

ROAD SAFETY AUDIT

West Falmouth Highway (Route 28A) between
Chapoquoit Road and Old Dock Road

Town of Falmouth

April 2023

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 evaluates West Falmouth Highway (Route 28A) between Chapoquoit Road and Old Dock Road in Falmouth, MA (the Study Area).

While this corridor has not been identified by the Massachusetts Department of Transportation (MassDOT) as a high crash cluster under the Highway Safety Improvement Program (HSIP), an RSA was performed at the request of the Town of Falmouth after a recent roadway fatality and a separate crash involving a bicyclist. MassDOT defines an HSIP-eligible cluster as one in which the total number of "equivalent property damage only" (EPDO) crashes in the cluster is within the top 5% of all clusters in that regional planning region.

A key objective of the RSA is to identify short-term, mid-term, and long-term safety improvements that can be implemented at the subject intersection and incorporated in potential projects.

Project Data

An RSA for the intersection was completed on Tuesday, April 4, 2023. The agenda for the RSA meeting, which was held at Falmouth Town Hall located at 59 Town Hall Square, is provided in Appendix A of this report. As shown below in Table 1, the audit team consisted of a multidisciplinary team with representatives from state, regional, and local entities providing expertise in the engineering, planning, and emergency response fields. The audit team also included residents of West Falmouth, who provided first-hand accounts of safety concerns in the Study Area. Contact information for the RSA attendees is provided in Appendix B of this report.

Each RSA participant received an email invitation to the RSA on March 20, 2023. Appendix C contains a copy of the background data (collision diagrams, crash data summary tables, and charts) that was distributed to the audit team members prior to the RSA meeting. Participants were encouraged to visit the site prior to the audit and were urged to consider elements on MassDOT's RSA Prompt List.

On the day of the audit, a pre-audit meeting was held to discuss background information, the audit process, review the distributed materials, and discuss some of the safety issues that the audit team members had observed individually. The audit site walk consisted of field observations along the corridor. Handwritten notes and photographs documented the observations made by audit team members during the site walk. Following the audit site walk, a post-audit meeting was held where the audit team confirmed the observations made in the field and discussed potential countermeasures to enhance the safety of areas noted in the pre-audit meeting and site walk.

Table 1: Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Phil Viveiros	McMahon
Randy Fixman	McMahon
Brian Loewen	Falmouth Police
Nick Croft	Town of Falmouth Engineering
Maurice Harlow-Hawkes	Resident, West Falmouth Village
Jim Gray	Resident, West Falmouth Village
Todd Taylor	West Falmouth Village Association
Dan Shearer	West Falmouth Village Association
Colleen Medeiros	Cape Cod Commission
Steven Wheeler	MassDOT
Jason Walters	MassDOT D5 Projects
David Soares	MassDOT D5 Traffic
Samuel Hawkins	MassDOT D5 Traffic
Ana Fill	MassDOT Traffic Safety
Michelle Deng	MassDOT Traffic Safety
Joshua Oliver	Falmouth Police
James McLoughlin	Falmouth DPW
Jed Cornock	Falmouth Town Planner
Peter McConarty	Falmouth DPW Director
Steve Cadorette	Falmouth DPW

Project Location and Description

The Study Area consists of an approximately 1,600-foot long segment of West Falmouth Highway (Route 28A) between Chapoquoit Road and Old Dock Road in Falmouth, MA. Route 28A in the Study Area is under MassDOT jurisdiction. It is functionally classified as an Urban Minor Arterial and has a 35-mph speed limit. Route 28A is a two-lane road with a double-yellow centerline, lanes approximately 11 feet wide, striped shoulders of varying width, and disconnected segments of sidewalk. Route 28A parallels Route 28 and provides access to destinations in West Falmouth Village, Chapoquoit Beach, and the Shining Sea Bikeway.

Old Dock Road is functionally classified as an Urban Collector operating west of Route 28A to Nashawena Street and is classified as a local road west of Nashawena Street. It is under local jurisdiction and is approximately 24 feet wide. Old Dock Road connects with Chapoquoit Road to the west and provides access to a municipal dock and landing area, as well as Chapoquoit Beach via Chapoquoit Road.

Chapoquoit Road is also located west of Route 28A. It is under local jurisdiction with two 10-foot lanes and striped fog lines. It is classified as a local road that provides access to Chapoquoit Beach and residences

along West Falmouth Harbor. Both Old Dock and Chapoquoit Roads are two lane roads with single yellow centerlines and sidewalks only on the north sides of both streets. While neither road has posted speed limits near Route 28A, a statutory speed limit of 30 mph applies to thickly settled districts within the Town of Falmouth.

The Shining Sea Bikeway, which runs from North Falmouth to Woods Hole, parallels Route 28A to the west. It crosses Old Dock and Chapoquoit Roads; there is a parking lot for the bikeway at Old Dock Road. There are three crosswalks across Route 28A in the Study Area: at Old Dock Road, the West Falmouth Library, and at the Fire Station. There are also striped crosswalks on the west side of Route 28A crossing Old Dock and Chapoquoit Roads. Route 28A is a signed bike route with no bicycle facilities or bicycle pavement markings present on the roadway. There is no fixed-route transit service in this area.

Crash Data

Crash data was compiled for the Study Area during the seven-year period from 2016-2022. The source of the crash data was the Falmouth Police Department. A total of five crashes were reported at the intersection of Route 28A and Old Dock Road, with an additional crash located to the south of this intersection in front of Chapman Funerals and Cremations. Based on the reported data, two crashes (33%) were rear-end crashes, two crashes (33%) were angle crashes, one crash involved a single vehicle, and one crash involved a sideswipe in the same direction. Of the six crashes, two (33%) involved injuries and four (67%) only involved property damage, with no fatalities reported during this period. The time period of the crashes was fairly evenly distributed between 8AM and 10PM. Four crashes (67%) occurred in daylight and three crashes (50%) occurred in dry conditions. The other 50% of crashes occurred in wet or slushy conditions. Falmouth Police also indicated during the audit meeting that a bicyclist was hit by a car at this intersection on March 31, 2023, a crash that is not included in the compiled crash data. The bicyclist, who was traveling north on Route 28A and stuck while turning left onto Old Dock Road, sustained minor injuries.

Of the eight total crashes reported at the intersection of Route 28A and Chapoquoit Road, three (38%) were angle crashes, two (25%) were single vehicle crashes, one (13%) was a sideswipe in the opposite direction, one (13%) was a rear-end crash, and one (13%) was a head-on collision. The head-on collision resulted in the fatality of a moped driver. Two crashes (25%) resulted in injuries, while the remaining five crashes (63%) resulted in property damage only. Two crashes (25%) occurred between 4PM and 6PM and three (38%) occurred between 8PM and 12AM. Five crashes (63%) occurred during daylight and 88% occurred in clear weather.

Detailed crash diagrams are provided in Appendix C.



FIGURE 1: LOCUS MAP

West Falmouth Highway
Falmouth, MA

Audit Observations and Potential Safety Enhancements

During the RSA meeting prior to the field visit, a brief introduction of the RSA process and a summary of crash information was presented to the audit participants. Following this presentation, the members of the audit team were asked to discuss existing issues that may affect safety within the Study Area. The audit team then conducted a site visit of the Study Area. The weather at the time of the site visit was mostly cloudy and dry, with an approximate temperature of 55 degrees. The audit team recognized that the observed vehicle, bicycle, and pedestrian volumes were likely much lower than in the peak summer months.

During the site visit, observations of various safety concerns and deficiencies were identified and documented. Audit participants saw a near-miss crash at the intersection of Route 28A and Old Dock Road, where a vehicle turning left from Route 28A northbound to Old Dock Road westbound cut off an approaching vehicle traveling southbound on Route 28A.

Provided below is a list of the safety concerns and the potential enhancements that were identified during the RSA. Where applicable, enhancements are associated with reported crashes where the enhancements may have prevented the crashes. Since there were not many reported crashes in the study area, some enhancements cannot be tied to specific crashes, but they would help resolve obvious safety concerns identified during the site visit that could reasonably contribute to future crashes.

Summary of Road Safety Audit

Safety Issue #1: Intersection Visibility and Sight Distance

Observations:

The audit team observed that intersection visibility and sight distance may limit driver visibility of other vehicles, bicyclists, and pedestrians.

Roadside objects appear to obstruct driver visibility on the eastbound approaches of Old Dock Road and Chapoquoit Road at Route 28A. Drivers turning onto Route 28A from both roads have vegetation blocking southbound visibility and a decline in elevation from north to south on Route 28A inhibits northbound visibility. Both of these conditions may obstruct a driver's view of cross-traffic on Route 28A until the driver is encroaching into the intersection and crosswalk (Chapoquoit crash #4, 5, 6, 8). The audit team observed multiple drivers turning left and right from Old Dock Road onto Route 28A encroaching into the intersection to get a better view of oncoming traffic.

On Old Dock Road, the stone wall and regulatory signage on the northwest side of the intersection with Route 28A also block northbound visibility for drivers turning onto Route 28A and limits the visibility of people on the sidewalk to drivers traveling south on Route 28A (Old Dock crash #6). There is a similar issue on Chapoquoit Road, where the picket fence on the northwest side of the intersection with Route 28A blocks northbound visibility for drivers turning onto Route 28A.



Image 1: View from Chapoquoit Road Looking North with Picket Fence Obstructing Visibility (Google)

In addition, vehicles parking on both sides of Route 28A in front of the West Falmouth Market (located just north of Old Dock Road) inhibit the visibility of drivers turning into and out of both the market’s driveway and Old Dock Road; audit participants noted that vehicles park in these areas despite the presence of No Parking signage on both sides of Route 28A in the vicinity of the market. Drivers exiting the West Falmouth Market parking lot also face obstructed visibility from vegetation on the southeast corner of the intersection. In particular, this vegetation limits driver visibility of pedestrians on the adjacent sidewalk. Through these observations, the audit team concluded that drivers traveling south on Route 28A may have difficulty seeing other roadway users crossing Route 28A at Old Dock Road and the West Falmouth Market (Old Dock crash #6), and drivers traveling north on Route 28A and turning left onto Old Dock Road may have difficulty seeing vehicles traveling southbound before initiating the turn.



