may be caused by excessive vehicle speeds or inadequate sight distances between motorists and crossing pedestrians.

Geometry and Operations

12. It was noted by Audit participants that vehicles queuing from the westbound approach to Belmont Circle may result in rear end crashes (similar to Crashes #1 and #5). Queuing may be reduced upon the completion of the ongoing Belmont Circle construction project as this project will improve geometries and signs for the approach and may lead to traffic operations improvements within and approaching the circle.
13. The Audit team observed that this segment of Scenic Highway has limited paved shoulder width for both directions. The limited shoulder width restricts the available space to provide a safe pull-over area in case of crashes or when emergency vehicles require passing through the segment during times of heavy congestion. The limited shoulder width could also lead to more stormwater ponding in the travel lanes (gutter spread) rather than in the shoulder if that were available. As noted previously at the Speedway Gas Station gas pumps entering Scenic Highway, vehicles queue within the right travel lane on occasion, as there is no shoulder available.

Speeding

14. It was observed by the Audit team that vehicles often travel at elevated speeds through this segment, particularly approaching from the east. This can contribute to rear and crashes when these vehicles encounter stopped traffic queuing from the rotary (Crashes #1 and #5).

Potential Enhancements

Lighting

1. Evaluate increased street lighting on this segment of Scenic Highway. Increased street lighting is expected to improve lighting conditions for drivers, particularly those in the left lane, further from the gas station, to see and provide uniform illumination.
2. Consider using pavement markings that have higher reflectivity, such as thermoplastic, to increase the visibility of the markings affected by the lighting.

Traffic Signs

3. Review commercial signs at the Speedway Gas Station / Dunkin' driveways and evaluate relocating or resizing commercial "Enter" signs for improved visibility to motorists on Scenic Highway. Also evaluate the potential for the installation of clear "Exit" driveway signs. Improved visibility to signs is expected to reduce driver confusion, particularly among drivers unfamiliar with the area.
4. Consider installing additional guide signs, along this segment to provide guidance to motorists entering Belmont Circle from Scenic Highway westbound. Providing guide signs is expected to reduce driver confusion approaching the complex intersection of Belmont Circle, resulting in an expected reduction in the risk of rear end crashes from sudden stops and sideswipes from sudden lane changes for the approach.

Access Management

5. Evaluate adding a dedicated right-turn lane on Scenic Highway westbound for traffic entering the Speedway Gas Station / Dunkin' entrance driveway. A dedicated turn lane for entering traffic will relocate queued vehicles from the through travel lanes on Scenic Highway, potentially reducing the likelihood of rear end crashes between queued vehicles entering the gas station and through vehicles on Scenic Highway. If a turning lane is not feasible, a widened shoulder can provide some improved accommodation.
6. Coordinate with the new commercial and residential development across the street to ensure that the signs at the driveways will be placed in such a way that they can be seen by oncoming traffic, that site vegetation will be well controlled to provide acceptable sight lines at the driveways, and that sidewalk curb ramps at the driveways will meet current accessibility standards.
7. Evaluate the potential to consolidate the Speedway Gas Station / Dunkin' driveway openings and the Bourne Bridge Crossing Shopping Center driveways to reduce the number of site access points along Scenic Highway through this segment.

8. Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area. Separating the traffic could reduce congestion along this specific segment of Scenic Highway, reducing the risk of rear end crashes.
9. Evaluate providing a dedicated auxiliary lane on Scenic Highway westbound between the Speedway Gas Station / Dunkin' exit driveway and the Bourne Bridge Crossing Shopping Center entrance driveway. An auxiliary lane for this segment should allow for separation of through vehicles on Scenic Highway and those that are turning to accelerate on and decelerate off Scenic Highway. Separating this traffic and allowing for acceleration and deceleration space could reduce the risk of rear end crashes from sudden stops, and angle crashes at driveways.

Multimodal

10. Consider updating curb ramps at the driveways to meet current Massachusetts Architectural Access Board (MAAB)/Americans with Disabilities Act (ADA) standards. Accessible curb ramps that meet current accessibility standards improve pedestrian accommodations along roadways for people with mobility limitations. In particular, new ramps with detectable warning panels should warn pedestrians that they are about to enter a potential conflict point and may prevent pedestrian involved crashes.
11. Consider clearing vegetation that is encroaching onto existing sidewalks on the south side of Scenic Highway. A reduction of the encroaching vegetation on the sidewalk should reduce the incidents of pedestrians walking in the vehicular travel way as the vegetation constrains the sidewalk width and could reduce potential conflicts between pedestrians and vehicles. This measure is expected to provide accessibly compliant sidewalk widths for pedestrians along the segment.
12. Evaluate the feasibility of extending the multiuse path proposed as part of the Scenic Highway Median Project through this segment to connect to the multiuse path currently being constructed as part of the Belmont Circle Project. This proposed extension of the path would allow for seamless bicycle/pedestrian travel along the Scenic Highway corridor from Belmont Circle east toward the Sagamore Bridge, eliminating the gap in the network that would be created by these two projects and reducing the risk of crashes involving pedestrians and bicycles interacting on the sidewalk segment. Eliminating the gap in the multiuse path network can reduce the potential conflicts between vehicles and bicycles where bicycles may enter the vehicular travel ways of Scenic Highway to continue riding.
13. At the time of this RSA, a Pedestrian Hybrid Beacon (PHB) signal is under construction at the Scenic Highway leg of Belmont Circle to enhance the existing pedestrian crosswalk across this leg as part of the Belmont Circle Improvements Project. The installation of the PHB should improve visibility of the crossing and beacon control of the crossing will provide standardized and dedicated walk and clearance intervals for pedestrians. Additionally, pedestrian crashes and rear end crashes caused by sudden vehicle stops for crossing pedestrians may be reduced due to

the PHB signal, when compared to the previous uncontrolled crossing, as the PHB provides more predictability and defined control for drivers when pedestrians are crossing.

14. Consider implementing an educational campaign that will inform local and regional Scenic Highway vehicular, bicycle, and pedestrian users on the use and operations of PHBs. The goal of this campaign will be to reduce potential confusion that may arise with this relatively new type of signal control for all users.

Geometry and Operations

15. Consider reviewing the operations for Scenic Highway's approach entering Belmont Circle. Evaluating updated operations may lead to identifying additional improvements to the guide signing or pavement markings on the approach. Evaluating and improving pavement markings and guide signing should reduce confusion and provide consistency for drivers' expectations. Reducing confusion in the segment ahead of Belmont Circle may reduce rear end or sideswipe – same direction, collisions in this segment.
16. Consider widening Scenic Highway to provide wider shoulders available for vehicles to pull over into due to vehicle breakdowns, emergency vehicle passage, and gutter spread for on-road stormwater. Placing vehicles out of the travel way during vehicle break downs or emergency vehicle passage can reduce the risk of collisions associated with moving over for emergency incidents. Providing additional shoulder for stormwater gutter spread may reduce collisions due to loss of control because of driving over standing stormwater.

Speeding

17. Consider speed management measures to counter speeding on the segment, including speed feedback signs and additional enforcement. Lower speeds can reduce the severity of crashes. Lower speeds reduce the necessary stopping and sight distances required for vehicles to stop.

Audit Site 2 – Scenic Highway near Intersection with Nightingale Pond Road and Andy Olivia Drive

Observations

Traffic Signal Equipment

1. At the intersection of Scenic Highway with Nightingale Pond Road, it was noted that the Scenic Highway eastbound protected left-turn phase was inconsistently activated. During the Audit, vehicles in the left-most lane (designated as a shared left/through lane) on the Scenic Highway eastbound approach waiting to turn left were observed to be provided the leading, protected left-turn green arrow signal approximately half of the cycles in which a vehicle was queued in this lane.



Image 2: Lack of left turn lane on Eastbound intersection approach

Members of the Audit team suggested that there may likely be faults in the loop detection system for the eastbound left-most approach lane, in which the detectors were not detecting vehicles consistently. This would affect a left-turning driver's normal expectation of making the protected left turn under a left-turn protected phase assigned by the traffic signal (green arrow), instead requiring them to make a permissive (unprotected) left turn across the path of oncoming traffic. When drivers attempt to make left turns during the permissive phase, they may be more inclined to turn when there are shorter gaps in opposing traffic. The lack of a consistent protected left-turn phase leads to an increase in vehicles needing to use the permissive phase, which could result in angle crashes (Crash #16). Accepting shorter gaps in opposing traffic could result in additional angle crashes between the left turning vehicles and through vehicles, as there is less time for the through vehicles to slow or stop to avoid a crash.

2. Members of the Audit team noted that the yellow and all-red clearance intervals for the traffic signals appeared to be shorter than expected for an intersection that handles the speeds of approaching traffic, especially from the Scenic Highway westbound approach that is at a downgrade. Yellow clearance intervals that are too short may not provide enough time for vehicles to stop before entering the intersection. This can contribute to rear end crashes at signalized intersections when vehicles suddenly stop for the early red indication instead of entering the intersection on a yellow indication, as shown in Crashes #2, #11, #13, #18 westbound and Crashes #6, #10, #17, and #26 eastbound.
3. It was also noted that there was no emergency vehicle preemption system at the traffic signal system. Emergency vehicle pre-emption systems allow for emergency vehicles to pre-empt typical signal operations to allow for a green signal for an approaching emergency vehicle that activates the system. The lack of this system can disrupt traffic flow at the intersection for both emergency vehicles and other vehicles, as an emergency vehicle would have to enter the

intersection while conflicting traffic movements are occurring. Additionally, it is difficult to bypass vehicles in this intersection due to the raised median and the lack of shoulders on Scenic Highway near the intersection. Emergency vehicles entering the intersection during a conflicting movement can increase the risk of crashes with vehicles that would not expect the conflict to be occurring while being assigned a green signal.

Traffic Signs

4. It was noted that there were no lane utilization traffic signs on the intersection's approaches. A lack of lane utilization signs can lead to driver confusion, especially for motorists not familiar with the area. This may have been a contributing factor for Scenic Highway eastbound, where Crashes #6, #7, #10, #14, #17, #19, #24, and #26 involved rear end crashes in the left-most lane for following too closely to vehicles slowing to attempt left turns.
5. The vegetation along the northwest side of the intersection obstructs westbound traffic exiting the intersection from seeing the "Speed Limit 20 MPH" regulatory sign and the "Rotary Ahead" warning signs. These signs are important in this transition from a highway with higher speeds to one with lower speeds, coupled with access driveways to businesses and approaching a major intersection (Belmont Circle). The inability to see the signs increases the risk of rear end crashes and same direction sideswipes as drivers may not be aware of slowing vehicles ahead of them and may not stop in time or may perform sudden lane changing maneuvers.

Multimodal

6. It was identified that the signalized pedestrian crossing across Scenic Highway is not fully compliant with current MAAB/ADA requirements due the lack of a tactile warning panel on the curb ramp on the south side of the crossing. This condition may make the crossing more difficult for someone with a visual disability, as the detectable warning panel provides tactile guidance to users that they are about to enter the roadway.
7. It was identified that the pedestrian pushbuttons that activate the pedestrian phase for the signalized intersection have no accessibility features. Additionally, the location of the pushbutton on the northwest corner is not adjacent to the level landing of the ramp. These conditions may make the crossing more difficult for someone with a visual disability, as some pedestrians may have difficulty accessing the pushbutton. The accessible pedestrian push button features provide guidance on the button locations and when and where to cross.
8. The vegetation along the northeast side of the intersection encroaches onto the sidewalk. Letting the vegetation continue to overgrow onto the sidewalk may eventually reduce effective sidewalk widths below the regulatory minimum and may lead to pedestrians walking in the roadway, potentially resulting in additional pedestrian involved crashes.

Geometry and Operations

9. Along the north side of this segment, the Audit team noted vegetation may be encroaching on the intersection sight triangle between vehicles on the southbound Nightingale Pond Road approach and the Scenic Highway westbound approach. Limitations on the sight triangle reduces the intersection sight distance for the Scenic Highway westbound approach or for right-turning vehicles from Nightingale Pond Road, when making a turn on a red signal. Insufficient intersection sight distance increases the risks for vehicles entering insufficient gaps in traffic from Nightingale Pond Road to Scenic Highway or for Scenic Highway westbound vehicles to be able to stop for entering vehicles. These insufficiencies can increase the occurrences of rear end collisions (sudden stops or following too closely), sideswipe same direction (avoiding entering or stopped vehicles) or angle crashes (insufficient gaps).
10. It was noted by members of the Audit team that there were some instances of vehicles turning right from the left lane on Scenic Highway eastbound (Crashes #5 and #20). One possibility is that these crashes may have been due to larger vehicles entering the campground at Bourne Scenic Park needing more room to make the turn and using the left lane.
11. It was noted in the crash history that some crashes were caused by Scenic Highway eastbound U-turns or attempted U-turns (Crashes #4 and #25), potentially attempting to reverse direction to access the Speedway Gas Station and the Dunkin' Donuts/Starbucks coffee shops on the westbound side of the roadway. U-turns are currently prohibited at the intersection as posted on the Scenic Highway eastbound approach.
12. There is no dedicated left turn lane on the Scenic Highway eastbound approach to the intersection, despite notable left turning traffic on to Nightingale Pond Road. The protected left turn phase provided by the traffic signal is also relatively short in duration. The lack of a dedicated left turning lane can lead to rear end crashes (Crashes #7, #14, and #19) when through vehicles do not anticipate having to queue behind slowing or stopped vehicles making a left turn. Additionally, although there were no crashes recorded due to this issue, through vehicles in the left lane may swerve to avoid slowing or stopped left-turning vehicles, increasing the chances of same direction sideswipe collisions.
13. It was noted by local members of the Audit team that there are often crashes or near-misses between local traffic and regional, seasonal traffic through the Audit segment. Poor sign guidance, and overall unfamiliarity with the area can result in poor driver behaviors.

Speeding

14. It was noted that Scenic Highway approaching the intersection from the east has characteristics that lend itself to higher travel speeds approaching the signalized intersection with Nightingale Pond Road. The Audit team noted speed was a common contributing factor for vehicles approaching the intersection (Crashes #9, #11, #13, #18, and #23). Speeds that are too fast for weather conditions or Scenic Highway's design speed can increase the required reaction time and stopping distance for motorists. Sometimes vehicle queues form on the westbound approach to

the intersection and the back of this queue may not be seen with enough time to stop to avoid a crash, due to the higher travel speeds. The horizontal and vertical curvature of this segment can also impact the available sight distances to the queue vehicles on the westbound approach to the intersection.

Drainage

15. Members of the Audit team noted that the roadway's stormwater drainage system appeared to underperform in the Audit area, there was only one stormwater catch basin noted at the intersection (at the southeast corner). Local members of the Audit team identified this area as having insufficient drainage during rain events, such as ponding on the roadway during moderate rainfall.

Potential Enhancements

Traffic Signal Equipment

1. Consider evaluating and repairing if needed, the loop detectors on the left-most lane of the eastbound intersection approach so that vehicles waiting to make left turns will be appropriately detected by the traffic signal system. This may reduce the need for drivers to be aggressive and accept potentially unsafe gaps in the oncoming conflicting westbound traffic, reducing the risk of angle crashes involving eastbound left turns.
2. Evaluate improved signal timings and phasing at the intersection, including for potential overlapping non-conflicting movements or vehicle detection adjustments to improve operations at the intersection. One enhancement may be to consider allowing the right turn from Nightingale Pond Road to operate concurrently (overlap) with the protected left turn movement from Scenic Highway eastbound. This would be implemented while also prohibiting right turns on red from Nightingale Pond Road. Another measure to consider would be the implementation of a programmed delay time for the vehicle detection loops in the right turn lane on Nightingale Pond Road. This delay time may improve the efficiency of traffic operations as this measure may eliminate unnecessary green signal phase assignments to the side street. These enhancements provide a balance of enhancing operations of the signal while providing additional control of vehicles on Nightingale Pond Road at the intersection to enter Scenic Highway.
3. Evaluate the yellow and all-red clearance intervals at the intersection. Implementing traffic signal clearance intervals that conform to current standards may reduce the chances of sudden stops causing rear end collisions or angle crashes resulting from vehicles in the intersection when conflicting traffic is released.
4. Consider installing an emergency vehicle preemption system at the traffic signal system. Installing an emergency vehicle preemption system is expected to assist in clearing out vehicle queues on the approach in the direction of emergency vehicles responding to calls. This is expected to reduce the number of emergency vehicles and other vehicles entering the intersection while conflicting movements are occurring.

Traffic Signs

5. Consider installing additional traffic signs, such as “Traffic Signal Ahead” (eastbound) and lane use configuration signs, to provide additional information or direction to drivers in advance of the intersection. Preparing motorists with additional, pertinent information to inform decision-making prior to intersections may reduce collisions occurring from sudden stops (rear end collisions), turns (angle collisions), or lane changes (same-direction sideswipe collisions).
6. Evaluate clearing vegetation in select areas to increase visibility of the “Speed Limit 20 MPH” regulatory sign and “Rotary Ahead” warning sign along the north side of Scenic Highway, west of the intersection. Providing additional warning of the presence of a traffic signal for the Scenic Highway westbound approach may make drivers more aware of the potential for having to stop and consequently potentially reduce the incidents of rear end crashes associated with motorists’ behavior transitioning from a higher speed roadway with fewer driveways to a low-speed roadway with intersections and driveways.
7. The addition of wayfinding signs in advance of the Bourne Scenic Park entrance (Andy Oliva Drive) may also provide guidance to drivers in advance of the park entrance, so that eastbound vehicles can position themselves in the right lane to make a right turn into the park entrance. This measure may reduce crashes involving drivers turning right into the park from the left lane of Scenic Highway eastbound.

Multimodal

8. Consider updating curb ramps at the crosswalk to meet current MAAB/ADA standards. Fully accessible curb ramps improve accessibility of pedestrian accommodations along roadways for people with disabilities and is expected to improve safety and comfort for the community at the intersection and adjacent roadways.
9. Consider installing Accessible Pedestrian Signals (APS) pushbuttons, which are at accessible locations, at the existing pedestrian crossing across the west leg of the intersection. At the proposed crossing of the south leg of the intersection to be installed as part of the future Scenic Highway median project, APS pushbuttons and countdown pedestrian signal indications should be installed.
10. Consider clearing vegetation that is encroaching onto existing sidewalks along Scenic Highway and Nightingale Pond Road. Clearing vegetation from pedestrian sidewalks is expected to maintain compliance with minimum standards for accessible width for pedestrians. Keeping minimum accessible space on the sidewalks should reduce the risks of pedestrians entering the vehicular travel lanes through this segment.

Geometry and Operations

11. Evaluate clearing vegetation in select areas along the north side of Scenic Highway to increase visibility (sight distance) for southbound right turning vehicles from Nightingale Pond Road onto Scenic Highway westbound. Select clearing of vegetation will increase visibility for vehicles

making the right turn on red movement from the Nightingale Pond Road approach. This will decrease the risk of angle crashes, rear end, or sideswipe – same direction collisions.

12. Evaluate if the curb radius at the southwest corner of the intersection needs to be flattened to better accommodate larger turning vehicles. Providing sufficient turning radii at the corner for larger vehicles to make the turn is expected reduce the number of vehicles encroaching on adjacent travel lanes to the left in order to make the right turn.
13. Consider reconfiguring the Scenic Highway eastbound approach to the intersection to include a dedicated left turn lane in addition to its two through lanes. Adding a dedicated left turn lane may reduce rear end crashes by removing left turning vehicles from the through traffic stream by eliminating the sharing of the left lane by left turning and through traffic at the intersection, and potentially reducing sideswipe crashes involving through vehicles going around queued or stopped left turning vehicles. Allowing U-Turns from this dedicated left turn lane should be considered and may reduce U-Turn related crashes by providing a dedicated space in which to queue and wait for the opportunity to make the U-Turn. If adding an exclusive left turn lane is not feasible, evaluate reconfiguring the approach to include an exclusive left turn lane and a single shared through/right turn lane.
14. Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area. Separating the traffic could reduce congestion along this specific segment of Scenic Highway, reducing the risk of rear end, angle and same direction sideswipe crashes.

Speeding

15. Evaluate speed management techniques to mitigate the noted high speeds coming from the westbound approach to the intersection. Such techniques could include digital speed feedback signs and enforcement as well as median treatments to narrow the perceived cross section space and slow traffic. Lower speeds tend to reduce the severity of crashes. Lower speeds also reduce the necessary stopping and sight distances required for vehicles to stop or evade crashes with other vehicles. The median project to the east (MassDOT Project# 606082) includes the installation a signal actuation warning sign on this approach that may reduce the prevalence of these crashes. This sign is intended to actuate when the Scenic Highway phases of the signal is red (“Red Signal Ahead” messaging) to assist with approaching motorists to prepare to stop as they clear the horizontal, vertical, and vegetation encroachments of the sight distance to the intersection.

Drainage

16. The Audit team identified the adjacent MassDOT project along Scenic Highway east of the Audit area is planning on implementing roadway drainage improvements. The intersection should be considered for evaluation and implementation of drainage improvements. Improving stormwater drainage would reduce the risks of crashes resulting from standing water on the roadway.

Audit Site 3 – Sandwich Road at Sandwich Road Connector

Observations

Lighting

1. It was noted that there was only one overhead luminaire providing street lighting for the entire intersection, which is likely not enough street lighting, and is placed only across from the intersection itself, without enough light to illuminate oncoming approach traffic. Insufficient lighting makes it difficult for a driver's eyes to adjust to see properly at night and could lead to crashes (Crashes #8, #9, #12, #22, and #23).

Traffic Signs and Pavement Markings

2. It was observed that much of the existing traffic signs at the intersection may not be compliant with the current MUTCD, including requirements for retroreflectivity, sign mounting heights, and sign placement offsets from roadway. Non-compliant signs may increase confusion for motorists, particularly at an intersection, as not providing optimal visibility to motorists. Non-compliant or older signs may not provide the legibility or retroreflectivity as newer signs that provide clearer messages approaching the intersection.
3. It was observed that the pavement markings at this intersection were worn through the intersection. Worn pavement markings, in conjunction with the large footprint of the intersection noted above, can lead to unclear paths of travel or unclear stop and yield locations within the intersection, potentially causing confusion for drivers and may contribute to sudden stops or turning movements, increasing the risk of angle crashes.

Access Management

4. It was noted by the local members of the Audit team that the segment of Sandwich Road that passes underneath the Bourne Bridge and terminates at the intersection is often used to bypass the Bourne Rotary, as the rotary traffic operations frequently experience congested conditions due to its proximity to the Bourne Bridge. Sandwich Road is designated as local roadway whereas Sandwich Road Connector is designated as an arterial roadway.

Multimodal

5. No sidewalks or bike accommodations are provided on this segment of Sandwich Road. This puts those non-vehicular users who choose to walk or bike in the roadway along this segment at increased risk as they must share space with high-speed traffic. This was not seen in the crash data but was noted by several members of the Audit team.

Geometry and Operations

6. It was observed that vegetation on the northwest corner of the intersection limits the sightlines of vehicles making a left turn from Sandwich Road (at the STOP sign) onto Sandwich Road eastbound. The vegetation also obstructs the visibility of traffic signs at that corner. Vegetation obstructing left turning traffic's view of eastbound traffic on Sandwich Road Connector coming from the Bourne Rotary can cause vehicles making a left turn onto Sandwich Road to be unable to see conflicting traffic before entering the roadway, potentially contributing to Crashes #2, #8, #12, and #27.



Image 3: Signs obstruct sightlines to east, from stopped approach

7. It was noted that signs on both raised islands at the intersection were posted at heights obstructing the sightlines of vehicles (looking to the east). Obstructed sightlines reduce intersection sight distances necessary for stop-controlled vehicles to see and judge whether or not there are adequate gaps in oncoming traffic. Insufficient sight distances increase the risk of angle crashes between vehicles turning out of Sandwich Road southbound.
8. Vehicles queuing to make the left turn out of the stop-controlled approach of Sandwich Road on to Sandwich Road eastbound can obstruct the sightlines of vehicles attempting to make a right turn toward the Bourne Rotary, i.e. the right turning vehicle's view of westbound oncoming traffic may be blocked by these queues. Obstructed sightlines impede the ability of these stopped controlled vehicles from being able to assess if there are adequate gaps in mainline traffic in which to enter the roadway. This inability to assess gaps increases the risk of angle crashes between vehicles turning right out of Sandwich Road southbound.
9. It was noted during the Audit that westbound vehicles on the Sandwich Road Connector would queue hundreds of feet east from the Bourne Rotary, impacting the intersection with Sandwich Road. This queue of vehicles from the Bourne Rotary may block sight distance for vehicles attempting to turn left onto Sandwich Road from the stop-controlled approach, as the queued vehicles could block the view of oncoming eastbound traffic. This sight obstruction can make it difficult for traffic exiting the approach, as a driver whose sightline is obstructed would not be able to judge whether or not there are sufficient gaps in eastbound traffic in order to safely make a left turn into the intersection. These impacts to sight distances could contribute to crashes between vehicles turning left from the stop-controlled approach and eastbound through movements (Crashes #2, #8, #12, and #27).
10. At times, the queue of westbound traffic on the approach to the Bourne Rotary extends close to the Sandwich Road/Sandwich Road connector intersection. Sandwich Road westbound vehicles may not expect this stopped queued traffic, potentially resulting in sudden stops and an increase in the risk of rear end crashes.

11. During the Audit, it was noted that queued motorists on Sandwich Road westbound from the Bourne Rotary were allowing (i.e. courtesy hand waves) stop-controlled Sandwich Road southbound traffic to enter Sandwich Road, regardless of approaching Sandwich Road Connector eastbound vehicles. These “courtesy crashes”, where one vehicle stops to let a turning vehicle into mainline traffic, but the vehicle approaching in the adjacent lane cannot see around the westbound vehicle queue and crashes into the turning vehicle. These crashes are most likely to occur when the otherwise free-flowing westbound through movement at the intersection is congested, and drivers are more likely to allow side street traffic to enter the major roadway, creating the opportunity for a courtesy crash. These maneuvers can increase the risk of angle crashes between Sandwich Road Connector eastbound and Sandwich Road southbound vehicles, and avoidance maneuver related crashes (rear end or same direction sideswipe crashes).
12. It was noted that this segment of Sandwich Road does not have shoulders as wide as other segments of Sandwich Road. Lack of shoulder width at the intersection may result in a safety risk when there is a crash or emergency that occupies Sandwich Road or when a vehicle is disabled along Sandwich Road. There is no shoulder for vehicles to pull off the roadway to allow emergency vehicles to pass. The limited shoulder width could lead to more stormwater ponding in the travel lanes (gutter spread) rather than in the shoulder if that were available. Without a wider shoulder, there is little margin for even slight errant driving maneuvers at a relatively high speed (40 MPH) through this segment.
13. It was observed that the intersection has a relatively large, paved footprint. This large footprint, in conjunction with the sign deficiencies noted previously, can make the travel paths at the intersection unclear, which can confuse drivers and contribute to unexpected turning movements. Unexpected turning movements can increase the likelihood of angle crashes, the predominant crash type at this intersection. The large footprint may also encourage higher speeds while traveling through the intersection.
14. It was noted by the Audit team that the interaction between local traffic and regional, seasonal traffic regularly conflict through the Audit segment, either through reported crashes or near misses. Poor sign guidance, vegetation overgrowth, and overall unfamiliarity with the area can result in poor driver behaviors.

Speeding

15. The Audit team observed high prevailing travel speeds on this segment of Sandwich Road. High travel speeds, in addition to the high seasonal traffic volumes, can make it difficult for turning vehicles to find appropriate gaps in conflicting traffic, contributing to angle crashes.

Drainage

16. It was observed that there were indications of standing stormwater and other indications that stormwater may not be effectively drained from Sandwich Road when it is raining. During the Audit, it was noted that there was degradation along the edge of pavement along the south side of the intersection. It was noted there was a single catch basin along this gutter line. Stormwater that

does not drain from the roadway effectively could increase risk of single vehicle crashes as hydroplaning and/or reduced grip could increase the likelihood of crashes (Crashes #7, #10, #13, #24, and #25).

Potential Enhancements

Lighting

1. Evaluate the installation of additional street lighting, including at locations farther away from the center of the intersection, along the approaches. Increased street lighting will improve visibility for all traffic approaching the intersection in low-light conditions.

Traffic Signs and Pavement Markings

2. Consider improving the pavement markings at the intersection, with attention to providing narrower travel lanes and wider shoulders on the east (Sandwich Road) and west (Sandwich Road Connector) legs of the intersection. Improving pavement markings provides roadway users a more clearly defined paths of travel through the intersection. In addition, providing wider shoulders through restriping can improve pull-off space for disabled vehicles, emergency vehicle passage, and provide a bit more width for vehicles to correct themselves in order to maintain their lane. Improving definition of travel paths and increasing the margin of error for vehicles traveling through the intersection should reduce the risks of angle crashes between the major and minor street, as well as rear end crashes due to sudden stops or avoidance maneuvers.
3. Consider replacing and upgrading existing traffic signs at the intersection's approaches to be compliant with the current MUTCD, including requirements for retroreflectivity, sign mounting heights, and sign placement offsets from roadway. Compliant signs may reduce confusion for motorists by providing optimal visibility to motorists and clear guidance for navigating the intersection. Improving drivers' reactions and reducing confusion should reduce the risk of crashes caused by motorists unfamiliar with the intersection. Improving the visibility and placements of the signs should give motorists more time to make appropriate decisions and could result in less frequent sudden stops or sudden turning movements.
4. Evaluate relocating, resizing, and remounting the traffic signs on the raised islands within the intersection as to not obstruct the sight lines between the stop-control and free moving approaches, specifically where vehicles making a left turn from Sandwich Road (at the STOP sign) onto Sandwich Road eastbound. Improving sight lines should improve the ability to assess gaps for turning movements into Sandwich Road, with the potential to reduce angle crashes, the predominant crash type at this intersection.
5. Evaluate adding pavement markings to form two approach lanes, one exclusive left-turn lane and one exclusive right-turn lane, on Sandwich Road's stop-controlled approach. In addition, consider including staggered, separate stop lines located so that both lanes achieve the improved sight triangles to vehicles on the main roadway. This modification will formalize how motorists on this approach are currently operating in two lanes, with staggered stop lines potentially providing

better sight lines and improving the ability to assess gaps in traffic for turning vehicles. Improving drivers' ability to assess gaps has the potential to reduce angle crashes, the predominant crash type at this intersection.

Access Management

6. To improve the impacts due to local and regionally significant traffic interacting on the local roadways diverting from congested areas, consider providing Intelligent Transportation System (ITS) solutions, including real-time travel time message signs displaying travel times regionally between the Bourne Bridge and Sagamore Bridge. This suggestion would be consistent with the installations elsewhere in the region to provide traffic information to drivers to self-divert ahead of Bourne Rotary or Sandwich Road on other State roadways, if possible, and reduce the vehicles entering local roads, like Sandwich Road underneath the Bourne Bridge.
7. The operations of the Bourne Rotary and its feeder roadways, including Sandwich Road Connector, should be evaluated, and considered for operational improvements. Improving operations through the Bourne Rotary should make using Sandwich Road Connector a preferred route through this area and relieve the local roads, such as Sandwich Road underneath the bridge, of more traffic volumes than was originally intended to accommodate.

Multimodal

8. Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor. Providing dedicated bicycle and pedestrian facilities is expected to encourage pedestrians and bicyclists to use these facilities instead of using the roadway, potentially reducing the risk of conflicts between vehicles, bicycles and pedestrians along Sandwich Road.

Geometry and Operations

9. Suggest clearing vegetation on the northwest corner to improve visibility for left turning vehicles out of Sandwich Road (from the STOP controlled approach) and to improve the visibility of the signs on that corner. Clearing vegetation is expected to allow for vehicles entering the roadway to better see conflicting eastbound traffic on Sandwich Road Connector and assess whether there are sufficient gaps in which to enter the roadway, allowing drivers better sightlines before entering the intersection, potentially decreasing the risk of angle crashes.
10. Evaluate geometric changes to the intersection including closing the channelized westbound right turn lane and narrowing the lanes at the approaches to create something closer to a conventional "T" intersection. These geometric changes have the potential to improve the safety of the intersection by requiring westbound right turn movements to make a slower speed conventional right-angle turn, and by reducing potential conflict points for some turning movements.
11. Evaluate converting the intersection to allow only right turns into and out of the north leg of the intersection (Sandwich Road). By eliminating left turns onto Sandwich Road eastbound from the stop-control approach and left turns from the Sandwich Road Connector onto Sandwich Road

westbound, instances of left-turning movements conflicting with oncoming traffic will be eliminated. The evaluation of this alternative would need to review the redistribution of traffic that will result from this modification and its impacts to nearby intersections.

12. Consider adding a free right turn onto Sandwich Road Connector westbound from Sandwich Road southbound. Sandwich Road Connector would be provided an acceleration lane towards the Rotary due to the uphill grades that would cause slow acceleration and to potentially eliminate conflict points at the intersection, as right turning vehicles would not have to wait for gaps in traffic currently utilizing one travel lane.
13. Evaluate the alternative intersection control of a traffic signal system (pending evaluation of signal warrants). Providing signal control to the intersection may lower speeds and reduce the severity of crashes. Providing this alternative control may also improve the operations and safety of the turning movements into and out of the intersecting driveway and roadways. Improving the operations and safety for turning movements at the intersection should reduce the risk of angle crashes between turning vehicles or rear end crashes caused by sudden stops and following too closely.
14. Evaluate the alternative intersection control of a modern roundabout. Providing alternative control to the intersection may lower speeds and reduce the severity of crashes. Providing this alternative control may improve the operations and safety of the turning movements into and out of the intersecting driveways and roadways. Improving the operations and safety for turning movements at the intersection should reduce the risk of angle crashes between turning vehicles or rear end crashes caused by sudden stops and following too closely. It was also suggested to consider realigning the driveway to the Upper Cape Cod Regional Technical School to meet the Sandwich Road/Sandwich Road Connector intersection. This realignment, in conjunction with implementation of alternative intersection control (traffic signal or roundabout), may reduce opportunities for crashes as the number of conflict points would be reduced through consolidating the intersections and changing the intersection controls should reduce the risks of angle and rear end crashes.
15. Consider widening the shoulders along Sandwich Road and Sandwich Road Connector through the Audit area to be consistent with other sections of Sandwich Road with wider shoulders. Wider shoulder widths on these roadways may improve traffic safety by allowing for a margin of error for vehicles to maintain their travel lanes. Wider shoulders may also help during incidents, such as disabled vehicles or emergency vehicle passage.
16. Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area. Separating the traffic could reduce congestion along this specific segment of Sandwich Road, reducing the risk of rear end, angle, and same direction sideswipe collisions.

Speeding

17. Several of the considerations listed above, including reducing the travel lanes widths and improving signing and pavement markings, should influence motorists to reduce speeds through the intersection. Additionally, consider the implementation of real-time speed feedback signs and increased enforcement, to reduce speeds through the segment. Reducing speeds generally reduces the severity of crashes.

Drainage

18. Evaluate drainage at and approaching the intersection and consider improvements, such as additional catch basins, curbing, and roadway grade adjustment. Implementing drainage improvements may more effectively remove water from roadways, leading to less ponding that can cause vehicles to hydroplane, leading to single vehicle crashes from loss of control, or sideswipe crashes from vehicles swerving to avoid standing stormwater. Managing stormwater can lead to less degradation of the roadway and extending the life of pavement and pavement markings.

Audit Site 4 – Sandwich Road at Upper Cape Cod Regional Technical School

Observations

Traffic Signal Equipment

1. It was noted by members of the Audit team that the current location of the post-mounted flashing beacon at this intersection is not the ideal location for it to be seen by drivers. It is located at one corner of the intersection, adjacent to the larger lighted Upper Cape Cod Regional Technical School sign. Lack of awareness of the presence of this intersection may contribute to rear-end crashes (Crashes #4, #5, and #8).



Image 4: Beacons at the intersection with the School Driveway

Multimodal

2. No sidewalks or bike accommodations are present on this segment of Sandwich Road. This puts those non-vehicular users who choose to walk or bike in the roadway along this segment at increased risk as they must share space with high-speed traffic. This was not seen in the crash data but was noted by several members of the Audit team.

Geometry and Operations

3. It was noted that heavy volumes on Sandwich Road cause excessive delays to vehicles attempting to exit the School driveway. Excessive delays and queues can result in motorists exiting the school driveway aggressively, attempting to enter Sandwich Road in smaller gaps in traffic.

Attempting to enter the uncontrolled roadway in smaller gaps of traffic may increase the risk of angle crashes between Sandwich Road and School driveway movements or rear end crashes on Sandwich Road caused by sudden stops. Of the nine crashes evaluated at the intersection, four crashes were angle crashes (Crashes #2, #3, #6, and #7) that included descriptions in their crash reports of vehicles failing to yield to vehicles on Sandwich Road. Four of the remaining five identified crashes evaluated at the intersection included one rear end crash at the School driveway (Crash #9) and three rear end crashes on Sandwich Road eastbound (Crashes #4, #5, and #8) due to slowing traffic and following too closely.

4. It was noted that the traffic volumes during the day are significantly concentrated during school opening times in the morning and release times in the afternoon. Local Audit team members identified that police details are needed during school release periods and during special events at the School. It was noted that these daily periods of heavy volumes can lead to excessive delays for all approaches due to the volumes exceeding the capacity of the intersection. Excessive delays and congested operations can increase the chances of rear end crashes due to following too closely. As gaps in traffic are limited, aggressive drivers may be entering gaps that are too small and increasing the risk of collisions during periods in which police details are not controlling traffic.
5. It was noted that the driveway is located on a horizontal curve along Sandwich Road, and that the curve could limit sight distance at the driveway for westbound vehicles. This limitation could contribute to crashes such as Crash #6, involving a westbound vehicle crash with a vehicle exiting the driveway.

Speeding

6. It was noted by some local members of the Audit team that vehicle speeds were typically higher than the posted speed limit through the intersection. High speeds can make it difficult for a vehicle on the school driveway to find a gap, resulting in potential aggressive driver behavior, such as accepting a smaller gap that could result in a crash. The horizontal curve on Sandwich Road on this segment can also limit the available sight distances to vehicles.

Potential Enhancements

Traffic Signal Equipment

1. Evaluate the potential relocation of the existing flashing beacon at the intersection or installing a new overhead flashing beacon at the intersection. A more visible location for the beacon at the intersection could provide more warning of the potential for entering traffic at the intersection for drivers on Sandwich Road, increasing awareness of potential conflicting traffic and may reduce the incidence of angle crashes at the intersection.

