

ROAD SAFETY AUDIT

Tremont Street / Enterprise Street (Route 3A) at Church Street and Tremont Street (Route 139)

Duxbury, Massachusetts

February 18, 2022

Prepared through Old Colony MPO FFY 2022 Unified Planning Work Program – Road Safety Audits at Multiple Locations:
Under Contract with MassDOT



Prepared By:
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Background

This Road Safety Audit for Tremont Street / Enterprise Street (Route 3A) and Church Street / Tremont Street (Route 139) in Duxbury was prepared as part of the Old Colony Metropolitan Planning Organization's (MPO) Road Safety Audits at Multiple Locations project in the MPO's FFY 2022 Unified Planning Work Program. The objective of the Road Safety Audits at Multiple Locations project is to identify known issues and potential improvements that can be implemented at high crash locations in a continuing effort to achieve safety performance targets for reducing serious injuries and fatalities on the regional highway network. Locations were selected through a data driven process as part of the MPO's Safety Management System and consultation with the communities of the Old Colony MPO.

This location was selected as the result of a request from the Town of Duxbury. Despite a previous road safety audit that was conducted by Old Colony Planning Council in 2018 (Route 3A Corridor Road Safety Audits), crash frequency and severity remained high, and the location continued to be a top priority of the Town's for improving safety

Project Data

This Road Safety Audit was held on February 18, 2022. It was done in conjunction with Road Safety Audits for the nearby intersections of Congress Street (Route 14) at Franklin Street, and Summer Street (Route 53) at Franklin Street and High Street. Out of an abundance of caution and respect to health and safety of Audit participants, this Road Safety Audit was conducted virtually through a webinar format. Participants were provided crash data and associated analysis (crash characteristics charts, collision diagrams) prior to the Audit for review, and background traffic data (traffic volumes and travel speeds) along with surrounding land use were discussed during the Audit.

During the audit, crash analysis, land use, and traffic data was discussed. Aerial photographs of the intersection along with ground level photographs were provided.

A four-year crash history from January 1, 2017 through December 31, 2020 was initially analyzed and provided to audit participants. Based on MassDOT and Duxbury Police Department data and reports, there were 21 crashes in this four-year period. Eight (38%) of those crashes resulted in personal injury. Thirteen (62%) of crashes involved a collision between a northbound and eastbound vehicle.

The RSA participants formed a multidisciplinary team representing many fields, including planning, and engineering. A list of RSA attendees is shown in Table 1.

Table 1: Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Peter Buttkus	Duxbury Department of Public Works
Paul Bragna	Duxbury Highway Safety Committee
Chief Stephen McDonald	Duxbury Police Department
Deputy Chief Michael Carbone	Duxbury Police Department
Sergeant Friend Weiller	Duxbury Police Department
State Representative Josh Cutler	Commonwealth of Massachusetts House of Representatives
Cole Angley	Office of State Representative Josh Cutler
Deidre Teehan	Office of State Representative Josh Cutler
Michael Murphy	Office of State Senator Patrick O'Connor
Dakota Delsignore	MassDOT Traffic and Safety Engineering Section
Loussyan Darwich	MassDOT Traffic and Safety Engineering Section
Kevin Fitzgerald	MassDOT Traffic and Safety Engineering Section
James Kummer	MassDOT District Five Projects
Ale Kuncaitis	MassDOT District Five Traffic
Barbara Lachance	MassDOT District Five Projects
Bianca Marshall	MassDOT District Five Traffic
Jason Walters	MassDOT District Five Projects
Mary Waldron	Old Colony Planning Council
Charles Kilmer, AICP	Old Colony Planning Council
Bill McNulty, PTP	Old Colony Planning Council
Ray Guarino	Old Colony Planning Council
Guoqiang Li	Old Colony Planning Council
Shawn Bailey	Old Colony Planning Council
Kyle Mowatt	Old Colony Planning Council

Project Location and Description

The intersection of Tremont Street (Route 3A and Route 139), Enterprise Street (Route 3A), and Church Street (Route 139) is a four-legged unsignalized intersection, with Tremont Street (Route 139) and Church Street (Route 139) operating as the STOP sign controlled side streets. Both Tremont Street and Church Street have raised, vegetated splitter islands.

Development around the intersection is primarily commercial in the corners, and low density residential just beyond.

Figure 1 provides an aerial photo of the intersection.

- **Tremont Street / Enterprise Street (Route 3A):** Tremont Street (south of the intersection) and Enterprise Street (north of the intersection) forms part of State Number Route 3A

and is a two-lane roadway under the jurisdiction of the Massachusetts Department of Transportation (MassDOT), functionally classified as an Urban Principal Arterial. It is a major north-south roadway in southeastern Massachusetts, running from Plymouth to Boston. There are no sidewalks nor any bicycle accommodations on Route 3A in this area. The posted speed limit on the roadway is 35 MPH per Massachusetts Special Speed Regulation 325B.