Image 2: Signs Blocking Sight Distance on Route 28A Facing North

Enhancements:

- Consider trimming overgrown vegetation, particularly on the southwest corner of Route 28A and Chapoquoit Road (Chapoquoit crash #8)
- Consider consulting with abutters to remove visibility obstructions adjacent to the ROW but on private property such as fences and bushes (Old Dock crash #6, Chapoquoit crash #8)
- Make physical improvements to implement daylighting at intersections where parked vehicles may obstruct visibility (Old Dock crash #6)

- Add plaques with street names to the existing intersection warning signs on Route 28A and add intersection warning signs on Route 28A where they are missing at key intersections and approaches (Old Dock crash #6, Chapoquoit crash #6)
- Implement traffic calming elements that slow vehicle speeds so drivers have additional time to react where incline visibility issues exist (Old Dock crash #2, 3, 4, 5, 6; Chapoquoit crash #6)
- Consider installing flashing stop signs on the Old Dock Road and Chapoquoit Road approaches to Route 28A to improve stop compliance (Chapoquoit crash #4, 5)
- Evaluate the feasibility of increasing the corner radius on the southwest corner of Chapoquoit Road and Route 28A so drivers turning right from Chapoquoit Road onto Route 28A do not have to take as wide of a turn, potentially into oncoming traffic (Chapoquoit crash #8)
- Trim vegetation on Old Dock Road and Chapoquoit Road at the Shining Sea Bikeway that may obstruct the visibility of drivers approaching the bike path



Image 3: Chapoquoit Road at Route 28A Has Visibility Concerns from all Approaching Directions

Safety Issue #2: Roadway Lighting

Observations:

The audit team noted that the tree canopy along Route 28A limits natural sunlight and moonlight illuminating the roadway. Route 28A has several streetlights affixed to utility poles that are inconsistently placed. Local RSA participants noted that the streetlights are dim and do not currently use LED technology (Old Dock crash #1, 3; Chapoquoit crash #3, 4, 5). In addition, not every crosswalk in the Study Area has a nearby streetlight. Local RSA participants indicated that the crosswalk at the Quaker Meeting House is often used at night, as the parking lot at the adjacent funeral home is used for overflow parking for evening events at the West Falmouth Library.



Image 4: Streetlight on Route 28A

Enhancements:

- Consider upgrading existing streetlights in the Study Area to LEDs to improve roadway visibility (Old Dock crash #1, 3; Chapoquoit crash #3, 4, 5)

- Consider installing additional streetlights where missing at crosswalks and intersections (Old Dock crash #1, 3; Chapoquoit crash #3, 4, 5)

Safety Issue #3: Roadway Guidance and Wayfinding

Observations:

RSA participants noted that signage and pavement markings in the Study Area were not easy to see, which may be due either to paint fading on the roadway or to obstructions from vegetation or other objects, such as utility poles (Chapoquoit crash #3). From a driver's perspective, the audit team noted that crosswalks across Route 28A are difficult to see (Old Dock crash #6). Furthermore, the intersections of Route 28A at Old Dock Road and Chapoquoit Road lacked sufficient signage to warn drivers from all approaches of the upcoming intersections (Chapoquoit crash #4, 5).

While Falmouth attracts tourists and its population swells in the summer, Route 28A in the Study Area has limited wayfinding to nearby beaches. This likely contributes to tourists relying on GPS devices to alert them to turn onto Old Dock Road or Chapoquoit Road, often with little notice, potentially resulting in near-miss crashes not reflected in the crash data.



Image 5: Obstructed Stop Sign on Chapoquoit Road



Image 6: Crosswalk with Faded Striping on Route 28A at the Fire Station

Enhancements:

- Develop a maintenance schedule to trim overgrown vegetation that is blocking regulatory and wayfinding signs. Overall, ensure that posts for regulatory signs are not blocked by vegetation or utility poles, are adequately separated, and at a proper height (Chapoquoit crash #3)
- Consider adding signage on the Old Dock Road and Chapoquoit Road approaches to Route 28A warning of an intersection ahead. Such signage could include double-yellow arrow signs on the far side of the intersections, as well as flashing stop signs (Chapoquoit crash #4, 5)
- Relocate the stop sign on Chapoquoit Road at Route 28A that is blocked by a utility pole approaching the intersection (Chapoquoit crash #4, 5)
- Restripe Route 28A, particularly its mid-block crosswalks. Evaluate widening the crosswalk striping and using high visibility striping to improve visibility to drivers (Old Dock crash #6)

Safety Issue #4: Speeding

Observations:

Local RSA participants indicated that speeding is widespread in the Study Area, particularly during the off-peak season when vehicle volumes are lower and there is a greater share of local drivers who are familiar with the roads (Old Dock crash #1, 2, 3; Chapoquoit crash #4, 5, 6). Most of the reported crashes at both intersections occurred on weekdays, which the audit team noted typically feature fewer tourists. In addition, while there were peaks in crashes during the summer, the increases were minor given the limited number of reported crashes (Chapoquoit Road had two reported crashes in July compared to one crash in other months), as well as complementary peaks in crashes during the off-season (Old Dock Road had the same number of reported crashes in January and August).

The audit team also noted that speeding is also prevalent in the summer season on Old Dock Road when drivers rush west to see the sunset over West Falmouth Harbor, then travel back east on Old Dock Road at dusk.

Route 28A has a downward slope from the fire station south past Chapoquoit Road, which may contribute to an increase in the speed of drivers traveling south (Chapoquoit crash #2, 6).

There are few posted speed limit signs in the Study Area, particularly on Route 28A southbound. RSA participants noted a lack of speed limit signs on Route 28A after Thomas B. Landers Road to the north and Brick Kiln Road to the south, which connect to exits at Route 28. Drivers arriving in the Study Area from



Image 7: Speed Limit Sign on Route 28A at Chapoquoit Road, Facing North. Vegetation Obstructs This Sign in Warmer Months

Route 28, which has a 55-mph speed limit, may not realize that the speed limit is lower on Route 28A due to the lack of speed limit signs.

There are no permanent speed monitoring devices in the Study Area. RSA participants from MassDOT, which has jurisdiction over Route 28A, expressed willingness to collaborate with the Town to address speeding on this road. It was noted that traffic calming engineering improvements are generally much more effective at reducing speeding than reducing the posted speed limit.

Enhancements:

- Consider installing speed feedback signs to increase driver awareness of speeds along Route 28A (Old Dock crash #1, 2, 3, 5; Chapoquoit crash #2, 6)
- Consider installing confirmatory speed limit signs on Route 28A near highway interchanges to alert drivers of speed limits through the corridor (Old Dock crash #1, 2, 3, 5; Chapoquoit crash #2, 6)
- Evaluate village gateway treatments, such as “welcome” signs for the West Falmouth Historic District and banners on utility poles, in the core village area (Old Dock crash #1, 2, 3, 5; Chapoquoit crash #2, 6)
- Evaluate the feasibility of conducting a speed study along the Route 28A corridor to reevaluate the posted speed limit (Old Dock crash #1, 2, 5; Chapoquoit crash #2, 6)
- Evaluate the appropriateness of installing a speed table at Old Dock Road (Old Dock crash #1, 2, 3, 5, 6)
- Install curb extensions at intersections and crosswalks where feasible to narrow Route 28A in these areas and encourage slower speeds (Old Dock crash #1, 2, 5, 6)

Safety Issue #5: Pedestrian Accessibility

Observations:

While there were no reported crashes in the Study Area involving pedestrians between 2016 and 2022, the RSA team identified many deficiencies that have likely caused near-miss pedestrian collisions and could potentially contribute to future crashes.

The RSA team observed that sidewalks on Route 28A in the Study Area are disconnected, in poor condition, not compliant with the Americans with Disabilities Act (ADA), and narrower than the 5-foot width required by MassDOT's Engineering Directive E-20-001 for sidewalks in urbanized areas. Curb ramps (where available) and crosswalks were also generally not ADA compliant. On some segments of Route 28A, utility pole placements are in the middle of sidewalks or placed in the ROW in the likely path of a sidewalk.



Image 8: Crosswalk at the West Falmouth Market with a Catch Basin in the Path of Travel

The eastern side of the crosswalk across Route 28A at Old Dock Road and the West Falmouth Market, which is often used by bicyclists and pedestrians traveling from the Shining Sea Bikeway to the market, ends at the market's driveway and has a storm drain in the middle of the crosswalk (Old Dock crash #6). RSA participants observed several vehicles entering the market's parking lot from the south (on Route 28A) and east (on Old Dock Road) drive over the eastern side of the crosswalk and where a landing area for the crosswalk would be located. The audit team noted that changes in the pavement and historical Google Street View images indicate that there used to be landscaping behind the crosswalk that prevented drivers from cutting over the crosswalk to enter the parking lot, but the landscaping was removed sometime between 2009 and 2011, according to historical Google Street View imagery.



Image 9: Crosswalk at Chapoquoit Road Does Not Have Accessible Curb Ramps

Enhancements:

- Consider relocating the crosswalk across Route 28A at Old Dock Road to an area that has greater visibility and fewer accessibility and vehicle encroachment concerns (Old Dock crash #6)
- Bring all crosswalks to ADA compliance, including the use of high-visibility markings and the installation of compliant curb ramps
- Evaluate the feasibility of improving sidewalks on Route 28A between the West Falmouth Market and Chapoquoit Road to make them continuous and accessible
- Consider relocating utility poles where needed to have continuous sidewalks

- Evaluate the desire lines of pedestrians and consider pedestrian infrastructure improvements where needed to better match the desire lines
- Install Rapid Rectangular Flashing Beacons (RRFBs) at crosswalks across Route 28A at Old Dock Road, the Quaker Meeting House, and the fire station’

Safety Issue #6: Bicycling Connectivity

Observations:

While there was only one reported crash in the Study Area involving a bicyclist between 2016 and 2022 and one additional crash in March 2023 noted by participants during the audit meeting, the RSA team identified several deficiencies that have likely caused near-miss bicycle collisions and could reasonably contribute to future crashes.

The RSA team observed minimal bicycle traffic on Route 28A, but bicycle volumes are much higher in warmer weather. Route 28A is a signed bicycle route, but there are no bicycle facilities on this road. However, the current width of Route 28A could not accommodate dedicated space for bicycles. Sand in the shoulder and catch basins may pose a falling hazard to bicyclists.

The West Falmouth Market is a popular destination for bicyclists near the Shining Sea Bikeway, which crosses Old Dock Road approximately 500 feet west of the market. Old Dock Road between the bikeway and Route 28A does not have dedicated space for bicyclists; the audit team noted faded sharrows in the roadway during the field audit. Signs on Old Dock Road prohibit bicyclists from riding on the sidewalk (Old Dock crash #6). Local RSA participants indicated that the majority of Falmouth’s population lives east of Route 28A and needs to cross this road to access the bikeway.