Multimodal

2. Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor. Providing dedicated bicycle and pedestrian facilities is expected to encourage pedestrians and bicyclists to use these facilities instead of using the roadway, potentially reducing the risk of conflicts between vehicles, bicycles and pedestrians along Sandwich Road.

Geometry and Operations

3. Evaluate the alternative intersection control of a traffic signal system (pending evaluation of signal warrants). Providing this alternative control may reduce the risk of angle crashes between turning vehicles.
4. Evaluate the alternative intersection control of a modern roundabout. Modern roundabouts may lower speeds and reduce the severity of crashes. Providing this alternative control may reduce the risk of angle crashes between turning vehicles.
5. Evaluate clearing vegetation along the north side of Sandwich Road through this Audit segment. Clearing vegetation may improve motorists' sight line to the existing flashing beacons in addition to providing improved sightlines to the driveway. Controlling the vegetation along the north side of Sandwich Road should also improve the visibility to the existing advanced intersection warning sign for Sandwich Road westbound. Improving sightlines may allow for drivers exiting the driveway to better judge acceptable gaps in Sandwich Road traffic before entering. Improving sightlines to the flashing beacon and advance warning sign is expected to provide advance warning to Sandwich Road drivers of the impending intersection at the school so that they will be aware for the potential of conflicting traffic entering the roadway.
6. Evaluate an alternate location for the school driveway as a long-term improvement in coordination between the School, Town of Bourne and MassDOT. One such relocation proposal could consist of relocating the school driveway to access/egress the site from another regionally significant roadway (General MacArthur Highway / Massachusetts Route 28, for example). Another relocation proposal would relocate the school driveway along Sandwich Road at an improved intersection along Sandwich Road. In either scenario, the goal would be to locate the driveway at a place where sight distances and volume distribution may be improved. Some Audit participants suggested evaluating and coordinating with abutting landowners along Sandwich Road regarding relocating the School Driveway to the intersection of Sandwich Road and Sandwich Road Connector.

Speeding

7. Evaluate the warrants for establishment of a school speed zone on Sandwich Road in the area of the intersection, potentially using dynamic signs and additional advanced warning. Reducing speeds on Sandwich Road should reduce the severity of crashes and reduce the sight and stopping distances required by approaching traffic and for exiting School driveway traffic to enter Sandwich Road.

Audit Site 5 – Sandwich Road, in the area of Gallo Arena, Harbor Lights Road, and Weatherdeck Drive

Observations

Lighting

1. It was noted that there was not sufficient street lighting at this location. Insufficient street lighting, particularly in areas with unsignalized entrances and exits, can contribute to reduced visibility for drivers and can result in driveway crashes. In review of the crash analysis for this observation, 24 percent of the crashes were associated with dark and unlit conditions (Crashes #7, #10, #14, #15, and #21) 14 percent of crashes were associated with dawn conditions (Crashes #3, #4, #13), and five percent of crashes were associated with dusk conditions (Crash #20).



Image 5: Vegetation was observed obstructing sightlines to the entrance to Gallo Arena

Traffic Signs and Pavement Markings

2. It was noted that there are no intersection warning signs on Sandwich Road along the segment or a street name sign at Harbor Lights Road to indicate the location of driveways and streets. This could cause rear end crashes as vehicles approaching the segment may stop suddenly to turn into the side streets or stop for vehicles that are turning (Crashes #1, #2, #4, #9, #13, #14, #16, #17, and #20).
3. It was noted that there were no STOP signs or stop lines present for either Weatherdeck Drive or Harbor Lights Road at their intersection with Sandwich Road. Without STOP signs or stop lines to indicate where side street traffic is expected to stop, drivers from these approaches may not be able to recognize that they need to stop before entering Sandwich Road, particularly in low-light conditions or during periods of low visibility due to weather conditions (rain, fog, snow). Entering Sandwich Road without stopping could lead to angle crashes.
4. It was noted there is a lack of consistency in the breaks provided in the painted double yellow roadway centerline to indicate the points along Sandwich Road where traffic may be crossing over the centerline, at intersections and driveways through the segment. A break in the centerline is provided at the intersection with Weatherdeck Drive; however no centerline breaks are provided for the intersection with Harbor Lights Road or the driveways at Gallo Arena. Inconsistencies in the application of centerline breaks, especially over short roadway segments, impact drivers' expectations of locations where traffic may be entering from side streets or the location at which to turn into side streets. Not having breaks in the centerline markings may cause confusion for drivers as to where they are required to stop and turn for their respective destinations and may result in rear-end type crashes caused by sudden stops.

Access Management

5. The existing access to the Gallo Arena site is provided by two separate driveways approximately 475 feet apart along Sandwich Road, with the entrance driveway to the west and the exit driveway to the east. These driveways are “T” intersections on Sandwich Road offset from the “T” intersections of Harbor Lights Road and Weatherdeck Drive. This amounts to four separate intersections in under 500 feet along Sandwich Road. With so many intersecting roadways in a short segment, drivers may be confused in locating their intended destination, increasing the risk of angle crashes from the quantity of conflicting turning movements (Crashes #11 and #18) and rear end crashes from sudden stops (Crashes #1, #2, #4, #5, #9, #13, #14, #16, #17, and #20).

Multimodal

6. No sidewalks or bike accommodations are provided on this segment of Sandwich Road. This puts those non-vehicular users who choose to walk or bike in the roadway along this segment at increased risk as they must share space with high-speed traffic. This was not seen in the crash data but was noted by several members of the Audit team.

Geometry and Operations

7. During the audit, it was identified that the Sandwich Road cross section in this segment has narrower lanes and shoulders than other segments of the Sandwich Road corridor. The combination of narrow lanes and narrow shoulders, especially on two-lane, higher speed (40+ MPH) roadways, may increase the risk for sideswipe crashes due to the low margin for error available to vehicles in the travel way. Sideswipe crashes in the same direction occur when vehicles cross over the centerline or edge of travel way line when through vehicles are attempting to avoid stopped left-turning or right-turning vehicles in front of them. Sideswipe crashes in the opposite direction typically occur during similar attempts to avoid slowing/turning vehicles, but motorists instead will attempt to pass these turning vehicles by driving over on the opposite side of the centerline. The crash history of this segment of Sandwich Road showed that there were several sideswipe crashes, both same direction (Crashes #8 and #10) and opposite direction (Crashes #6 and #21).
8. The narrow lanes and shoulders also result in minimal width available for vehicles attempting to pass vehicles stopped in the roadway (waiting to turn). Rear end crashes occur when vehicles continuing along the major roadway fail to stop or slow down appropriately for turning vehicles (Crashes #9, #14, and #18). Avoidance of vehicles attempting to make turns from Sandwich Road may have also been contributing factors for the sideswipe crashes, both same direction (Crashes #8 and #10).
9. It was noted that vegetation adjacent to the Gallo Arena Entrance Drive obstructs the view of the driveway from Sandwich Road eastbound approaching the driveway - eastbound vehicles who are trying to enter the arena cannot see the driveway is there until they are almost past it. This can lead to rear end crashes as vehicles stop suddenly to turn (Crash #1).

10. It was also noted that the vertical curve on Sandwich Road to the east of this segment may be limiting sight distance to the Gallo Arena driveways, as vehicles approaching the segment from the east are unable to see the intersections at the bottom of the curve. This could contribute to angle crashes, due to a lack of sight distance, or rear-end crashes involving westbound vehicles (Crashes #2, #4, #9, and #14) due to sudden stops and following too closely.

Speeding

11. It was noted by some local members of the Audit team that vehicle speeds were typically higher than the posted speeds through this segment. High speeds can make it difficult for a vehicle stopped on the minor streets to judge gaps, thus increasing the risk and severity of crashes that occur when they misjudge gaps and enter into traffic. These conditions may contribute to angle crashes (Crashes #11 and #18) and can make it more difficult for vehicles to stop if they are following the car ahead of them too closely, contributing to rear-end crashes (Crashes #1, #4, #5, #9, #13, #14, #16, and #20).

Potential Enhancements

Lighting

1. Consider additional roadway lighting, particularly near the intersections at Harbor Lights Road and Weatherdeck Drive. Additional roadway lighting will improve visibility at night and prevent collisions in low lighting conditions, a notable occurrence at this location.

Traffic Signs and Pavement Markings

2. Consider installing intersection warning signs along Sandwich Road approaching the segment. This will increase driver awareness of the presence of the approaching driveway/intersection area, with the potential to reduce rear end and angle crashes, as drivers may be more prepared for other vehicles turning into and out of the driveways.
3. Consider installing STOP signs and painting stop lines on the Weatherdeck Drive and Harbor Lights Road approaches at their respective intersections with Sandwich Road. Supplementing these improvements with improved lighting as described previously should improve visibility of these intersections and to the pavement markings and signing associated with the side streets. Increasing the visibility of the locations at which side street vehicles should stop before entering the intersection should reduce the number of drivers entering the intersection without stopping, which could lead to fewer right-angle crashes.
4. Consider changes to the double yellow centerline pavement markings on Sandwich Road to include breaks to indicate points at which traffic may enter or exit Sandwich Road, at intersections and the Gallo Arena driveways. Including breaks along the centerline consistently through this segment is expected to assist drivers on Sandwich Road to better identify the location of the approaching intersections and driveways. Providing clearer indications of the location of

driveways and side streets may reduce confusion of where motorists are required to turn for their respective destinations and may reduce rear-end type crashes caused by sudden stops.

Access Management

5. Evaluate access management for the Gallo Arena driveways, including reversing entrance and exit configurations in the short term. Evaluate consolidating driveway and intersection access points in the long term. If two driveways for Gallo Arena site are desirable, consider aligning these driveways to create four-leg intersections with Harbor Lights Road and Weatherdeck Drive to reduce potential conflict points. If a single driveway for Gallo Arena is desired, this driveway may be consolidated into a four-way intersection with Harbor Lights Road or Weatherdeck Drive. Overall, consolidating access driveways or intersecting roadways over the relatively short segment would reduce the number of conflict points over the four intersections along this short segment. Reducing the conflict points of the segments should reduce the risk of angle crashes due to conflicting movements or rear end crashes due to sudden stops and following too closely.
6. Evaluate the feasibility of combining Weatherdeck Drive and Harbor Lights Road into a single roadway prior to their intersection with Sandwich Road. Overall, consolidating access driveways or intersecting roadways over the relatively short segment would reduce the number of conflict points over the four intersections along this short segment. Reducing the conflict points of the segments should reduce the risk of angle crashes due to conflicting movements or rear end crashes due to sudden stops and following too closely.

Multimodal

7. Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor. Providing dedicated bicycle and pedestrian facilities is expected to encourage pedestrians and bicyclists to use these facilities instead of using the roadway, potentially reducing the risk of conflicts between vehicles, bicycles and pedestrians along Sandwich Road.

Geometry and Operations

8. Consider the installation of sinusoidal centerline rumble strips to prevent sideswipe crashes in opposing directions. Sinusoidal centerline rumble strips, which are inlaid into the pavement surface along the double yellow centerline, can alert drivers that they have crossed into the opposing travel lane, and can reduce the risk of head on and opposite direction sideswipe crashes without making excessive noise (that a typical rumble strip might make) that would impact abutting properties.
9. Evaluate the feasibility of installing a two-way left turn lane on this segment of Sandwich Road to separate traffic turning left from through traffic on Sandwich Road. A two-way left turn lane has the potential to reduce same direction sideswipe and rear end crashes, as it allows left turning vehicles a space to stop and queue separated from vehicles continuing through the roadway segment.

10. Evaluate the feasibility of upgrading the pavement cross section to provide wider shoulder width or deceleration lanes and tapers for right-turning vehicles. Moving right-turning vehicles out of the through travel lanes may reduce the risk of rear end crashes from sudden stops and following too closely through this segment.
11. Evaluate the alternative intersection control of a traffic signal system (pending evaluation of signal warrants). Providing this alternative control may also reduce the risk of angle crashes between turning vehicles .
12. Evaluate the alternative intersection control of a modern roundabout. Modern roundabouts may lower speeds and reduce the severity of crashes. Providing this alternative control may reduce the risk of angle crashes between turning vehicles.
13. Evaluate clearing vegetation to ensure visibility for vehicles entering the Arena from Sandwich Road. Clearing vegetation will make it easier for vehicles entering the site from the west to see the entrance, reducing the risk of rear end crashes from sudden stops to turn, and sideswipe crashes from vehicles attempting to go around stopped turning vehicles.

Audit Site 6 – Sandwich Road in the vicinity of the Midway Recreation Area

Observations

Access Management

1. It was noted that speeds on Sandwich Road makes it difficult for drivers entering from driveways to judge gaps in traffic to enter Sandwich Road. The difficulty of judging gaps in traffic can make drivers willing to accept shorter gaps in order to enter the main roadway, leading to potential angle crashes. This issue was not seen in the crash data specific to this location, but to the entire segment of Sandwich Road in this area and was expressed by members of the Audit team.



Image 6: Lack of “No Parking” signs on Sandwich Road leads to parking along the road

2. It was observed that vehicles were parked in gravel areas outside the shoulder along the north side of Sandwich Road and at the access driveways to the Canal Service Road. It was noted that people park in these areas and walk to the Canal to engage in recreational activities (fishing, biking, etc.). The Audit team identified that there were no signs prohibiting parking in these areas. Unauthorized parking along the roadside increases the number of potential conflict points along Sandwich Road as vehicles leave the areas used for unauthorized parking along Sandwich Road. These frequent conflict points cannot be easily anticipated by drivers on Sandwich Road and increase the risks of angle crashes or rear end crashes due to sudden stops along Sandwich Road (noted for Crashes #2 and #5).

Multimodal

3. No sidewalks or bike accommodations are provided on this segment of Sandwich Road. This puts those non-vehicular users who choose to walk or bike along this segment at increased risk as they must share space with high-speed traffic. This was not seen in the crash data but was noted by several members of the Audit team.

Geometry and Operations

4. During the audit, it was identified that the Sandwich Road cross section in this segment has narrower lanes and shoulders than other segments of the Sandwich Road corridor. The combination of narrow lanes and narrow shoulders, especially on two-lane, higher speed (40+ MPH) roadways, may increase the risk for sideswipe crashes due to the low margin for error available to vehicles in the travel way. It was noted in the crash data that there is a history of same direction sideswipe crashes along Sandwich Road in the area (Crash #4).

Potential Enhancements

Access Management

1. Consider speed management measures to counter speeding on the segment, including speed feedback signs and additional enforcement. Lower speeds tend to reduce the severity of crashes. Lower speeds also reduce the necessary stopping sight distances required for vehicles to stop.
2. Consider the installation of traffic signs prohibiting parking along both sides of Sandwich Road, which would notify motorists that parking is prohibited. Enforcement of the parking restrictions should also be considered. By reinforcing that parking is not allowed along the roadway, less conflicts would occur between Sandwich Road vehicles and parked/parking vehicles entering and exiting the shoulders and the access driveways. This applies to the entirety of the Sandwich Road segment between the Bourne Bridge and Sagamore Bridge.
3. Evaluate the Audit section of Sandwich Road for the potential establishment of parking spaces or surface parking lots with established driveways for the public, located along the north side of Sandwich Road. Providing designated driveways to parking lots and parking spaces along the Audit segment should reduce the risk of angle crashes due to vehicles misjudging gaps in Sandwich Road traffic and rear end crashes due to sudden stops from the previously unexpected turning movements into and out of the unauthorized parking areas. Given the demand for parking along this segment of Sandwich Road for alternative access to the Cape Cod Canal Bikeway and access to the Cape Cod Canal for other recreation opportunities, including fishing, the Audit team believed it is worth further exploration to accommodate parking in a safe and formalized manner in combination with enhancing pedestrian and bicycle access between Sandwich Road and the Cape Cod Canal. Although Sandwich Road through this section is under MassDOT jurisdiction, the study and design of potential parking locations would require coordination amongst other stakeholders for the area, including the Town of Bourne, U.S. Army Corps of Engineers, and Mass Coastal Railroad.

Multimodal

4. Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor. Providing dedicated bicycle and pedestrian facilities is expected to encourage pedestrians and bicyclists to use these facilities instead of using the roadway, potentially reducing the risk of conflicts between vehicles, bicycles, and pedestrians along Sandwich Road.

Geometry and Operations

5. Consider the installation of sinusoidal centerline rumble strips to reduce the risk of sideswipe crashes in opposing directions. Centerline rumble strips can alert drivers that they have crossed into the opposing travel lane, reducing the risk of head on and opposite direction sideswipes without making excessive noise that would impact the abutting properties.

Audit Site 7 – Cranberry Highway, between U.S. Route 6 Westbound Exit 55 and east of Adams Street

This intersection was reconfigured in 2015, converting Adams Street from a two-way roadway to a one-way roadway southbound (towards the intersection). This change precedes the date range of the crash reports evaluated as part of this RSA.



Image 7: Adams Street SB Single wide lane approach operates as two lanes

Observations

Lighting

1. It was noted by Audit team members that there was a lack of street lighting in the area. Non-uniform street lighting can make it difficult for a driver's eyes to adjust to see properly at night and maintain motorists' sight distances and expectations along the roadway, particularly with the presence of intersections with other public roadways and the driveways along Cranberry Highway. There have been several crashes in the record (Crashes #1, #4, #8, #10, #13, and #17) noted to have occurred during periods of low light.

Traffic Signs and Pavement Markings

2. The Audit team noted that some of the pavement markings were worn, which can affect the delineation of the travel lanes on Cranberry Highway. Poor delineation of lanes can contribute to same direction sideswipe crashes (Crashes #2, #6, #9, #11, and #12) or opposite direction sideswipe crashes.
3. The Audit team noted that the existing traffic signs at the intersection, including the existing STOP signs, "Dead End" warning sign (south leg), and "One Way" signs (north leg) were found to not meet MUTCD compliance for mounting height and locations at the intersection. The intersection also was missing intersection warning signs along Cranberry Highway from both approaches. Missing signs or signs not meeting current standards for legibility and visibility provide less guidance for roadway users on direction or operations of the roadways.
4. The Audit team noted that as vehicles approach the on-ramp from Cranberry Highway to U.S. Route 6, the roadway transitions from two travel lanes to one travel lane with no warning signs to indicate this change. Lane drops without advanced warning can increase the risk of same direction sideswipe collisions for vehicles merging into the single lane for the on-ramp.
5. In addition, with the proximity of the lane drop to intersections where vehicles are entering from side streets, rear end crashes can occur for vehicles unable to avoid vehicles entering Cranberry Highway. Crash #15 is an example of a vehicle accelerating from a stop at Adams Street being

rear-ended by a vehicle from Cranberry Highway westbound was unable to avoid or stop before the collision with the accelerating vehicle.

Access Management

6. Members of the Audit team noted that there are access points to a service road that runs parallel to Cranberry Highway, west of the intersection. The service road provides access to properties northwest of the intersection, including to the Christmas Tree Shops site. There are two access points to the service road (one off Cranberry Highway and one off Adams Street) that are immediately adjacent to the intersection of Cranberry Highway and Adams Street. Too many curb cuts over a short distance and near an intersection provides many conflict points for movements through the section and may increase the risk of angle crashes.
7. It was noted by local members of the Audit team that there are often crashes or near-misses between local traffic and regional, seasonal traffic through the Audit segment. Poor sign guidance, and overall unfamiliarity with the area can lead to poor driver behaviors contributing to crashes.

Multimodal

8. Pedestrians and bicyclists are provided access between the Cranberry Highway and Sandwich Road corridors via Adams Street with a sidewalk and a southbound bicycle lane, both located on the east side of the street. Both facilities end at the intersection and are not continued along Cranberry Highway or crossing onto the south leg of Adams Street. Not continuing the pedestrian or bicycle network along Cranberry Highway increases the likelihood that pedestrians or bicyclists will use the roadway, and this increases the risk of pedestrian and bicycle crashes with vehicles in the Audit segment.
9. It was noted by members of the Audit team that there are no sidewalks, crosswalks, or bicycle lanes on Cranberry Highway in the area of the intersection. To continue along Cranberry Highway, these users might have to share space with four lanes of vehicular traffic. Pedestrian or bicycle involved crashes were not observed in the crash reporting, however past near misses between these users and vehicles were noted by the local members of the Audit team. A pedestrian was observed crossing the Cranberry Highway lanes during the Audit. The lack of infrastructure to separate pedestrians and bicyclists from vehicular traffic increases the risks of crashes amongst the different users.

Geometry and Operations

10. It was noted that sightlines between Adams Street southbound approach vehicles and vehicles in the Cranberry Highway westbound travel lanes were impacted by multiple obstructions and the horizontal curve on Cranberry Highway. One common obstruction was parked vehicles at the adjacent Canal Café (located on the northeast corner of the intersection) which can obstruct sightlines for vehicles exiting Adams Street onto Cranberry Highway, resulting in insufficient visibility between vehicles stopped on Adams Street southbound and vehicles approaching the

intersection from Cranberry Highway westbound. It was noted in the field that, the restaurant building itself could also be an obstruction for vehicles exiting Adams Street onto Cranberry Highway. Vehicles on Adams Street are not able to identify oncoming westbound traffic and affected the ability to judge gaps in the oncoming traffic. These issues with sight lines contribute to angle crashes, such as Crashes #10 and #14.

11. The Audit team noted the proximity of the Marconi Street/Cranberry Highway intersection to the U.S. Route 6 Westbound Exit 55 ramps. Marconi Street is a two-way residential street that intersects Cranberry Highway right where the Route 6 westbound off ramp discharges onto Cranberry Highway. Although traffic volumes from Marconi Street are low, there are poor sightlines for traffic exiting Marconi Street onto Cranberry Highway due to the horizontal curve of the Exit 55 Westbound Off-Ramp in combination with the speeds at which vehicles using the off-ramp. The limited visibility between the Off-Ramp and Marconi Street can lead to angle crashes involving exiting vehicles (Crash #7).
12. The Audit team noted that, although Adams Street southbound has a single wide approach lane to the intersection with Cranberry Highway, the width of the Adams Street approach is such that vehicles were observed to form two separate lanes: one for left-turning or through movements and one for right-turning movements. There is no matching lane use traffic signs or pavement marking to support this behavior, and this behavior was inconsistent by motorists during observations of the intersection. The vehicles queuing alongside each other may impact the others' sightlines increasing the difficulty for vehicles entering Cranberry Highway to judge gaps in traffic. Inability to judge gaps in traffic can contribute to rear end (Crash #3) and angle (Crashes #1, #10, #13, and #14).
13. Vehicles entering Cranberry Highway may have insufficient gaps in which to enter, due to high travel speeds in relation to the sight distance available on Cranberry Highway. Vehicles entering the intersection with insufficient gaps may increase the risk of angle crashes (Crashes #10 and #14) as well as rear end crashes from "false starts" (Crash #3). These "false starts" are incidents where vehicles attempting to enter Cranberry Highway suddenly stop the attempt and are impacted by a rear end crash by the following vehicle on the side street.
14. The Audit team observed that the cross section of Cranberry Highway was very wide (two travel lanes in each direction separated by a painted double yellow centerline), even with relatively low traffic volumes observed. For Cranberry Highway eastbound from U.S. Route 6, the crash data for the Audit segment identified five crashes related to same-direction sideswipe collisions (Crashes #2, #6, #9, #11, and #12) and an angle crash related to a vehicle in the leftmost eastbound lane attempting to turn right into a driveway and colliding with a vehicle in the rightmost eastbound lane (Crash #8). The intersections of Cranberry Highway with Adams Street and Marconi Street adjacent to the On-Ramp and Off-Ramp of U.S. Route 6 represents conflict points requiring drivers' attention in a relatively short segment.
15. The Audit team observed that some improvements were made to the north leg of the intersection of Cranberry Highway at Adams Street as part of the change in operations from two-way

operations of this leg to southbound-only / exit-only. These improvements included pavement markings and stop lines and signs reinforcing the one-way travel pattern on Adams Street. Concrete blocks are used within the paved roadway, presumably as a measure to reduce the width of the throat of Adams Street in an attempt to discourage vehicles turning into the southbound-only / exit-only approach leg of Adams Street. However, the pavement of the leg is still wide, and this could lead to head-on crashes (Crashes #1 and #13) if a driver still observing the existing curb lines and previous operations of the intersection. Crash #4 involved a vehicle that had entered the wrong way of the north leg of Adams Street and contributed to an angle crash with a Cranberry Highway westbound vehicle.

16. The Audit team observed that concrete blocks are used within the paved roadway, as noted above. The concrete blocks did not appear to be of a design where they provided deflection to keep vehicles from overturning nor did they have any impact attenuators to minimize the impact to a vehicle, if struck. When these blocks are impacted by an errant vehicle, they may cause increased damage to the impacting vehicle.

Potential Enhancements

Lighting

1. Evaluate lighting coverage at the intersection for compliance with current standards and the potential improvements that may be required to improve visibility at the intersection and surrounding approaches. Improving visibility at the intersection should reduce the risk of crashes occurring during low-light conditions.

Traffic Signs and Pavement Markings

2. Consider updating pavement markings to provide better lane delineation and visibility of intended travel ways along Cranberry Highway. Improving pavement marking conditions may improve motorists' compliance of maintaining their lanes and reduce the chances of sideswipe crashes.
3. Consider improving existing signs that do not comply with the current MUTCD, including the signs at the intersection of Cranberry Highway with Adams Street that are found to not meet minimum mounting heights or locations adjacent to the roadway or travel ways. Also provide new advanced signing, including warning, regulatory, and lane use, for the approaches of Cranberry Highway to the intersection with Adams Street. Improved and additional signing approaching the intersection should provide clearer messaging of the operations of the intersection and alert drivers on Cranberry Highway of the potential for traffic exiting from Adams Street.
4. Consider providing warning signs and associated pavement markings on Cranberry Highway westbound to appropriately control the lane reduction on Cranberry Highway (from two westbound lanes to one westbound lane), which occurs in the vicinity of Adams Street. Warning signs and pavement markings provide control of the lane reduction, which in turn could

potentially lead to more orderly merging of vehicles, potentially reducing sudden stops causing rear end crashes or reducing sideswipes crashes.

Access Management

5. Evaluate ways to improve access to the service road parallel to Cranberry Highway, which provides access to the Christmas Tree Shops and other properties, as part of any future (short/mid/long term) improvements at the intersection. Improvements to access can lead to more orderly operations on Cranberry Highway near Adams Street and can in turn lead to fewer angle or rear-end type crashes.
6. Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area. Separating the traffic could reduce congestion along this specific segment of Cranberry Highway and Adams Street, reducing the risk of rear end, angle, and same direction sideswipe collisions.

Multimodal

7. Consider the installation of bicycle and pedestrian infrastructure on the Cranberry Highway corridor. Relocating potential bicycle and pedestrian users off Sandwich Road vehicular travel ways onto protected, or at least separated, facilities should reduce the risks of conflicts between the multiple user types of Cranberry Highway, Adams Street, and other State and local roadways in the area.
8. Consider installation of additional bicycle accommodation, such as a two-way protected bicycle lane or multiuse path on Adams Street to allow designated bicycle access in both directions. Currently, there is only a southbound bicycle lane on the one-way street, so contraflow bicycle lanes would require additional width to construct and new, supporting signing and pavement markings to supplement.

Geometry and Operations

9. Review the limits of the State Highway Layout in this area to consider how sight distance for vehicles exiting Adams Street might be improved in the area where the Café and its parking lot is located. After this review, coordination between MassDOT, Town of Bourne, and the property owner is required for the potential to reconfigure the site, in order to achieve the minimum thresholds for sight distances between Adams Street and Cranberry Highway. Improving sight distance for vehicles entering the roadway from Adams Street southbound or approaching the intersection from Cranberry Highway westbound has the potential to reduce the instances of misjudging gaps and reduce angle crashes from these conflicting movements or rear end crashes from sudden stops related to these movements.
10. Evaluate the feasibility of establishing an exclusive right-turn lane on the Adams Street southbound approach at the intersection with Cranberry Highway. Striping the lane could be beneficial to formalize the two-lane operation that is currently occurring, which could lead to less

confusion (sometimes drivers form in one lane and sometimes in two lanes). Formalizing the two-lane operation may result in fewer sideswipe type crashes on the southbound approach.

11. Evaluate the feasibility of changing Marconi Street from a two-way street to a one-way southbound street, entering only from Cranberry Highway. This measure would remove exiting Marconi Street traffic from potentially conflicting with vehicles immediately exiting from U.S. Route 6 westbound onto the Cranberry Highway/Marconi Street intersection. Residents on Marconi Street would have to exit the neighborhood via Adams Street, which did not see any recorded crashes associated with exiting vehicles onto Cranberry Highway.
12. Evaluate a road diet on the Cranberry Highway segment near the intersection with Adams Street. A road diet, consisting of reducing the eastbound cross section to one lane west of Adams Street would help to calm regional traffic coming from U.S. Route 6 onto the more local and commercial Cranberry Highway. Calming the eastbound traffic through the intersection from two travel lanes to one travel lane should assist in reducing vehicle speeds and reduce the risk of same-direction sideswipe crashes along the segment. Reducing vehicles speeds should generally reduce the severity of crashes.
13. Evaluate more permanent improvements to formalize the one-way pattern on Adams Street, including geometric improvements (curbing) on Adams Street instead of using concrete barriers. The addition of curbs and sharper curb radii at the throat of Adams Street should formalize the intersection one-way operations for the north leg of Adams Street and reduce the throat width that may lead drivers to perceive that Adams Street is still two-way roadway.
14. Providing curbing to match the current painted markings on the north leg of the intersection with Adams Street, will allow for the placement of permanent ground mounted “ONE WAY”, “STOP”, “DO NOT ENTER”, “WRONG WAY” signs. Curbing will allow for the removal of the concrete blocks on which the existing signs on the northeast corner are mounted. Removing the concrete blocks will remove roadside hazards to both motorists, bicyclists, and pedestrians, if struck by an errant vehicle.

Summary of Road Safety Audit

Safety payoff estimates are based on engineering judgment and are categorized as follows: low, medium, and high. As referenced in Table 2, the time frame is categorized as short-term (<1 year), mid-term (1 to 3 years), or long-term (>3 years) and the costs are categorized as low (<\$10,000), medium (\$10,001 to \$50,000), or high (>\$50,000). Table 3 through Table 9 summarize potential recommendations discussed by the Audit team. The recommendations are categorized based on the potential safety payoff, time frame, and cost.

Table 2: Estimated Time Frame and Costs Breakdown

Time Frame		Costs	
Short-Term	<1 Year	Low	<\$10,000
Mid-Term	1-3 Years	Medium	\$10,001-\$50,000
Long-Term	>3 Years	High	>\$50,000

Table 3: Potential Safety Enhancement Summary – Scenic Highway (Main Street), just East of Belmont Circle (Site #1)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Street Lighting	Evaluate increased street lighting to provide uniform illumination along this segment of Scenic Highway.	Medium	Mid-term	High	MassDOT
Street Lighting	Consider using pavement markings that have higher reflectivity, such as thermoplastic, to increase the visibility of the markings affected by the lighting.	Medium	Short-term	Medium	MassDOT
Traffic Signs	Review commercial signs at the Speedway Gas Station / Dunkin' driveways and evaluate relocating or resizing commercial "Enter" signs for improved visibility to motorists on Scenic Highway.	Low	Short-term	Low	MassDOT
Traffic Signs	Consider installing guide signs, along this segment to provide guidance to motorists entering Belmont Circle from Scenic Highway westbound.	Medium	Mid-term	Medium	MassDOT
Access Management	Evaluate adding a dedicated right-turn lane on Scenic Highway westbound for traffic entering the Speedway Gas Station / Dunkin' entrance driveway.	High	Long-term	High	MassDOT

Table 3 (continued): Potential Safety Enhancement Summary – Scenic Highway (Main Street), just East of Belmont Circle (Site #1)

	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Access Management	Coordinate with the new commercial and residential development across the street to ensure that the signs at the driveways will be placed in such a way that they can be seen by oncoming traffic, that site vegetation will be well controlled, and that sidewalk curb ramps at the driveways will meet current accessibility standards.	Medium	Short-term	Low	MassDOT
Access Management	Evaluate the potential to consolidate the Speedway Gas Station / Dunkin' driveway openings and the Bourne Bridge Crossing Shopping Center driveways to reduce the number of site access points along Scenic Highway through this segment.	High	Mid-term	High	MassDOT
Access Management	Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area.	Low	Short-term	Medium	MassDOT
Access Management	Evaluate providing a dedicated auxiliary lane on Scenic Highway westbound between the Speedway Gas Station / Dunkin' exit driveway and the Bourne Bridge Crossing Shopping Center entrance driveway.	Medium	Long-term	High	MassDOT

Table 3 (continued): Potential Safety Enhancement Summary – Scenic Highway (Main Street), just East of Belmont Circle (Site #1)

Multimodal	Consider updating curb ramps at the driveways to meet current Massachusetts Architectural Access Board (MAAB)/Americans with Disabilities Act (ADA) standards.	Low	Short-term	Medium	MassDOT
Multimodal	Consider clearing vegetation that is encroaching onto existing sidewalks on the south side of Scenic Highway.	Low	Short-term	Low	MassDOT
Multimodal	Evaluate the feasibility of extending the multiuse path proposed as part of the Scenic Highway Median Project through this segment to connect to the multiuse path currently being constructed as part of the Belmont Circle Project.	High	Long-term	High	MassDOT
Multimodal	Consider implementing an educational campaign that will inform local and regional Scenic Highway vehicular, bicycle, and pedestrian users on the use and operations of PHBs.	Low	Short-term	Low	MassDOT

Table 3 (continued): Potential Safety Enhancement Summary – Scenic Highway (Main Street), just East of Belmont Circle (Site #1)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Geometry and Operations	Consider reviewing the operations for Scenic Highway’s approach entering Belmont Circle. Evaluating updated operations may lead to identifying additional improvements to the guide signing or pavement markings on the approach.	Medium	Mid-term	Medium	MassDOT
Geometry and Operations	Consider widening Scenic Highway to provide wider shoulders available for vehicles to pull over into due to vehicle breakdowns, emergency vehicle passage, and gutter spread for on-road stormwater.	High	Long-term	High	MassDOT
Speeding	Consider speed management measures to counter speeding on the segment, including speed feedback signs and additional enforcement.	Low	Short-term	Medium	MassDOT

Table 4: Potential Safety Enhancement Summary – Scenic Highway near Intersection with Nightingale Pond Road and Andy Olivia Drive (Site #2)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Traffic Signal Equipment	Consider evaluating and repairing if needed, the loop detectors on the left-most lane of the eastbound intersection approach so that vehicles waiting to make left turns will be appropriately detected by the traffic signal system.	Medium	Short-term	Low	MassDOT
Traffic Signal Equipment	Evaluate improved signal timings and phasing at the intersection, including for potential overlapping non-conflicting movements or vehicle detection adjustments to improve operations at the intersection.	Medium	Short-term	Low	MassDOT
Traffic Signal Equipment	Evaluate the yellow and all-red clearance intervals at the intersection. Implementing traffic signal clearance intervals that conform to current standards	Low	Short-term	Low	MassDOT
Traffic Signal Equipment	Consider installing an emergency preemption system at the traffic signal system.	Medium	Short-term	Medium	MassDOT
Traffic Signs	Consider installing updated and additional traffic signs to be compliant with the MUTCD.	Medium	Short-term	Low	MassDOT

Table 4 (continued): Potential Safety Enhancement Summary – Scenic Highway near Intersection with Nightingale Pond Road and Andy Olivia Drive (Site #2)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Traffic Signs	Evaluate clearing vegetation in select areas to increase visibility of the “Speed Limit 20 MPH” regulatory sign and “Rotary Ahead” warning sign along the north side of Scenic Highway, west of the intersection.	Low	Short-term	Low	MassDOT
Traffic Signs	Consider adding wayfinding signs in advance of the Bourne Scenic Park entrance (Andy Oliva Drive).	Low	Short-term	Low	MassDOT
Multimodal	Consider updating curb ramps at the crosswalk to meet current MAAB/ADA standards.	Low	Short-term	Medium	MassDOT
Multimodal	Consider installing Accessible Pedestrian Signals (APS) pushbuttons, which are at accessible locations, at the existing pedestrian crossing across the west leg of the intersection.	Low	Short-term	Low	MassDOT
Multimodal	Consider clearing vegetation from encroaching onto existing sidewalks along Scenic Highway and Nightingale Pond Road.	Low	Short-term	Low	MassDOT
Geometry & Operations	Consider clearing vegetation that is encroaching onto existing sidewalks along Scenic Highway and Nightingale Pond Road.	Low	Short-term	Low	MassDOT

Table 4 (continued): Potential Safety Enhancement Summary – Scenic Highway near Intersection with Nightingale Pond Road and Andy Olivia Drive (Site #2)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Geometry & Operations	Evaluate if the curb radius at the southwest corner of the intersection needs to be flattened to accommodate a larger turning vehicle.	Low	Mid-term	Medium	MassDOT
Geometry & Operations	Consider reconfiguring the Scenic Highway eastbound approach to the intersection to include a dedicated left turn lane in addition to its two through lanes.	High	Long-term	High	MassDOT
Geometry & Operations	Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area.	Low	Short-term	Medium	MassDOT
Speeding	Evaluate speed management techniques to mitigate the noted high speeds coming from the westbound approach to the intersection. Such techniques could include digital speed feedback signs and enforcement as well as median treatments to narrow the perceived cross section space and slow traffic.	Medium	Mid-term	Medium	MassDOT
Drainage	The intersection should be considered for evaluation and implementation of drainage improvements.	Medium	Mid-term	High	MassDOT

Table 5: Potential Safety Enhancement Summary – Sandwich Road at Sandwich Road Connector
 (Site #3)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Street Lighting	Evaluate the installation of additional street lighting at this location, including at locations farther away from the center of the intersection, along the approaches.	Medium	Mid-term	High	MassDOT
Traffic Signs and Pavement Markings	Consider improving the pavement markings at the intersection, with attention to providing narrower travel lanes and wider shoulders on the east (Sandwich Road) and west (Sandwich Road Connector) legs of the intersection.	Medium	Short-term	Medium	MassDOT
Traffic Signs and Pavement Markings	Consider replacing and upgrading existing traffic signs at the intersection's approaches to be compliant with the current MUTCD, including requirements for retroreflectivity, sign mounting heights, and sign placement offsets from roadway.	Medium	Short-term	Low	MassDOT
Traffic Signs and Pavement Markings	Evaluate relocating, resizing, and remounting the traffic signs on the raised islands within the intersection as to not obstruct the sight lines between the stop-control and free moving approaches, specifically where vehicles making a left turn from Sandwich Road (at the STOP sign) onto Sandwich Road eastbound.	Medium	Short-term	Low	MassDOT