- **Church Street (Route 139):** Church Street forms part of State Number Route 139 and is a two-lane Major Collector under jurisdiction of the Town of Duxbury. It runs from east to west, connecting from Route 3A to Congress Street, where it becomes State Number Route 14. Church Street does not have sidewalks or any bicycle accommodations. There is a posted 30 MPH speed limit sign, which is not supported by a special speed regulation.
- **Tremont Street (Route 139):** Tremont Street forms part of State Number Route 139 and is a two-lane Minor Arterial under jurisdiction of the Town of Duxbury. It runs from east to west, connecting from Route 3A to the Marshfield Town Line, where it becomes Careswell Street, continuing as Route 139 into Brant Rock. Tremont Street does not have sidewalks or any bicycle accommodations. The roadway does not have a posted speed limit or special speed regulation.



Figure 1: Locus Map

Audit Observations and Potential Safety Enhancements

Geometry: The prevailing crash pattern at this intersection was between drivers entering from the eastbound direction of Church Street collision with vehicles on the northbound approach. During field observation, it was observed that two lanes of traffic were forming on the eastbound approach. Drivers were pulling up on the right-hand side of drivers waiting to either turn left or proceed straight across Route 3A. The vehicles queuing on the right may be blocking sight lines looking to the south and preventing drivers from seeing northbound vehicles. It was also noted that the wide turn radii on the southeast corner of the intersection was allowing drivers on the northbound approach to turn right onto Route 139 at high rates of speed. It is also noted the stop sign controlled legs of Route 139 has higher traffic volumes than Route 3A.

Potential Safety Enhancements:

1. Mid-Term / Medium Cost: Narrow the Route 139 approaches to prevent side-by-side queuing of vehicles, which blocks sight lines.
2. Mid-Term / Medium Cost: Tighten turn radius on the southeast corner to prevent high speeds on this turning movement.
3. Long-Term / High Cost: Consider reconstructing this intersection with either a roundabout or traffic signals

High Speeds: Analysis of crash data suggests many of these crashes between northbound and eastbound vehicles were due to drivers either failing to stop at the stop sign or misjudging the gap in traffic and speed of approaching northbound vehicle.

Potential Safety Enhancements:

1. Short-Term / Low Cost: Increased regular and strict speed enforcement on Route 3A,
2. Short-Term / Low Cost: Use street paint or flex posts to tighten southeast corner in attempt to control speed.
3. Mid-Term / Medium Cost: Consider installation of an overhead flashing beacon with AMBER towards the Route 3A approaches and RED towards the Route 139 approaches.

Poor Drainage: Crash records indicate about 20 percent of crashes at this intersection occur in inclement weather on wet roadway surfaces. Evidence of ponding (puddles days after last rain, debris on roadway) was observed during site visit.

Potential Safety Enhancements:

1. Short-Term / Low-Cost: Maintain catch basins regularly.
2. Long-Term / High-Cost Improve drainage with a combination of additional catch basins, raising crown of roadway, and redesigning curbing to allow run-off into off road drainage features.

Missing Signage / Signage in Poor Condition / Obscured Signage: On the northbound approach of Route 3A, only the left-hand side of the roadway has an advance warning sign for the intersection. In the southbound direction, advance warning signs are vandalized and appeared weathered. The STOP Ahead sign on the eastbound approach of Church Street is only on the left-hand side of the roadway, is obstructed by vegetation, and is on a horizontal curve immediately before the intersection. There is no advance warning of sharp curvature at the intersection on neither the eastbound nor westbound approaches.

Potential Safety Enhancements:

1. Short-Term / Low-Cost: Replace all outdated and missing advance warning signs with MUTCD compliant, retroreflective signs. Place signs on both sides of roadway for maximum visibility and driver awareness. Use street name placards below signs to further enhance driver awareness.

Exposed utility pole on northwest corner: There is a utility pole on the northwest corner that is on the street side of the guardrail.

Potential Safety Enhancements:

1. Long term / High Cost: Relocate utility pole to other side of guardrail.

No pedestrian accommodations: The roadways do not include any existing sidewalks.

Potential Safety Enhancements:

2. Long term / High Cost: Consider adding sidewalks with any planned improvements.

No bicycle accommodations: The roadways do not include any existing bicycle accommodations.