Enhancements:

- Consider initiating a bicycle safety campaign, possibly building on the Town’s Safe Routes to School initiative (Old Dock crash #6)
- Consider off-street bike accommodations on Route 28A that complement the Shining Sea Bikeway (Old Dock crash #6)
- Evaluate installing additional traffic controls at the Shining Sea Bikeway crossings of Old Dock Road and Chapoquoit Road to make them more conspicuous
- Consider installing bicycle pavement markings and Share the Road signs on Old Dock Road between the bikeway and Route 28A
- Install Share the Road signs on Route 28A to alert drivers of the potential presence of bicyclists
- Clear sand out of the shoulders and catch basins on Route 28A and evaluate drainage grates to remove potential bicyclist falling hazards



Image 10: Bike Route and Wayfinding Signs on Route 28A at Old Dock Road

- Evaluate the desire lines of bicyclists and consider infrastructure improvements where needed to better match the desire lines

Safety Issue #7: Road Geometry at Old Dock Road

Observations: Awkward geometry at the intersection of Route 28A, Old Dock Road, and the West Falmouth Market contributes to higher speeds, visibility issues, and safety concerns for bicyclists and pedestrians. Compared to Chapoquoit Road, audit participants noted that this intersection sees higher activity of all roadway users because of the connections it provides to the West Falmouth Market, Shining Sea Bikeway, municipal dock, and Chapoquoit Beach.

The north and west sides of the intersection are wider than the intersecting roads, encouraging higher speeds (Old Dock crash #2, 3, 4, 5, 6). Drivers traveling south on Route 28A often use the wide approach at Old Dock Road as a right turn lane or to pass drivers stopped for someone in the crosswalk. Drivers of cars and trucks also sometimes park on both sides of Route 28A north of Old Dock Road to visit the West Falmouth Market (Old Dock Crash #4). Both sides of Route 28A in front of the market have posted No Parking signs, but they are routinely ignored.

RSA participants also noted drainage issues with blocked catch basins on the northwest side of the intersection. As noted under Safety Issue #1, this intersection has obstructed visibility for drivers turning into and out of the market's driveway and Old Dock Road. The audit team noted that the market driveway effectively acts as the fourth leg of the Old Dock Road intersection, but its location slightly north of Old Dock Road creates an offset movement for drivers travelling between the market and Old Dock Road, impacting through movements and left turns from these locations.

Vehicles parking on both sides of Route 28A in front of the West Falmouth Market inhibit the visibility of drivers turning into and out of the Market's driveway and Old Dock Road who may not see approaching vehicles, bicyclists, and pedestrians. RSA participants observed numerous vehicles turning from Old Dock Road onto Route 28A stopping past the stop sign and blocking the crosswalk to gain better visibility before proceeding.



Image 11: Crosswalk at Old Dock Road Blocked by an Encroaching Car



Image 12: View from the West Falmouth Market Parking Lot Facing South with Vegetation Obstructing Visibility

As noted under Safety Issue #5, the east side of the crosswalk across Route 28A ends in the parking lot for the West Falmouth Market and drivers turning into the market often cut across the pedestrian path of travel.

Enhancements:

- Consider installing hatched striping and flexible delineators on the northwest side of the Old Dock Road intersection to narrow the Route 28A southbound approach (Old Dock crash #2, 3, 4, 5, 6)
- Consider implementing a chicane in front of the West Falmouth Market by shifting Route 28A west and striping a legal parking lane in front of the market
- Evaluate the feasibility of installing a curb extension on the north side of the Old Dock Road intersection to define the southern end of the parking lane (Old Dock crash #2, 3, 4, 5, 6)
- Evaluate the feasibility of installing a pedestrian refuge island on the north side of the Old Dock Road intersection, which would act as a traffic calming device on Route 28A and discourage wide turning movements (Old Dock crash #2, 3, 4, 5, 6)v
- Evaluate parking regulations and curbside activity near the West Falmouth Market and consider curb relocation north of Old Dock Road to discourage parking in this area (Old Dock crash #2, 4, 5)
- Confer with the owners of the West Falmouth Market and 631 West Falmouth Highway (Route 28A) to see if there is an opportunity to introduce one-way circulation for the market parking lot
- Evaluate the feasibility of formalizing the edges of the West Falmouth Market driveway apron with a reconstructed pedestrian curb ramp and reintroducing the landscaping that was removed between 2009 and 2011
- Consider narrowing the right turn radius at the northwest and southwest corners on Old Dock Road at Route 28A
- Clean catch basins and evaluate the need for additional stormwater infrastructure to mitigate drainage issues



Image 13: Storm Drains on Route 28A As It Widens North of Old Dock Road

Recommendations

After the site visit, audit participants returned to discuss the safety issues and consider various improvements. The audit participants were encouraged to consider improvements of various time horizons for each existing safety issue. Each improvement considered is categorized as short-term, mid-term, or long-term based on the definitions shown in Table 2. Additionally, a cost category is assigned to each improvement based on the parameters set forth in Table 2.

Table 2: Estimated Time Frame and Costs Breakdown

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

Summary of Road Safety Audit

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

Table 3: Potential Safety Enhancement Summary

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Intersection Visibility and Sight Distance	Consider trimming overgrown vegetation, particularly on the southwest corner of Route 28A and Chapoquoit Road	High	Short-Term	Low	MassDOT
Intersection Visibility and Sight Distance	Consider consulting with abutters to remove visibility obstructions adjacent to the ROW but on private property such as fences and bushes	Medium	Mid-Term	Medium	MassDOT, Town
Intersection Visibility and Sight Distance	Make physical improvements to implement daylighting at intersections where parked vehicles may obstruct visibility	Medium	Short-Term	Medium	MassDOT
Intersection Visibility and Sight Distance	Add plaques with street names to the existing intersection warning signs on Route 28A and add intersection warning signs on Route 28A where they are missing at key intersections and approaches	Medium	Short-Term	Low	MassDOT
Intersection Visibility and Sight Distance	Implement traffic calming elements that slow vehicle speeds so drivers have additional time to react where incline visibility issues exist	High	Mid-Term	High	MassDOT
Intersection Visibility and Sight Distance	Consider installing flashing stop signs on the Old Dock Road and Chapoquoit Road approaches to Route 28A to improve stop compliance	High	Short-Term	Medium	MassDOT

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Intersection Visibility and Sight Distance	Evaluate the feasibility of increasing the corner radius on the southwest corner of Chapoquoit Road and Route 28A so drivers turning right from Chapoquoit Road onto Route 28A do not have to take as wide of a turn, potentially into oncoming traffic	Medium	Mid-Term	High	MassDOT
Intersection Visibility and Sight Distance	Trim vegetation on Old Dock Road and Chapoquoit Road at the Shining Sea Bikeway that may obstruct the visibility of drivers approaching the bike path	Medium	Mid-Term	High	MassDOT
Roadway Lighting	Consider upgrading existing streetlights in the Study Area to LEDs to improve roadway visibility	High	Mid-Term	Medium	Town
Roadway Lighting	Consider installing additional streetlights where missing at crosswalks and intersections	High	Mid-Term	High	Town
Roadway Guidance and Wayfinding	Develop a maintenance schedule to trim overgrown vegetation that is blocking regulatory and wayfinding signs. Overall, ensure that posts for regulatory signs are not blocked by vegetation or utility poles, are adequately separated, and at a proper height	Medium	Short-Term	Medium	MassDOT

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Roadway Guidance and Wayfinding	Consider adding signage on the Old Dock Road and Chapoquoit Road approaches to Route 28A warning of an intersection ahead. Such signage could include double-yellow arrow signs on the far side of the intersections, as well as flashing stop signs	Medium	Short-Term	Low	MassDOT
Roadway Guidance and Wayfinding	Relocate the stop sign on Chapoquoit Road at Route 28A that is blocked by a utility pole approaching the intersection	Low	Short-Term	Low	MassDOT
Roadway Guidance and Wayfinding	Restripe Route 28A, particularly its mid-block crosswalks. Evaluate widening the crosswalk striping and using high visibility striping to improve visibility to drivers	High	Short-Term	Medium	MassDOT
Speeding	Consider installing speed feedback signs to increase driver awareness of speeds along Route 28A	Low	Short-Term	Medium	MassDOT, Town
Speeding	Consider installing confirmatory speed limit signs on Route 28A near highway interchanges to alert drivers of speed limits through the corridor	Low	Short-Term	Low	MassDOT
Speeding	Evaluate village gateway treatments, such as “welcome” signs for the West Falmouth Historic District and banners on utility poles, in the core village area	Medium	Mid-Term	High	MassDOT, Town
Speeding	Evaluate the feasibility of conducting a speed study along the Route 28A corridor to reevaluate the posted speed limit	Low	Mid Term	Low	MassDOT, Town

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Speeding	Evaluate the appropriateness of installing a speed table at Old Dock Road	High	Mid-Term	High	MassDOT, Town
Speeding	Install curb extensions at intersections and crosswalks where feasible to narrow Route 28A in these areas and encourage slower speeds	Medium	Mid-Term	High	MassDOT
Pedestrian Accessibility	Consider relocating the crosswalk across Route 28A at Old Dock Road to an area that has greater visibility and fewer accessibility and vehicle encroachment concerns	High	Mid-Term	Medium	MassDOT
Pedestrian Accessibility	Bring all crosswalks to ADA compliance, including the use of high-visibility markings and the installation of compliant curb ramps	High	Mid-Term	High	MassDOT
Pedestrian Accessibility	Evaluate the feasibility of improving sidewalks on Route 28A between the West Falmouth Market and Chapoquoit Road to make them continuous and accessible	High	Long-Term	High	MassDOT
Pedestrian Accessibility	Consider relocating utility poles where needed to have continuous sidewalks	High	Long-Term	High	MassDOT
Pedestrian Accessibility	Evaluate the desire lines of pedestrians and consider pedestrian infrastructure improvements where needed to better match the desire lines	Medium	Mid-Term	Medium	MassDOT, Town