Table 5 (continued): Potential Safety Enhancement Summary – Sandwich Road at Sandwich Road Connector (Site #3)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Traffic Signs and Pavement Markings	Evaluate adding pavement markings to form two approach lanes, one exclusive left-turn lane and one exclusive right-turn lane, on Sandwich Road's stop-controlled approach.	Low	Short-term	Low	MassDOT
Access Management	Consider providing Intelligent Transportation System (ITS) solutions, including real-time travel time message signs displaying travel times regionally between the Bourne Bridge and Sagamore Bridge.	Low	Long-term	High	MassDOT
Access Management	Evaluate operations of the Bourne Rotary to improve mobility through the Rotary and its feeder roadways, including Sandwich Road Connector.	Low	Mid-term	High	MassDOT
Multimodal	Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor.	Medium	Long-term	High	MassDOT
Geometry & Operations	Suggest clearing vegetation on the northwest corner to improve visibility for left turning vehicles out of Sandwich Road (from the STOP controlled approach) and to improve the visibility of the signs on that corner.	Low	Short-term	Low	MassDOT

Table 5 (continued): Potential Safety Enhancement Summary – Sandwich Road at Sandwich Road Connector (Site #3)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Geometry & Operations	Evaluate geometric changes to the intersection including closing the channelized westbound right turn lane and narrowing the lanes at the approaches to create something closer to a conventional “T” intersection.	Medium	Long-term	High	MassDOT
Geometry & Operations	Evaluate converting the intersection to allow only right turns into and out of the north leg of the intersection (Sandwich Road).	High	Long-term	High	MassDOT
Geometry & Operations	Consider adding a free right turn onto Sandwich Road Connector westbound from Sandwich Road southbound.	Low	Long-term	High	MassDOT
Geometry & Operations	Evaluate the installation of a traffic signal system (pending evaluation of signal warrants).	High	Long-term	High	MassDOT
Geometry & Operations	Evaluate the installation of a modern roundabout.	High	Long-term	High	MassDOT
Geometry & Operations	Consider widening the shoulders along Sandwich Road and Sandwich Road Connector through the Audit area to be consistent with other sections of Sandwich Road with wider shoulders.	Medium	Long-term	High	MassDOT
Geometry & Operations	Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area.	Low	Short-term	Medium	MassDOT

Table 5 (continued): Potential Safety Enhancement Summary – Sandwich Road at Sandwich Road Connector (Site #3)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Speeding	Consider the implementation of radar speed feedback signs and enhanced enforcement to reduce speeds through the segment.	Medium	Mid-term	Medium	MassDOT
Drainage	Evaluate drainage at and approaching the intersection and consider drainage improvements with elements such as additional catch basins, curbing, and roadway grade adjustment.	Medium	Long-term	High	MassDOT

Table 6: Potential Safety Enhancement Summary – Sandwich Road at Upper Cape Cod Regional Technical School Driveway (Site #4)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Traffic Signal Equipment	Evaluate the potential relocation of the existing flashing beacon at the intersection or installing a new overhead flashing beacon at the intersection.	Medium	Long-term	High	MassDOT
Multimodal	Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor.	High	Long-term	High	MassDOT
Geometry and Operations	Evaluate the installation of a traffic signal system (pending evaluation of signal warrants).	High	Long-term	High	MassDOT
Geometry and Operations	Evaluate the installation of a modern roundabout.	High	Long-term	High	MassDOT
Geometry and Operations	Evaluate clearing vegetation along the north side of Sandwich Road through this Audit segment.	Medium	Short-term	Low	MassDOT
Geometry and Operations	Evaluate an alternate location for the school driveway as a long-term improvement in coordination between the School, Town of Bourne and MassDOT.	Medium	Long-term	High	Upper Cape Cod Regional Technical School
Speeding	Evaluate the warrants for the establishment of a school speed zone on Sandwich Road in the area of the intersection, potentially using dynamic signs and additional advanced warning.	Medium	Mid-term	Medium	MassDOT

Table 7: Potential Safety Enhancement Summary – Sandwich Road, in the area of Gallo Arena, Harbor Lights Road, and Weatherdeck Drive (Site #5)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Street Lighting	Consider additional roadway lighting, particularly near the intersections at Harbor Lights Road and Weatherdeck Drive.	Medium	Mid-term	High	MassDOT
Traffic Signs and Pavement Markings	Consider installing intersection warning signs along Sandwich Road approaching the segment.	Low	Short-term	Low	MassDOT
Traffic Signs and Pavement Markings	Consider installing STOP signs and painting stop lines on the Weatherdeck Drive and Harbor Lights Road approaches at their respective intersections with Sandwich Road.	Low	Short-term	Low	Town of Bourne
Traffic Signs and Pavement Markings	Consider changes to the double yellow centerline pavement markings on Sandwich Road to include breaks to indicate points at which traffic may enter or exit Sandwich Road, at intersections and the Gallo Arena driveways.	Low	Short-term	Low	MassDOT

Table 7 (continued): Potential Safety Enhancement Summary – Sandwich Road, in the area of Gallo Arena, Harbor Lights Road, and Weatherdeck Drive (Site #5)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Access Management	Evaluate access management for the Gallo Arena driveways, including reversing entrance and exit configurations in the short term. Evaluate consolidating driveway and intersection access points in the long term.	Medium	Long-term	High	MassDOT
Access Management	Evaluate the feasibility of combining Weatherdeck Drive and Harbor Lights Road into a single roadway prior to their intersection with Sandwich Road.	Medium	Long-term	High	Town of Bourne
Multimodal	Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor.	High	Long-term	High	MassDOT
Geometry and Operations	Consider the installation of sinusoidal centerline rumble strips to prevent sideswipe crashes in opposing directions.	Low	Mid-term	Medium	MassDOT
Geometry and Operations	Evaluate the feasibility of installing a two-way left turn lane on this segment of Sandwich Road to separate traffic turning left from through traffic on Sandwich Road.	High	Long-term	High	MassDOT
Geometry and Operations	Evaluate the feasibility of upgrading the pavement cross section to provide wider shoulder width or deceleration lanes and tapers for right-turning vehicles.	Medium	Long-term	High	MassDOT

Table 7 (continued): Potential Safety Enhancement Summary – Sandwich Road, in the area of Gallo Arena, Harbor Lights Road, and Weatherdeck Drive (Site #5)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Geometry and Operations	Evaluate the installation of a traffic signal system (pending evaluation of signal warrants).	High	Long term	High	MassDOT
Geometry and Operations	Evaluate the installation of a modern roundabout.	High	Long term	High	MassDOT
Geometry and Operations	Evaluate clearing vegetation to ensure visibility for vehicles entering the Arena from Sandwich Road.	Low	Short-term	Low	MassDOT

Table 8: Potential Safety Enhancement Summary – Sandwich Road in the vicinity of the Midway Recreation Area (Site #6)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Access Management	Consider speed management measures to counter speeding on the segment, including speed feedback signs and additional enforcement.	Medium	Mid-term	Medium	MassDOT
Access Management	Consider the installation of traffic signs prohibiting parking along both sides of Sandwich Road, which would notify motorists that parking is prohibited.	Low	Short-term	Low	MassDOT
Access Management	Evaluate the Audit section of Sandwich Road potential for establishment of parking spaces or surface parking lots with established driveways for the public, located along the north side of Sandwich Road.	Low	Long-term	High	MassDOT
Multimodal	Consider the installation of bicycle and pedestrian infrastructure on the Sandwich Road corridor.	High	Long-term	High	MassDOT
Geometry and Operations	Consider the installation of sinusoidal centerline rumble strips to reduce the risk of sideswipe crashes in opposing directions.	Low	Mid-term	Medium	MassDOT

Table 9: Potential Safety Enhancement Summary – Cranberry Highway, between U.S. Route 6 Westbound Exit 55 and east of Adams Street (Site #7)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Street Lighting	Evaluate lighting coverage at the intersection for compliance with current standards and the potential improvements that may be required to improve visibility at the intersection and surrounding approaches.	Medium	Mid-term	High	MassDOT
Traffic Signs and Pavement Markings	Consider updating pavement markings to provide better lane delineation and visibility of intended travel ways along Cranberry Highway.	High	Short-term	Low	MassDOT
Traffic Signs and Pavement Markings	Consider improving existing signs that do not comply with the current MUTCD, including the signs at the intersection of Cranberry Highway with Adams Street that are found to not meet minimum mounting heights or locations adjacent to the roadway or travel ways.	Medium	Short-term	Low	MassDOT
Traffic Signs and Pavement Markings	Consider providing warning signs and associated pavement markings on Cranberry Highway westbound to appropriately control the lane reduction on Cranberry Highway (from two westbound lanes to one westbound lane), which occurs in the vicinity of Adams Street.	Medium	Short-term	Low	MassDOT

Table 9 (continued): Potential Safety Enhancement Summary – Cranberry Highway, between U.S. Route 6 Westbound Exit 55 and east of Adams Street (Site #7)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Access Management	Evaluate ways to improve access to the service road parallel to Cranberry Highway, which provides access to the Christmas Tree Shops and other properties, as part of any future (short/mid/long term) improvements at the intersection.	Medium	Long-term	High	MassDOT
Access Management	Consider a study to inform potential roadway network upgrades or changes in circulation through this segment to separate local from regional traffic in the area.	Low	Short-Term	Medium	MassDOT
Multimodal	Consider the installation of bicycle and pedestrian infrastructure on the Cranberry Highway corridor.	High	Long-term	High	MassDOT
Multimodal	Consider installation of additional bicycle accommodation, such as a two-way protected bicycle lane or multiuse path on Adams Street to allow designated bicycle access in both directions.	High	Long-term	High	Town of Bourne
Geometry & Operations	Review the limits of the State Highway Layout in this area to consider how sight distance for vehicles exiting Adams Street might be improved in the area where the Café and its parking lot is located.	High	Mid-term	Low	MassDOT

Table 9 (continued): Potential Safety Enhancement Summary – Cranberry Highway, between U.S. Route 6 Westbound Exit 55 and east of Adams Street (Site #7)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Geometry & Operations	Evaluate the feasibility of establishing an exclusive right-turn lane on the Adams Street southbound approach at the intersection with Cranberry Highway.	Low	Mid-Term	Medium	Town of Bourne
Geometry & Operations	Evaluate the feasibility of changing Marconi Street from a two-way street to a one-way southbound street, entering only from Cranberry Highway.	Medium	Mid-term	Low	Town of Bourne
Geometry & Operations	Evaluate a road diet on the Cranberry Highway segment near the intersection with Adams Street.	High	Long-term	High	MassDOT
Geometry & Operations	Evaluate more permanent improvements to formalize the one-way pattern on Adams Street, including geometric improvements (curbing) on Adams Street instead of using concrete barriers.	Medium	Mid-term	High	Town of Bourne
Geometry & Operations	Providing curbing to match the current painted markings on the north leg of the intersection with Adams Street, will allow for the placement of permanent ground mounted "ONE WAY", "STOP", "DO NOT ENTER", "WRONG WAY" signs.	Medium	Mid-term	Medium	Town of Bourne

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit

Cape Cod Canal Area (Bourne)

Tuesday June 21, 2022

Meeting Location: Bourne Department of Public Works,

35 Ernest Valeri Road – Buzzards Bay, MA

9:00 AM - 2:00 PM

Type of meeting:	Road Safety Audit for Canal Area Transportation Improvements
Attendees:	Invited Participants to Comprise a Multidisciplinary Team
Please bring:	Thoughts and Enthusiasm!!

9:00 AM	Welcome and Introductions
9:15 AM	Review of Site Specific Material <ul style="list-style-type: none">• Crash and Volume Summaries• Existing Geometries and Conditions
10:00 AM	Visit the Sites <ul style="list-style-type: none">• Travel to Nightingale Pond Road• Travel to Sandwich Road• Travel to Adams St• As a group, identify areas for improvement
12:30 PM	Post-Visit Discussion / Completion of RSA <ul style="list-style-type: none">• Discuss observations and finalize findings• Discuss potential improvements and finalize recommendations
2:00 PM	Adjourn for the Day – but the RSA has not ended

Instructions for Participants:

- Before attending the RSA on June 21, participants are encouraged to drive through the project intersections and corridors and complete/consider elements on the RSA Prompt List with a focus on safety.
- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas, but are reminded that the synergy that develops and respect for others' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.

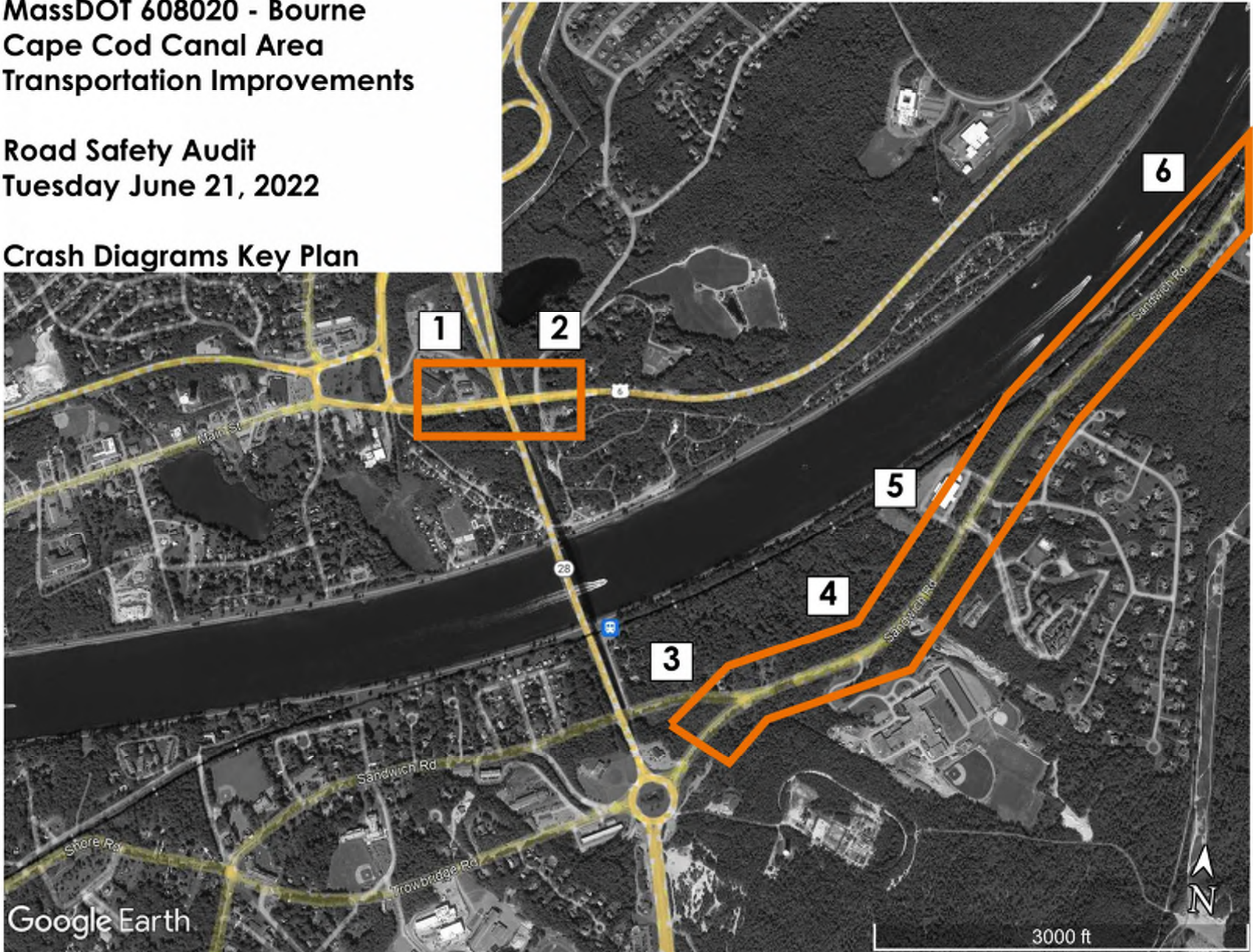
Appendix B. RSA Audit Team Contact List

Appendix C. Detailed Crash Data

MassDOT 608020 - Bourne
Cape Cod Canal Area
Transportation Improvements

Road Safety Audit
Tuesday June 21, 2022

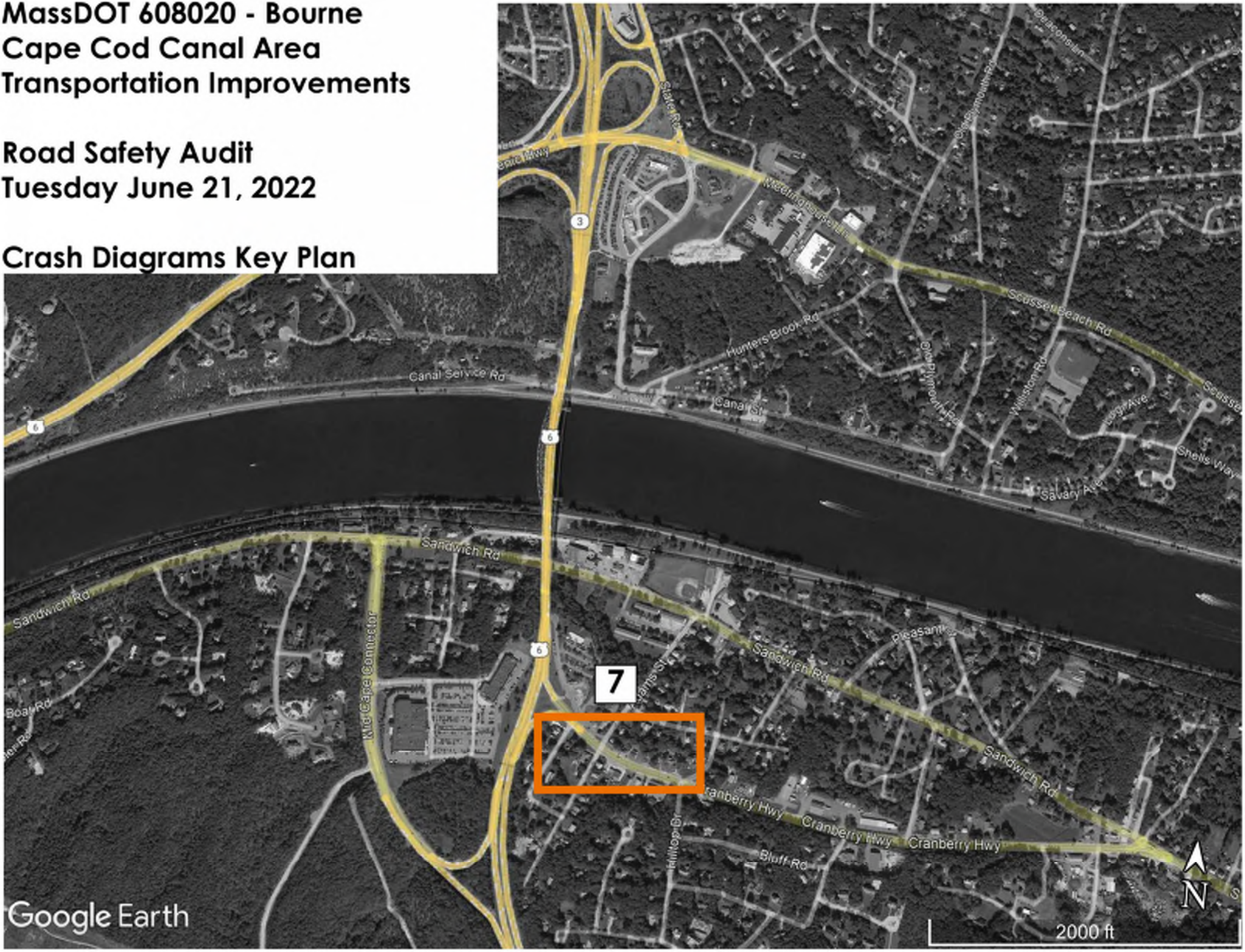
Crash Diagrams Key Plan



**MassDOT 608020 - Bourne
Cape Cod Canal Area
Transportation Improvements**

**Road Safety Audit
Tuesday June 21, 2022**

Crash Diagrams Key Plan



SEGMENT: SCENIC HWY, WEST OF BOURNE BRIDGE

PERIOD: 2017-2019

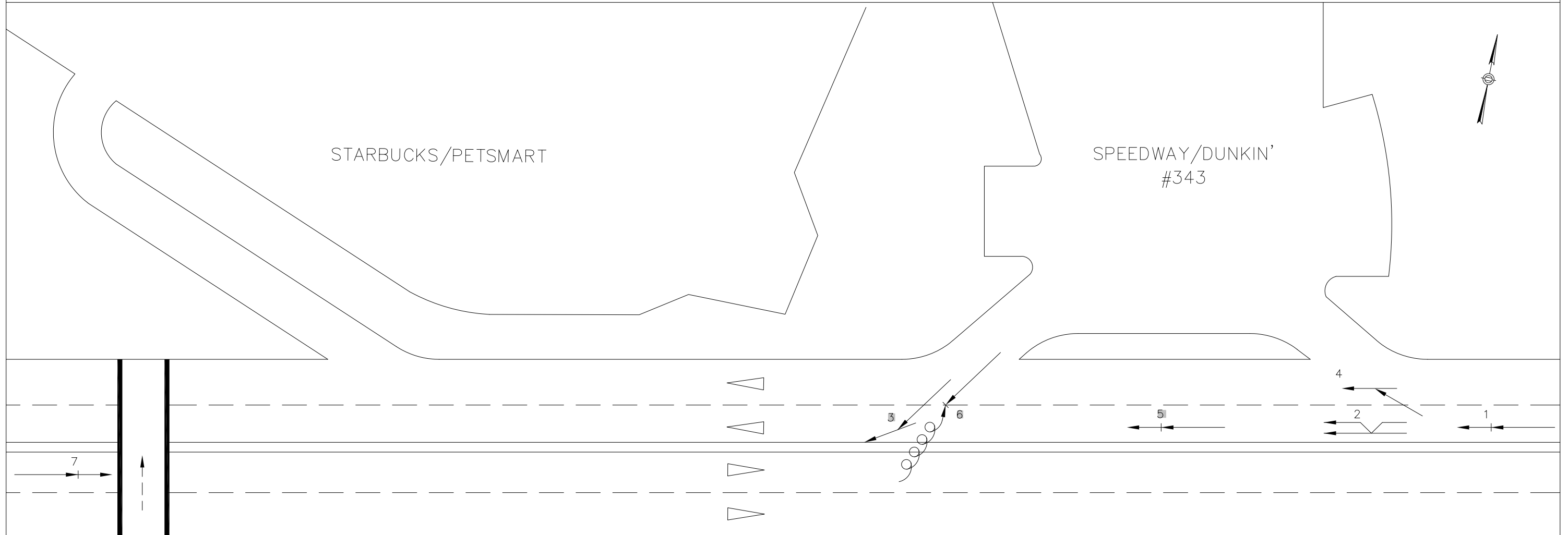
FROM: JANUARY

TO: DECEMBER

CITY/TOWN: BOURNE

1

PREPARED BY: STANTEC



SCENIC HWY

SYMBOL

	MOVING VEHICLE
	BACKING VEHICLE
	NON-INVOLVED VEHICLE
	PEDESTRIAN
	PARKED VEHICLE
	FIXED OBJECT
	FATAL ACCIDENT
	INJURY ACCIDENT
	LOW-LIGHT CONDITION

COLLISION TYPE

	REAR END
	HEAD ON
	SIDE - SWIPE, SAME SIDE
	SIDE - SWIPE, OPPOSITE SIDE
	OUT OF CONTROL
	LEFT TURN ANGLE
	RIGHT ANGLE
	ANIMAL ACCIDENT

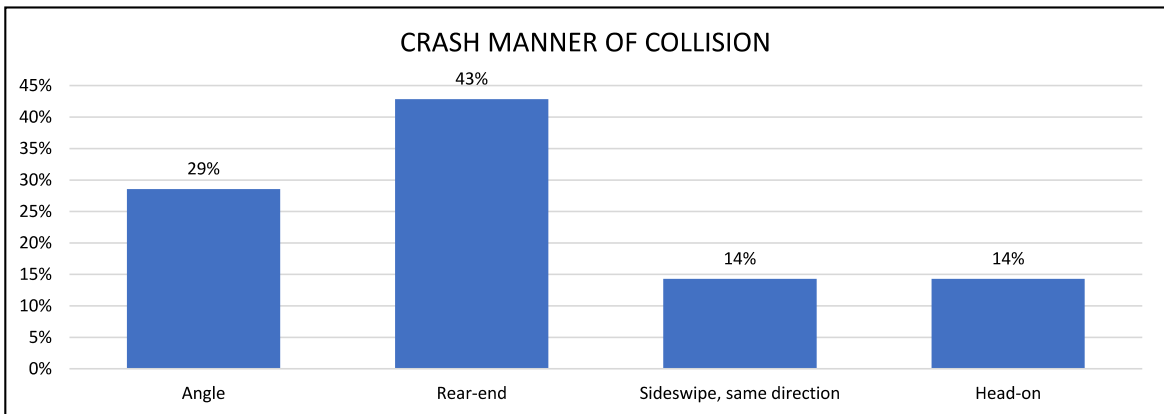
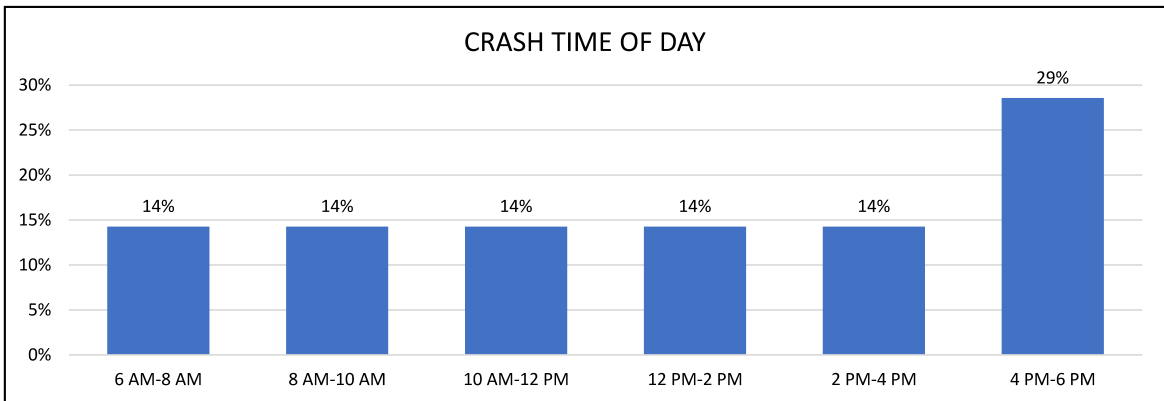
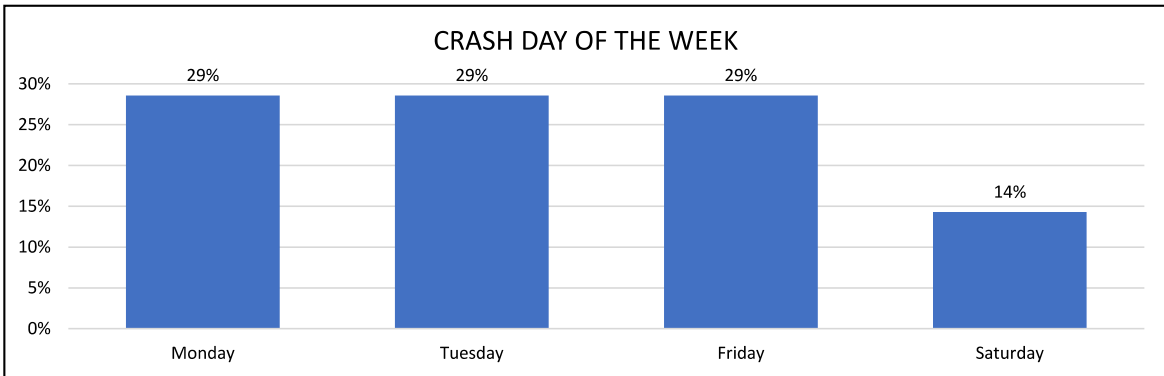
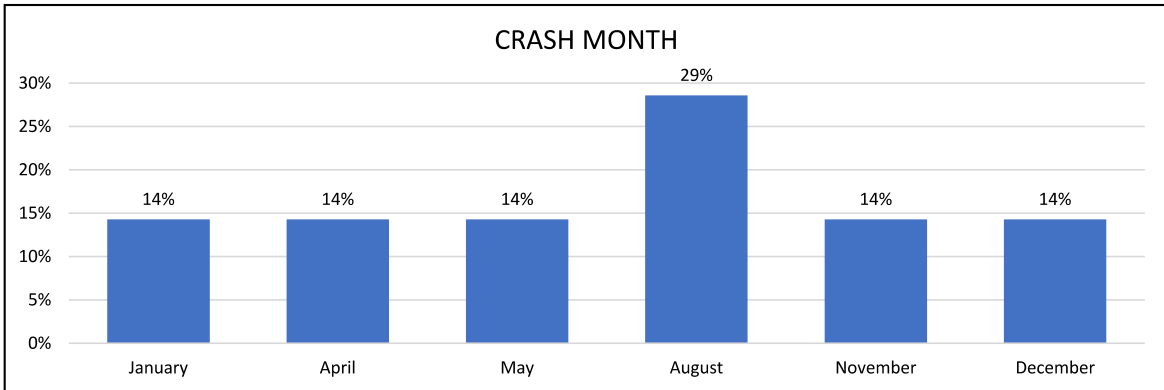
* NOT TO SCALE

COLLISION DIAGRAM

Crash Data Summary Table
 Scenic Highway-West
 2017 - 2019

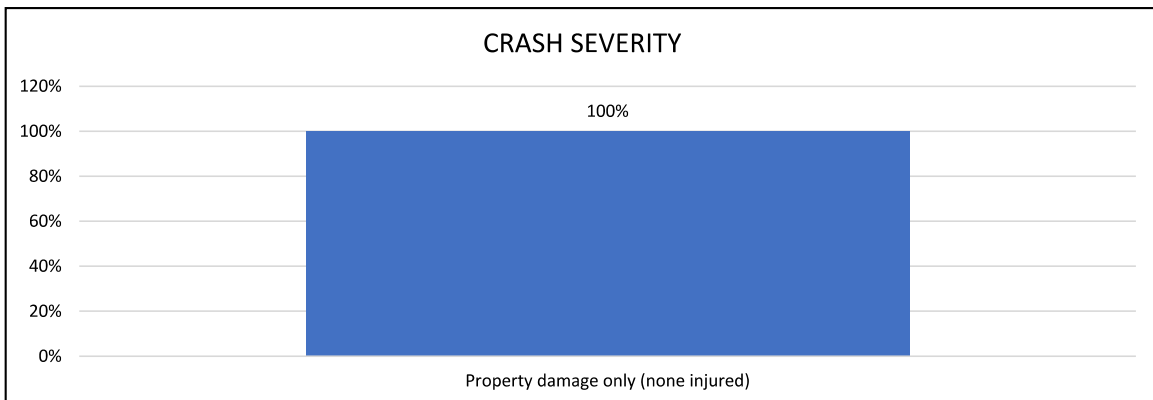
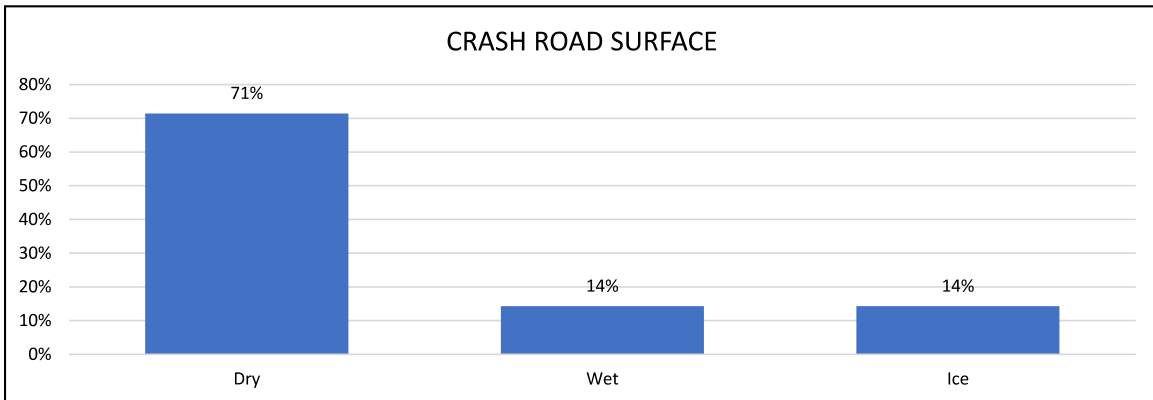
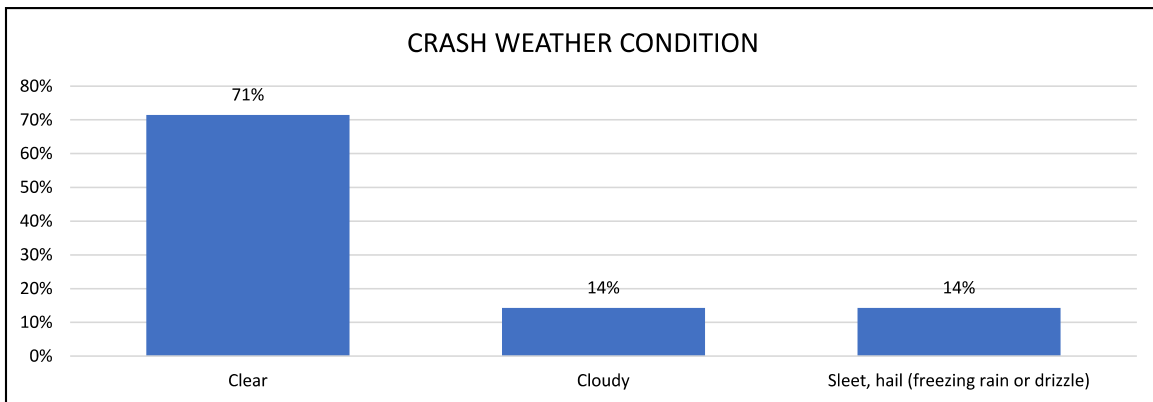
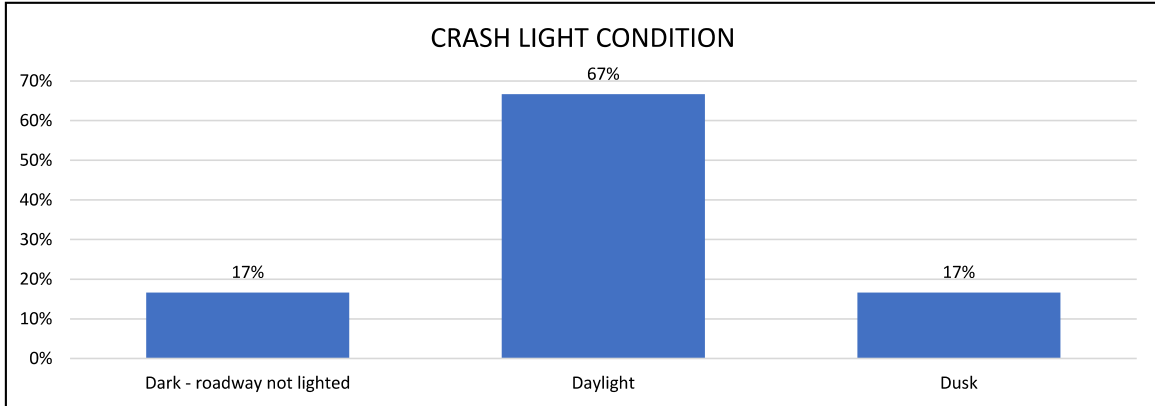
Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
1	08/11/2017	Friday	9:21 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	20-29			D1:(Followed too closely) D2:(No improper driving)	D1:Other activity (searching, eating, personal hygiene, etc.)	Both vehicles WB on Scenic Hwy near #350. V2 slowed for upcoming rotary traffic. V1 Following too closely and struck V2.
2	08/15/2017	Tuesday	11:35 AM	Daylight	Clear	Dry	Sideswipe, same direction	Property damage only (none injured)	50-59		40-49		D1:(Failure to keep in proper lane or running off road) D3:(No improper driving)		V1 (w/ V2 trailer attached) and V3 WB on Scenic Hwy near #343. V1 sideswiped V3, causing V2 to drive onto the median.
3	01/08/2018	Monday	3:20 PM	Dusk	Cloudy	Wet	Angle	Property damage only (none injured)	30-39	40-49			D1:(Failed to yield right of way) D2:(No improper driving)		V1 merged onto Scenic Hwy WB from #343 (Speedway). V2 WB on Scenic Hwy left lane. V1 entered the left lane and struck V2.
4	05/26/2018	Saturday	1:53 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	<=19	<=19			D1:(Failure to keep in proper lane or running off road) D2:(No improper driving)		Both vehicles WB on Scenic Hwy near #343 (Speedway). V1 changed from the left lane to the right, not seeing V2. V2 struck the side of V1 and spun it around. Both vehicles went off the road into the right median damaging an electronic sign board.
5	11/12/2018	Monday	5:48 PM	Dark - roadway not lighted	Clear	Dry	Rear-end	Property damage only (none injured)	>=80	50-59			D1:(Followed too closely) D2:(No improper driving)	D1:Other activity (searching, eating, personal hygiene, etc.)	Both vehicles WB on Scenic Hwy near #343. V2 slowed for upcoming rotary traffic. V1 following too closely and struck V2.
6	12/07/2018	Friday	6:03 AM	Dawn	Sleet, hail (freezing rain or drizzle)	Ice	Head-on	Property damage only (none injured)	50-59	40-49			D1:(Driving too fast for conditions) D2:(No improper driving)		V2 merged from #343 (Speedway) onto WB traffic on Scenic Hwy. V1 EB on Scenic Hwy. V1 driving too fast on icy road skid over median and struck V2.
7	04/02/2019	Tuesday	4:30 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	40-49	30-39			D1:(No improper driving) D2:(No improper driving)		V1 and V2 EB on Scenic Hwy. V1 rear-ended V2 as V2 abruptly stopped to avoid hitting a pedestrian running onto crosswalk.

Scenic Highway-West



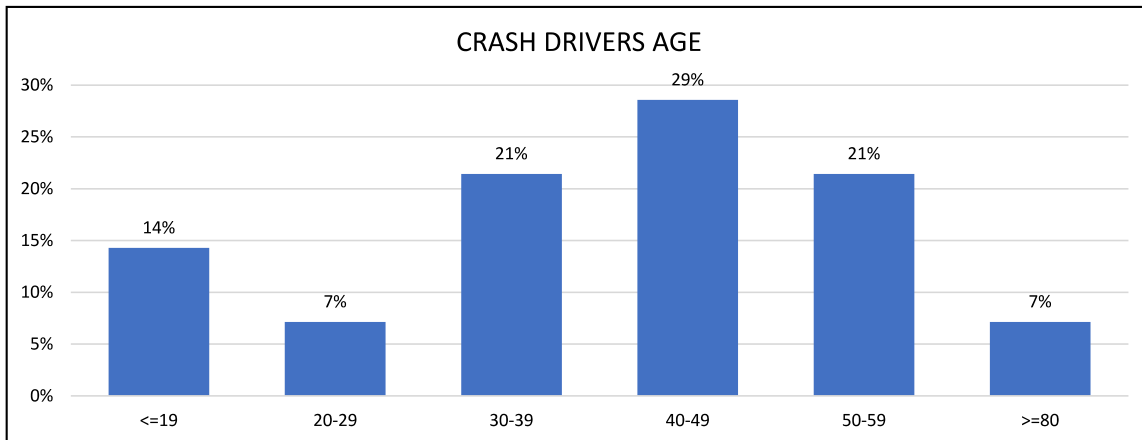
*Percentages may not total 100 due to rounding.

Scenic Highway-West



*Percentages may not total 100 due to rounding.

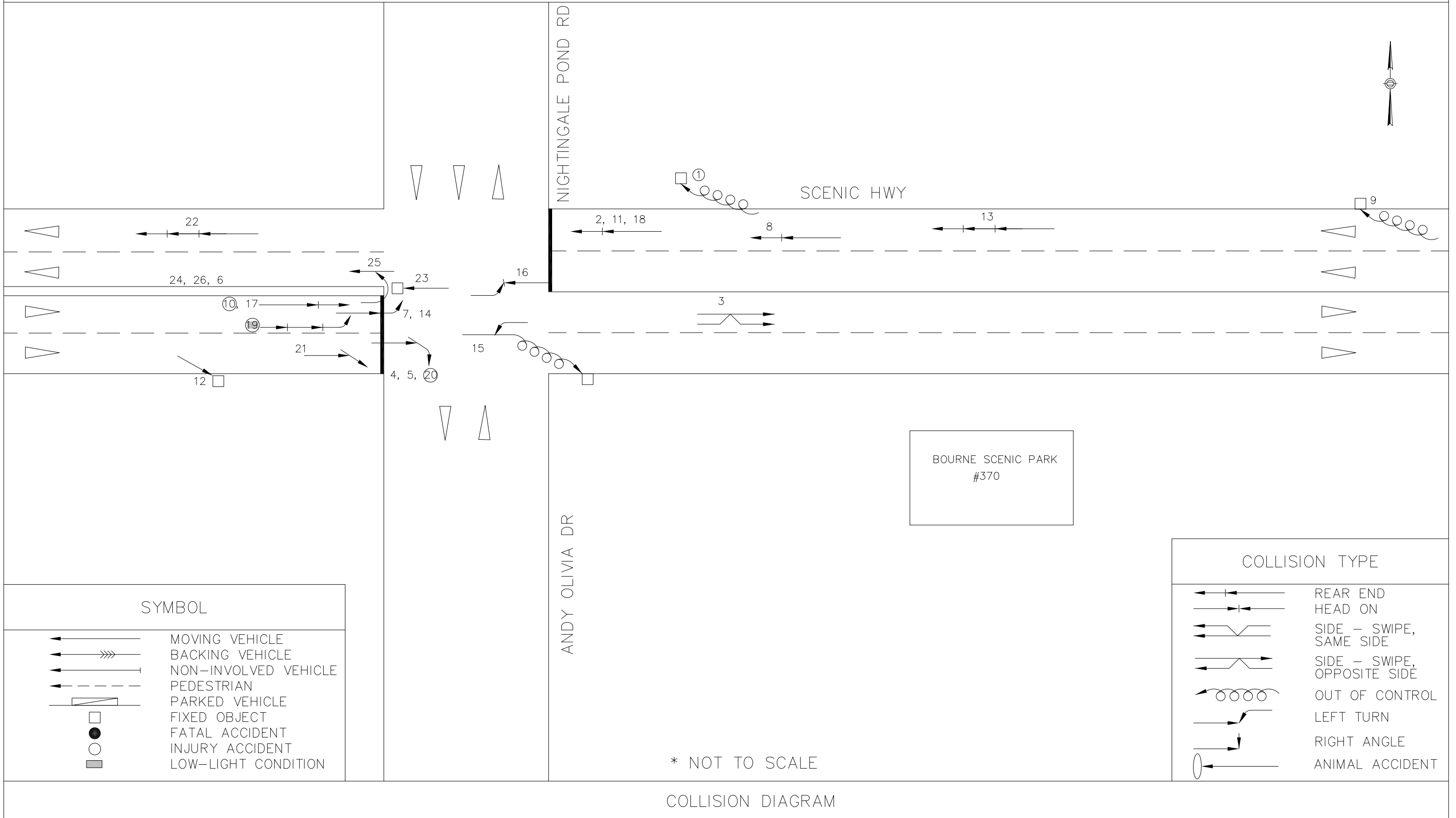
Scenic Highway-West



*Percentages may not total 100 due to rounding.

SEGMENT: SCENIC HWY AND: NIGHTINGALE POND ROAD AND ANDY OLIVIA DRIVE
 PERIOD: 2017-2019 FROM: JANUARY TO: DECEMBER
 CITY/TOWN: BOURNE

PREPARED BY: STANTEC



COLLISION DIAGRAM

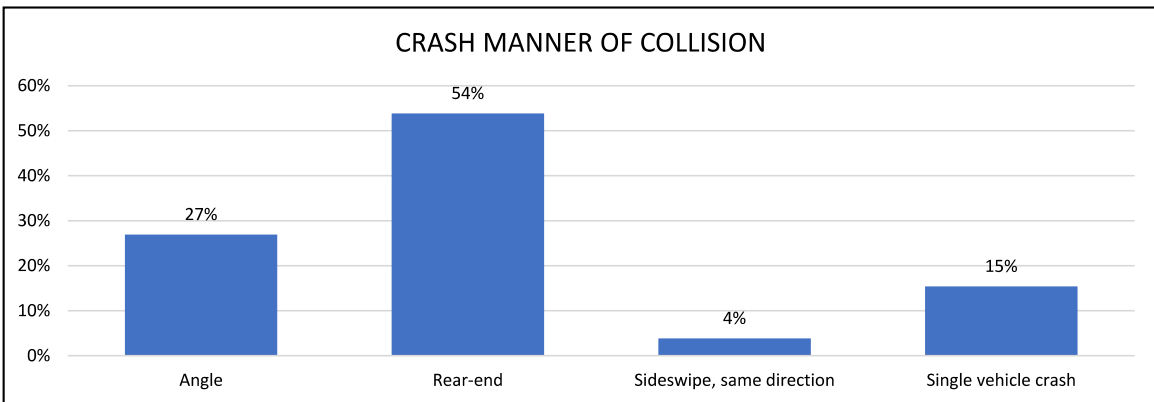
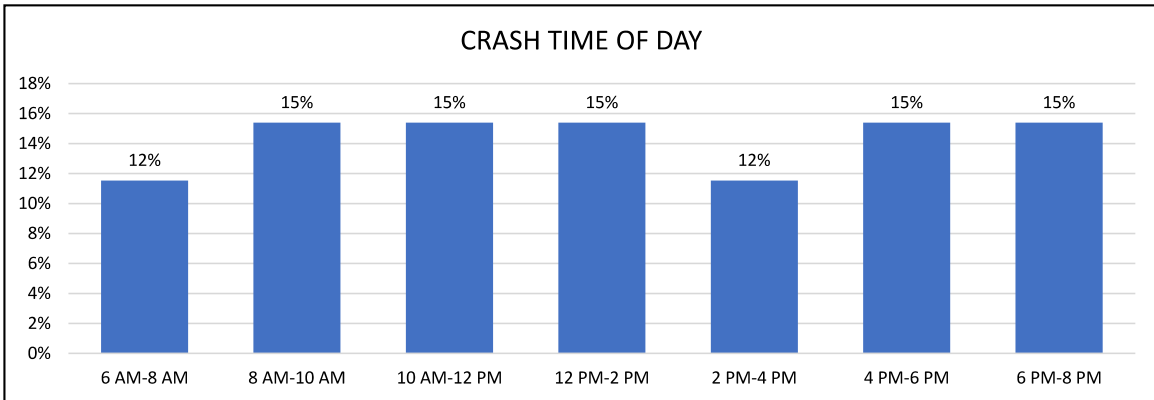
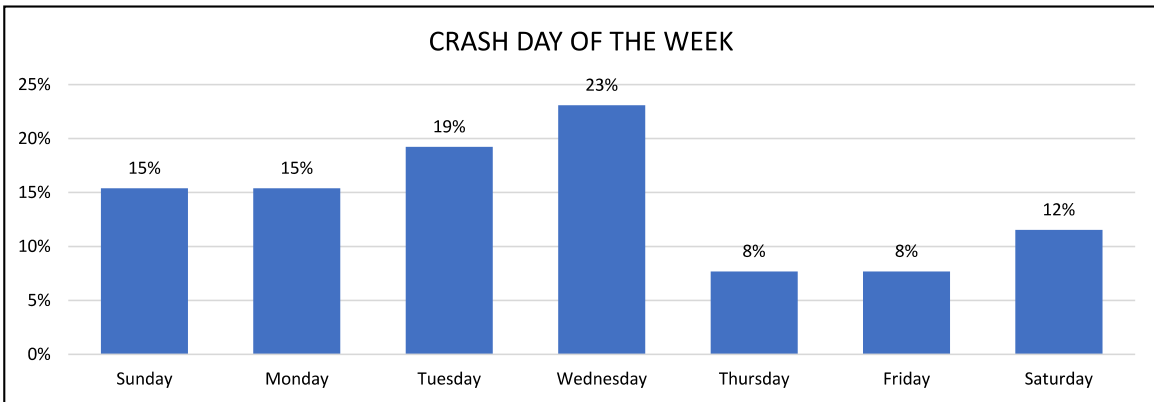
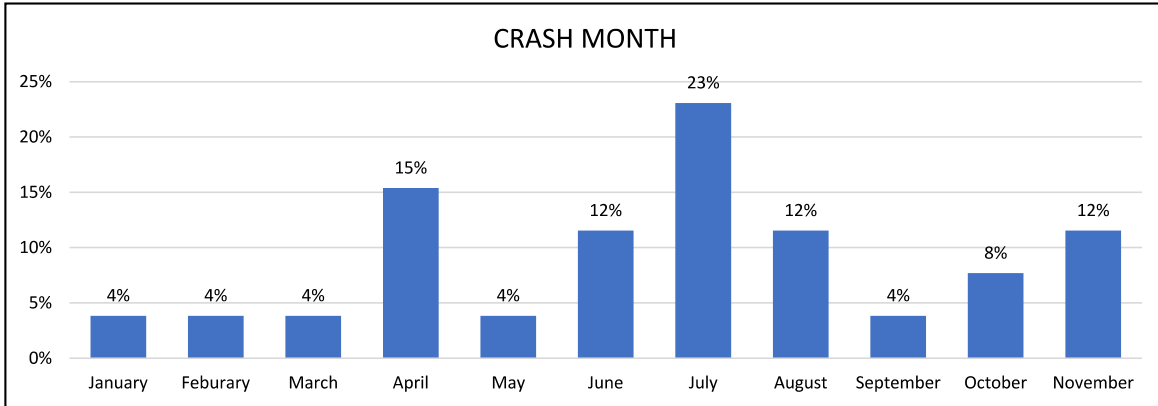
Crash Data Summary Table
Scenic Highway at Nightingale Pond Rd
2017 - 2019

Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
1	04/10/2017	Monday	1:46 PM	Daylight	Clear	Dry	Single vehicle crash	Non-fatal injury	50-59				D1:(No improper driving)		V1 (full dump truck) WB on Scenic Hwy approaching Nightingale Rd. V1 brakes failed and could not stop, so V1 drove off into trees on the right side to avoid collision.
2	04/10/2017	Monday	2:47 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	40-49	50-59			D1:(Inattention) D2:(Distracted)	D1:External distraction (outside the vehicle) / D2:External distraction (outside the vehicle)	(Crash occurred during emergency response to B-25). V1 WB on Scenic Hwy stopped for the red light at Nightingale Pond Rd when it was rear-ended by V2.
3	04/26/2017	Wednesday	9:15 AM	Daylight	Clear	Dry	Sideswipe, same direction	Property damage only (none injured)	50-59		30-39				V1 (w/ attached trailer V2) and V3 EB on Scenic Hwy just past Nightingale Rd. Both operators claimed the other drifted into their lane and sideswiped them.
4	06/13/2017	Tuesday	7:35 PM	Daylight	Clear	Wet	Angle	Property damage only (none injured)	60-69	20-29			D1:(Made an improper turn) D2:(No improper driving)		V1 and V2 EB on Scenic Hwy approaching Nightingale Pond Rd in the left and right lanes, respectively. V1, unfamiliar with area, wanted to perform a U-turn but rather turned right into Andy Olivia Dr. V2 could not avoid.
5	07/09/2017	Sunday	6:26 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	<=19	40-49			D1:(Made an improper turn) D2:(No improper driving)		V1 and V2 EB on Scenic Hwy at the Nightingale Pond Rd intersection. V1 tried to make a right turn from the left lane and struck V2 in the right lane.
6	07/17/2017	Monday	9:21 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	<=19	40-49			D1:(Followed too closely) D2:(No improper driving)		V2 EB on Scenic Hwy stopping at Nightingale Pond Rd intersection, V1 trailing. V1 rear-ended V2 following too closely.
7	07/28/2017	Friday	4:10 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	20-29	40-49			D1:(Followed too closely) D2:(No improper driving)		V1 and V2 EB on Scenic Hwy. V2 slowed to make left onto Nightengale Pod Rd. and was rear ended by V1.
8	10/04/2017	Wednesday	5:01 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	20-29			D1:(Failure to keep in proper lane or running off road) D2:(No improper driving)		V1 and V2 WB on Scenic Hwy/Hwy approaching Nightingale Pond Rd intersection and stopped in traffic. When traffic began to move V1 attempted to overtake V2 but struck its rear.
9	11/16/2017	Thursday	1:28 PM	Daylight	Rain	Water (standing, moving)	Single vehicle crash	Property damage only (none injured)	60-69				D1:(Driving too fast for conditions)		V1 WB on Scenic Hwy apparently upstream of the Nightingale Pond Rd intersection and opposite Bourne Scenic Park. V1 hydroplanes and hits guardrail.
10	11/29/2017	Wednesday	8:23 AM	Daylight	Clear	Wet	Rear-end	Non-fatal injury	20-29	60-69					V2 EB on Scenic Hwy stopped at the Nightingale Pond Rd intersection. V1 began skidding while attempting to slow down and rear-ends V2.
11	11/30/2017	Thursday	7:56 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	30-39			D1:(Inattention) D2:(No improper driving)		V2 WB on Scenic Hwy stopped at the Nightingale Pond Rd intersection. V1 could not stop in time and rear-ends V2.
12	01/03/2018	Wednesday	9:49 AM	Daylight	Clear	Wet	Single vehicle crash	Property damage only (none injured)	30-39				D1:(Operating vehicle in erratic, reckless, careless, negligent or aggressive manner)		V1 EB on Scenic Hwy approaching the Nightingale Pond Rd intersection. V1 struck the pedestrian signal post on the SW corner of the intersection but continued driving.
13	02/13/2018	Tuesday	3:21 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	>=80	>=80	50-59		D1:(Followed too closely) D2:(No improper driving) D3:(No improper driving)		V1, V2 and V3 WB on Scenic Hwy. V3 and V2 were stopped at intersection, while V1 failed to stop and struck V2 causing V2 to rear-end V3.
14	05/01/2018	Tuesday	11:22 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	20-29	20-29			D1:(Inattention) D2:(No improper driving)	D1:Other activity (searching, eating, personal hygiene, etc.)	V1 and V2 EB on Scenic Hwy. V1 rear-ended V2 as V2 attempted to make a left turn onto Nightingale Pond Rd.
15	06/18/2018	Monday	6:56 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	30-39	60-69			D1:(Failed to yield right of way) D2:(No improper driving)		V1 WB on Scenic Hwy. V2 EB on Scenic Hwy. V1 attempts to turn left into Andy Olivia Dr and strikes V2 causing V2 to strike a curb, light pole and telephone pole.
16	07/07/2018	Saturday	10:20 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	20-29	50-59			D1:(Failed to yield right of way) D2:(No improper driving)		V1 EB on Scenic Hwy. V2 WB on Scenic Hwy. V1 failed to yield right of way when making a left turn onto Nightingale Pond Rd causing V2 to strike it.
17	07/24/2018	Tuesday	7:48 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	50-59	60-69			D1:(Followed too closely) D2:(Other improper action)		V1 and V2 EB on Scenic Hwy. V2 braked abruptly for yellow traffic light at Nightingale Pond Rd intersection. V1 was following too closely and rear-ended V2.
18	09/02/2018	Sunday	10:20 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	60-69			D1:(Followed too closely)		V1 and V2 WB on Scenic Hwy approaching Nightingale Pond Rd intersection. V2 slowed down as unidentified vehicle in front stopped abruptly due to rotary traffic ahead. V1 struck V2 while following too closely.
19	03/01/2019	Friday	6:52 PM	Dark - roadway not lighted	Clear	Dry	Rear-end	Non-fatal injury	20-29	40-49	50-59		D1:(Followed too closely),(Exceeded authorized speed limit) D2:(No improper driving) D3:(No improper driving)		V1, V2 and V3 EB on Scenic Hwy. V3 stopped at intersection to make a left turn onto Nightingale Pond Rd. V2 appears to have slowed for V3 and was rear ended by V1. This pushed V2 into V3.
20	04/17/2019	Wednesday	10:23 AM	Daylight	Clear	Dry	Angle	Non-fatal injury	40-49	20-29			D1:(Made an improper turn) D2:(No improper driving)		V1 and V2 EB on Scenic Hwy. V1 attempted to make a right turn onto Andy Olivia Dr from the left lane. V2 in the right lane could not avoid.

Crash Data Summary Table
Scenic Highway at Nightingale Pond Rd
2017 - 2019

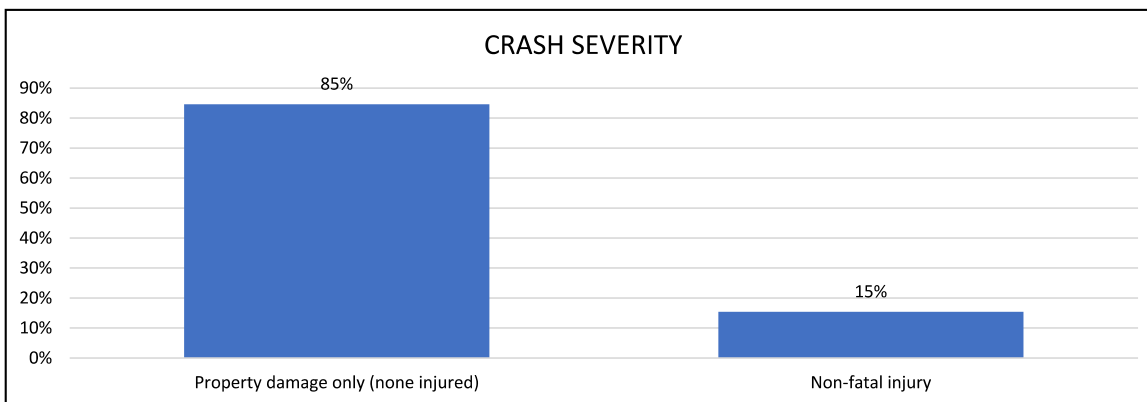
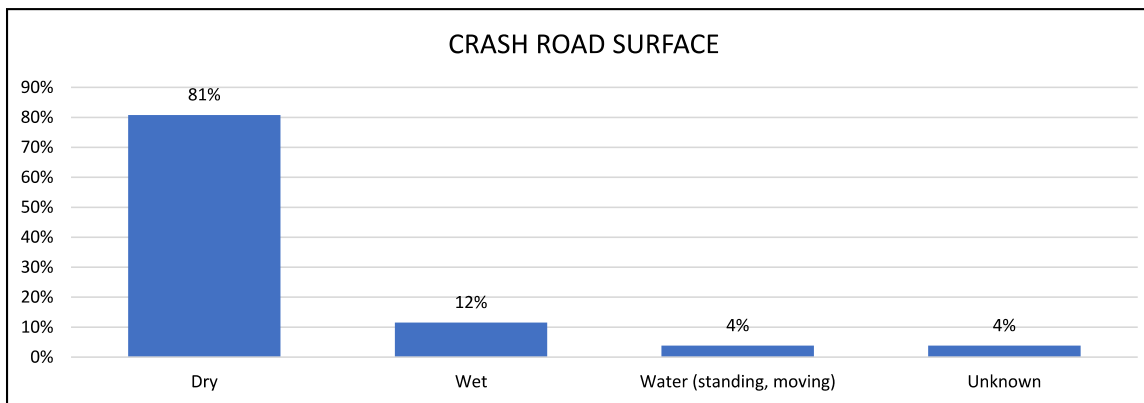
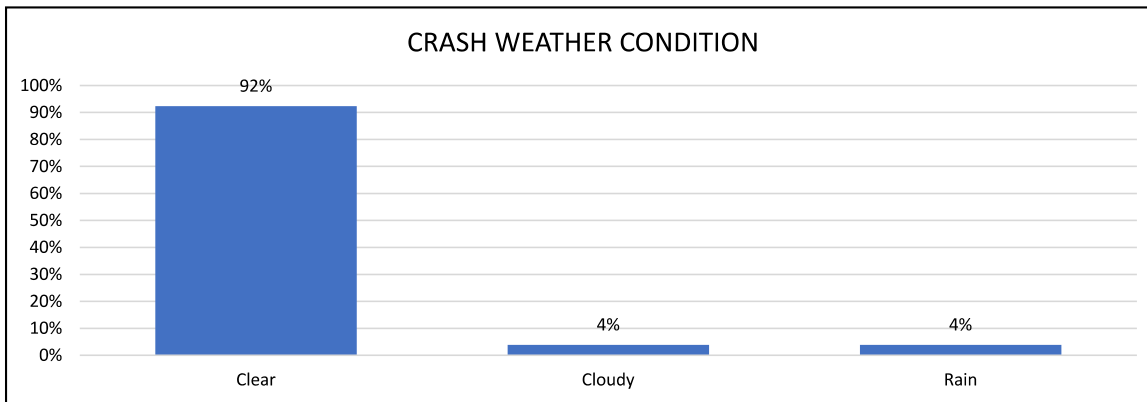
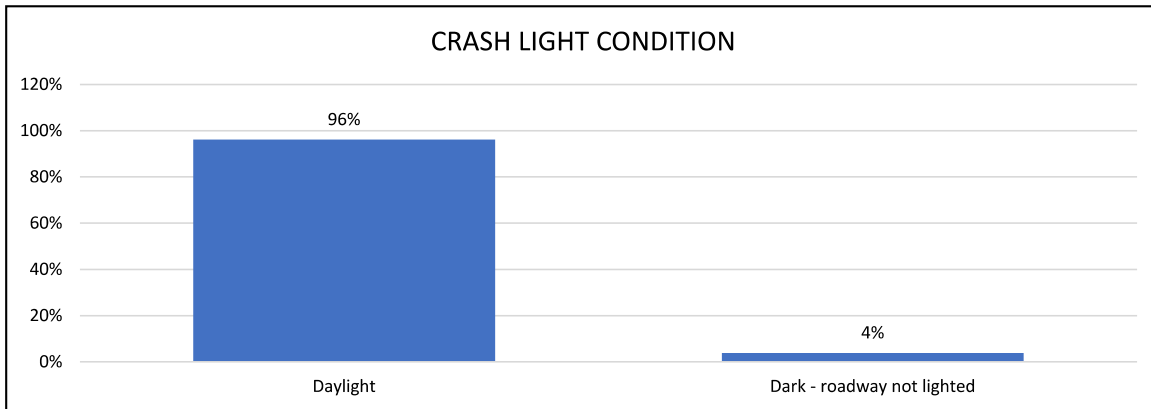
Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
21	06/30/2019	Sunday	3:06 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	70-79	20-29			D1:(Failed to yield right of way),(Inattention) D2:(No improper driving)		V1 and V2 EB on Scenic Hwy approaching the Nightingale Pond Rd intersection. V1 pulled into right lane without allowing enough space for V2. V2 was unable to avoid V1 and struck it.
22	07/17/2019	Wednesday	4:50 PM	Daylight	Cloudy	Unknown	Rear-end	Property damage only (none injured)	<=19	20-29	50-59		D1:(Inattention) D2:(No improper driving) D3:(No improper driving)	D1:Other activity, electronic device	V1, V2 and V3 WB on Scenic Hwy near the intersection with Nightingale Pond Rd. V1 was distracted using mobile phone which caused it to rear-end V2, causing V2 to rear-end V3 as they slowed approaching the East Rotary.
23	08/03/2019	Saturday	7:20 PM	Daylight	Clear	Dry	Single vehicle crash	Property damage only (none injured)	20-29				D1:(Exceeded authorized speed limit),(Inattention)		V1 WB on Scenic Hwy approaching the intersection. An unknown vehicle turning right from Nightingale Pond Rd took up both lanes and V1 swerved to avoid, striking a sign in the median.
24	08/18/2019	Sunday	4:16 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	70-79			D1:(Followed too closely) D2:(No improper driving)		V1 and V2 EB on Scenic Hwy stopped at the intersection with Nightingale Pond Rd. Traffic was just beginning to move when V1 struck V2.
25	08/20/2019	Tuesday	12:42 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	<=19	70-79			D1:(Made an improper turn),(Inattention) D2:(No improper driving)	D1:Manually operating an electronic device	V1 EB on Scenic Hwy. V2 WB on Scenic Hwy. V1 made an illegal u-turn at Nightingale Pond Rd onto Scenic Hwy WB and struck V2.
26	10/05/2019	Saturday	1:39 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	20-29	30-39			D1:(Inattention),(Followed too closely)		V1 and V2 EB on Scenic Hwy, near Nightingale Pond Rd. V2 stopped for red light. V1 failed to stop and struck the rear of V2.

Scenic Highway at Nightingale Pond Rd



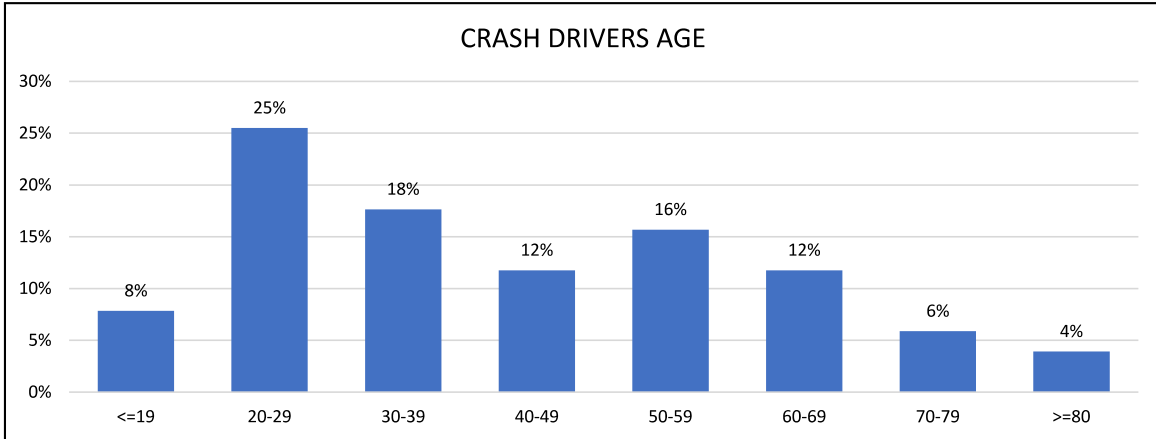
*Percentages may not total 100 due to rounding.

Scenic Highway at Nightingale Pond Rd



*Percentages may not total 100 due to rounding.

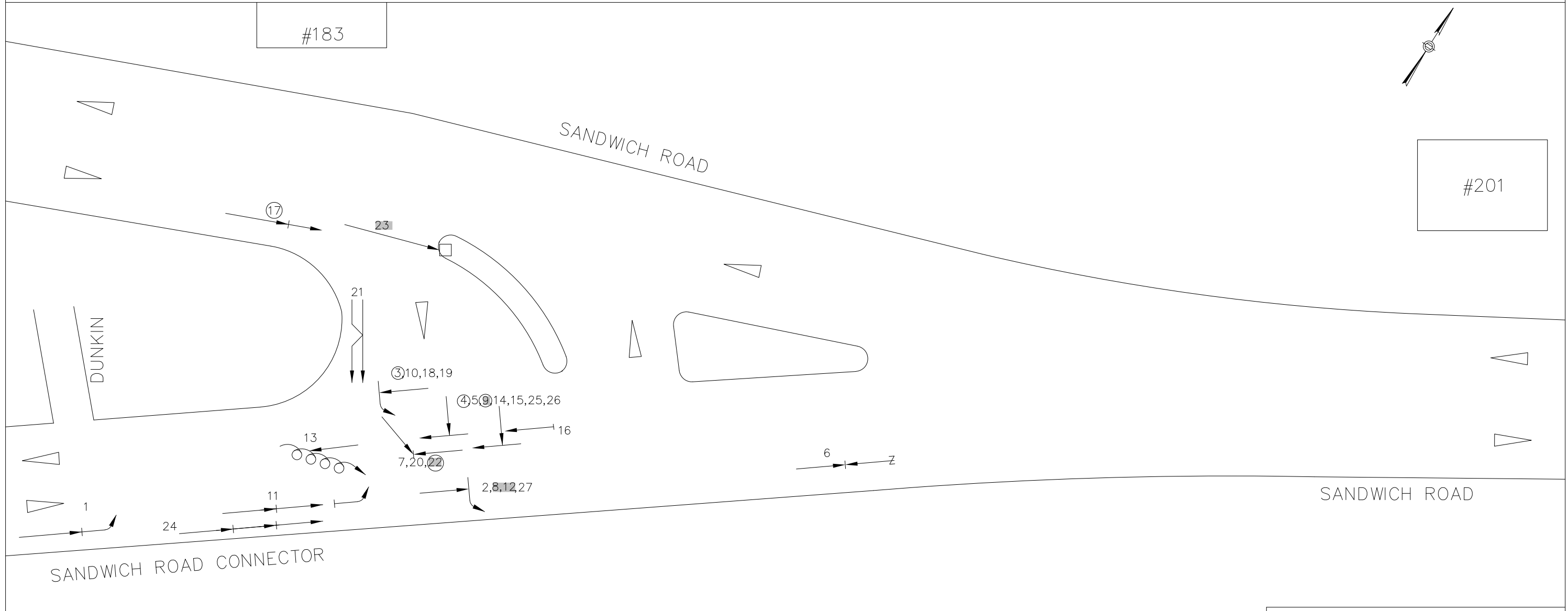
Scenic Highway at Nightingale Pond Rd



*Percentages may not total 100 due to rounding.

SEGMENT: SANDWICH ROAD AND: SANDWICH ROAD CONNECTOR
 PERIOD: 2017-2019 FROM: JANUARY TO: DECEMBER
 CITY/TOWN: BOURNE

PREPARED BY: STANTEC



SYMBOL	
	MOVING VEHICLE
	BACKING VEHICLE
	NON-INVOLVED VEHICLE
	PEDESTRIAN
	LOW-LIGHT CONDITION
	FIXED OBJECT
	FATAL ACCIDENT
	INJURY ACCIDENT
	OPERATOR FELL ASLEEP

COLLISION TYPE	
	REAR END
	HEAD ON
	SIDE - SWIPE
	OUT OF CONTROL
	LEFT TURN ANGLE
	RIGHT ANGLE
	ANIMAL ACCIDENT

*NOT TO SCALE

COLLISION DIAGRAM

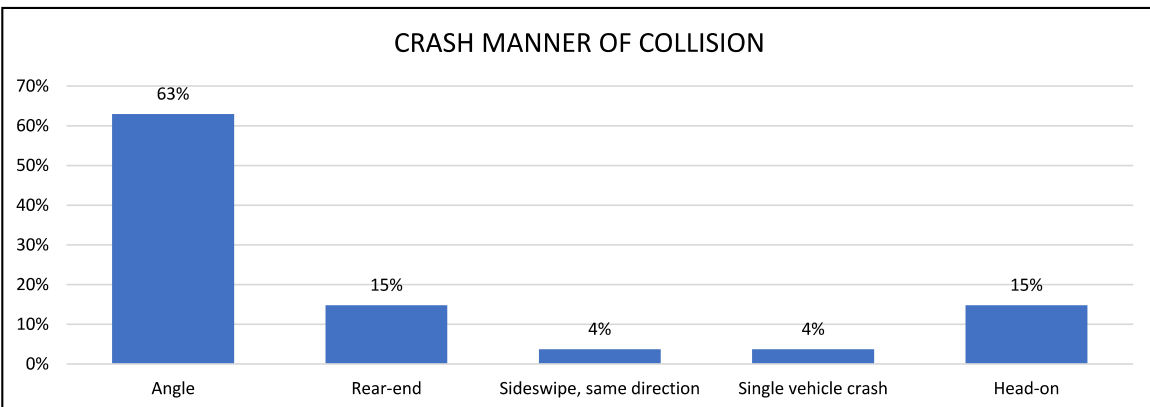
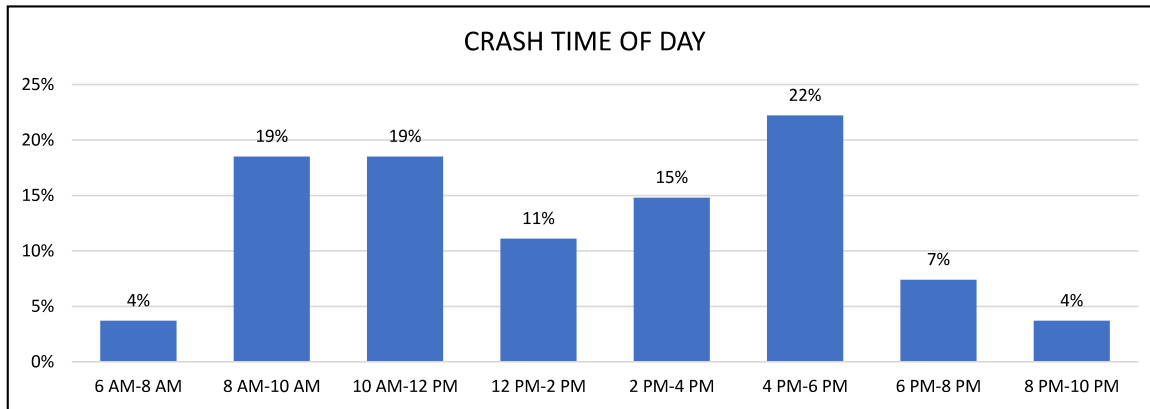
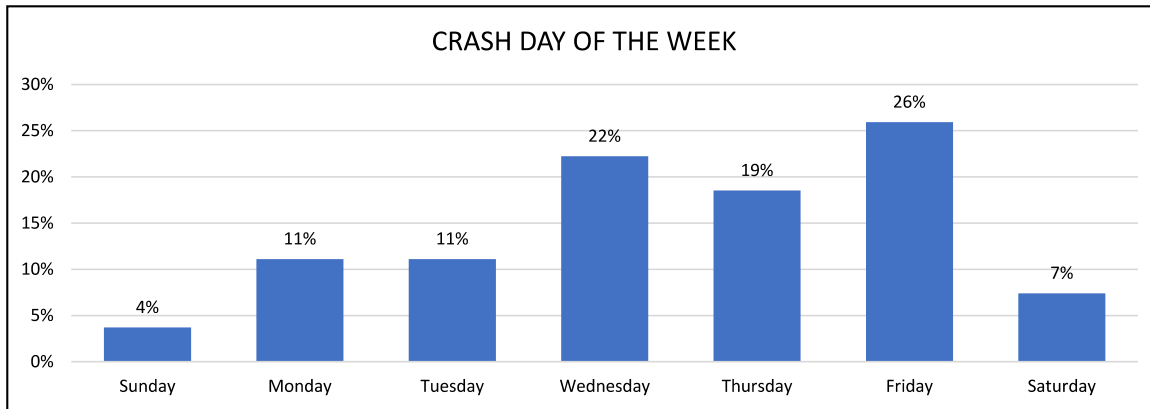
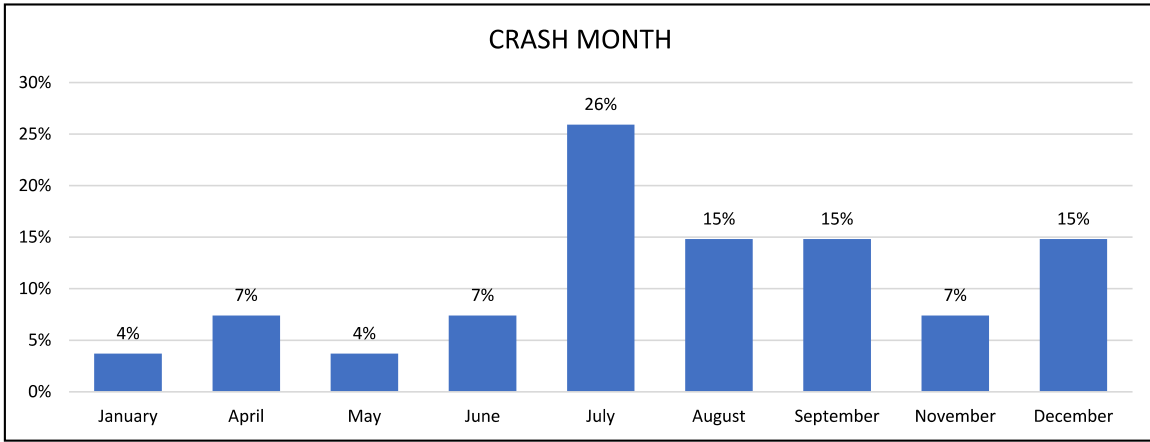
Crash Data Summary Table
Sandwich Road at Sandwich Road Connector Intersection
2017 - 2019

Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
1	04/14/2017	Friday	8:00 AM	Daylight	Cloudy	Dry	Rear-end	Property damage only (none injured)	40-49	40-49			D1:(Disregarded traffic signs, signals, road markings) D2:(No improper driving)		Both vehicles on the Connector. V2 rear ended V1 EB as V1 stopped to make an illegal left turn into the Dunkin'.
2	07/10/2017	Monday	12:00 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	Unknown	20-29			D1:(Unknown) D2:(No improper driving)		V1 EB on the Connector to Sandwich Rd. V2 at the STOP sign attempting to turn left. V1 struck V2 as V2 made a left turn. Hit and run.
3	07/12/2017	Wednesday	9:07 AM	Daylight	Clear	Dry	Angle	Non-fatal injury	>=80	60-69			D1:(Other improper action) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempting to turn left. V2 struck V1 as V1 failed to use care in stopping.
4	07/26/2017	Wednesday	6:02 PM	Daylight	Clear	Dry	Angle	Non-fatal injury	50-59	60-69			D1:(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempting to turn left. V1 struck V2. V1 failed to yield at intersection.
5	09/09/2017	Saturday	10:50 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	70-79	60-69			D1:(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempting to turn left. V1 struck V2 as V1 attempted to cross intersection.
6	09/10/2017	Sunday	4:46 PM	Daylight	Clear	Dry	Head-on	Property damage only (none injured)	20-29	70-79			D1:(Fatigued/asleep) D2:(No improper driving)	D1:Other activity (searching, eating, personal hygiene, etc.)	V1 WB on Sandwich Rd mainline near the intersection in heavy traffic. V2 EB from the Connector. V1 fell asleep and veered into EB lane and hit V2 head on.
7	09/23/2017	Saturday	10:27 AM	Daylight	Rain	Wet	Head-on	Property damage only (none injured)	60-69	60-69			D1:(Disregarded traffic signs, signals, road markings) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempting to turn left. V1 failed to stop and struck V2.
8	12/07/2017	Thursday	5:10 PM	Dusk	Clear	Dry	Angle	Property damage only (none injured)	50-59	70-79			D1:(No improper driving) D2:(Failed to yield right of way)		V2 EB on the Connector to Sandwich Rd. V1 at the STOP sign attempting to turn left. V2 struck V1 and continued into a fire hydrant off the right shoulder.
9	12/20/2017	Wednesday	5:13 PM	Dark - lighted roadway	Clear	Dry	Angle	Non-fatal injury	50-59	50-59			D1:(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign. V1 failed to yield and struck V2.
10	04/27/2018	Friday	2:50 PM	Daylight	Rain	Wet	Angle	Property damage only (none injured)	20-29	20-29			D1:(Disregarded traffic signs, signals, road markings),(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign pulls out behind another vehicle without stopping, and V2 cannot avoid. V1 flees scene.
11	05/24/2018	Thursday	10:54 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	40-49	<=19			D1:(Followed too closely) D2:(No improper driving)		An uninvolved vehicle, V2, and V1 EB on the Connector. The uninvolved vehicle stops to turn left onto Sandwich Rd. V2 stops quickly, and V1 rear-ends V2.
12	07/02/2018	Monday	8:58 PM	Dark - roadway not lighted	Clear	Dry	Angle	Property damage only (none injured)	30-39	50-59			D1:(Inattention) D2:(No improper driving)		V2 EB on the Connector to Sandwich Rd. V1 at the STOP sign attempting to turn left. V1 failed to yield.
13	07/06/2018	Friday	3:14 PM	Daylight	Rain	Wet	Angle	Property damage only (none injured)	20-29	40-49			D1:(Failure to keep in proper lane or running off road) D2:(No improper driving)		V1 EB on the Connector. V2 WB on Sandwich Rd. V2 struck V1 as V1 slid sideways while vehicle stopped in front of V1. Road was wet and V1 had faulty brakes.
14	07/11/2018	Wednesday	2:11 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	50-59	60-69			D1:(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign proceeded into the intersection. V1 failed to yield and struck V2.
15	07/16/2018	Monday	4:53 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	20-29	30-39			D1:(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempting to turn left. V1 failed to yield and struck V2.
16	08/02/2018	Thursday	4:58 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	60-69	20-29			D1:(Failure to keep in proper lane or running off road) D2:(No improper driving)		An involved vehicle and V1 WB on Sandwich Rd to the Connector in heavy traffic, V1 trailing. V2 at the STOP sign attempting to turn left. The uninvolved vehicle allowed V2 to enter the roadway, and V1 attempted to pass on the left, resulting in the collision.
17	08/30/2018	Thursday	11:15 AM	Daylight	Clear	Dry	Rear-end	Non-fatal injury	20-29	20-29			D1:(Inattention) D2:(No improper driving)		V2 EB on Sandwich Rd near 183 in heavy traffic, V1 trailing. V1 rear ended V2. V1 following too closely.
18	01/29/2019	Tuesday	11:13 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	70-79	20-29			D1:(Made an improper turn),(Inattention) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempts to turn left, and V2 cannot avoid
19	06/19/2019	Wednesday	0.734722222	Daylight	Cloudy	Dry	Angle	Non-fatal injury	>=80	70-79			D1:(Inattention),(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempts to turn left, and V2 cannot avoid
20	08/09/2019	Friday	12:00 PM	Daylight	Clear	Dry	Head-on	Property damage only (none injured)	70-79	70-79			D1:(Made an improper turn) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempting to turn left. The vehicles collided in the intersection.
21	08/13/2019	Tuesday	8:00 AM	Daylight	Clear	Dry	Sideswipe, same direction	Property damage only (none injured)	Unknown	50-59			D1:(Unknown) D2:(No improper driving)		V1 and V2 both on Sandwich Rd approaching the STOP sign. The vehicles were turning opposite directions. One sideswiped the other then fled the scene.
22	09/26/2019	Thursday	6:14 PM	Dusk	Cloudy	Dry	Head-on	Non-fatal injury	30-39	20-29			D1:(Disregarded traffic signs, signals, road markings),(Failed to yield right of way) D2:(No improper driving)		V2 WB on Sandwich Rd to the Connector. V1 at the STOP sign attempting to turn left continues into the intersection without stopping, resulting in the collision.
23	12/13/2019	Friday	7:15 AM	Dawn	Cloudy	Dry	Single vehicle crash	Unknown	Unknown				D1:(Unknown)		V1 (unknown vehicle) on Sandwich Rd approaching the STOP sign. V1 struck the median "Keep Left" sign and fled the scene.
24	12/17/2019	Tuesday	12:50 PM	Daylight	Rain	Wet	Rear-end	Property damage only (none injured)	50-59	50-59	40-49				Vs 1, 2, and 3 EB on the Connector at the Sandwich Rd intersection. V2 pulled over for a funeral procession in the opposite direction. V1 rear-ended V3 then proceeded into V2.

Crash Data Summary Table
Sandwich Road at Sandwich Road Connector Intersection
2017 - 2019

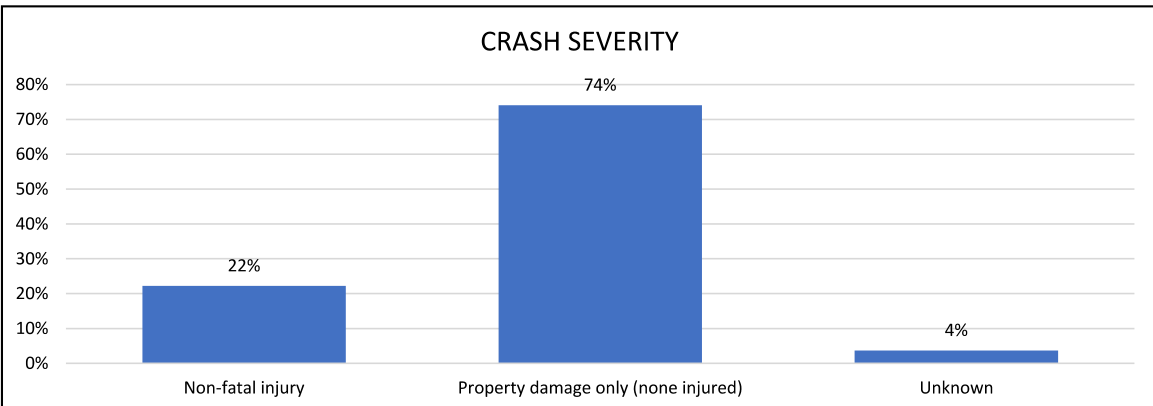
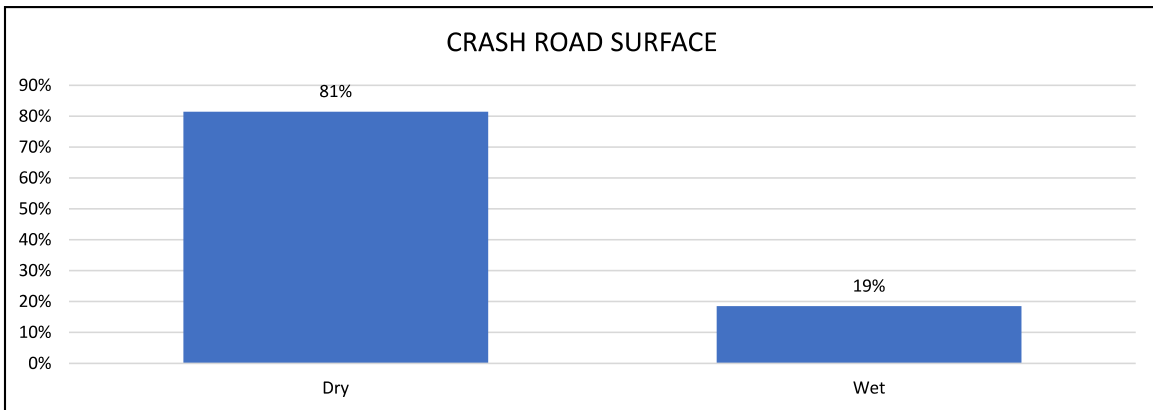
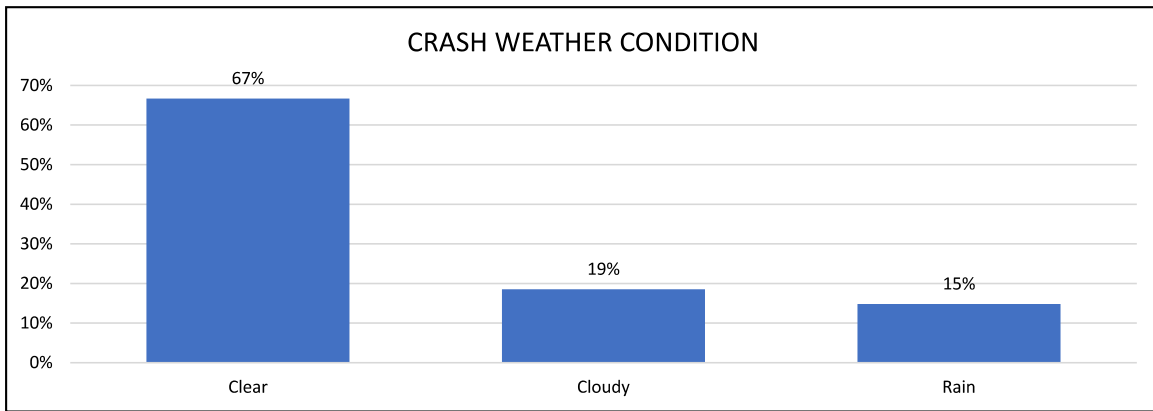
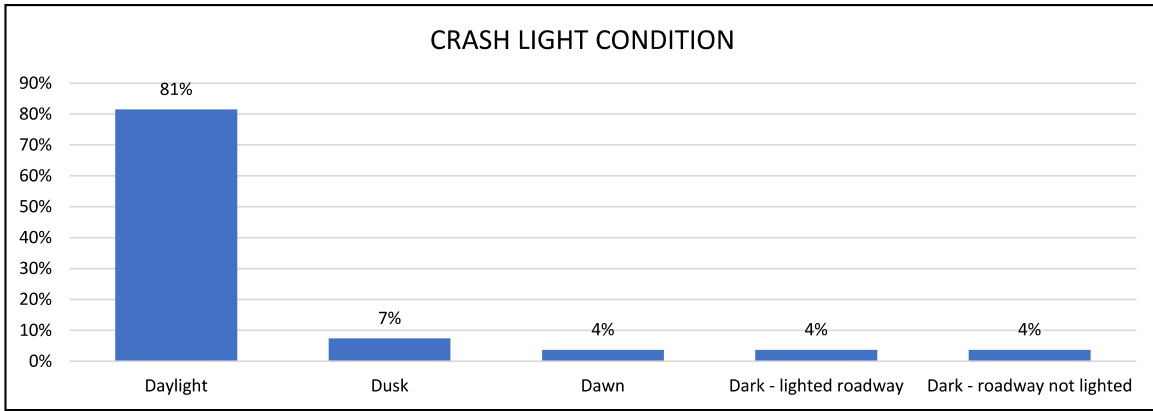
Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
25	11/16/2018	Friday	3:01 PM	Daylight	Cloudy	Wet	Angle	Property damage only (none injured)	20-29	60-69			D1:(Failed to yield right of way) D2:(No improper driving)		V2 WB towards the Connector. V1 SB attempting to turn left. V1 struck the passenger side of V2.
26	06/14/2019	Friday	8:48 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	30-39	40-49			D1:(Failed to yield right of way) D2:(No improper driving)		V1 WB towards the Connector. V1 SB attempting to turn left. V1 entered the intersection and V2 could not avoid.
27	11/27/2019	Wednesday	9:39 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	70-79	50-59					V2 EB from the Connector. V1 SB attempting to turn left. V1 struck the driver side of V2.

Sandwich Road at Sandwich Road Connector Intersection



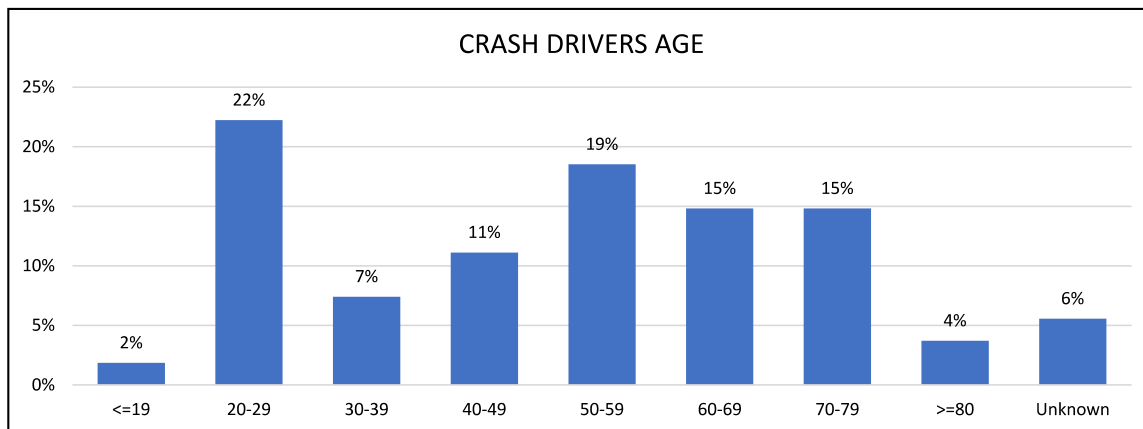
*Percentages may not total 100 due to rounding.

Sandwich Road at Sandwich Road Connector Intersection



*Percentages may not total 100 due to rounding.

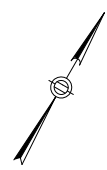
Sandwich Road at Sandwich Road Connector Intersection



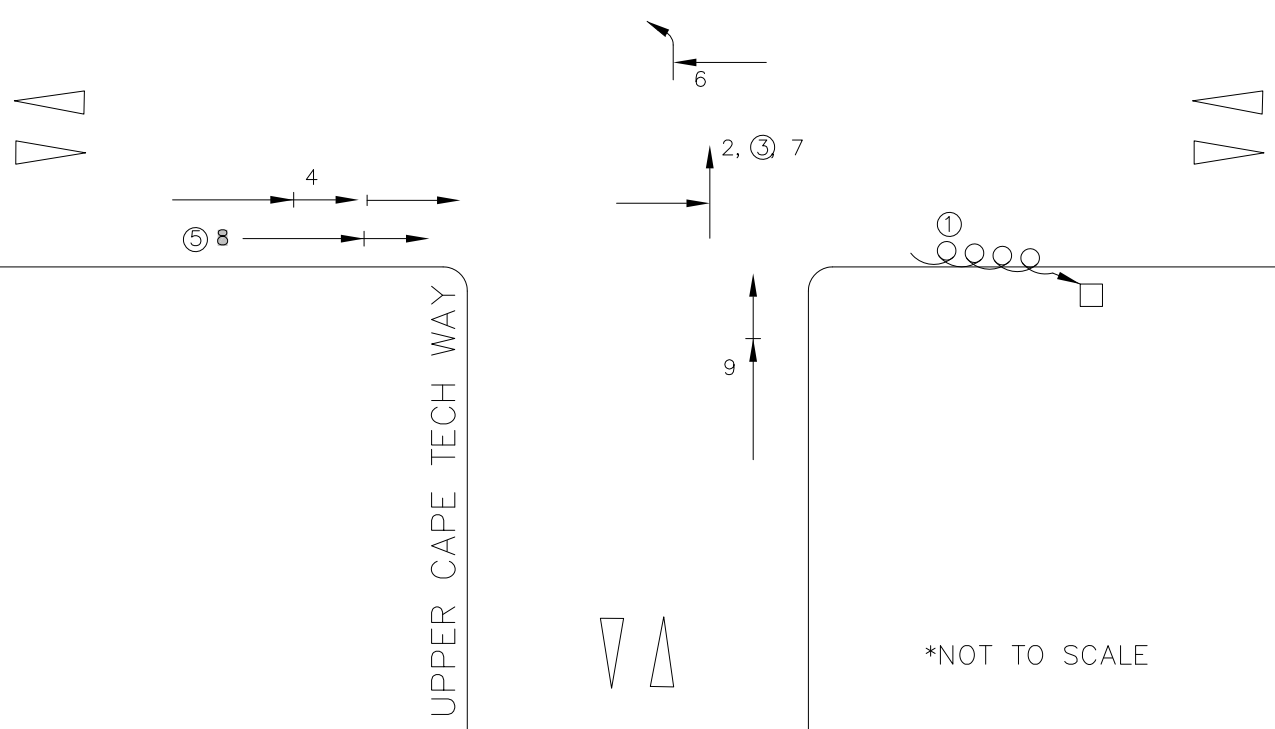
*Percentages may not total 100 due to rounding.

INTERSECTION: SANDWICH ROAD
 PERIOD: 2017-2019 FROM: JANUARY
 CITY/TOWN: BOURNE

AND: UPPER CAPE TECH WAY
 TO: DECEMBER
 PREPARED BY: STANTEC



SANDWICH ROAD



*NOT TO SCALE

SYMBOL

COLLISION TYPE

- ←——— MOVING VEHICLE
- ←———>>> BACKING VEHICLE
- ←———| NON-INVOLVED VEHICLE
- ←- - - - PEDESTRIAN
- LOW-LIGHT CONDITION
- FIXED OBJECT
- FATAL ACCIDENT
- INJURY ACCIDENT
- Z OPERATOR FELL ASLEEP

- ←———|←——— REAR END
- ←———|←——— HEAD ON
- ←———|←——— SIDE - SWIPE
- ←———|○○○○ OUT OF CONTROL
- ←———|↙ LEFT TURN ANGLE
- ←———|↓ RIGHT ANGLE
- ←———|○ ANIMAL ACCIDENT

COLLISION DIAGRAM

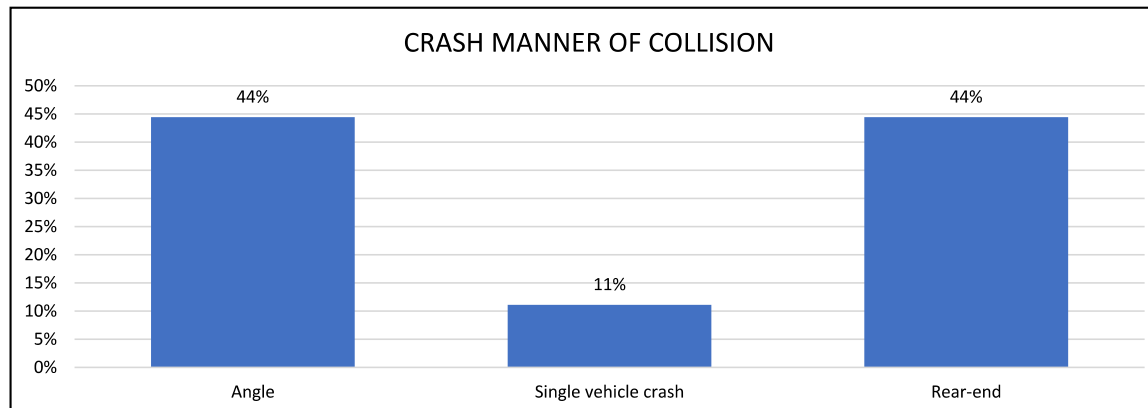
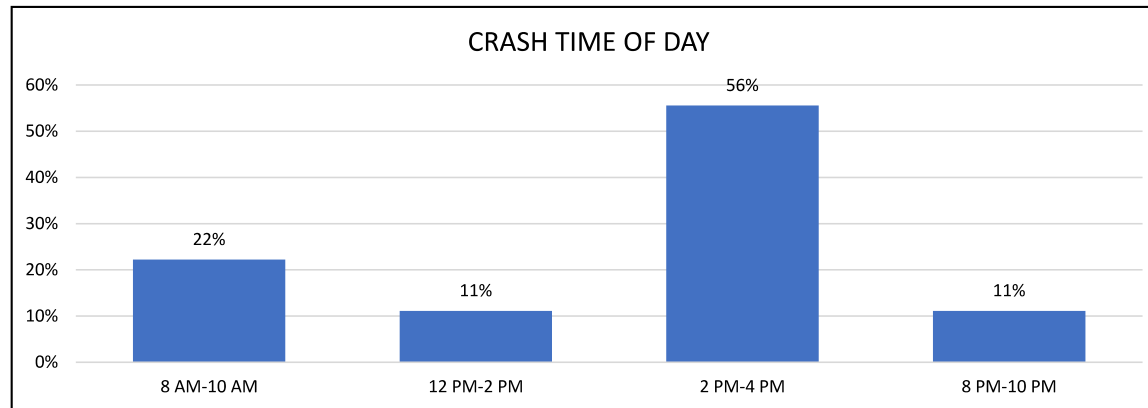
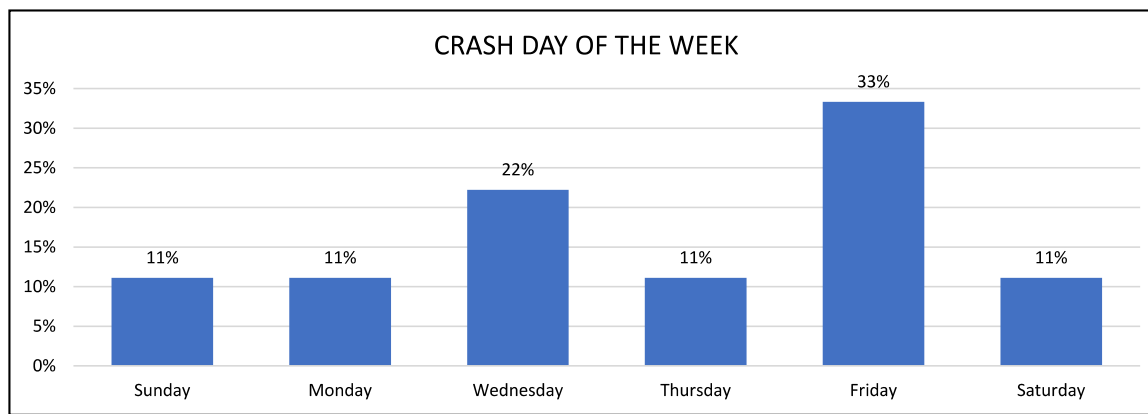
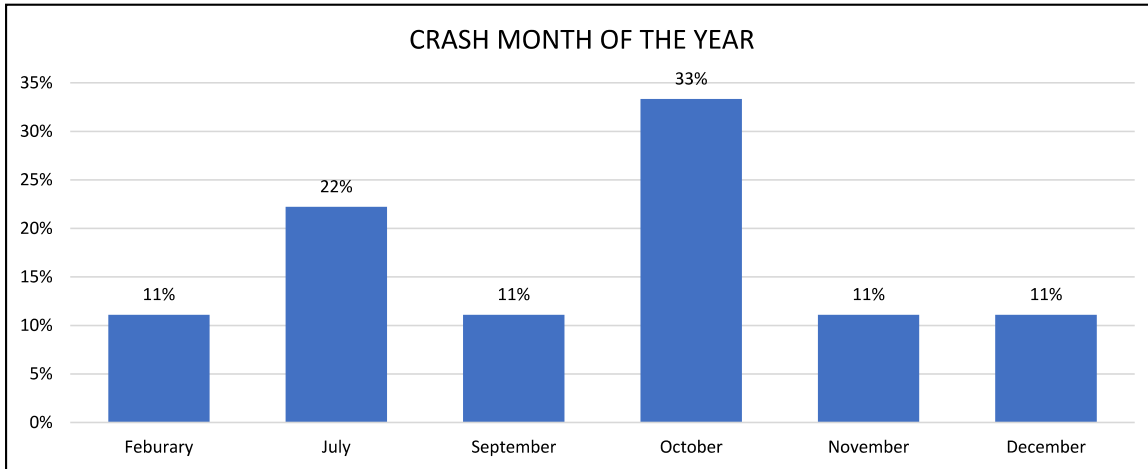
Crash Data Summary Table

Sandwich Road at Upper Cape Cod Regional Technical High School Intersection

2017 - 2019

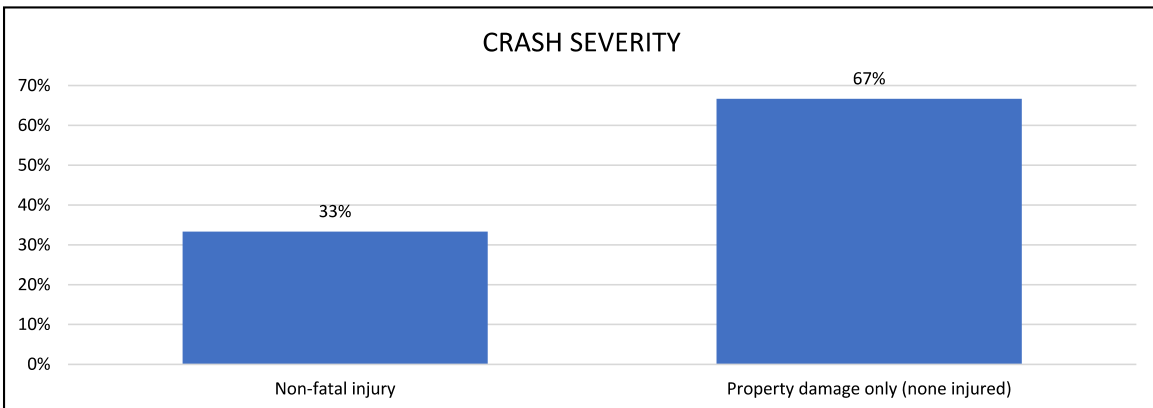
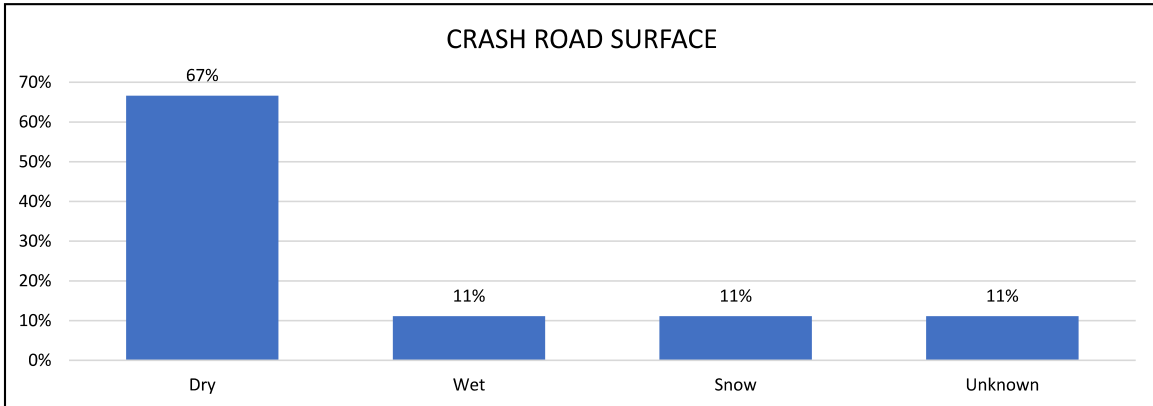
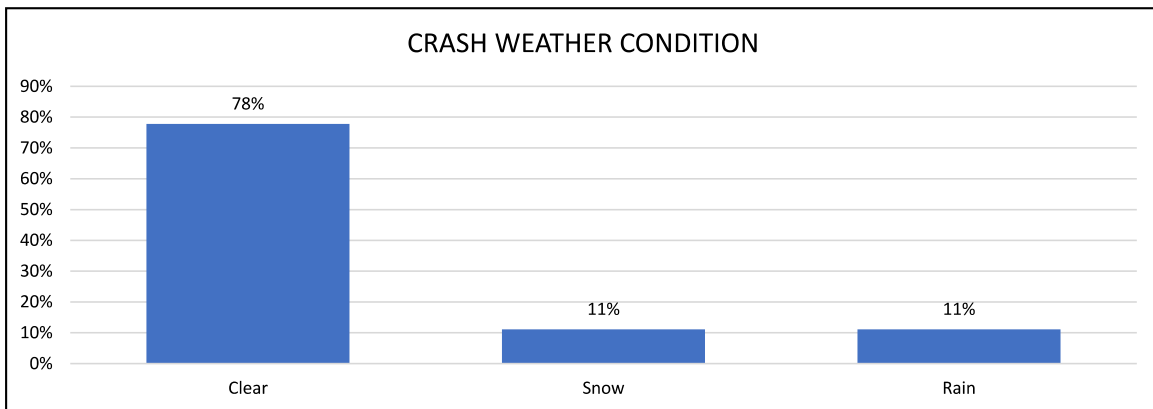
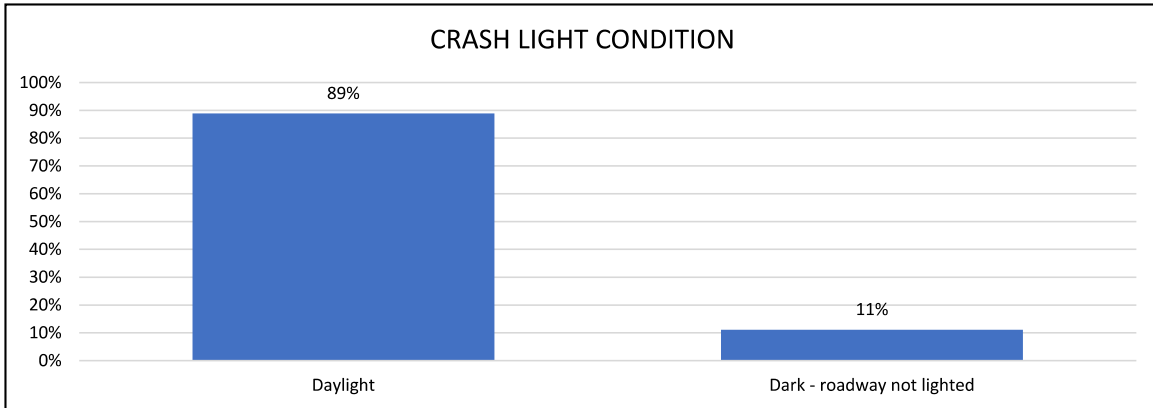
Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
1	02/12/2017	Sunday	3:47 PM	Daylight	Snow	Snow	Single vehicle crash	Non-fatal injury	60-69				D1:(Physical impairment)		V1 EB at Upper Cape Tech Way. V1 slid into the WB lanes, then crossed back over and struck a utility pole off the right shoulder. Operator charged with OUI.
2	10/21/2017	Saturday	2:08 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	<=19	50-59			D1:(Failed to yield right of way) D2:(No improper driving)		V2 EB on Sandwich Rd. V1 attempting to enter from Upper Cape Tech Way. V1 failed to yield and struck V2.
3	11/03/2017	Friday	12:33 PM	Daylight	Clear	Dry	Angle	Non-fatal injury	30-39	40-49			D1:(Inattention) D2:(No improper driving)		V2 EB on Sandwich Rd. V1 attempting to enter from Upper Cape Tech Way. V2 struck V1 as V1 pulled into traffic.
4	07/30/2018	Monday	8:12 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	20-29	20-29			D1:(Followed too closely) D2:(No improper driving)		An uninvolved vehicle, V2, and V1 EB on Sandwich Rd approaching Upper Cape Tech Way. The uninvolved vehicle stopped quickly, causing V2 to stop as well. V1 was following too closely and rear-ended V2.
5	09/14/2018	Friday	2:16 PM	Daylight	Clear	Dry	Rear-end	Non-fatal injury	20-29	30-39			D1:(Followed too closely) D2:(No improper driving)		V2 EB on Sandwich Rd at Upper Cape Tech Way, V1 trailing. V1 followed too closely and rear-ended V2.
6	10/25/2018	Thursday	9:44 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	30-39	70-79			D1:(Disregarded traffic signs, signals, road markings) D2:(No improper driving)		V2 WB on sandwich rd struck V1 as V1 attempted to make a left turn from UCT way. V1 failed to yield.
7	12/12/2018	Wednesday	3:40 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	50-59	50-59			D1:(Disregarded traffic signs, signals, road markings) D2:(No improper driving)		V2 struck V1 as V1 attempted to make a left turn on Rte 6a WB. V1 failed to yield.
8	07/26/2019	Friday	9:04 PM	Dark - roadway not lighted	Clear	Unknown	Rear-end	Property damage only (none injured)	20-29	60-69			D1:(Inattention) D2:(No improper driving)		Both vehicles EB approaching Upper Cape Tech Way. V1 rear ended V2 slowing in traffic.
9	10/09/2019	Wednesday	2:21 PM	Daylight	Rain	Wet	Rear-end	Property damage only (none injured)	<=19	<=19			D1:(Followed too closely) D2:(No improper driving)		V1 rear ended V2 NB on Upper Cape Tech Way while approaching stop sign. V1 followed too closely.

Sandwich Road at Upper Cape Cod Regional Technical High School Intersection



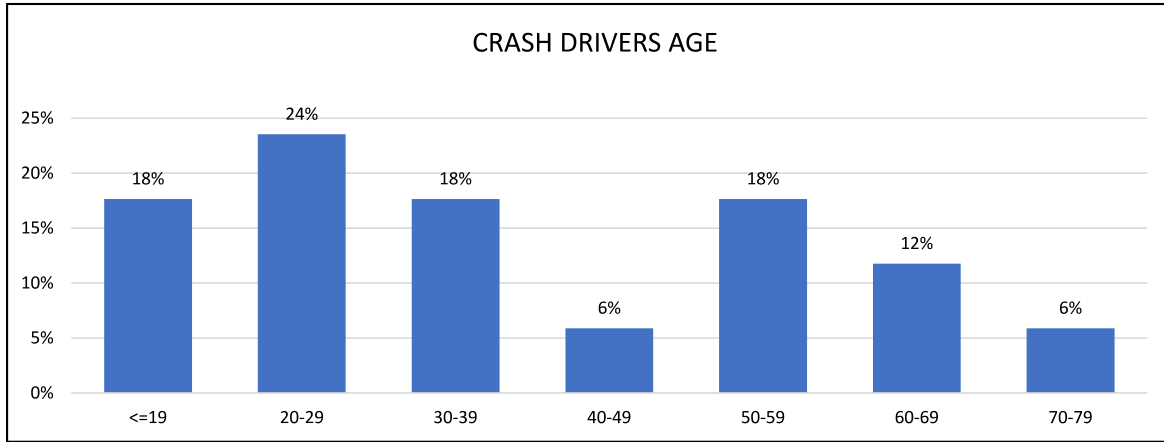
*Percentages may not total 100 due to rounding.

Sandwich Road at Upper Cape Cod Regional Technical High School Intersection



*Percentages may not total 100 due to rounding.

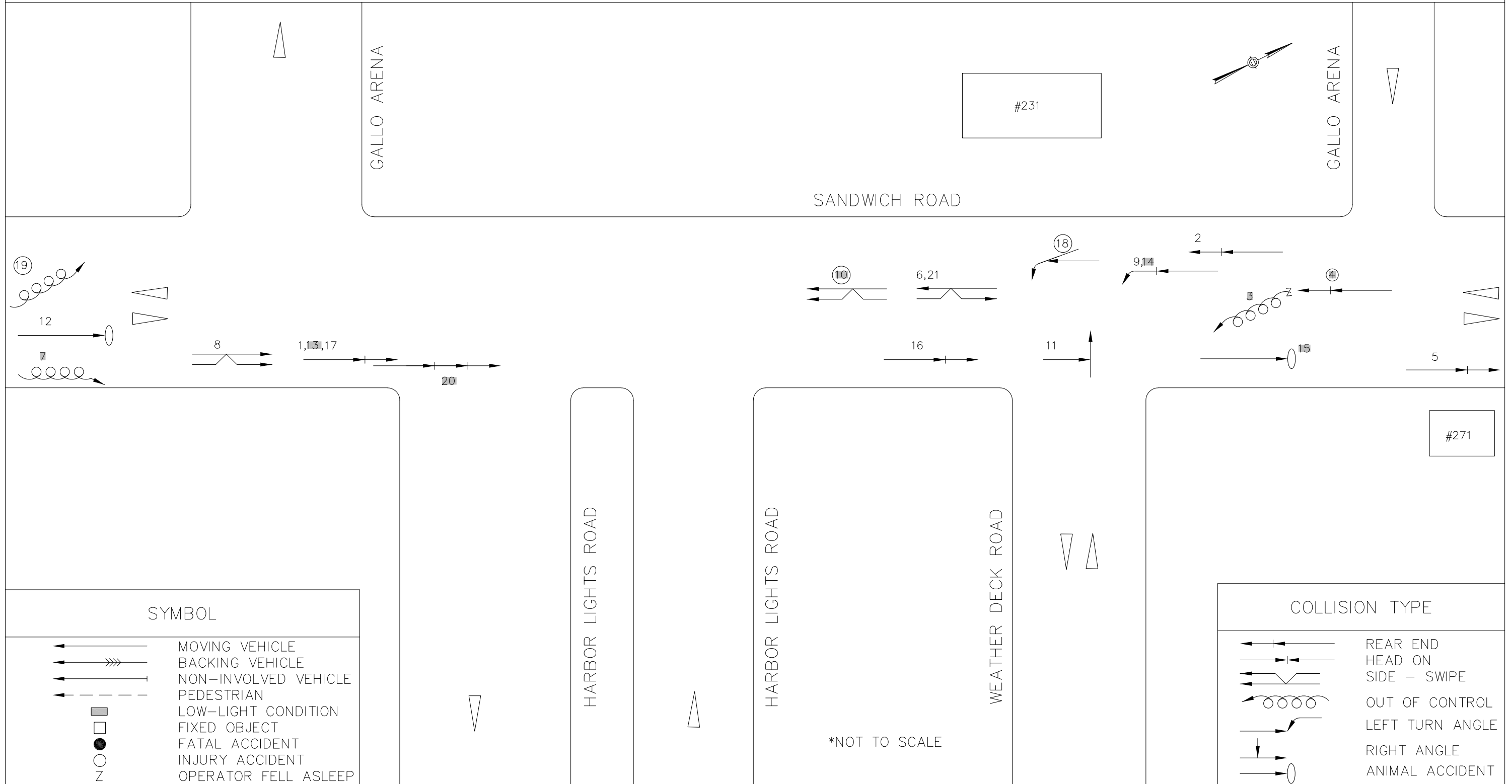
Sandwich Road at Upper Cape Cod Regional Technical High School Intersection



*Percentages may not total 100 due to rounding.