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Pedestrian Accessibility	Install Rapid Rectangular Flashing Beacons (RRFBs) at crosswalks across Route 28A at Old Dock Road, the Quaker Meeting House, and the fire station	High	Mid-Term	Medium	MassDOT
Bicycling Connectivity	Consider initiating a bicycle safety campaign, possibly building on the Town's Safe Routes to School initiative	Low	Mid-Term	Medium	Town
Bicycling Connectivity	Consider off-street bike accommodations on Route 28A that complement the Shining Sea Bikeway	High	Long-Term	High	MassDOT
Bicycling Connectivity	Evaluate installing additional traffic controls at the Shining Sea Bikeway crossings of Old Dock Road and Chapoquoit Road to make them more conspicuous	Medium	Mid-Term	High	Town
Bicycling Connectivity	Consider installing bicycle pavement markings and Share the Road signs on Old Dock Road between the bikeway and Route 28A	Low	Short-Term	Low	Town
Bicycling Connectivity	Install Share the Road signs on Route 28A to alert drivers of the potential presence of bicyclists	Low	Short-Term	Low	MassDOT
Bicycling Connectivity	Clear sand out of the shoulders and catch basins on Route 28A and evaluate drainage grates to remove potential bicyclist falling hazards	Low	Short-Term	Low	MassDOT

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Bicycling Connectivity	Evaluate the desire lines of bicyclists and consider infrastructure improvements where needed to better match the desire lines	Low	Mid-Term	High	Town
Road Geometry at Old Dock Road	Consider installing hatched striping and flexible delineators on the northwest side of the Old Dock Road intersection to narrow the Route 28A southbound approach	High	Short-Term	Medium	MassDOT
Road Geometry at Old Dock Road	Consider implementing a chicane in front of the West Falmouth Market by shifting Route 28A west and striping a legal parking lane in front of the market	Medium	Mid-Term	Medium	MassDOT
Road Geometry at Old Dock Road	Evaluate the feasibility of installing a curb extension on the north side of the Old Dock Road intersection to define the southern end of the parking lane	High	Mid-Term	Medium	MassDOT
Road Geometry at Old Dock Road	Evaluate the feasibility of installing a pedestrian refuge island on the north side of the Old Dock Road intersection, which would act as a traffic calming device on Route 28A and discourage wide turning movements	High	Mid-Term	Medium	MassDOT
Road Geometry at Old Dock Road	Evaluate parking regulations and curbside activity near the West Falmouth and consider curb relocation north of Old Dock Road to discourage parking in this area	High	Mid-Term	Medium	MassDOT

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Road Geometry at Old Dock Road	Confer with the owners of the West Falmouth Market and 631 West Falmouth Highway (Route 28A) to see if there is an opportunity to introduce one-way circulation for the market parking lot	Medium	Mid-Term	Medium	Town, Abutting Property Owners
Road Geometry at Old Dock Road	Evaluate the feasibility of formalizing the edges of the West Falmouth Market driveway apron with a reconstructed pedestrian curb ramp and reintroducing the landscaping that was removed between 2009 and 2011	Medium	Mid-Term	High	MassDOT
Road Geometry at Old Dock Road	Consider narrowing the right turn radius at the northwest and southwest corners on Old Dock Road at Route 28A	Low	Mid-Term	High	MassDOT
Road Geometry at Old Dock Road	Clean catch basins and evaluate the need for additional stormwater infrastructure to mitigate drainage issues	Low	Mid-Term	High	MassDOT

Appendix A. RSA Meeting Agenda

Agenda

Road Safety Audit

Falmouth, MA

West Falmouth Hwy (Rt 28A) corridor from
Chapoquoit Rd to Old Dock Rd

Meeting Location: Falmouth Town Hall, Old Water Room
59 Town Hall Square, Falmouth, MA 02540

April 4th, 2023

1:00 PM – 4:00 PM

Type of meeting:	High crash location – Road Safety Audit
Attendees:	Invited participants to comprise a multidisciplinary team
Please bring:	Thoughts and enthusiasm!!

1:00 PM	Welcome and Introductions
1:15 PM	Discussion of Safety Issues <ul style="list-style-type: none">• Crash history, speed regulations, recent and existing projects – all provided in advance• Existing geometries and conditions
2:00 PM	Site Visit <ul style="list-style-type: none">• Drive to the intersection of Rt 28A at Chapoquoit Road• As a group, identify areas for improvement
3:00 PM	Discussion of Potential Improvements <ul style="list-style-type: none">• Discuss observations and finalize safety issue areas• Discuss potential improvements and finalize recommendations
4:00 PM	Adjourn for the Day – but the RSA has not ended

Instructions for Participants:

- Before attending the RSA on April 4th, participants are encouraged to drive/walk through the intersection and complete/consider elements on the RSA Prompt List with a focus on safety.
- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas, but are reminded that the synergy that develops and respect for others' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.

Appendix B. RSA Team Contact List

Participating Audit Team Members

Date: April 4, 2023

Location: Falmouth Town Hall
59 Town Hall Square, Falmouth, MA

Audit Team Members	Agency/Affiliation	Email Address	Phone Number
Phil Viveiros	McMahon	pviveiros@bowman.com	508-967-3043
Randy Fixman	McMahon	rfixman@bowman.com	401-648-0712
Brian Loewen	Falmouth Police	Brian.Loewen@falmouthpolice.ma.gov	774-255-4503
Nick Croft	Town of Falmouth Engineering	Nicholas.croft@falmouthma.gov	774-392-4047
Maurice Harlow-Hawkes	Resident, West Falmouth Village	Harlow-hawkes@comcast.net	978-729-0100
Jim Gray	Resident, West Falmouth Village	jgray336@gmail.com	603-372-2563
Todd Taylor	West Falmouth Village Association	Toddtayl@verizon.net	508-548-4321
Dan Shearer	West Falmouth Village Association	Nandnshearer@aol.com	508-548-7903
Colleen Medeiros	Cape Cod Commission	Colleen.medeiros@capecodcommission.org	508-744-1226
Steven Wheeler	MassDOT	Steven.wheeler@dot.state.ma.us	781-853-8704
Jason Walters	MassDOT D5 Projects	Jason.walters@dot.state.ma.us	508-245-0895
David Soares	MassDOT D5 Traffic	David.soares@dot.state.ma.us	857-368-5250
Samuel Hawkins	MassDOT D5 Traffic	Samuel.g.hawkins@dot.state.ma.us	857-393-1078
Ana Fill	MassDOT Traffic Safety	Ana.fill@dot.state.ma.us	857-301-0787
Michelle Deng	MassDOT Traffic Safety	Michelle.Deng@dot.state.ma.us	857-303-1230
Joshua Oliver	Falmouth Police	Joshua.oliver@falmouthpolice.ma.gov	774-255-4527
James McLoughlin	Falmouth DPW	james.mcloughlin@falmouthma.gov	774-392-6471
Jed Cornock	Falmouth Town Planner	jed.cornock@falmouthma.gov	508-495-7481
Peter McConarty	Falmouth DPW Director	peter.mcconarty@falmouthma.gov	508-457-2543
Steve Cadorette	Falmouth DPW	Steven.Cadorette@falmouthma.gov	508-457-2543

Appendix C. Detailed Crash Data



SYMBOLS		TYPE OF CRASH	SEVERITY
	Moving Vehicle		
	Backing Vehicle		
	Non-Involved Vehicle		
	Involved Pedestrian		
	Non-Involved Bicycle		
	Involved Bicycle		
	Involved Animal		
	Direction of Motion		
	Parked Vehicle		
	Fixed Object		

FALMOUTH, MA

ROUTE 28A WEST FALMOUTH HIGHWAY AT
CHAPOQUOIT ROAD
REGION: CAPE COD

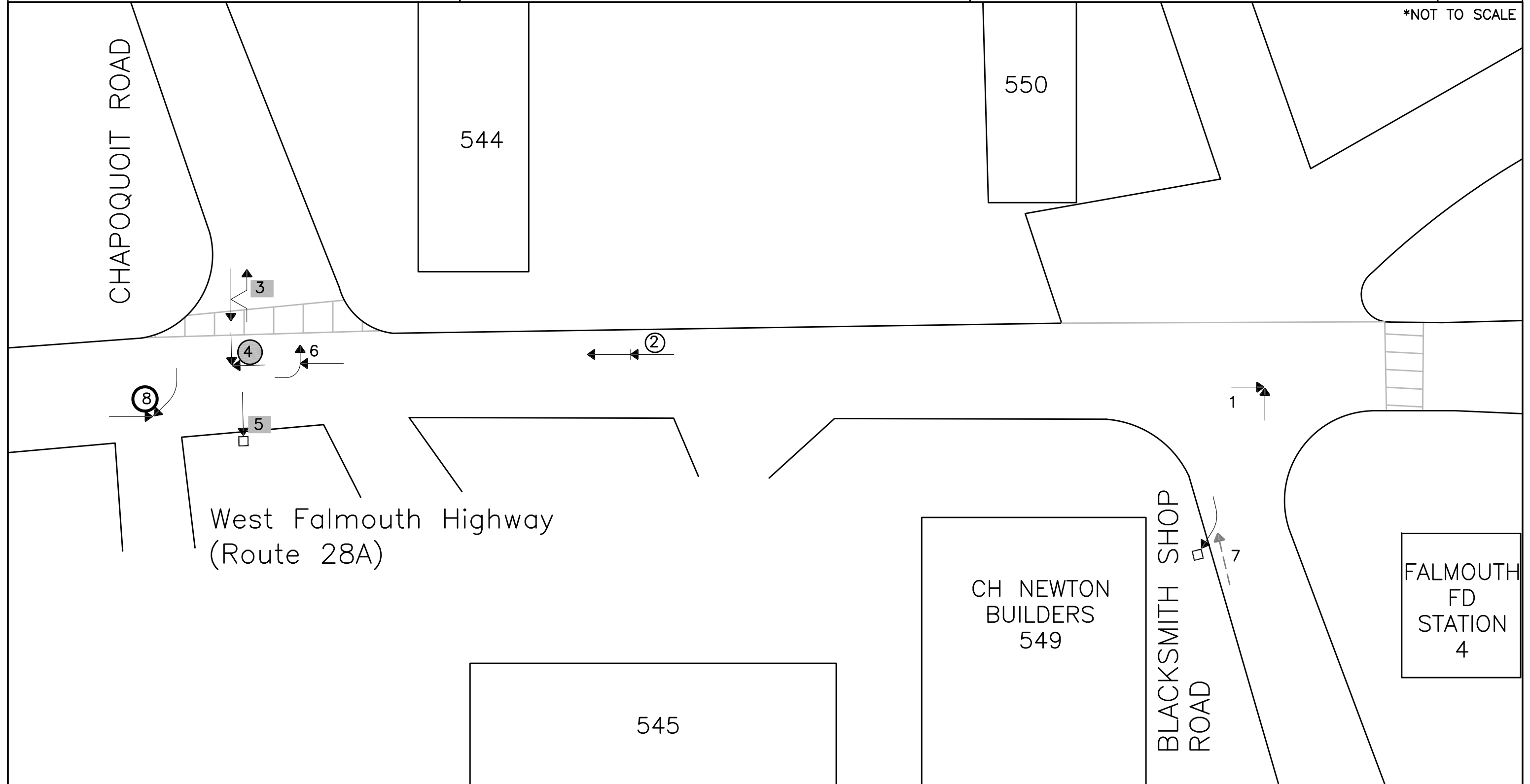
CRASH DIAGRAM

TIME PERIOD ANALYZED: 2016-2022
SOURCE OF CRASH REPORTS: FALMOUTH POLICE DEPARTMENT
DATE PREPARED: 12/22/2022
PREPARED BY: KTF