SEGMENT: SANDWICH ROAD AND: HARBOR LIGHTS ROAD AND WEATHER DECK ROAD
 PERIOD: 2017-2019 FROM: JANUARY TO: DECEMBER
 CITY/TOWN: BOURNE

PREPARED BY: STANTEC



COLLISION DIAGRAM

Crash Data Summary Table

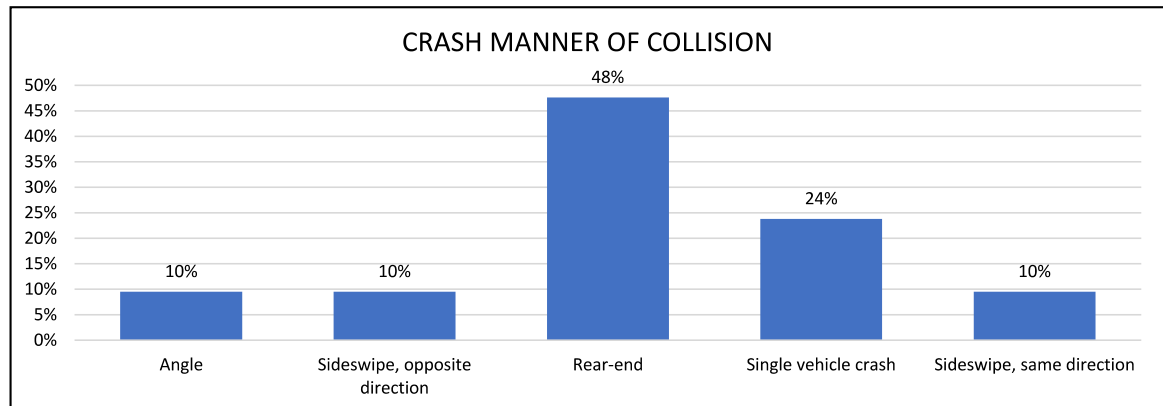
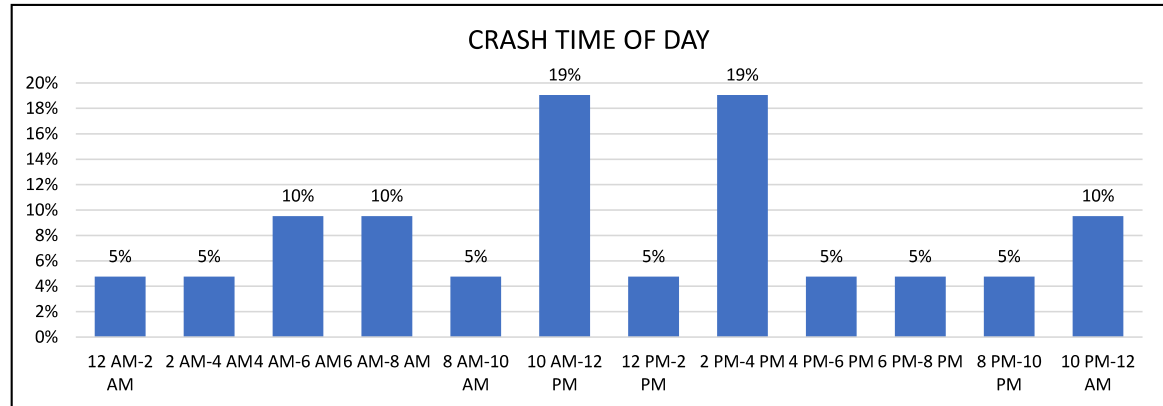
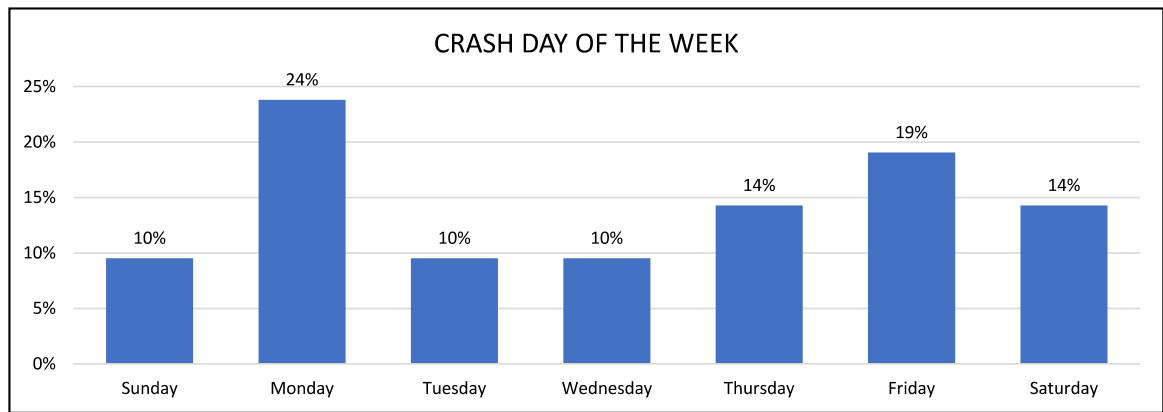
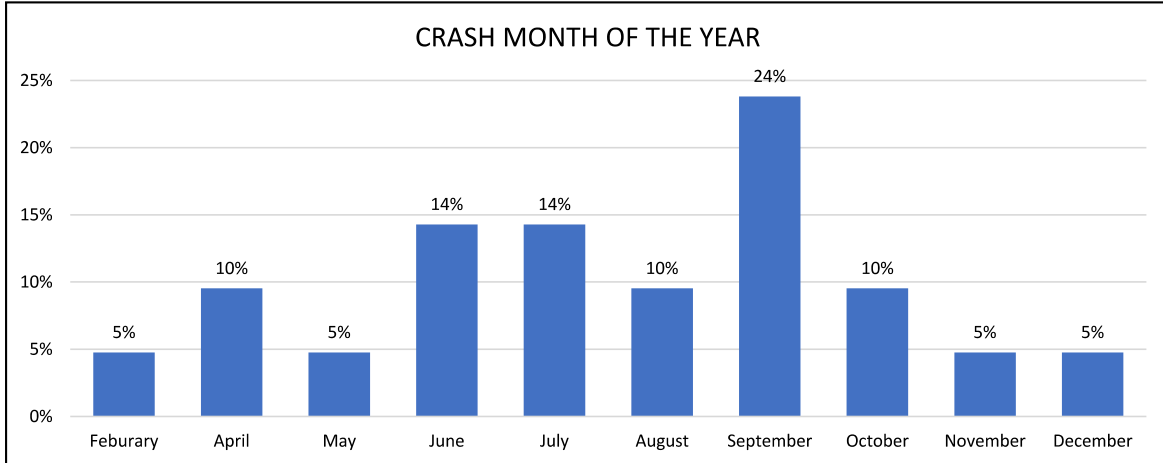
Sandwich Road at Harbor Lights Road, Weather Deck Road, and Gallo Arena

2017 - 2019

Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
1	02/15/2017	Wednesday	3:41 PM	Daylight	Rain	Wet	Rear-end	Property damage only (none injured)	<=19	<=19			D1:(Followed too closely),(Exceeded authorized speed limit) D2:(No improper driving)	D1:Other activity (searching, eating, personal hygiene, etc.)	V2 EB on Sandwich Rd attempting to turn left into 231 (Gallo Arena). V1 rear-ended V2. V1 following too closely and speeding.
2	06/21/2017	Wednesday	10:40 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	<=19	30-39			D1:(Inattention) D2:(No improper driving)		V2 WB on Sandwich Rd approaching the Gallo Arena, V1 trailing. Traffic slowed and V1 rear-ended V2. V1 failed to slow/stop.
3	06/29/2017	Thursday	4:45 AM	Dawn	Clear	Dry	Single vehicle crash	Property damage only (none injured)	60-69				D1:(Fatigued/asleep),(Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc)		V1 WB on Sandwich Rd approaching the Gallo Arena. V1 fell asleep and drove over the centerline, striking guardrail.
4	06/29/2017	Thursday	4:45 AM	Dawn	Clear	Dry	Rear-end	Non-fatal injury		20-29	60-69		D2:(Followed too closely) D3:(No improper driving)		(Crash occurred in response to 3) Vs 2, and 3 WB on Sandwich Rd approaching the Gallo Arena, V2 behind V3. V1 ahead fell asleep and drove over the centerline, striking guardrail. Witnessing this, V2 slowed down and was rear-ended by V3.
5	07/28/2017	Friday	3:59 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	70-79			D1:(Followed too closely) D2:(No improper driving)		Both vehicles EB past the Gallo Arena. V1 rear ended v2 as V2 slowed/stopped in traffic. Hit and run.
6	10/23/2017	Monday	1:57 PM	Daylight	Clear	Dry	Sideswipe, opposite direction	Property damage only (none injured)	70-79				D1:(No improper driving)		V2 WB and V1 EB near the Weatherdeck Rd intersection. V1 struck V2 as V1 crossed the centerline. Hit and run
7	12/25/2017	Monday	2:36 AM	Dark - roadway not lighted	Rain	Wet	Single vehicle crash	Property damage only (none injured)	30-39				D1:(Driving too fast for conditions),(Inattention)	D1:Talking on hands-free electronic device	V1 EB prior to 231 (Gallo Arena). V1 drove off right side of roadway and struck guardrail, then a utility pole. V1 traveling at high rate of speed.
8	04/17/2018	Tuesday	7:50 AM	Daylight	Clear	Dry	Sideswipe, same direction	Property damage only (none injured)	50-59	50-59			D1:(Failed to yield right of way) D2:(No improper driving)		Both vehicles EB just prior to the Harbor Lights Rd intersection. V1 struck V2 as V2 pulled in to traffic lane from shoulder without checking blind spot.
9	07/01/2018	Sunday	10:04 AM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	60-69	50-59			D1:(Followed too closely) D2:(No improper driving)		V2 WB approaching Weatherdeck Rd, V1 trailing. V1 rear ended V2 as V2 slowed to make a left turn. V1 following too closely.
10	07/29/2018	Sunday	9:27 PM	Dark - roadway not lighted	Clear	Dry	Sideswipe, same direction	Non-fatal injury	50-59	50-59	20-29		D1:(Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc) D2:(No improper driving) D3:(No improper driving) D4:(No improper driving) D5:(No improper driving)		All vehicles near 231 (Gallo Arena). V1 traveling WB with trailer failed to stop in traffic and struck V2 and V3 heading WB and further struck V4 and V5 on opposite lane.
11	08/16/2018	Thursday	3:56 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	<=19	70-79					V1 NB on Weatherdeck Rd, V2 EB on Sandwich Rd. V2 struck V1 as V1 attempted to make a left turn V1 thought they had enough time to pull out.
12	09/22/2018	Saturday	2:59 PM	Daylight	Clear	Dry	Single vehicle crash	Property damage only (none injured)	30-39				D1:(No improper driving)		V1 EB near 251 Sandwich Rd (prior to the arena). V1 struck an Animal.
13	10/15/2018	Monday	6:40 AM	Dawn	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	50-59			D1:(Followed too closely),(Inattention)		Both vehicles EB at Harbor Lights Rd. V1 rear ended V2 when V2 slowed to stop for a school bus. V1 following too closely.
14	04/15/2019	Monday	10:38 PM	Dark - roadway not lighted	Cloudy	Dry	Rear-end	Property damage only (none injured)	30-39	50-59			D1:(Followed too closely) D2:(No improper driving)		Both vehicles WB. V1 rear ended V2 as it was attempting to turn left onto Weatherdeck Rd. V1 failed to use caution stopping.
15	05/20/2019	Monday	12:33 AM	Dark - roadway not lighted	Cloudy	Dry	Single vehicle crash	Property damage only (none injured)	20-29				D1:(No improper driving)		V1 EB near 271 Sandwich Rd (past the arena). V1 struck an Animal.
16	08/16/2019	Friday	4:55 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	40-49			D1:(Followed too closely) D2:(No improper driving)		Both vehicles EB at Weatherdeck Rd. V1 rear ended V2 slowing in traffic. V1 Followed too doesly.
17	09/06/2019	Friday	9:01 AM	Daylight	Cloudy	Dry	Rear-end	Property damage only (none injured)	50-59	20-29					Both vehicles EB near 231 (Gallo Arena). V1 rear ended V2 as V2 slowed for vehicle making a three-point turn ahead.
18	09/10/2019	Tuesday	11:44 AM	Daylight	Clear	Dry	Angle	Non-fatal injury	60-69	50-59					Both vehicles WB at Weatherdeck Rd intersection. V1 (motorcycle) struck V2 as V1 attempted to pass left side of V2 and V2 was making a left turn.
19	09/14/2019	Saturday	10:49 AM	Daylight	Cloudy	Dry	Single vehicle crash	Non-fatal injury	50-59				D1:(Other improper action)		V1 EB near 246 (prior to the arena). Brake of V1 (motorcycle) locked up as it applied braked to stop for vehicle suddenly stopping ahead.
20	9/27/2019	Friday	6:51 PM	Dusk	Clear	Dry	Rear-end	Property damage only (none injured)	<=19	50-59	20-29		D1:(Followed too closely) D2:(No improper driving) D3:(No improper driving)		All vehicles EB near 254 (prior to the arena). V1 rear ended V2 stopped in traffic causing V2 to rear end stopped V3. V1 following too closely.
21	11/2/2019	Saturday	11:19 PM	Dark - roadway not lighted	Clear	Dry	Sideswipe, opposite direction	Property damage only (none injured)	Unknown	20-29			D1:(Unknown) D2:(No improper driving)		V1 EB and V2 WB in front of 231 (Gallo Arena). V1 and V2's mirror struck each other.

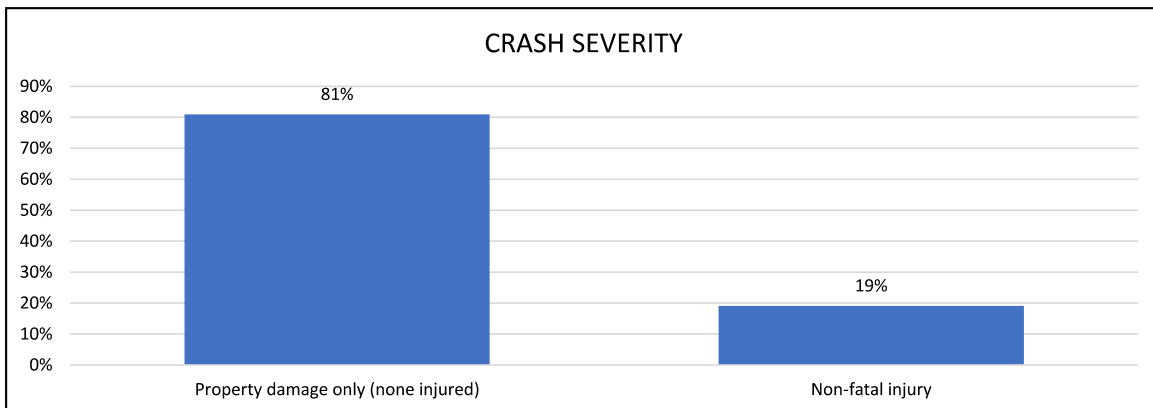
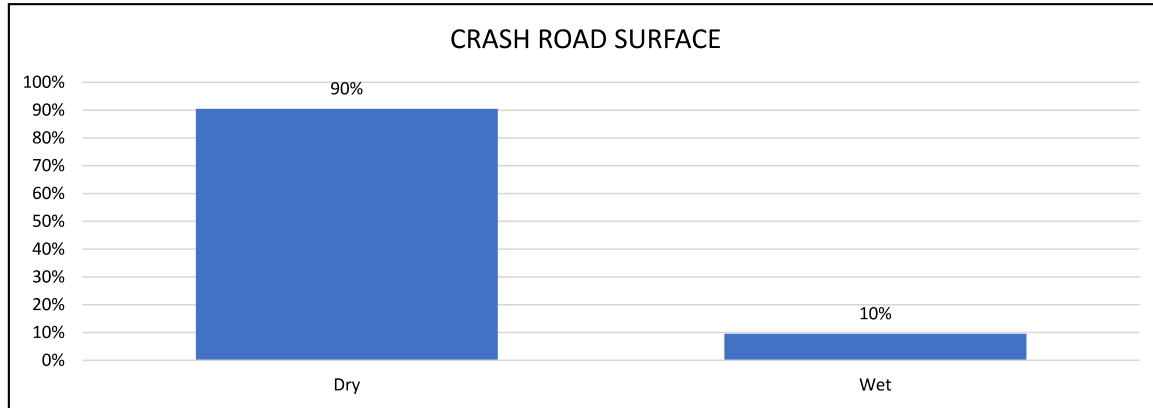
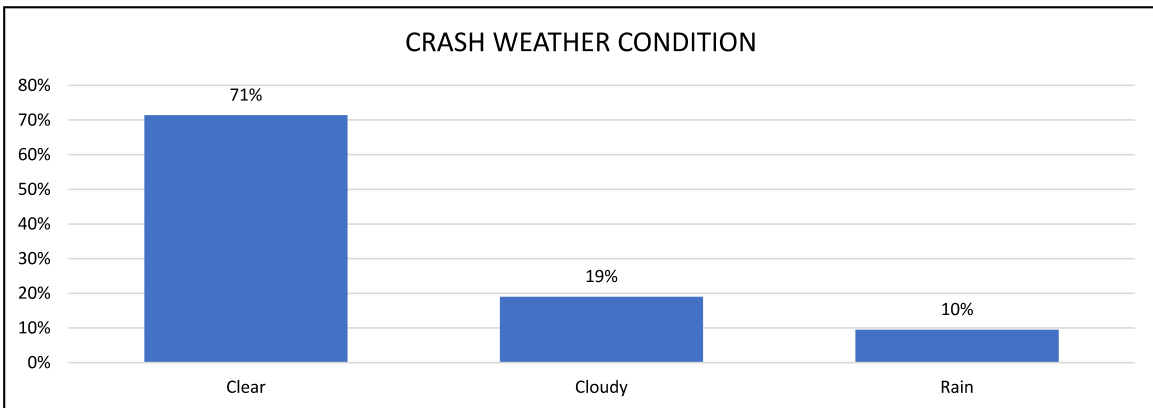
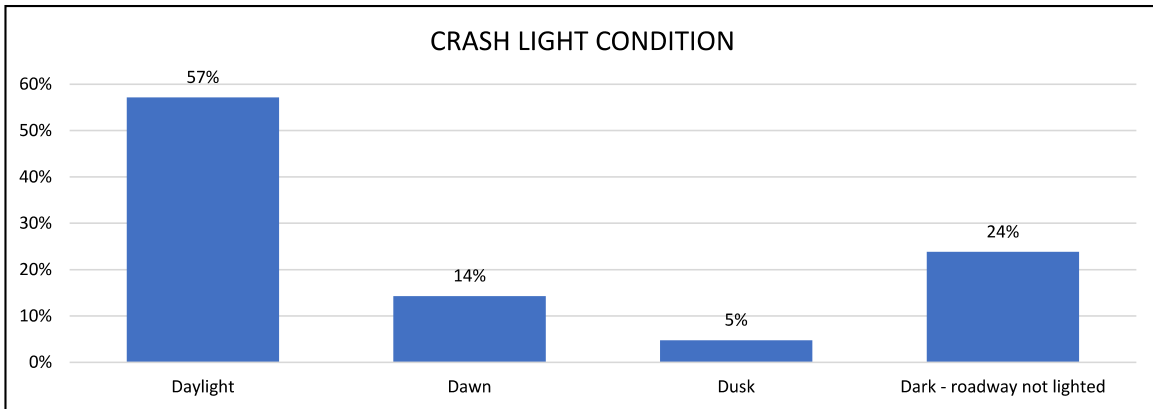
Crash Data Summary Charts

Sandwich Road at Harbor Lights Road, Weather Deck Road, and Gallo Arena



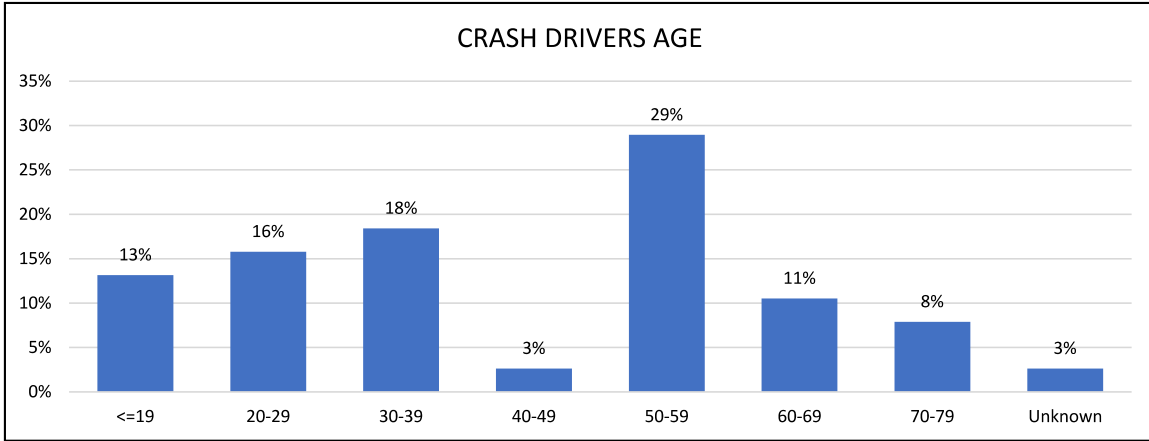
*Percentages may not total 100 due to rounding.

Sandwich Road at Harbor Lights Road, Weather Deck Road, and Gallo Arena



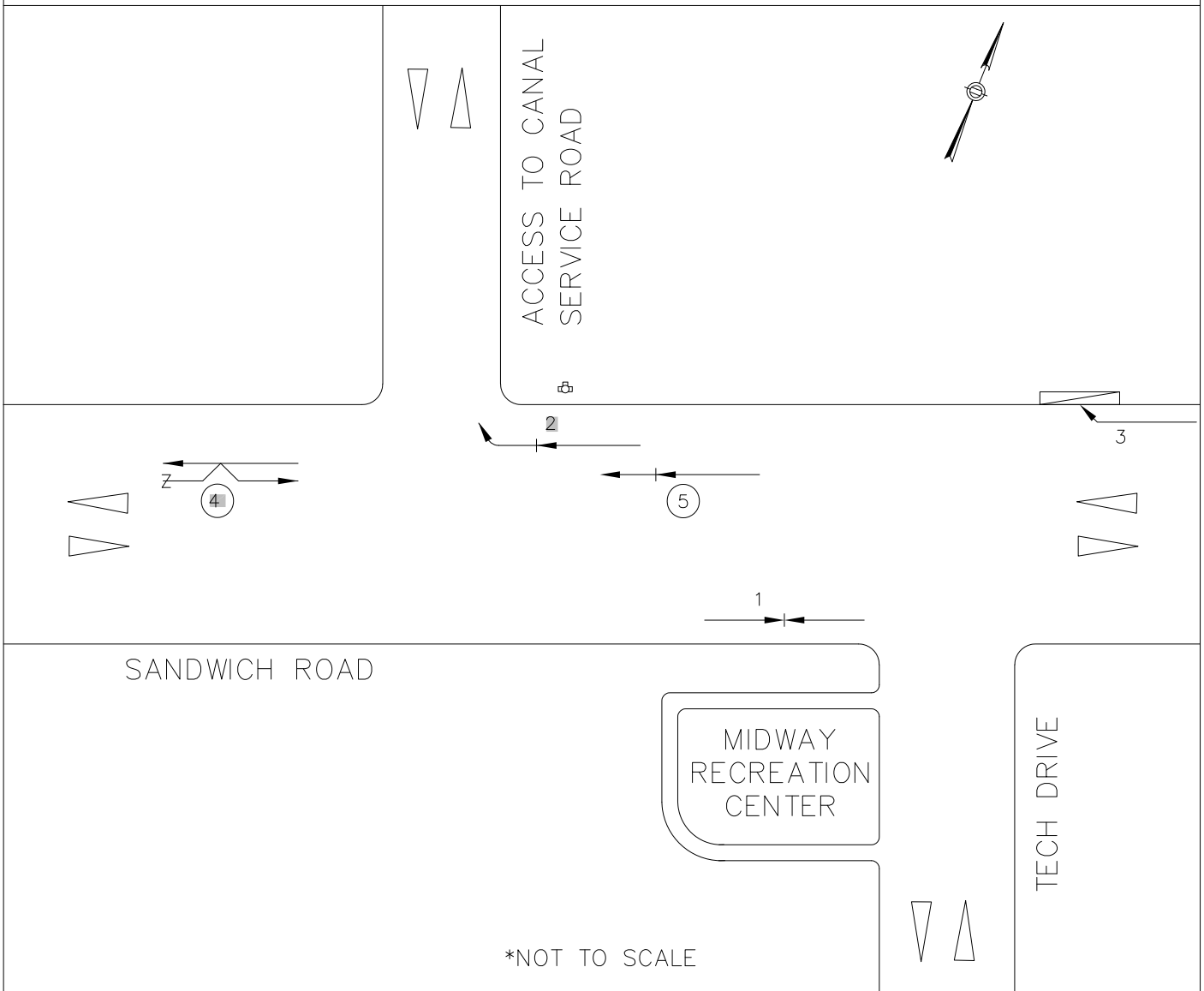
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Sandwich Road at Harbor Lights Road, Weather Deck Road, and Gallo Arena



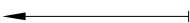









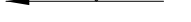





*Percentages may not total 100 due to rounding.

INTERSECTION: SANDWICH ROAD AND: CANAL SERVICE ROAD/TECH DRIVE
 PERIOD: 2017-2019 FROM: JANUARY TO: DECEMBER
 CITY/TOWN: BOURNE PREPARED BY: STANTEC



*NOT TO SCALE

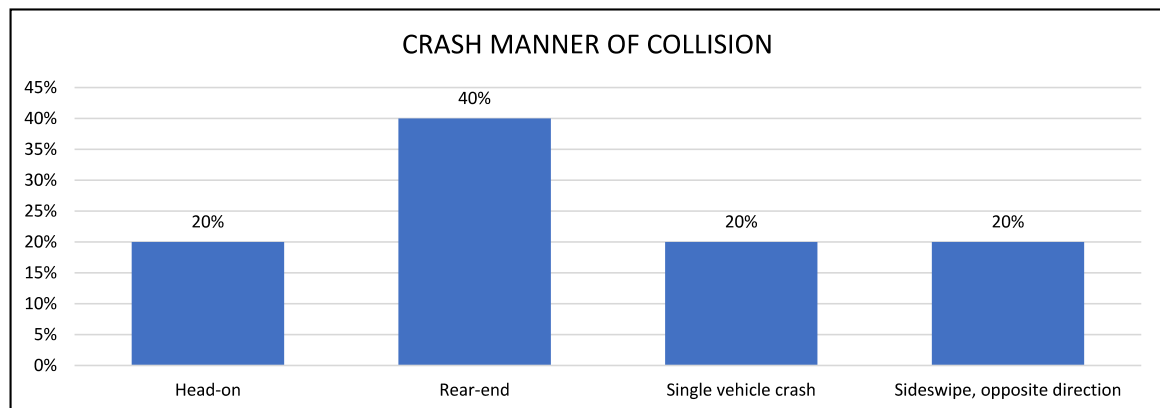
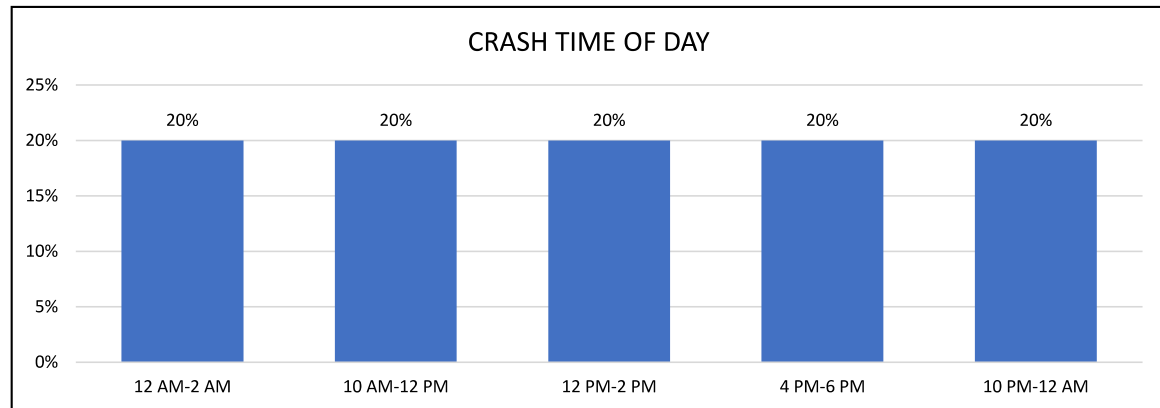
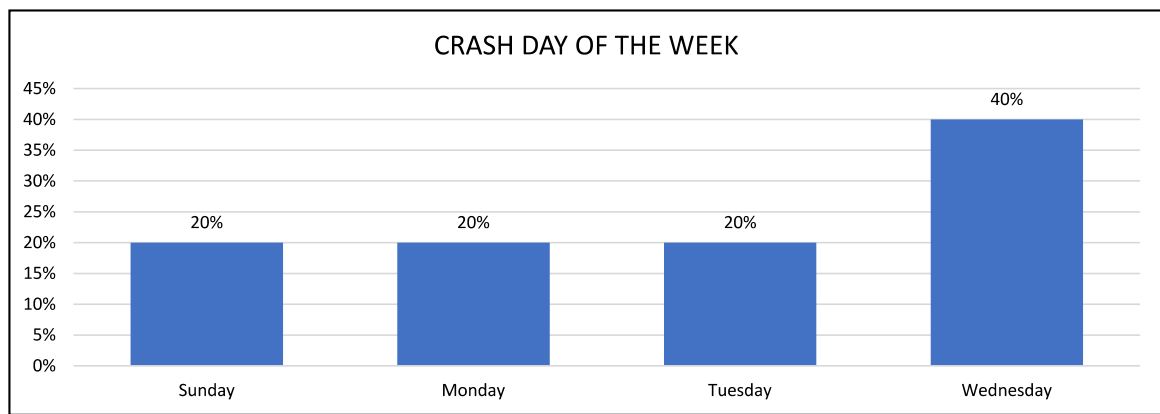
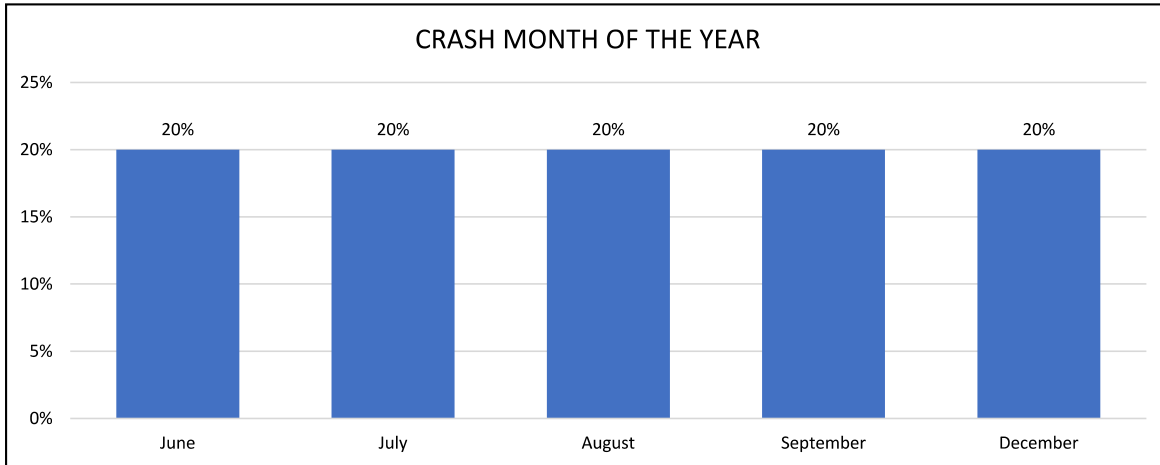
SYMBOL	COLLISION TYPE
 MOVING VEHICLE  BACKING VEHICLE  NON-INVOLVED VEHICLE  PEDESTRIAN  PARKED VEHICLE  FIXED OBJECT  FATAL ACCIDENT  INJURY ACCIDENT  LOW-LIGHT CONDITION	 REAR END  HEAD ON  SIDE - SWIPE  OUT OF CONTROL  LEFT TURN  RIGHT ANGLE  ANIMAL ACCIDENT

COLLISION DIAGRAM

Crash Data Summary Table
Sandwich Road at Tech Drive (Midway Recreation Area)
2017 - 2019

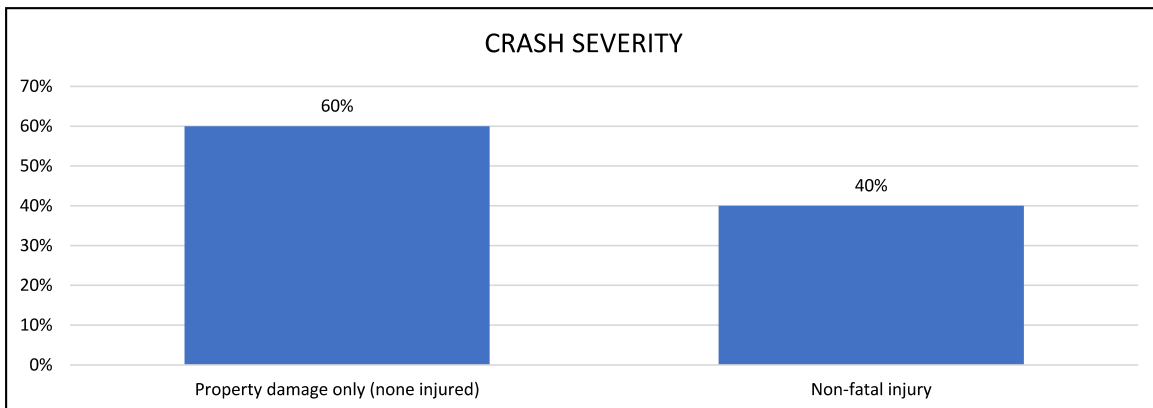
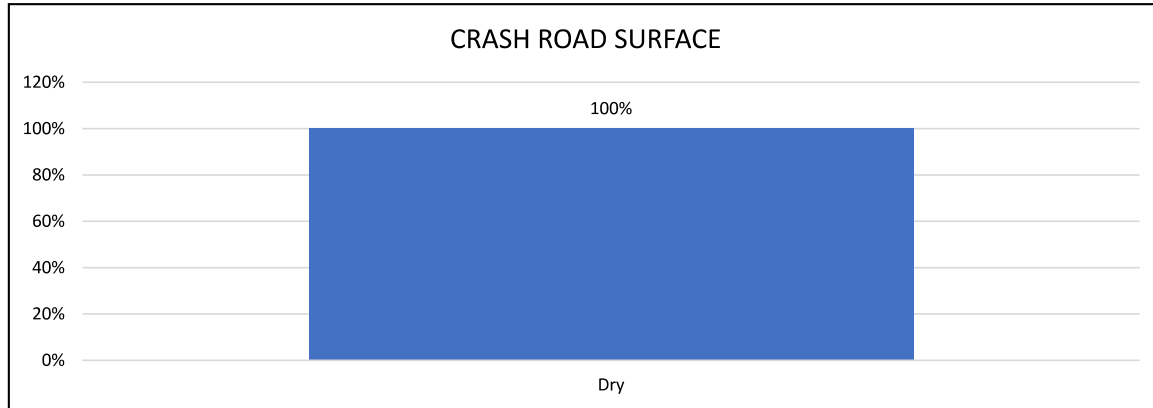
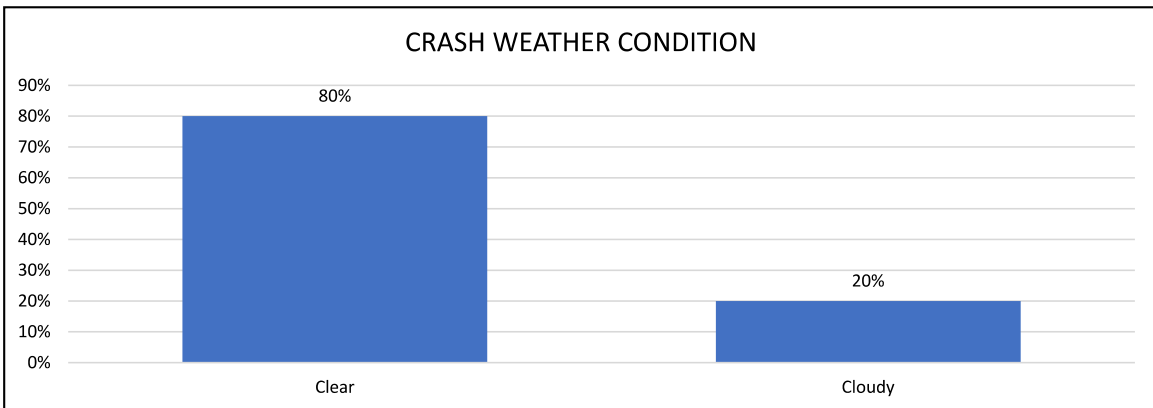
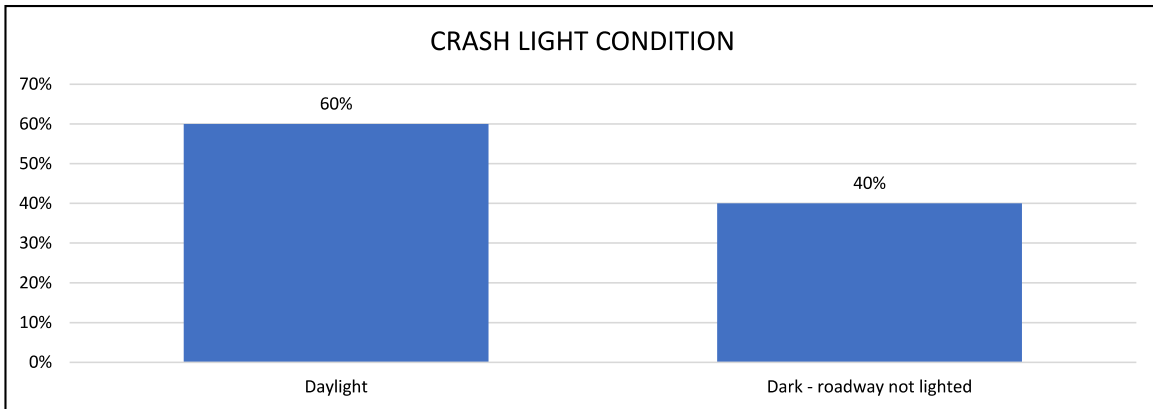
Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
1	06/21/2017	Wednesday	5:09 PM	Daylight	Clear	Dry	Head-on	Property damage only (none injured)	Unknown	>=80			D1:(Failed to yield right of way),(Made an improper turn) D2:(No improper driving)		V1 WB and V2 EB near Midway Recreation Area. V1 crossed the centerline in an apparent attempt to reverse direction and struck V2. Hit and run
2	09/12/2017	Tuesday	10:21 PM	Dark - roadway not lighted	Clear	Dry	Rear-end	Property damage only (none injured)	20-29	40-49					Both vehicles WB past Midway Recreation Area. V1 rear ended V2 while V2 slowed in traffic to make a right turn into the shoulder lot (that also provides access to the Canal Service Rd). V1 was following too closely.
3	08/01/2018	Wednesday	10:50 AM	Daylight	Cloudy	Dry	Single vehicle crash	Property damage only (none injured)	70-79	Unknown			D1:(Inattention)		V1 WB approaching Midway Recreation Area (Tech Dr). Vehicle pulls into the right shoulder in an attempt to make a U-turn and strikes a parked vehicle.
4	12/09/2018	Sunday	1:34 AM	Dark - roadway not lighted	Clear	Dry	Sideswipe, opposite direction	Non-fatal injury	<=19	20-29	50-59		D1:(Fatigued/asleep) D2:(No improper driving) D3:(No improper driving)		All vehicles near parking lot/Canal Service Rd access to the west of Midway Recreation Area. V1 EB crossed centerline and sideswiped V2 then struck V3 head-on. Operator of V1 fell asleep while driving.
5	07/08/2019	Monday	12:04 PM	Daylight	Clear	Dry	Rear-end	Non-fatal injury	20-29	20-29			D1:(Inattention) D2:(No improper driving) D3:(No improper driving) D4:(No improper driving) D5:(No improper driving)		Multiple Vehicl Crash. All vehicles traveling between Midway Recreation Area and the parking lot/Canal Service Rd access to the west. WB V1 rear ended V2 sending it into V3 and eventually to opposite lane striking V5. V1 continued and struck guardrail and V4.