SHEET 1 OF 1



*NOT TO SCALE



Crash Data Summary Table

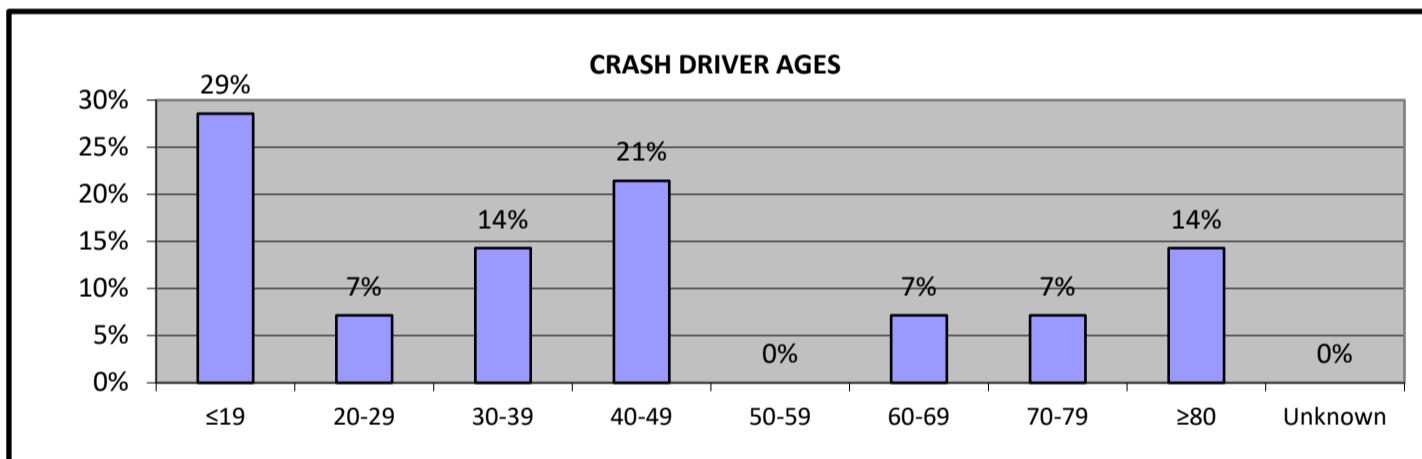
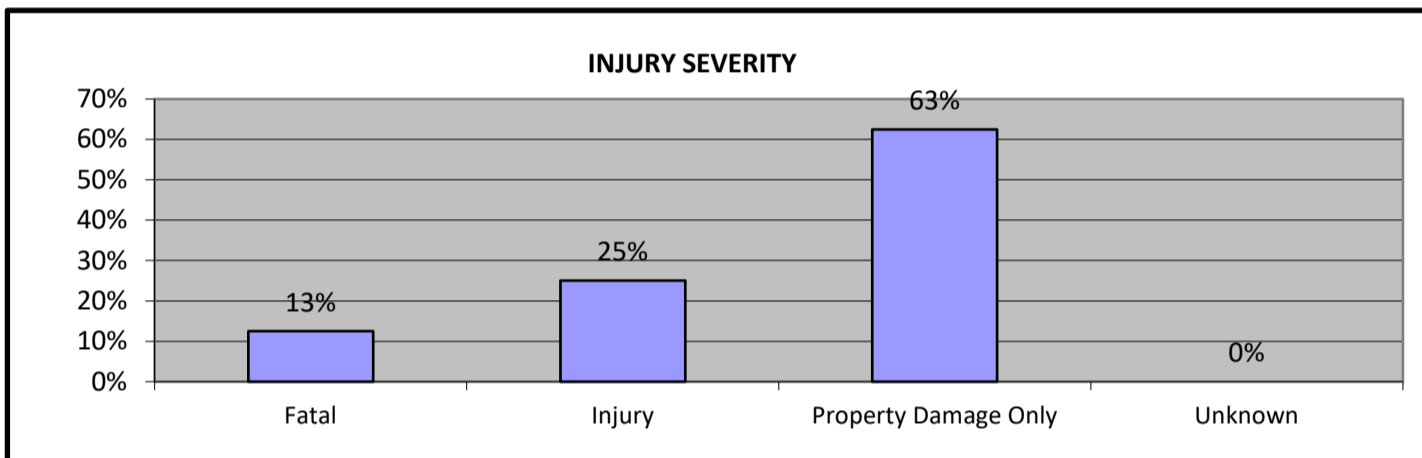
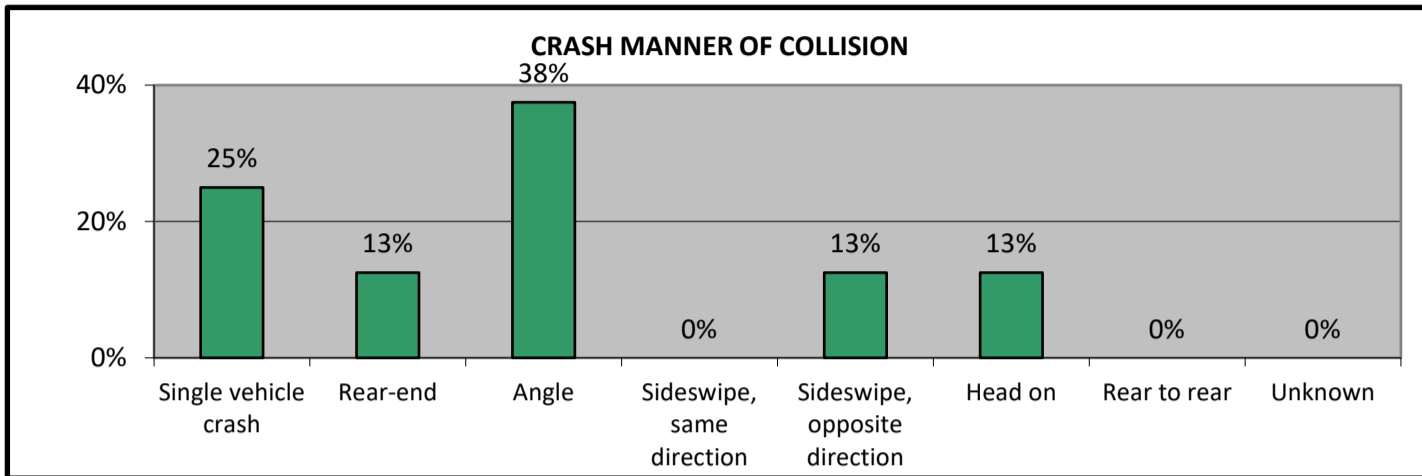
West Falmouth Highway at Chapoquoit Rd, Falmouth, MA
2016-2022

Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	Driver Distracted By	Injury Severity	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	Type	Type	#	#	#	#	
1	04/13/16	Wednesday	2:11 PM	Angle	Daylight	Clear	Dry	Failure to keep in proper lane or running off road		No Injury	75	89			No narrative - Diagram shows V1 driving around stopped vehicles on the opposite of the road
2	06/07/17	Wednesday	7:12 AM	Rear-end	Daylight	Rain	Wet	Driving too fast for conditions		Non-fatal injury	16	17			OP2 travelling at speeds greater than reasonable for wet road conditions attempted to brake and hydroplaned into Vehicle 1
3	07/13/18	Friday	9:37 PM	Sideswipe, opposite direction	Dark - roadway not lighted	Clear	Dry	Inattention		No Injury	33	48			Vehicle two made a left turn onto Chapoquoit Rd and sideswipped Vehicle one waiting to turn left onto W Falmouth Highway
4	01/15/19	Tuesday	8:56 PM	Angle	Dark - roadway not lighted	Clear	Dry	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Other activity (searching, eating, personal hygiene, etc.)	Non-fatal injury	17	41			Vehicle one failed to stop at the stop sign and struck vehicle two in the right side door. OP1 stated he was arguing with his brother, drove in the other lane and through the stop sign
5	12/27/19	Friday	10:23 PM	Single vehicle crash	Dark - lighted roadway	Clear	Dry	Disregarded traffic signs, signals, road markings		No Injury	21				OP1 stated he was "messaging around" with his friends and he passed a vehicle and was speeding. OP1 stated he went through the stop sign, crossed West Falmouth Highway and crashed between two large trees
6	05/26/20	Tuesday	1:34 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way		No Injury	39	18			OP1 failed to yield to vehicle 2 while turning left onto Chapoquoit Rd. OP2 stated they may have been travelling 4 to 5mph over the speed limit
7	07/23/20	Thursday	4:59 PM	Single vehicle crash	Daylight	Clear	Dry	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.		No Injury	48				OP1 stated they swerved to avoid an oncoming vehicle and struck the corner of the CH Newton Building
8	08/24/22	Wednesday	4:08 PM	Head on	Daylight	Clear	Dry	Over-correcting/over-steering		Fatal Injury	68	80			Operator 2 took a wide right turn onto Rt28A and struck Vehicle one in the Northbound lane

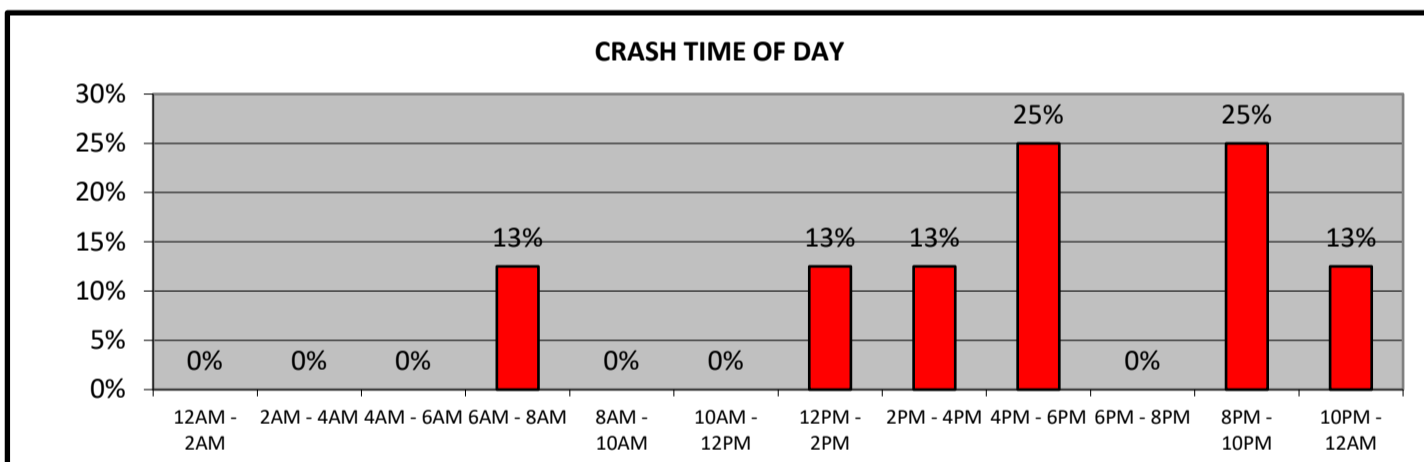
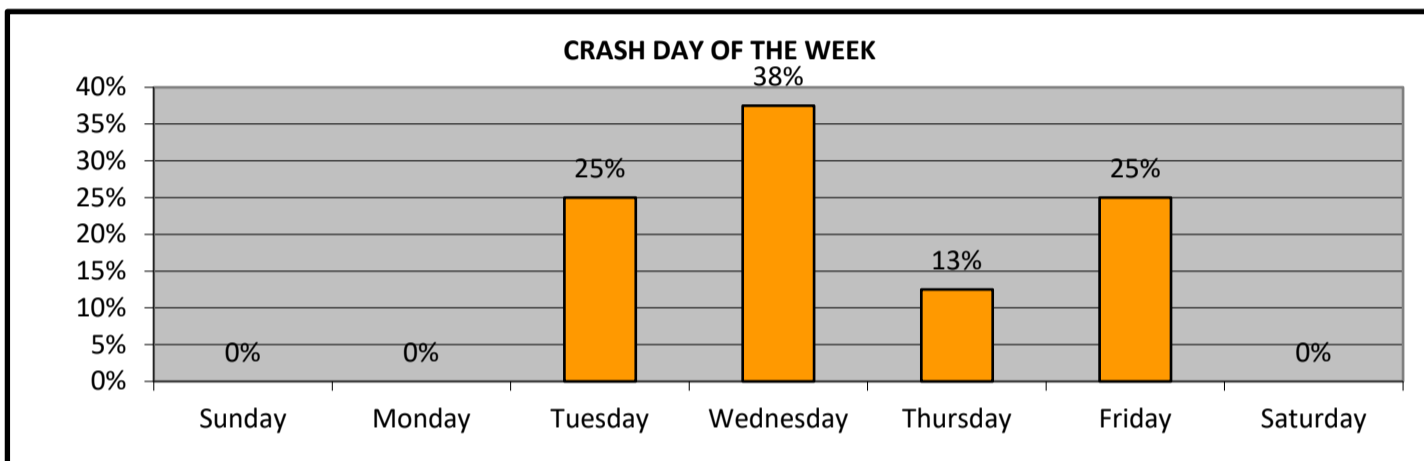
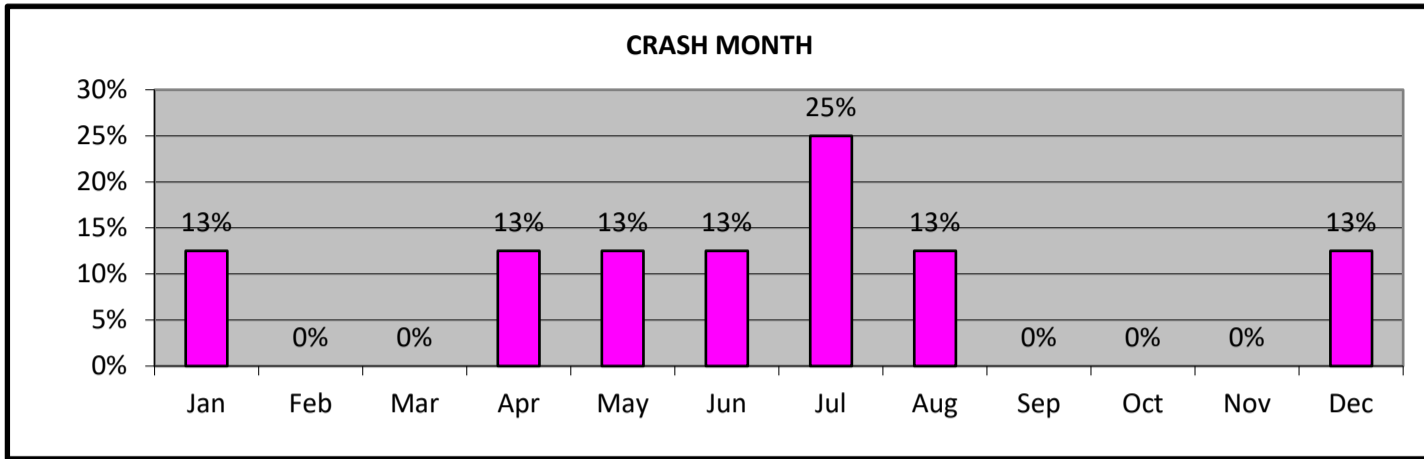
*Courtesy Crash - A term used to describe a crash that occurs subsequent to a non-involved mainline driver who gives the right of way, contrary to the rules of the road, to another driver.

Summaries based on crash reports obtained from the Falmouth Police Department.

Crash Data Summary Charts
West Falmouth Highway at Chapoquoit Rd, Falmouth, MA

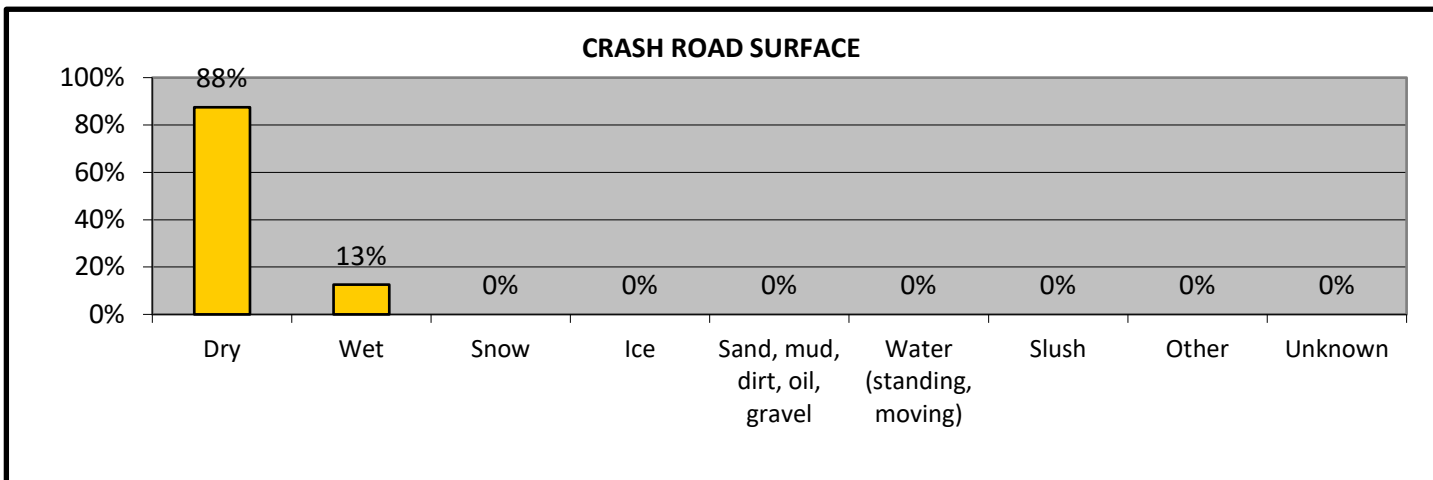
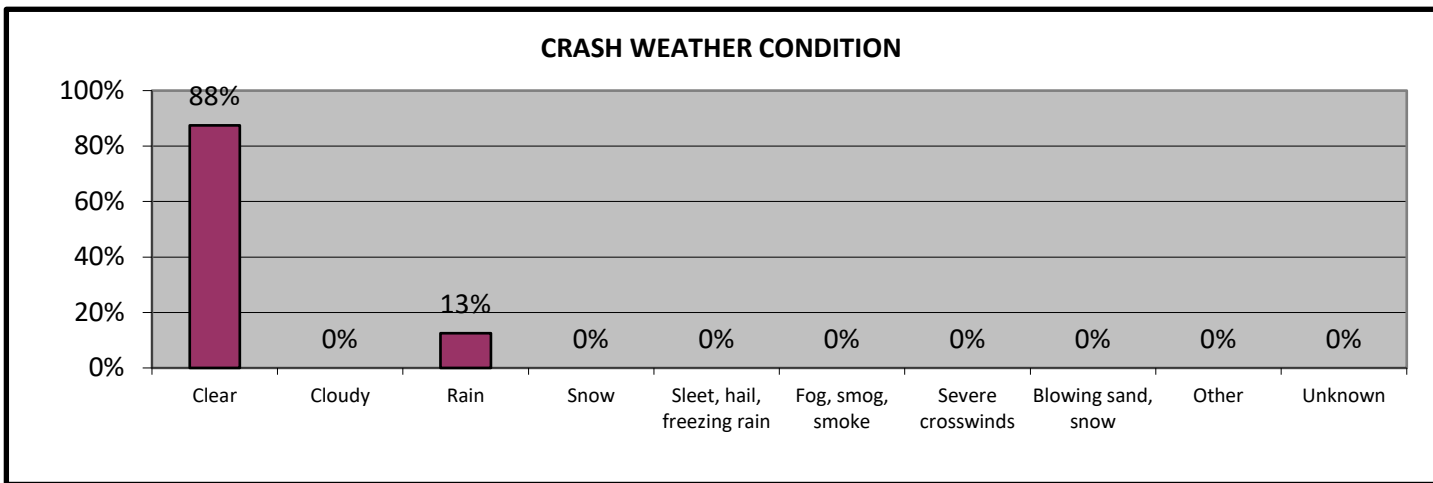
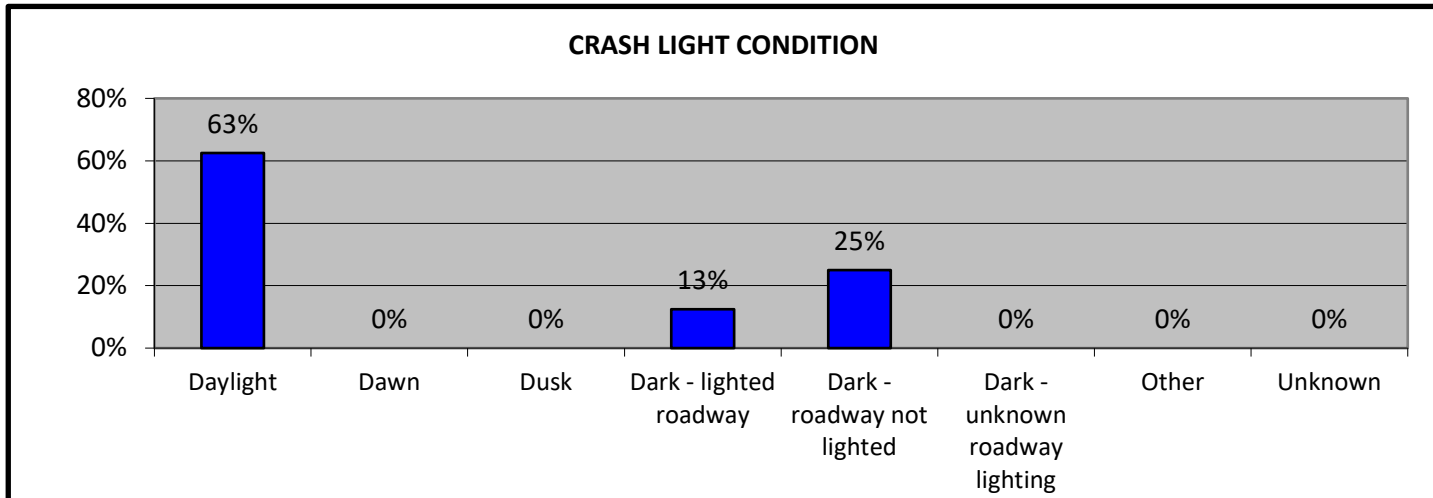