Additional Sandwich Road Crash Segments



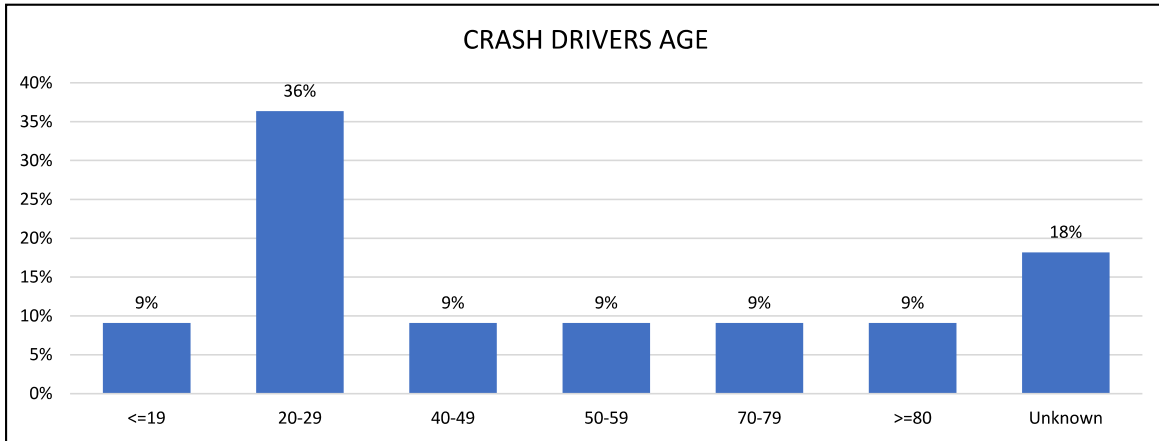
*Percentages may not total 100 due to rounding.

Additional Sandwich Road Crash Segments



*Percentages may not total 100 due to rounding.

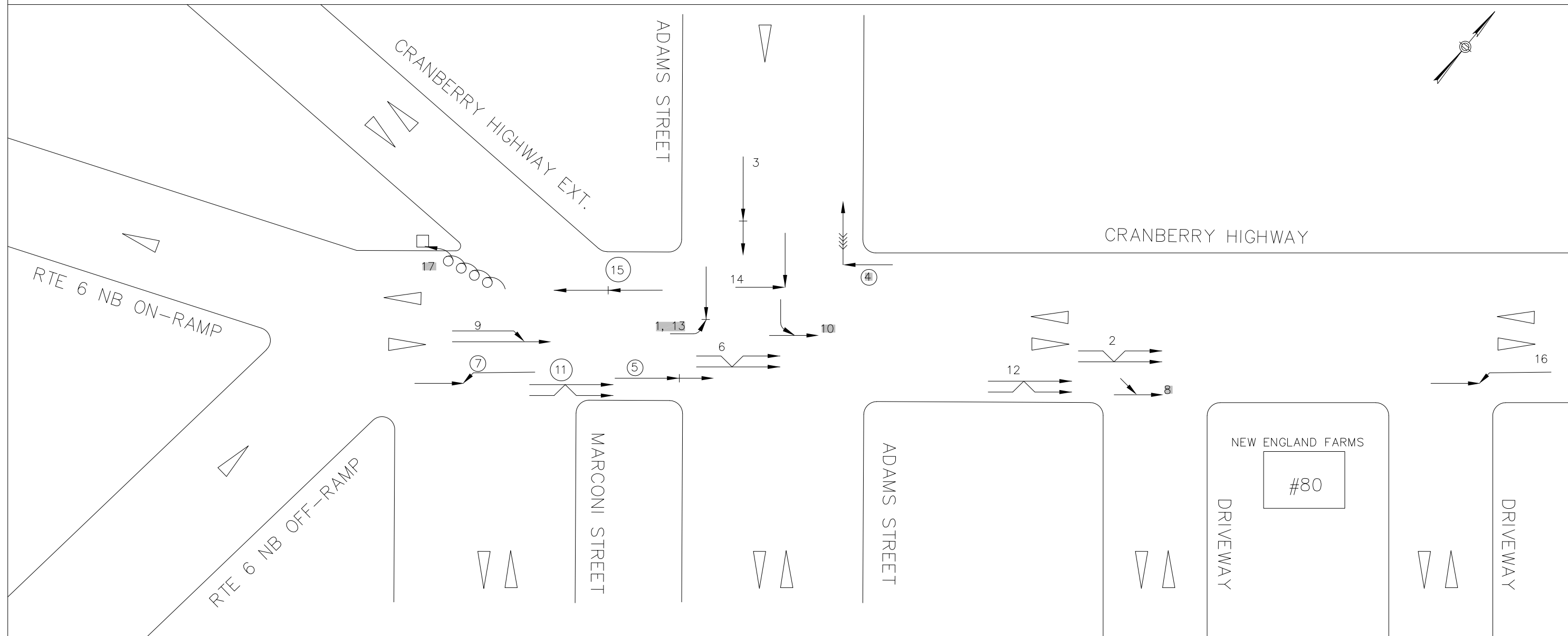
Additional Sandwich Road Crash Segments



*Percentages may not total 100 due to rounding.

SEGMENT: SANDWICH ROAD FROM: ADAMS STREET TO: US 6
 PERIOD: 2017-2019 FROM: JANUARY TO: DECEMBER
 CITY/TOWN: BOURNE

PREPARED BY: STANTEC



* NOT TO SCALE

COLLISION DIAGRAM

SYMBOL

	MOVING VEHICLE
	BACKING VEHICLE
	NON-INVOLVED VEHICLE
	PEDESTRIAN
	LOW-LIGHT CONDITION
	FIXED OBJECT
	FATAL ACCIDENT
	INJURY ACCIDENT

CRASH TYPE

	REAR END
	HEAD ON
	SIDE - SWIPE
	OUT OF CONTROL
	LEFT TURN ANGLE
	RIGHT ANGLE

Crash Data Summary Table

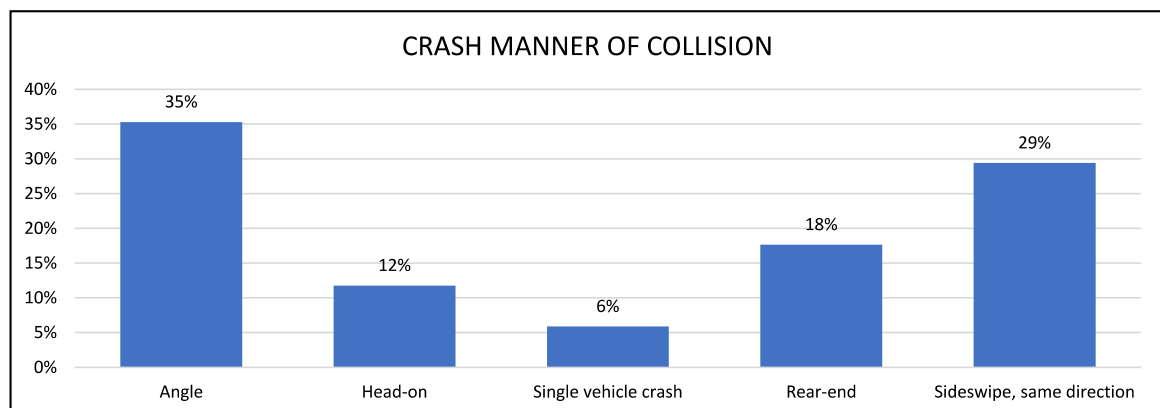
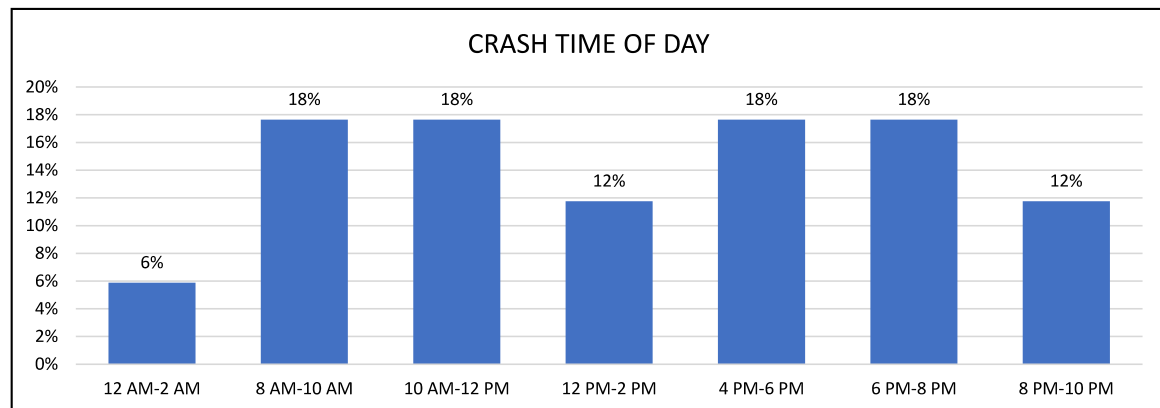
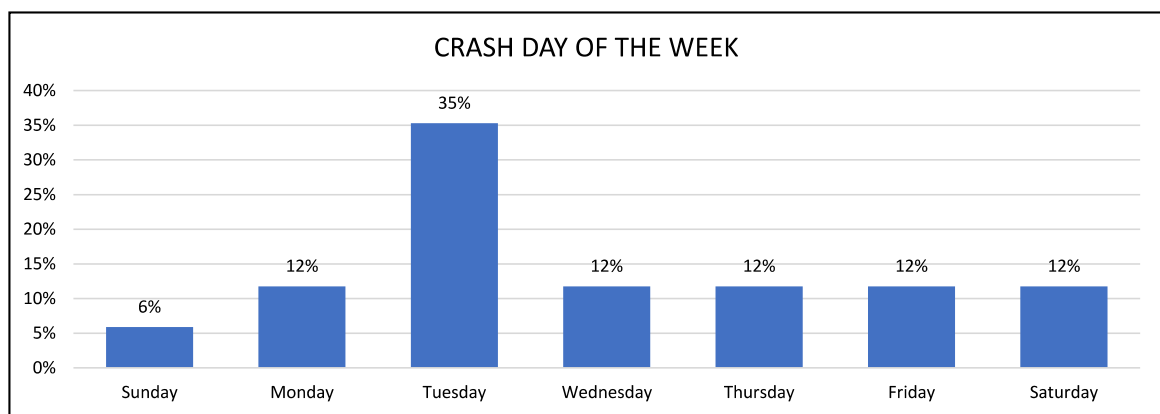
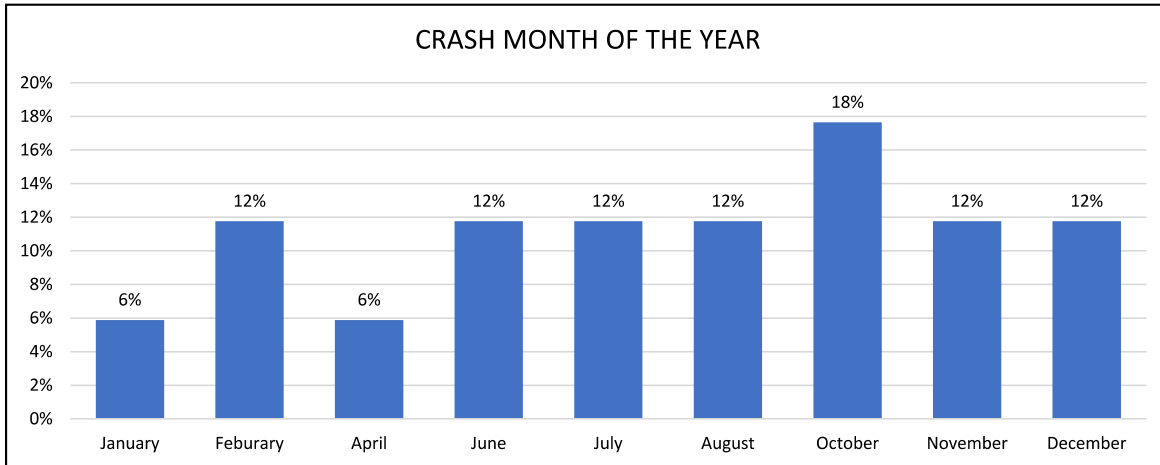
Cranberry Highway at Adams Street Intersection

2017 - 2019

Crash Diagram Ref. #	Date	Day	Time	Light Conditions	Weather Conditions	Road Surface	Manner of Collision	Severity	Age D1	Age D2	Age D3	Age D4	Driver Contributing Code	Driver Distracted By	Comments
1	2/28/2017	Tuesday	8:26 PM	Dark - lighted roadway	Clear	Dry	Head-on	Property damage only (none injured)	70-79	20-29			D1:(Made an improper turn),(Wrong side or wrong way) D2:(No improper driving)		V2, who was SB on Adams St. was slowed/stopped in traffic. V1 was EB on Cranberry Hwy and made an improper left turn the wrong way onto Adams St. and hit V2.
2	04/18/2017	Tuesday	6:21 PM	Daylight	Clear	Dry	Sideswipe, same direction	Property damage only (none injured)	20-29	20-29			D1:(Other improper action) D2:(No improper driving)		V1 and V2 were EB on Cranberry Hwy in the left and right lanes, respectively. V1 tried to make a right turn into #80 (New England Farms) and hit V2.
3	6/28/2017	Wednesday	5:24 PM	Daylight	Clear	Dry	Rear-end	Property damage only (none injured)	30-39	30-39			D1:(Followed too closely) D2:(No improper driving)		V1 rear ended V2 while waiting on the SB approach on Adams St to turn onto Cranberry Hwy.
4	7/18/2017	Tuesday	9:01 PM	Dark - lighted roadway	Clear	Dry	Angle	Non-fatal injury	>=80	40-49			D1:(Made an improper turn) D2:(No improper driving)		V1 was EB on Cranberry Hwy and made an improper left turn onto Adams St. V1 then realized it was the wrong way and reversed to the middle of the intersection where it struck by V2, who was WB on Cranberry Hwy.
5	8/20/2017	Sunday	9:31 AM	Daylight	Clear	Dry	Rear-end	Non-fatal injury	60-69	40-49			D1:(Followed too closely),(Inattention) D2:(No improper driving)		V2 was slowed/stopped in traffic EB on Cranberry Hwy at the Adams St. intersection when it was rear ended by V1.
6	10/26/2017	Thursday	10:40 AM	Daylight	Rain	Wet	Sideswipe, same direction	Property damage only (none injured)	Unknown	50-59			D1:(Unknown) D2:(No improper driving)		V1 and V2 were both EB on Cranberry Hwy at the Adams St. intersection. V1 attempted to pass V2 and sideswiped V2.
7	11/20/2017	Monday	11:59 AM	Daylight	Clear	Dry	Angle	Non-fatal injury	50-59	50-59			D1:(Inattention) D2:(No improper driving)		V1 was WB on Cranberry Hwy attempting to make a left turn SB onto Marconi St. V2 was exiting off Route 6 to go EB onto Cranberry Hwy. V1 collided with the left side of V2.
8	11/22/2017	Wednesday	4:34 PM	Dark - lighted roadway	Rain	Wet	Angle	Property damage only (none injured)	50-59	30-39					V1 and V2 were EB on Cranberry Hwy in the left and right lanes, respectively. V1 tried to make a right turn into #80 (New England Farms) and V2 could not avoid.
9	12/26/2017	Tuesday	8:59 AM	Daylight	Clear	Dry	Sideswipe, same direction	Property damage only (none injured)	Unknown	50-59			D1:(Over-correcting/over-steering) D2:(No improper driving)		V1 Drifted into V2s lane coming off the Rt 6 ramps. Hit and Run
10	1/9/2018	Tuesday	7:29 PM	Dark - lighted roadway	Clear	Wet	Angle	Property damage only (none injured)	40-49	<=19			D1:(Made an improper turn) D2:(No improper driving)		V1 was SB on Adams St. turning EB onto Cranberry Hwy when it collided with V2. V1 did not see V2 who was traveling straight EB on Cranberry Hwy.
11	07/27/2018	Friday	12:42 PM	Daylight	Clear	Dry	Sideswipe, same direction	Non-fatal injury	60-69	60-69			D1:(Distracted) D2:(No improper driving)		V1 was traveling EB in the right travel lane on Cranberry Hwy in front of #23 and drifts into the passing lane, sideswiping the right side of V2.
12	10/20/2018	Saturday	11:11 AM	Daylight	Clear	Dry	Sideswipe, same direction	Property damage only (none injured)	60-69	50-59			D1:(Failure to keep in proper lane or running off road) D2:(No improper driving)		V1 was traveling EB in the right travel lane on Cranberry Hwy near #80. V1 in right lane drifted into left lane hitting V2.
13	2/19/2019	Tuesday	4:03 PM	Daylight	Clear	Dry	Head-on	Property damage only (none injured)	40-49	20-29			D1:(Made an improper turn) D2:(No improper driving)		V2 was slowed/stopped SB on Adams St. V1 was EB on Cranberry Hwy and made an improper left turn onto Adams St. V1 did not see V2 which resulted in the collision with V2.
14	6/6/2019	Thursday	6:05 PM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	<=19	70-79			D1:(Failed to yield right of way) D2:(No improper driving)		V1 was SB on Adams St. attempting to make a left turn EB onto Cranberry Hwy. Operator did not use care when entering the roadway and drove in front of V2, who was going straight WB on Cranberry Hwy, which resulted in the collision.
15	08/05/2019	Monday	1:41 PM	Daylight	Clear	Dry	Rear-end	Non-fatal injury	40-49	50-59			D1:(Exceeded authorized speed limit) D2:(No improper driving)		V1 was traveling WB on Cranberry Hwy at a high rate of speed. V2 was also WB and had just entered onto Cranberry Hwy from Adams St NB. V1 rear ended V2 and struck a utility pole before coming to rest.
16	10/18/2019	Friday	9:01 AM	Daylight	Clear	Dry	Angle	Property damage only (none injured)	70-79	40-49					V2 was WB and V1 was EB on Cranberry Hwy near #80 (New England Farms). V1 attempted to make a left turn into #80 without yielding, and V2 could not avoid.
17	12/21/2019	Saturday	1:45 AM	Dark - lighted roadway	Clear	Dry	Single vehicle crash	Unknown	30-39						V1 was traveling WB on Cranberry Hwy when it lost control of the vehicle, left the roadway, and struck a utility pole. Hit and run.

Crash Data Summary Charts

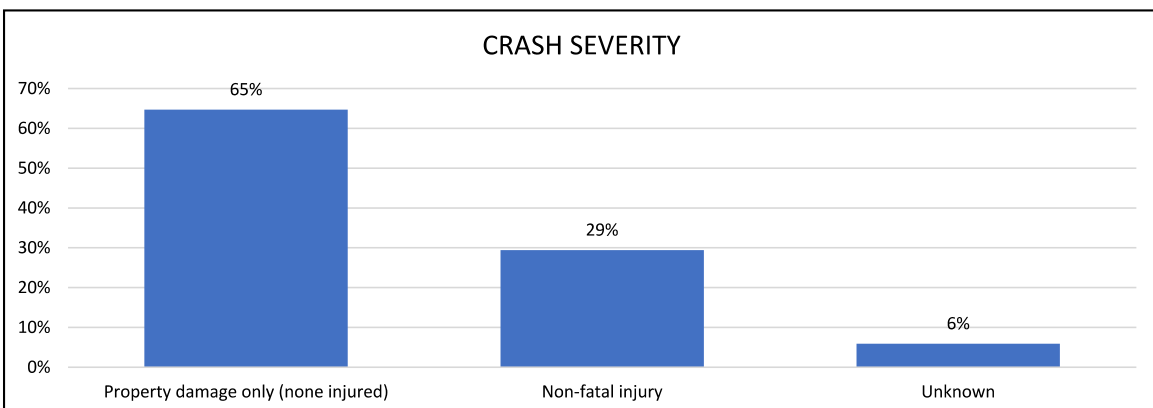
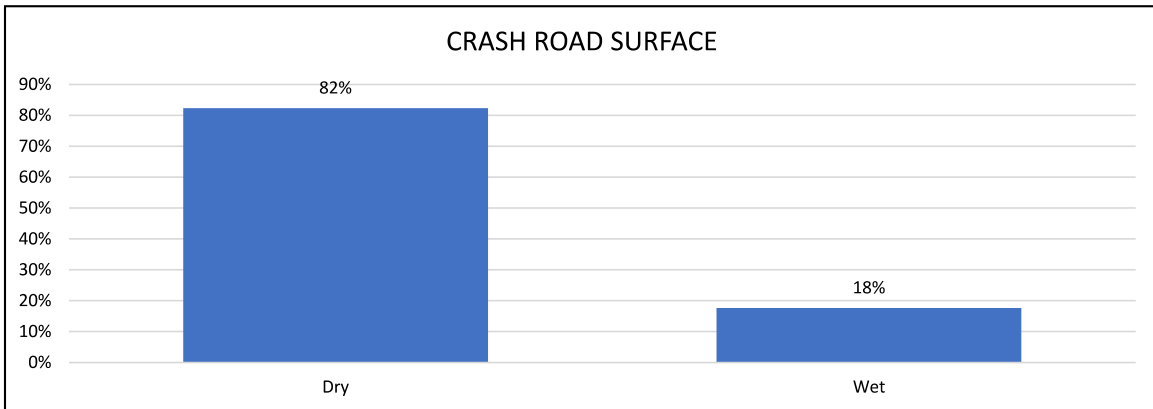
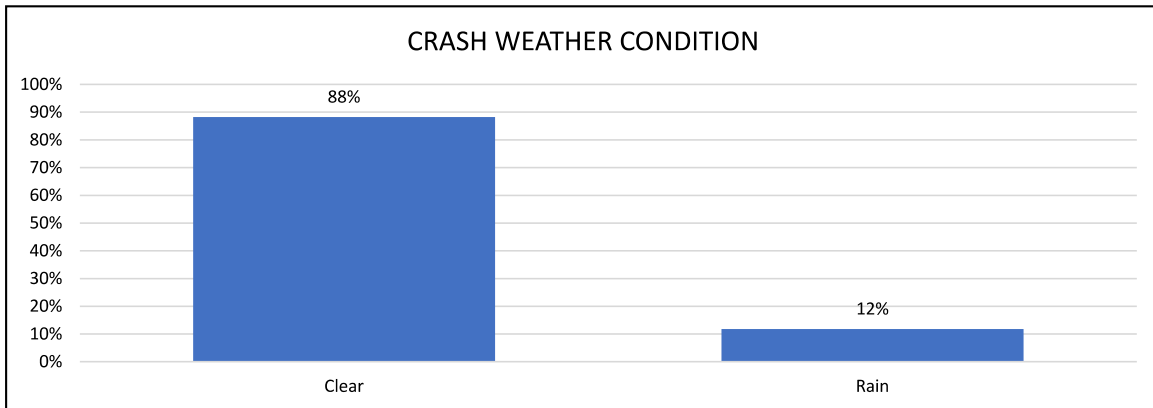
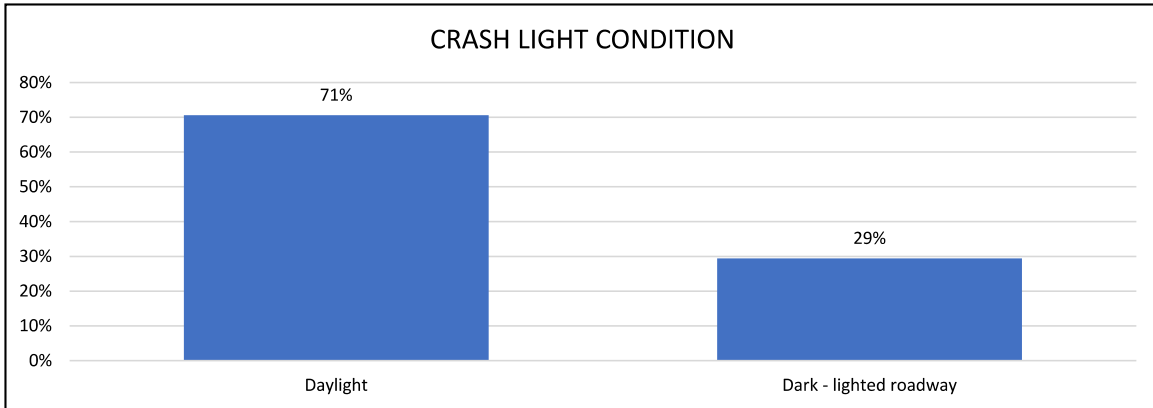
Cranberry Highway at Adams Street Intersection



*Percentages may not total 100 due to rounding.

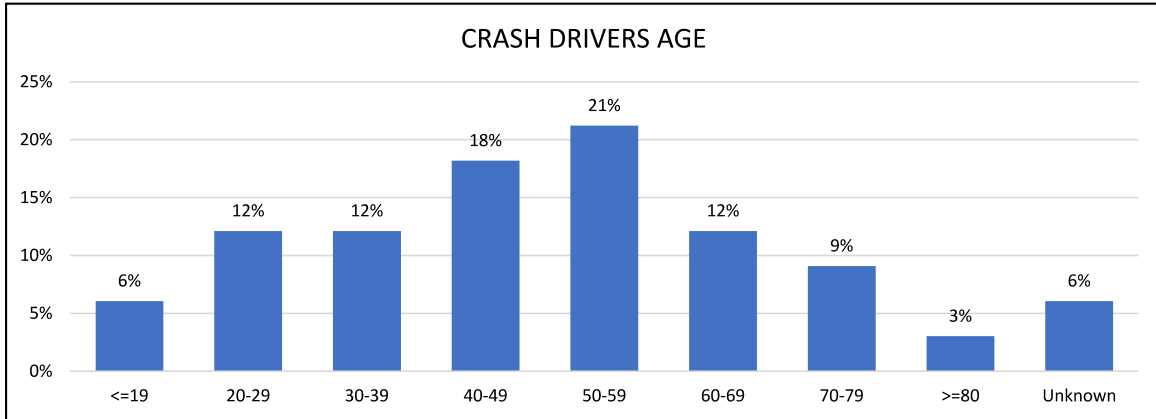
Crash Data Summary Charts

Cranberry Highway at Adams Street Intersection



*Percentages may not total 100 due to rounding.

Cranberry Highway at Adams Street Intersection



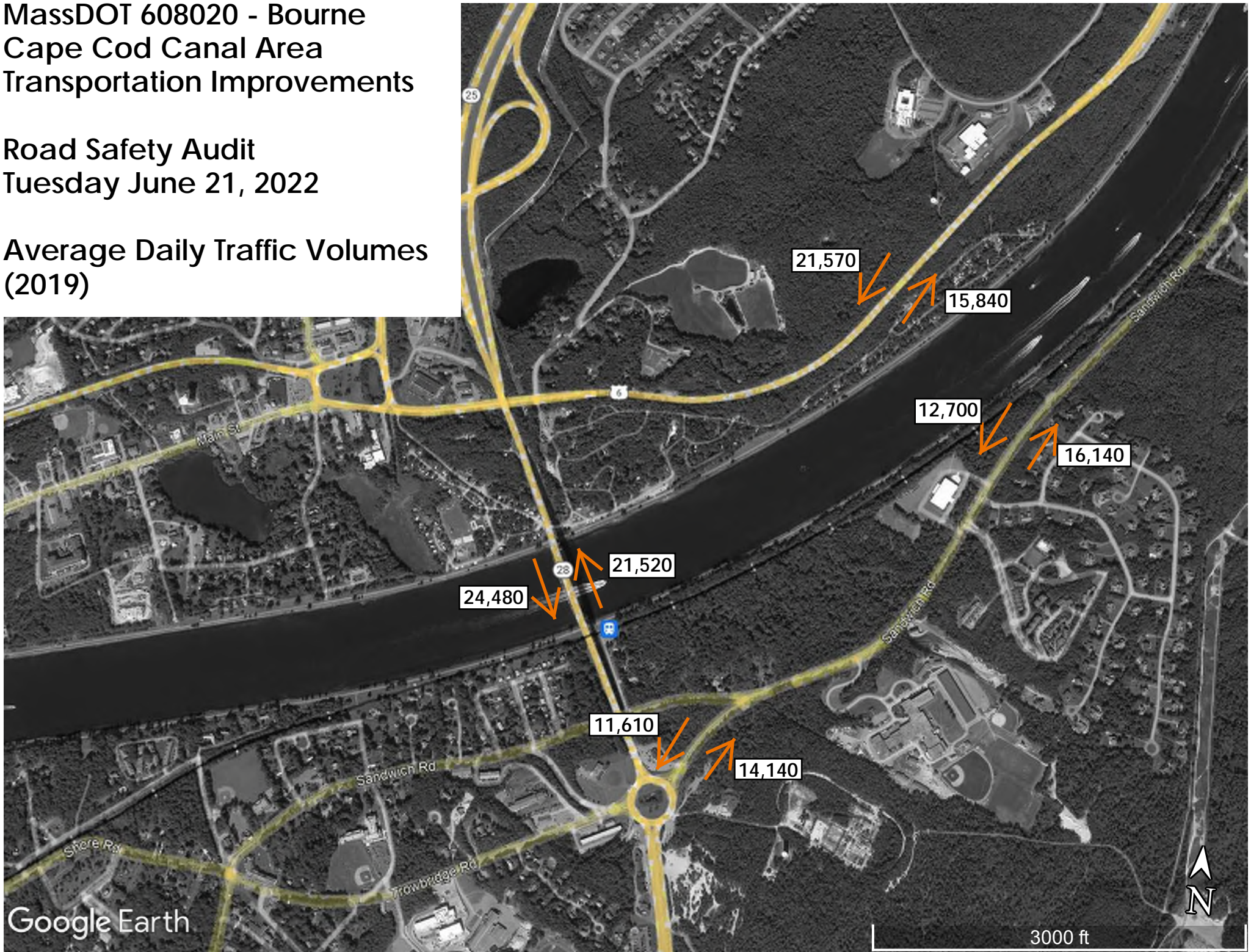
*Percentages may not total 100 due to rounding.