Crash Data Summary Charts West Falmouth Highway at Chapoquoit Rd, Falmouth, MA



Crash Data Summary Charts

West Falmouth Highway at Chapoquoit Rd, Falmouth, MA





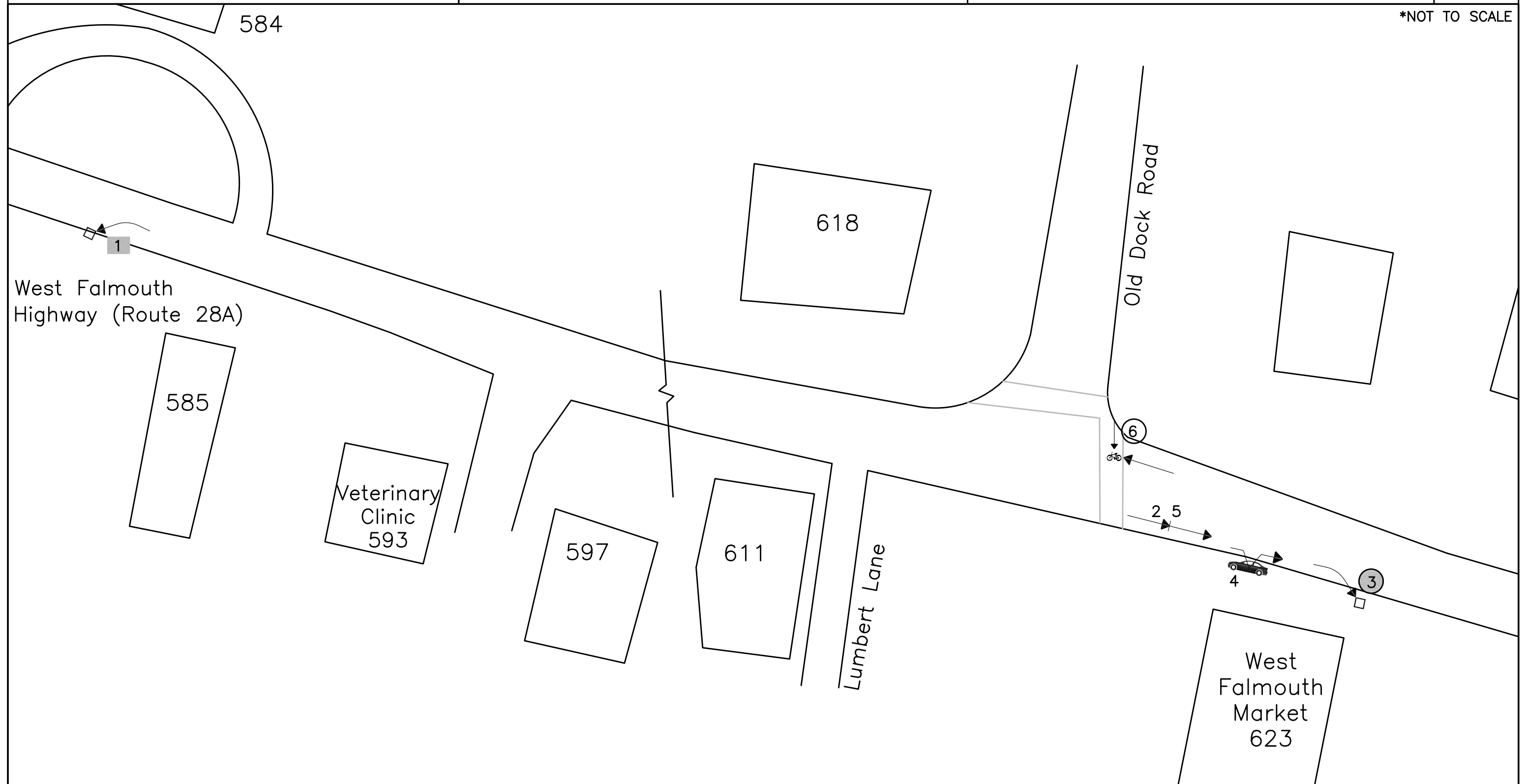
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	Non-Involved Bicycle		
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	Non-Involved Animal		
	Direction of Motion		
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FALMOUTH, MA
 ROUTE 28A WEST FALMOUTH HIGHWAY AT OLD DOCK ROAD
 REGION: CAPE COD

CRASH DIAGRAM

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 SOURCE OF CRASH REPORTS: FALMOUTH POLICE DEPARTMENT
 DATE PREPARED: 12/22/2022
 PREPARED BY: KTF

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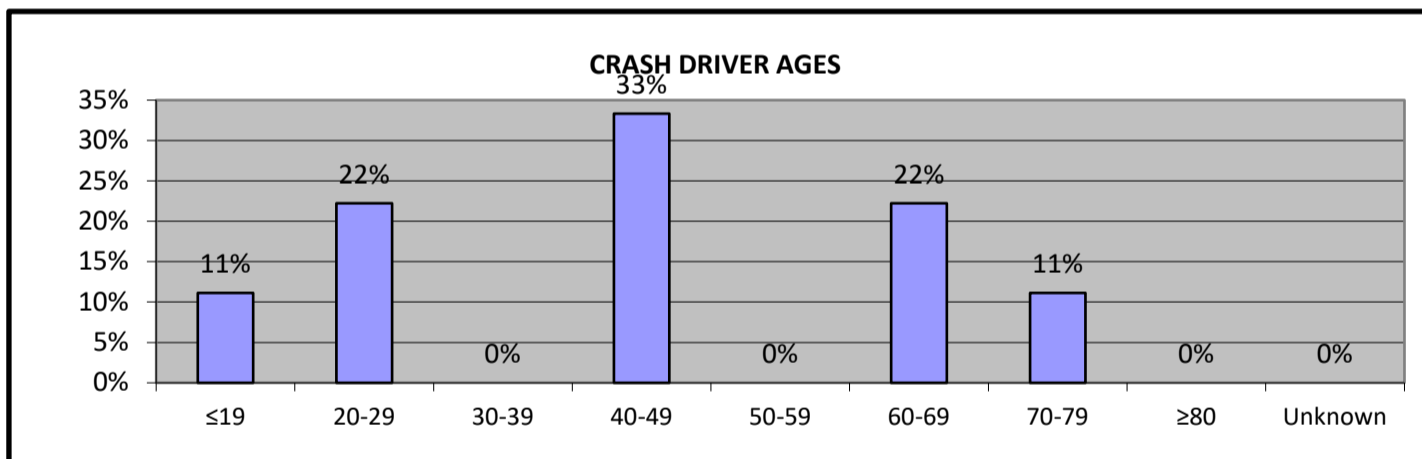
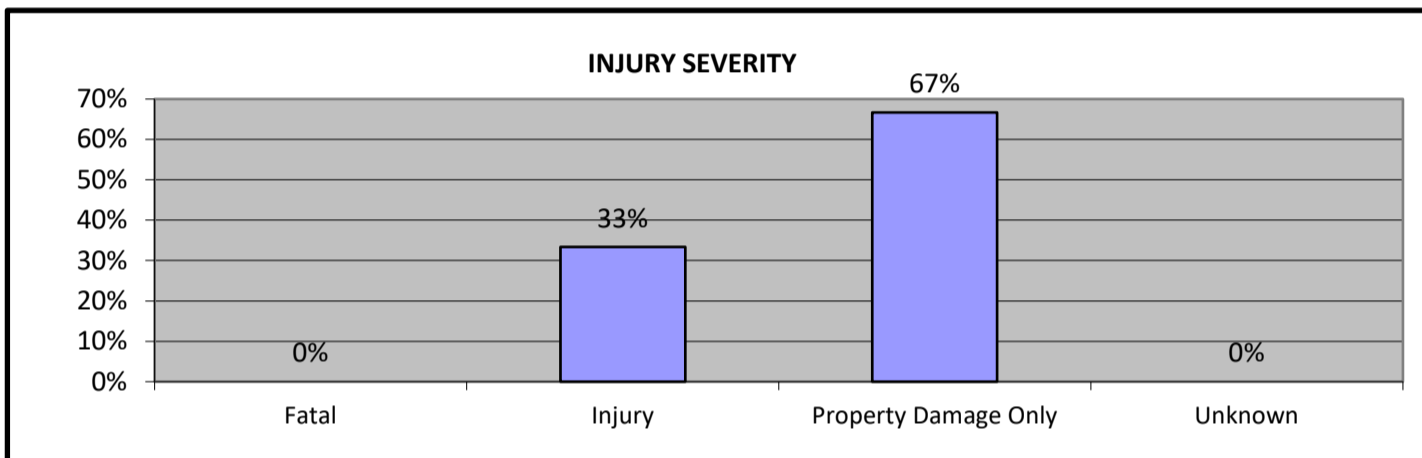
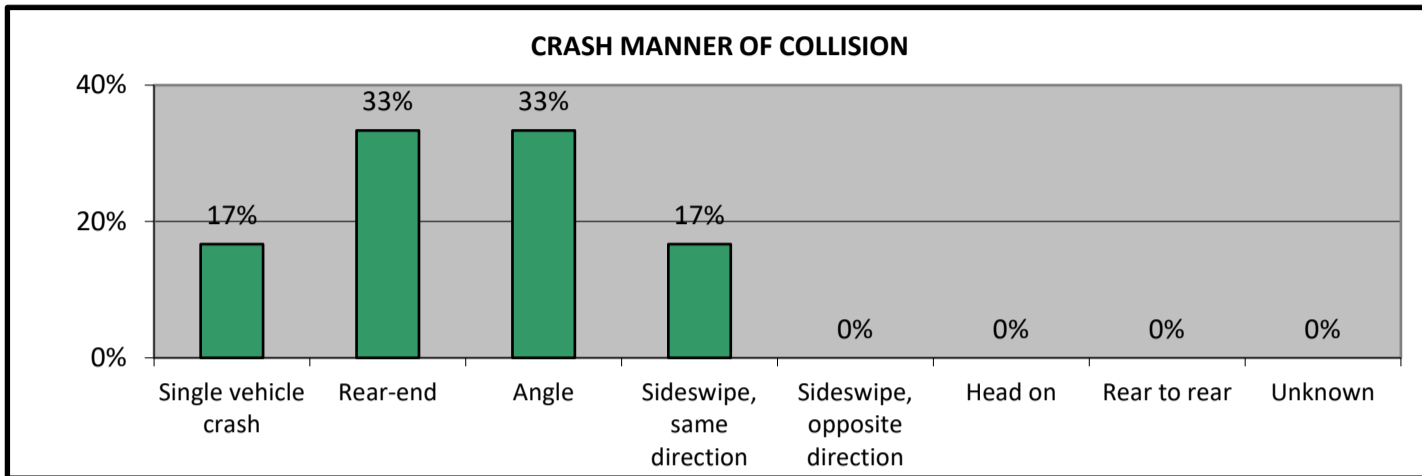
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2016-2022