Appendix D. Additional Information

MassDOT 608020 - Bourne
Cape Cod Canal Area
Transportation Improvements

Road Safety Audit
Tuesday June 21, 2022

Average Daily Traffic Volumes
(2019)



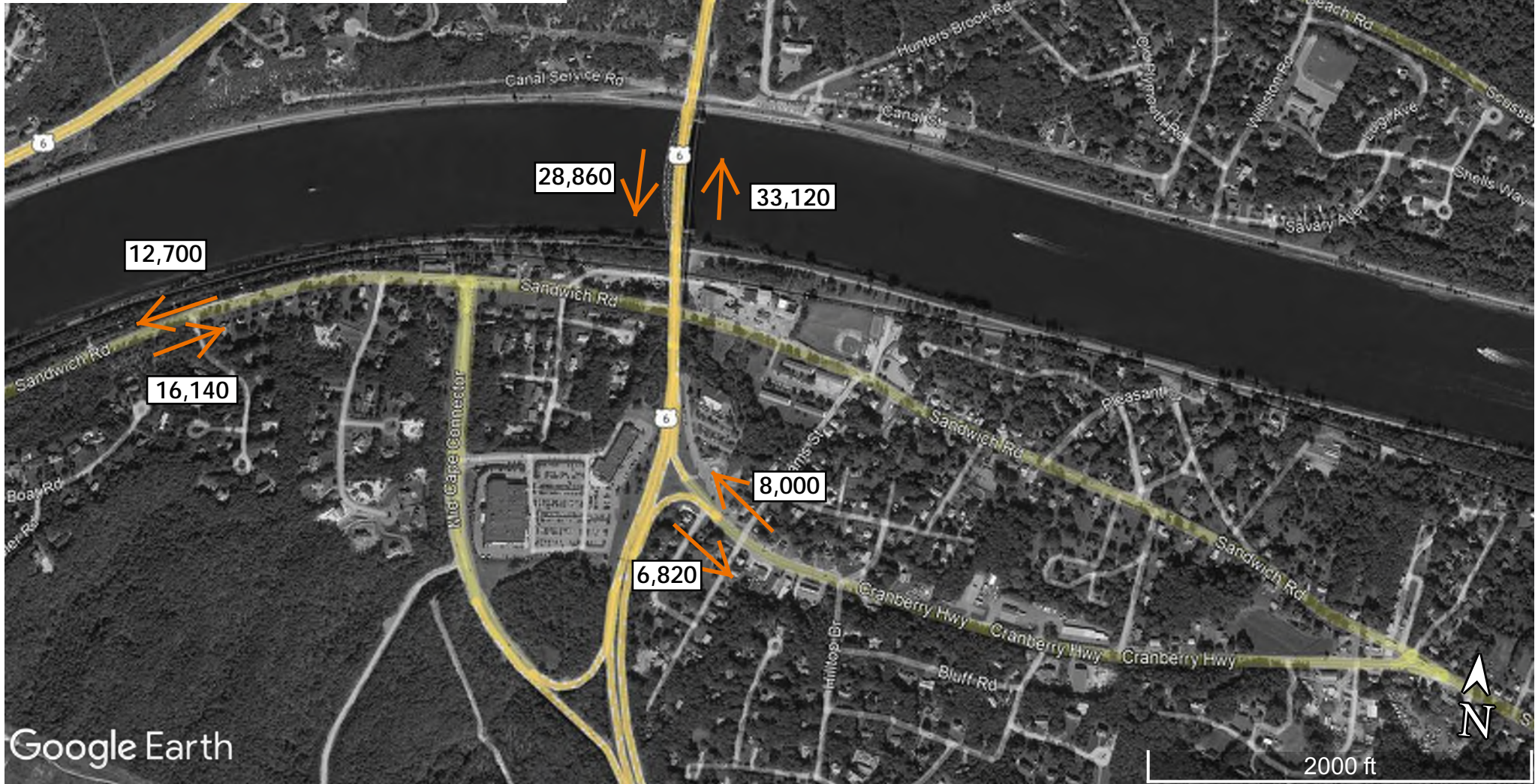
Google Earth

3000 ft

MassDOT 608020 - Bourne Cape Cod Canal Area Transportation Improvements

Road Safety Audit
Tuesday June 21, 2022

Average Daily Traffic Volumes
(2019)



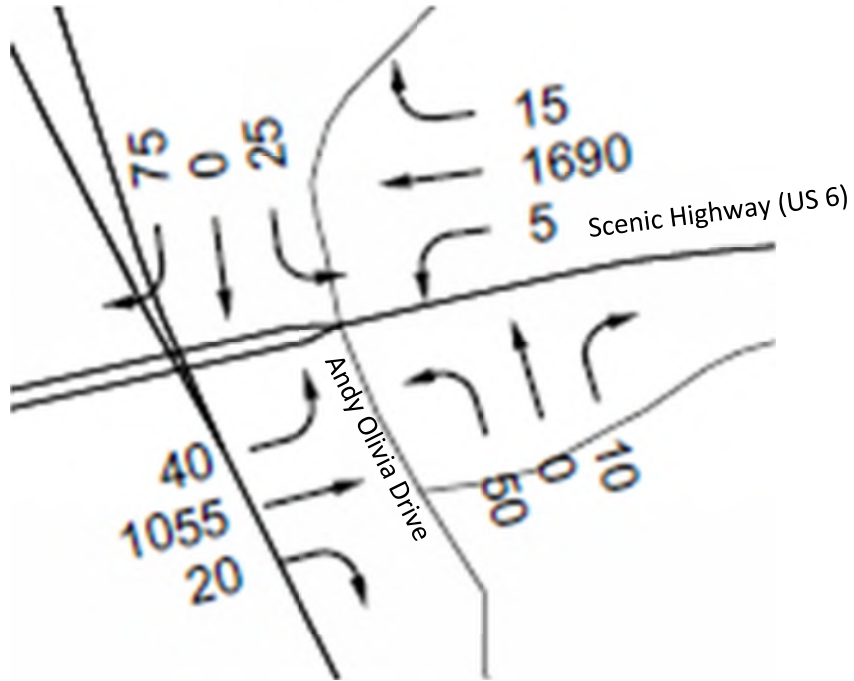
**MassDOT 608020 – Bourne
Cape Cod Canal Area Transportation Improvements
Road Safety Audit
Tuesday, June 21, 2022**

Summer AM Peak Hour Turning Movement Counts (2019)

#7 - Cranberry Highway at Adams Street



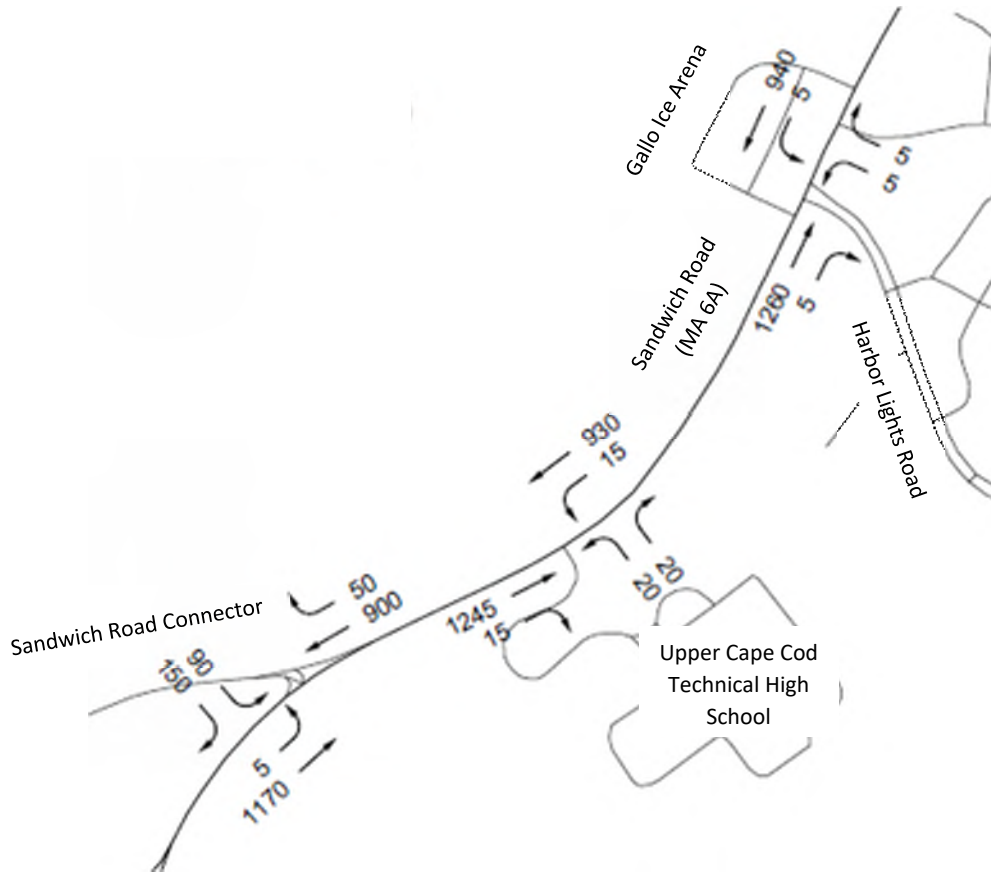
#2 - Scenic Highway (Route 6) at Nightingale Pond Road



#6 - Sandwich Road at Midway Recreation Area



#3, #4, #5 - Sandwich Road from Sandwich Road Connector to Gallo Arena/Harbor Lights Road

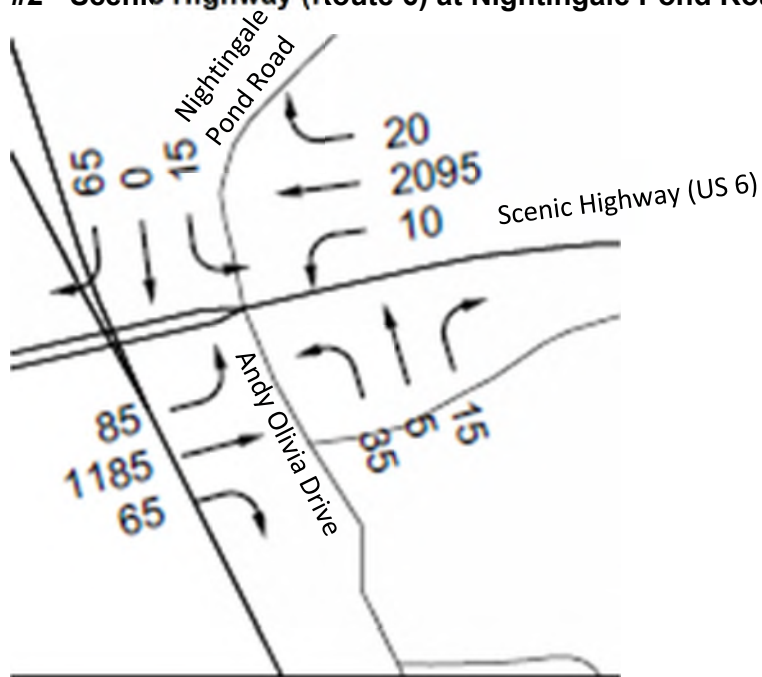


Summer PM Peak Hour Turning Movement Counts (2019)

#7 - Cranberry Highway at Adams Street



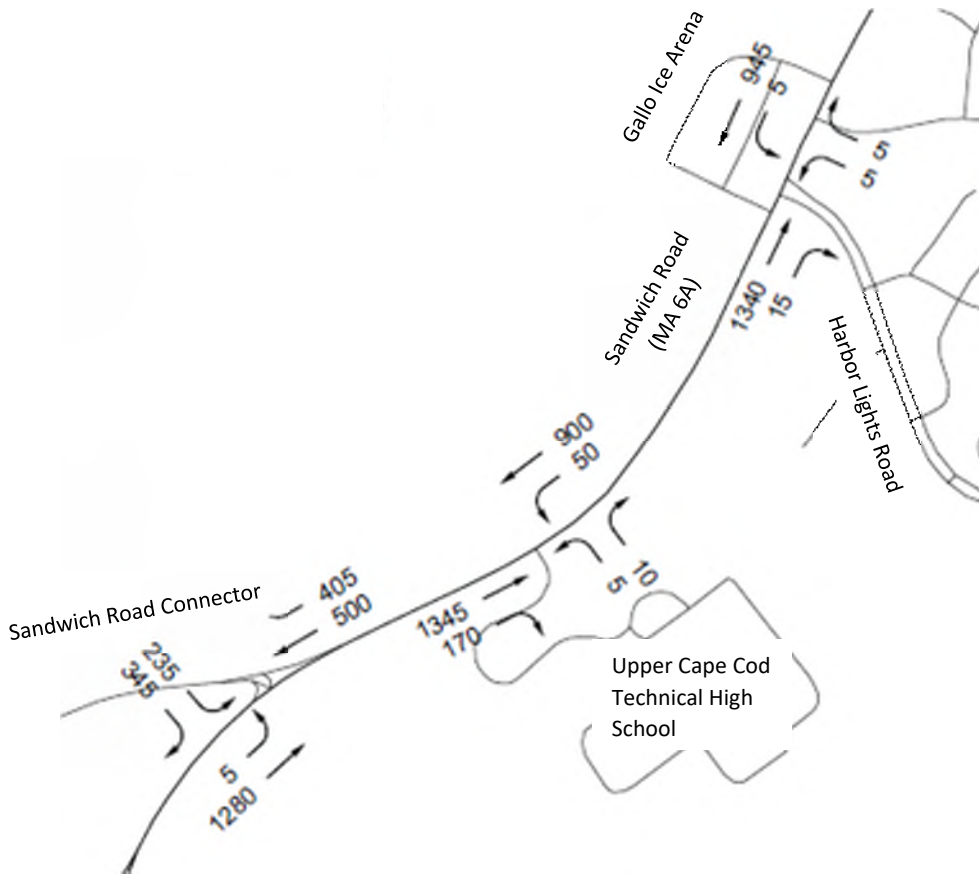
#2 - Scenic Highway (Route 6) at Nightingale Pond Road



#6 - Sandwich Road at Midway Recreation Area



#3, #4, #5 - Sandwich Road from Sandwich Road Connector to Gallo Arena/Harbor Lights Road

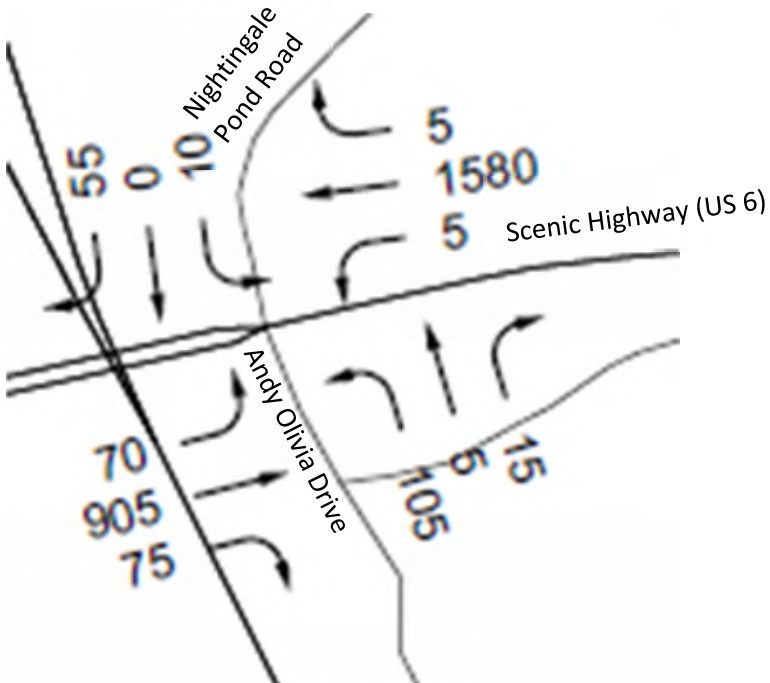


Summer Saturday Peak Hour Turning Movement Counts (2019)

#7 - Cranberry Highway at Adams Street



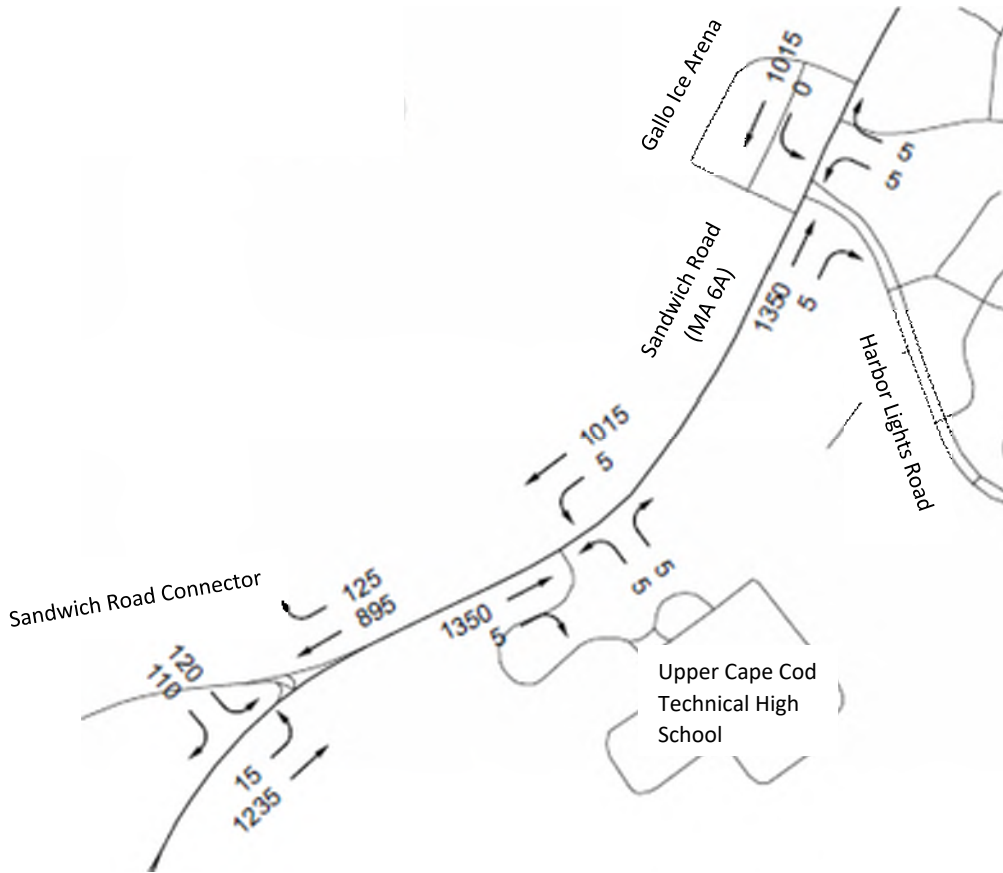
#2 - Main Street/Scenic Highway at Nightingale Pond Road



#6 - Sandwich Road at Midway Recreation Area



#3, #4, #5 - Sandwich Road from Sandwich Road Connector to Gallo Arena/Harbor Lights Road



MassDOT 608020 - Bourne Cape Cod Canal Area Transportation Improvements

Road Safety Audit
Tuesday June 21, 2022

Speed Limits of RSA Area



MassDOT 608020 - Bourne Cape Cod Canal Area Transportation Improvements

Road Safety Audit
Tuesday June 21, 2022

Speed Limits of RSA Area



February 17, 1967

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

SPECIAL SPEED REGULATION NO. 369

Highway Location: PLYMOUTH and BOURNE
Authority in Control: COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS
Name of Highway: Misc. State Highway (Formerly Route 3)

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

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

SOUTHBOUND

Beginning at Station 425+69 thence southerly in Plymouth
0.14 miles at 40 miles per hour
0.93 " " 45 " " " to the Bourne line.

Thence southerly in Bourne
0.07 miles at 45 miles per hour
0.98 " " 50 " " "
0.45 " " 40 " " " ending at Station
79+00, the total distance being 2.57 miles.

NORTHBOUND

Beginning at Station 80+00 thence northerly in Bourne
0.46 miles at 40 miles per hour
0.93 " " 50 " " "
0.12 " " 45 " " " to the Plymouth
line.

Thence northerly in Plymouth
0.93 miles at 45 miles per hour
0.14 " " 40 " " " ending at Station
425+69, the total distance being 2.58 miles.

369

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

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

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

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

FOR THE DEPARTMENT

DATE: February 17, 1967

BY: Edward J. Ribbs KK

EDWARD J. RIBBS

Commissioner

Richard E. McLaughlin
Registrar of Motor Vehicles

for Highway Engineering

THE COMMONWEALTH OF MASSACHUSETTS
HIGHWAY DEPARTMENT
SPECIAL SPEED REGULATION # 369-A

Highway Location: PLYMOUTH AND BOURNE

Authority In Control: COMMONWEALTH OF MASSACHUSETTS
HIGHWAY DEPARTMENT

Name of Highway (s): MISCELLANEOUS STATE HIGHWAY
(FORMERLY ROUTE 3)

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

Special Speed Regulation number 369, dated February 17, 1967, is hereby amended as follows:

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

SOUTHBOUND

By striking out the clauses reading:
0.14 miles at 40 miles per hour
0.93 miles at 45 miles per hour to the Bourne line;
thence southerly in Bourne
0.07 miles at 45 miles per hour
And inserting in place thereof:
1.07 miles at 40 miles per hour to the Bourne line;
thence southerly in Bourne
0.07 miles at 40 miles per hour to the Bourne line;

NORTHBOUND

By striking out the clauses reading:
0.12 miles at 45 miles per hour to the Plymouth line;
thence northerly in Plymouth
0.93 miles at 45 miles per hour
0.14 miles at 40 miles per hour
And inserting in place thereof:
0.12 miles at 40 miles per hour to the Plymouth line;
thence northerly in Plymouth
1.07 miles at 40 miles per hour

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

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

The Highway Department and the Registry of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interest.

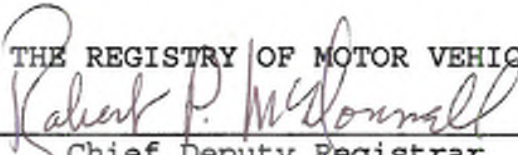
Standard signs must be erected at the beginning of each zone.

DATE: 10-15-97

FOR THE HIGHWAY DEPARTMENT

BY: 
Traffic Engineer

FOR THE REGISTRY OF MOTOR VEHICLES

BY: 
Chief Deputy Registrar

7/13/93

THE COMMONWEALTH OF MASSACHUSETTS
HIGHWAY DEPARTMENT
SPECIAL SPEED REGULATION # 7579

Highway Location: PROVINCETOWN TO SEEKONK

Authority In Control: COMMONWEALTH OF MASSACHUSETTS
HIGHWAY DEPARTMENT

Name of Highway (s): Provincetown - State Highway - Route 6
Truro - State Highway - Route 6
Wellfleet - State Highway - Route 6
Eastham - State Highway - Route 6
Orleans - State Highway - Route 6
Brewster - State Highway - Route 6
Harwich - State Highway - Route 6
Dennis - State Highway - Route 6
Yarmouth - State Highway - Route 6
Barnstable - State Highway - Route 6
Sandwich - State Highway - Route 6
Bourne - State Highway - Route 6
Wareham - State Highway - Route 6
Marion - State Highway - Route 6
Mattapoisett - State Highway - Route 6
Fairhaven - State Highway - Route 6
New Bedford - State Highway - Route 6
Dartmouth - State Highway - Route 6
Westport - State Highway - Route 6
Somerset - State Highway - Route 6
Swansea - State Highway - Route 6
Rehoboth - State Highway - Route 6
Seekonk - State Highway - Route 6

In accordance with the provisions of Chapter 90, Section 18, of the General Laws (Ter. Ed.) as amended, the following Special Speed Regulation is hereby promulgated: Special Speed Regulations Numbered 401, 401-A, 401-B, 401-C, 401-D, 401-E, 401-F, 401-G, 401-H, 401-I, 401-J, 401-K, 401-L, 401-M, 401-O, 401-P, 348-D, 348-E, 348-F, and 348-G dated February 8, 1968, September 12, 1968, April 27, 1971, October 26, 1971, November 19, 1971, September 27, 1973, September 10, 1974, June 16, 1975, April 20, 1976, December 3, 1979, December 3, 1979, June 6, 1982, June 6, 1983, October 8, 1985, March 16, 1987, January 17, 1989, October 18, 1977, May 11, 1979, April 13, 1984 and August 30, 1990 respectively, are hereby amended by striking out the regulations in their entireties and inserting in place thereof the following revisions and addenda.

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

WESTBOUND

Beginning in Provincetown at the beginning of State Highway, thence westerly.

- 1.16 miles at 55 miles per hour - *Dennis - 1 school*
- 0.20 miles at 45 miles per hour
- 2.20 miles at 55 miles per hour to the Truro Town Line. *3.17*

Thence Westerly in Truro

- 4.43 miles at 50 miles per hour *unimhab - 50 is low*
- 0.29 miles at 45 miles per hour *bank - intersection of 2nd Street*
- 5.19 miles at 50 miles per hour to the Wellfleet Town Line.

Thence Westerly in Wellfleet

- 0.44 miles at 50 miles per hour
- 3.52 miles at 45 miles per hour *part sections still 60*
- 1.19 miles at 50 miles per hour *7.27*
- 0.61 miles at 45 miles per hour
- 1.51 miles at 50 miles per hour to the Eastham Town Line. *3.37*

Thence Westerly in Eastham

- 1.39 miles at 50 miles per hour *THURONT 4 lanes*
- 0.33 miles at 45 miles per hour *6.12*
- 1.18 miles at 50 miles per hour
- 2.96 miles at 40 miles per hour
- 0.24 miles at 25 miles per hour to the Orleans Town Line.

Thence Westerly in Orleans

- 0.13 miles at 25 miles per hour
- 3.30 miles at 50 miles per hour to the Brewster Town Line.

Thence Westerly in Brewster

- 2.92 miles at 50 miles per hour to the Harwich Town Line.

Thence Westerly in Harwich

- 5.63 miles at 50 miles per hour to the Dennis Town Line.

Thence Westerly in Dennis

- 0.79 miles at 50 miles per hour
- 1.23 miles at 55 miles per hour to the Yarmouth Town Line.

Thence Westerly in Yarmouth

- 4.80 miles at 55 miles per hour to the Barnstable Town Line.

Thence Westerly in Barnstable

- 8.47 miles at 55 miles per hour to the Sandwich Town Line.

3.17

SEE 7579-B

3.37

7579 C

Thence Westerly in Sandwich
7.28 miles at 55 miles per hour to the Bourne Town Line.

Thence Westerly in Bourne
1.41 miles at 55 miles per hour
0.13 miles at 40 miles per hour to the end of State Highway
south of the Sagamore Bridge

Beginning again at the beginning of State Highway north of the
Sagamore Bridge at Station 91+17, thence northerly.

0.08 miles at 40 miles per hour
0.18 miles at 25 miles per hour
3.26 miles at 50 miles per hour
0.48 miles at 20 miles per hour
0.99 miles at 40 miles per hour
0.19 miles at 20 miles per hour
0.08 miles at 35 miles per hour to the Wareham Town Line.

Thence Westerly in Wareham
3.33 miles at 35 miles per hour
1.18 miles at 45 miles per hour
0.52 miles at 40 miles per hour ending at the end of State
Highway, east of Town

Beginning again 800 feet west of the beginning of State
Highway, west of Town,

Thence Westerly in Wareham
0.16 miles at 35 miles per hour
0.76 miles at 45 miles per hour
1.11 miles at 50 miles per hour to the Marion Town Line.

Thence Westerly in Marion
0.52 miles at 50 miles per hour
0.24 miles at 45 miles per hour
1.11 miles at 50 miles per hour
0.41 miles at 40 miles per hour
0.81 miles at 50 miles per hour
0.29 miles at 35 miles per hour
1.40 miles at 50 miles per hour to the Mattapoisett Town Line.

Thence Westerly in Mattapoisett
0.33 miles at 45 miles per hour
2.10 miles at 50 miles per hour
0.64 miles at 40 miles per hour
1.48 miles at 45 miles per hour to the Fairhaven Town Line.

Thence Westerly in Fairhaven

0.45 miles at 40 miles per hour
0.47 miles at 35 miles per hour
0.91 miles at 40 miles per hour
1.70 miles at 35 miles per hour
0.08 miles at 40 miles per hour to the New Bedford City
Line.

Thence Westerly in New Bedford

0.69 miles at 40 miles per hour
0.31 miles at 30 miles per hour ending at the end of State
Highway.

And beginning again in Dartmouth at the beginning of State
Highway.

Thence Westerly in Dartmouth

0.47 miles at 45 miles per hour
0.24 miles at 40 miles per hour
0.41 miles at 50 miles per hour
0.94 miles at 40 miles per hour
0.38 miles at 45 miles per hour
0.32 miles at 40 miles per hour
1.24 miles at 55 miles per hour
0.56 miles at 40 miles per hour
0.12 miles at 35 miles per hour to the Westport Town Line.

Thence Westerly in Westport

0.13 miles at 35 miles per hour
0.92 miles at 55 miles per hour
0.49 miles at 50 miles per hour
0.73 miles at 45 miles per hour
0.22 miles at 40 miles per hour
1.38 miles at 50 miles per hour
0.47 miles at 45 miles per hour
0.32 miles at 35 miles per hour ending at the Fall River
City Line.

And beginning again in Fall River at the beginning of State
Highway.

Thence Westerly in Fall River

0.12 miles at 35 miles per hour to the Somerset Town Line.

Thence Westerly in Somerset

0.10 miles at 35 miles per hour
0.32 miles at 40 miles per hour
0.36 miles at 50 miles per hour
0.42 miles at 40 miles per hour
0.65 miles at 50 miles per hour to the Swansea Town Line.

Thence Westerly in Swansea

- 0.32 miles at 50 miles per hour
- 0.27 miles at 40 miles per hour
- 0.44 miles at 50 miles per hour
- 1.26 miles at 40 miles per hour
- 0.98 miles at 50 miles per hour *P.L. 75-79 - R*
- 0.85 miles at 55 miles per hour
- 0.41 miles at 50 miles per hour
- 0.32 miles at 40 miles per hour
- 0.67 miles at 50 miles per hour to the Rehoboth Town Line.

Thence Westerly in Rehoboth

- 0.71 miles at 50 miles per hour to the Seekonk Town Line.

Thence Westerly in Seekonk

- 1.29 miles at 50 miles per hour
- 1.81 miles at 40 miles per hour ending at the Massachusetts - Rhode Island State Line; the total distance being 109.83 miles.

EASTBOUND

Beginning in Seekonk at the beginning of State Highway at the Rhode Island - Massachusetts State Line.

Thence Easterly in Seekonk

- 1.81 miles at 40 miles per hour
- 1.29 miles at 50 miles per hour to the Rehoboth Town Line.

Thence Easterly in Rehoboth

- 0.71 miles at 50 miles per hour to the Swansea Town Line.

Thence Easterly in Swansea

- 0.67 miles at 50 miles per hour
- 0.32 miles at 40 miles per hour
- 0.41 miles at 50 miles per hour
- 0.85 miles at 55 miles per hour
- 0.98 miles at 50 miles per hour *P.L. 75-79 - R*
- 1.26 miles at 40 miles per hour
- 0.42 miles at 50 miles per hour
- 0.27 miles at 40 miles per hour
- 0.31 miles at 50 miles per hour to the Somerset Line.

Thence Easterly in Somerset

- 0.65 miles at 50 miles per hour
- 0.42 miles at 40 miles per hour
- 0.36 miles at 50 miles per hour
- 0.32 miles at 40 miles per hour
- 0.10 miles at 35 miles per hour to the Fall River City Line.

Thence Easterly in Fall River

0.12 miles at 35 miles per hour to the end of State Highway in Fall River.

And beginning again in Westport at the beginning of State Highway

Thence Easterly in Westport

0.32 miles at 35 miles per hour
0.47 miles at 45 miles per hour
1.38 miles at 50 miles per hour
0.22 miles at 40 miles per hour
0.73 miles at 45 miles per hour
0.49 miles at 50 miles per hour
0.92 miles at 55 miles per hour
0.15 miles at 35 miles per hour to the Dartmouth Town Line.

Thence Easterly in Dartmouth

0.12 miles at 35 miles per hour
0.56 miles at 40 miles per hour
1.24 miles at 55 miles per hour
0.32 miles at 40 miles per hour
0.38 miles at 45 miles per hour
0.93 miles at 40 miles per hour
0.40 miles at 50 miles per hour
0.24 miles at 40 miles per hour
0.47 miles at 45 miles per hour ending at the end of the State Highway at the New Bedford City Line.

And beginning again in New Bedford at the beginning of State Highway.

Thence Easterly in New Bedford

0.31 miles at 30 miles per hour
0.69 miles at 40 miles per hour to the Fairhaven Town Line.

Thence Easterly in Fairhaven

0.08 miles at 40 miles per hour
1.70 miles at 35 miles per hour
0.91 miles at 40 miles per hour
0.47 miles at 35 miles per hour
0.45 miles at 40 miles per hour to the Mattapoisett Town Line.

Thence Easterly in Mattapoisett

1.48 miles at 45 miles per hour
0.64 miles at 40 miles per hour
2.10 miles at 50 miles per hour
0.33 miles at 45 miles per hour

Thence Easterly in Marion

1.40 miles at 50 miles per hour
0.29 miles at 35 miles per hour
0.85 miles at 50 miles per hour
0.36 miles at 40 miles per hour
1.11 miles at 50 miles per hour
0.21 miles at 45 miles per hour
0.56 miles at 50 miles per hour to the Wareham Town Line.

Thence Easterly in Wareham

1.11 miles at 50 miles per hour
0.74 miles at 45 miles per hour
0.33 miles at 35 miles per hour to the end of State Highway,
West of Town.

Beginning again, 100 feet east of the beginning of State Highway, East of Town.

Thence Easterly in Wareham

0.50 miles at 40 miles per hour
1.18 miles at 45 miles per hour
0.13 miles at 20 miles per hour
3.22 miles at 35 miles per hour to the Bourne Town Line.

Thence Easterly in Bourne

0.11 miles at 35 miles per hour
0.14 miles at 20 miles per hour
1.00 miles at 40 miles per hour
0.15 miles at 20 miles per hour
0.51 miles at 45 miles per hour
2.80 miles at 50 miles per hour
0.22 miles at 40 miles per hour
0.14 miles at 25 miles per hour
0.08 miles at 40 miles per hour ending at the end of State Highway, north of the Sagamore Bridge.

Beginning again at the beginning of State Highway, South of the Sagamore Bridge.

Thence Easterly in Bourne

0.58 miles at 45 miles per hour
0.96 miles at 55 miles per hour to the Sandwich Town Line.

Thence Easterly in Sandwich

7.28 miles at 55 miles per hour to the Barnstable Town Line.

Thence Easterly in Barnstable

8.47 miles at 55 miles per hour to the Yarmouth Town Line.

Thence Easterly in Yarmouth

4.80 miles at 55 miles per hour to the Dennis Town Line.

Thence Easterly in Dennis
0.85 miles at 55 miles per hour
0.66 miles at 45 miles per hour
0.50 miles at 50 miles per hour to the Harwich Town Line.

Thence Easterly in Harwich
5.63 miles at 50 miles per hour to the Brewster Town Line.

Thence Easterly in Brewster
2.92 miles at 50 miles per hour to the Orleans Town Line.

Thence Easterly in Orleans
3.13 miles at 50 miles per hour
0.17 miles at 40 miles per hour
x 0.13 miles at 25 miles per hour to the Eastham Town Line.

Thence Easterly in Eastham
0.16 miles at 25 miles per hour
3.04 miles at 40 miles per hour
1.18 miles at 50 miles per hour
0.33 miles at 45 miles per hour
1.39 miles at 50 miles per hour to the Wellfleet Town Line.

4 LANE } COMM - RES
SIGNAL (VED COUNTY RD) - *ORANGE PT*

Thence Easterly in Wellfleet
1.51 miles at 50 miles per hour
0.61 miles at 45 miles per hour
1.19 miles at 50 miles per hour
3.52 miles at 45 miles per hour
0.44 miles at 50 miles per hour to the Truro Town Line.

ROAD TO 2 LANES AT T.L.
RURAL
SIGNAL - *ROYAL LN*
WARRING ST. SPOT COMM
LANE - COMM. SIG AT 1.85 & 2.2

Thence Easterly in Truro
5.19 miles at 50 miles per hour
0.29 miles at 45 miles per hour
4.43 miles at 50 miles per hour to the Provincetown Town Line.

307 6A - *4 LANES* *UNDIVIDED*

Thence Easterly in Provincetown
2.20 miles at 55 miles per hour
0.20 miles at 45 miles per hour
1.16 miles at 55 miles per hour ending at the end of State Highway, the total distance being 109.83 miles.

- DIVIDED - RURAL - LIMITED ACCESS
SIGNAL - RACE PT

MISCELLANEOUS STATE HIGHWAY - SANDWICH ROAD - EASTBOUND

Beginning 300 feet east of rotary, south side of Bourne Bridge.

Thence Easterly on Sandwich Road
0.46 miles at 40 miles per hour
2.55 miles at 45 miles per hour ending at Station 287+68, Junction of Route 6A, the total distance being 3.01 miles

MISCELLANEOUS STATE HIGHWAY - SANDWICH ROAD - WESTBOUND

Beginning on Sandwich Road at the Junction of Route 6A, at Station 287+68.

Thence Westerly on Sandwich Road
2.55 miles at 45 miles per hour
0.38 miles at 40 miles per hour
0.25 miles at 25 miles per hour ending at the end of State Highway, south of the Bourne Bridge; the Total Distance Being 3.18 miles.

MISCELLANEOUS STATE HIGHWAY - SANDWICH ROAD - WESTBOUND

Beginning on Sandwich Road at the Junction of Route 6A, at Station 342+70.

Thence westerly
0.26 miles at 35 miles per hour ending at Cemetary Road, Station 329+22, the total distance being 0.25 miles.

MISCELLANEOUS STATE HIGHWAY - CEMETARY ROAD - SOUTHBOUND

Beginning 88 feet south of the junction of Sandwich Road, thence southerly on Cemetary Road.

0.13 miles at 30 miles per hour ending at the junction of Route 6A, the total distance being 0.13 miles.

MISCELLANEOUS STATE HIGHWAY - CEMETARY ROAD - NORTHBOUND

Beginning at the junction of Route 6A

Thence northerly
0.14 miles at 30 miles per hour ending at the Junction of Sandwich Road, the total distance begin 0.14 miles.

MISCELLANEOUS STATE HIGHWAY - EASTBOUND

Beginning in Bourne at Cemetary Road.

Thence Easterly
0.25 miles at 45 miles per hour
0.12 miles at 40 miles per hour ending at Station 162+40, Route 6A, the total distance being 0.37 miles.

operation of a motor vehicle at such a speed if these limits shall be prima facie evidence that such speed is greater than is reasonable and proper.

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


The Highway Department and the Registry of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interest.

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

DATE: 7/13/93

FOR THE HIGHWAY DEPARTMENT

BY:


Traffic Engineer

FOR THE REGISTRY OF MOTOR VEHICLES

BY:

James Thomas McDavit
Chief Deputy Registrar



THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF TRANSPORTATION & PUBLIC WORKS
MASSACHUSETTS HIGHWAY DEPARTMENT

TRAFFIC ENGINEERING & OPERATIONS

SPECIAL SPEED REGULATION No. 7579-E

Highway Location: BOURNE
 Authority In Control: COMMONWEALTH OF MASSACHUSETTS
 HIGHWAY DEPARTMENT
 Name of Highway(s): BOURNE – STATE HIGHWAY – ROUTE 6
 MISCELLANEOUS STATE HIGHWAY – SCENIC HIGHWAY

In accordance with the provisions of MASS. GEN. LAWS Ch. 90, § 18 (2006), the following Special Speed Regulation is hereby promulgated:

Special Speed regulation number 7579, dated July 13, 1993 is hereby amended in Bourne as follows:

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

BOURNE – WESTBOUND

By striking out the clauses reading:

Beginning again at the beginning of State Highway north of the Sagamore Bridge at Station 91+17, thence northerly

0.08 miles at 40 miles per hour

0.18 miles at 25 miles per hour

3.26 miles at 50 miles per hour

0.48 miles at 20 miles per hour

And by striking out the clause reading: The total distance being 109.83 miles.

And inserting in place thereof:

Beginning again at the beginning of State Highway north of the Sagamore Bridge at Station 0+00, thence northerly

0.34 miles at 40 miles per hour ending at the Route 6 westbound ramp at the junction of the beginning of Route 3 northbound.

And beginning again, at the end of the Route 6 westbound ramp at the junction of Scenic Highway (miscellaneous state highway) at Station 54+58, thence westerly

0.49 miles at 40 miles per hour

2.84 miles at 50 miles per hour

0.21 miles at 35 miles per hour

0.38 miles at 20 miles per hour

And by inserting: The total distance being 110.09 miles.

BOURNE – EASTBOUND

By striking out the clauses reading:

0.51 miles at 45 miles per hour

2.80 miles at 50 miles per hour

0.22 miles at 40 miles per hour

0.14 miles at 25 miles per hour

0.08 miles at 40 miles per hour ending at the end of State Highway, north of the Sagamore Bridge.

And by striking out the clause reading: The total distance being 109.83 miles

And inserting in place thereof:

0.35 miles at 35 miles per hour

2.84 miles at 50 miles per hour

0.14 miles at 40 miles per hour ending at the beginning of the Route 6 eastbound ramp and the junction of Scenic Highway (miscellaneous state highway).

And beginning again at the end of the Route 6 eastbound ramp and the junction of the end of Route 3 southbound, thence southerly

0.11 miles at 40 miles per hour ending at the end of State Highway, north of the Sagamore Bridge.

And by inserting: The total distance being 109.52 miles.

Miscellaneous State Highway – BOURNE – Scenic Highway – Eastbound

Beginning at station 7+37, at the junction of the Route 6 eastbound off-ramp, thence easterly

0.43 miles at 40 miles per hour ending at station 30+29, the junction of Meetinghouse Road; the total distance being 0.43 miles.

Miscellaneous State Highway – BOURNE – Scenic Highway – Westbound

Beginning at station 28+79, 150 feet west of the junction of Meetinghouse Road, thence westerly

0.06 miles at 40 miles per hour ending at the junction of Route 6 westbound: the total distance being 0.06 miles.

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

The provisions of this regulation shall not, however, abrogate in any sense MASS. GEN. LAWS ch. 90, § 14 (2006).

The Massachusetts Highway Department and the Registry of Motor Vehicles, acting jointly, do hereby certify that this regulation is consistent with the public interest.

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

DATE: NOV - 4 2008

HIGHWAY DEPARTMENT

REGISTRY OF MOTOR VEHICLES

BY: *Neil E. Bourgeois*
State Traffic Engineer

BY: *James Frier*
Registrar

Appendix E. Road Safety Audit References

Road Safety Audit References

FHWA Office of Safety - Proven Safety Countermeasures, U.S. Department of Transportation, Federal Highway Administration <https://safety.fhwa.dot.gov/provencountermeasures/>.

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

Road Safety Audits. U.S. Department of Transportation, Federal Highway Administration, <https://safety.fhwa.dot.gov/rsa/>

FHWA Road Safety Audit Guidelines. U.S. Department of Transportation, Federal Highway Administration, 2006.

Road Safety Audit, 2nd edition. Austroads, 2000.

Road Safety Audits. ITE Technical Council Committee 4S-7. Institute of Transportation Engineers, February 1995.