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#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	Type	Type	#	#	#	#	
1	01/17/16	Sunday	9:02 PM	Single vehicle crash	Dark - lighted roadway	Sleet, hail, freezing rain	Slush	Driving too fast for conditions		No Injury	24				OP1 stated they slid on slush and hit a utility pole.
2	03/18/16	Friday	8:38 AM	Rear-end	Daylight	Clear	Dry	Inattention		No Injury	67	44			Vehicle one did not brake in time and rear ended vehicle 2
3	01/07/19	Monday	7:51 PM	Sideswipe, same direction	Dark - lighted roadway	Rain	Wet	Physical impairment		Non-fatal injury	29				Vehicle one struck a utility pole
4	10/10/19	Thursday	11:18 AM	Angle	Daylight	Rain	Wet	No improper driving		No Injury	40				Vehicle one was a parked semi trailer facing southbound in the northbound lane. Its mirror was struck by an unknown passing vehicle
5	08/12/20	Wednesday	2:13 PM	Rear-end	Daylight	Clear	Dry	Inattention		No Injury	49	68			Vehicle 1 was slowing for traffic when OP2 failed to stop in time and rear ended Vehicle 1.
6	08/15/22	Monday	12:15 PM	Angle	Daylight	Clear	Dry	Inattention	Other activity (searching, eating, personal hygiene, etc.)	Non-fatal injury	76	15			A bicyclist was crossing in the crosswalk when Vehicle 1 travelling SB struck the rear tire of the bicycle. OP1 may have had a dog in their lap.

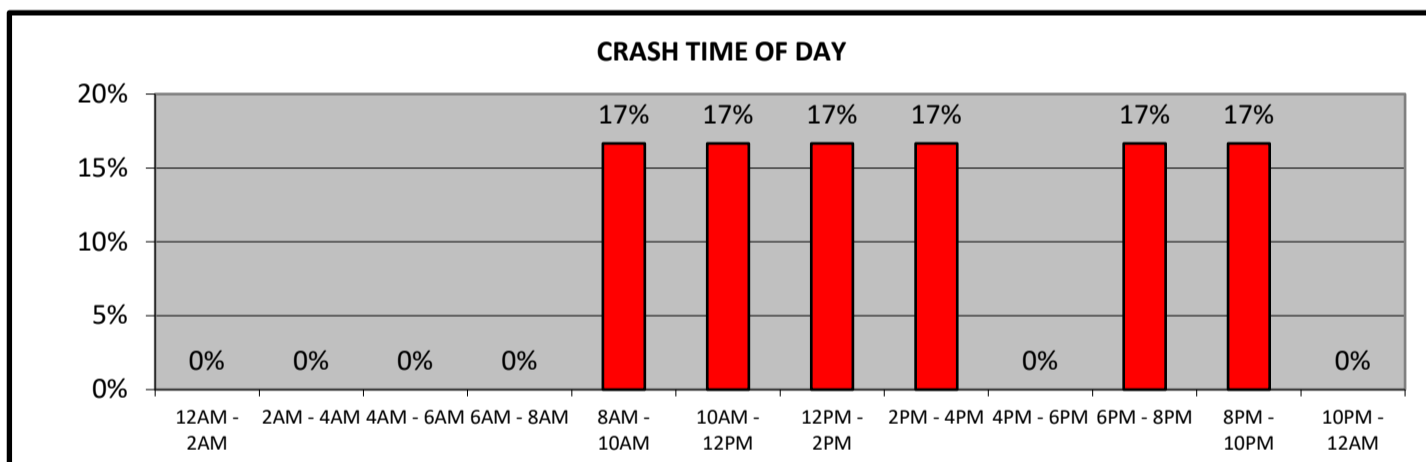
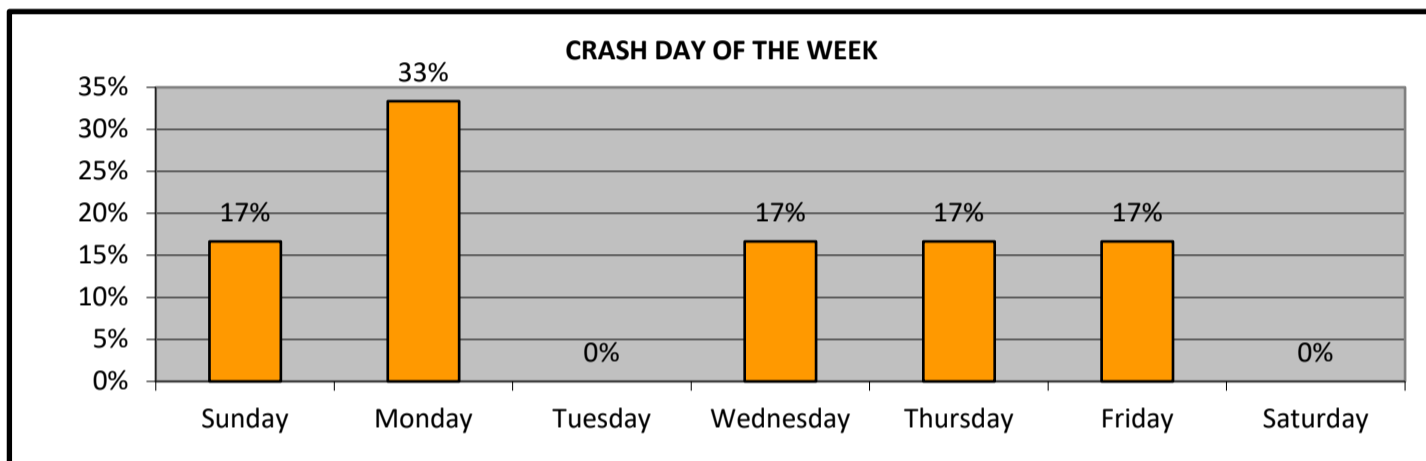
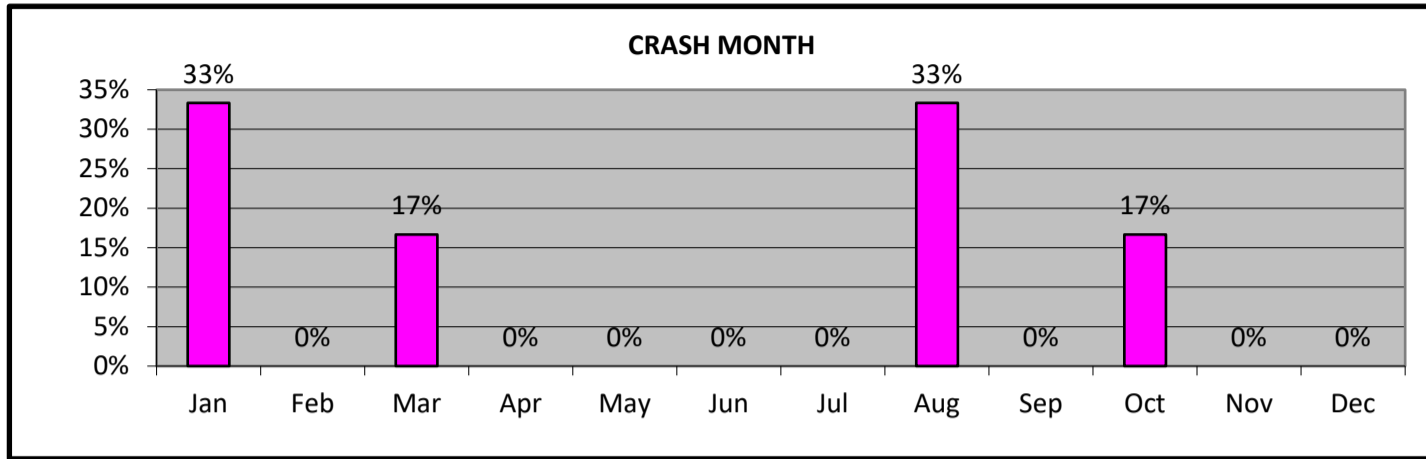
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