Potential Safety Enhancements:

1. Long term / High Cost: Consider adding bicycle lanes with any planned improvements.

Summary of Road Safety Audit

Based on the review of data, observations of the intersection made in the field, and group discussion, the RSA team identified possible enhancements that could improve safety at the intersection. Further study and design work will need to be conducted to determine the feasibility of improvements. Table 2 summarizes the estimated time frame and costs, and Table 3 summarizes the safety issues, possible enhancements, estimated safety payoff, time frame, cost, and jurisdiction responsibility. Safety payoff estimates are based on engineering judgment and are categorized as low, medium, and high. The time frame is categorized as short-term (<1 year), midterm (1 to 3 years), or long-term (typically >3 years). Long-term improvements are typically considered to be substantial improvements with an expected time frame for implementation greater than 3 years. The costs are categorized as low (<\$10,000), medium (\$10,001 to \$50,000), or high (>\$50,000).”

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

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Geometry	Narrow approaches to prevent side-by-side queuing of vehicles	High	Mid-Term	Medium	MassDOT
Geometry	Tighten curb radius on southeast corner	Medium	Mid-Term	Medium	MassDOT
Geometry	Reconstruct with roundabout or traffic signals	High	Long-Term	High	MassDOT
High Travel Speeds	Increased speed enforcement. Installation of a flashing beacon	High	Short-Term	Low	Duxbury PD
High Travel Speeds	Consider installation of overhead flashing control beacon	Medium	Mid-Term	Medium	MassDOT
High Travel Speeds	Use street pain and flex posts to prevent high-speed turning movements	Medium	Short-Term	Low	MassDOT
Poor drainage	Maintain existing catch basins. Enhance drainage	High	Long-Term	High	MassDOT
Exposed utility pole on northwest corner	Relocate utility pole to inside guardrail.	Low	Long-Term	Medium	MassDOT / Utility
No Pedestrian Accommodations	Consider construction of sidewalks	High	Long Term	High	MassDOT (Route 3A) / Town of Duxbury (Route 139)
No Bicycle Accommodations	Consider installation of bike lanes	High	Long-Term	High	MassDOT

Appendix A. RSA Meeting Agenda

Agenda	Road Safety Audits for Route 53 at Franklin Street and High Street; Route 14 at Franklin Street; and Route 3A at Route 139, Duxbury, MA Friday, February 18, 2022 10:00 AM – 12:00 Noon
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Contact:	Bill McNulty, Old Colony Planning Council (508) 583-1833 ext. 207 wmcnulty@ocpcrpa.org
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Attendees:	Invited Participants Include a Multidisciplinary Team including Duxbury Officials (Chief Elected Officials, DPW, Police, Fire, Administration, Planning), MassDOT, FHWA, Legislative Delegation
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Please Bring:	Thoughts and Suggestions
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Meeting Location:	Virtual Meeting (Zoom): https://us02web.zoom.us/j/88064332210?pwd=S1BadEM2MzFZbTJtMzlpc2QrT3ZuZz09 Webinar ID: 880 6433 2210 Password: 642581
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10:00 AM	Welcome and Introductions
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10:10 AM	Virtual Road Safety Audits of Summer Street (Route 53) at Franklin Street and High Street; Congress Street (Route 14) at Franklin Street; and Tremont Street (Route 3A) at Church Street and Tremont Street (Route 139) <ul style="list-style-type: none"> • Each Intersection will include: <ul style="list-style-type: none"> ○ Review of Traffic Data ○ Existing Conditions and Known Challenges ○ Identification of Potential Safety Improvements
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11:30 AM	Wrap-Up Site Audit; Discussion of Next Steps
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Instructions For Participants:	
<ul style="list-style-type: none"> • Before attending the Road Safety Audit, participants are encouraged to familiarize themselves with the study area, and make note of existing conditions and any deficiencies they observe • 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 Road Safety Audit process • After the meeting, participants will be asked to comment and respond to the document materials to ensure it is reflective of the Road Safety Audit completed by the multidisciplinary team 	

Appendix B. RSA Audit Team Contact List

Participating Audit Team Members

Date: February 18, 2022 Location: Route 3A at Route 139, Duxbury

Audit Team Members	Agency/Affiliation
Peter Buttkus	Duxbury Department of Public Works
Paul Bragna	Duxbury Highway Safety Committee
Chief Stephen McDonald	Duxbury Police Department
Deputy Chief Michael Carbone	Duxbury Police Department
Sergeant Friend Weiller	Duxbury Police Department
State Representative Josh Cutler	Commonwealth of Massachusetts House of Representatives
Cole Angley	Office of State Representative Josh Cutler
Deidre Teehan	Office of State Representative Josh Cutler
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Shawn Bailey	Old Colony Planning Council
Kyle Mowatt	Old Colony Planning Council

Appendix C. Detailed Crash Data

Crash Data Summary Table

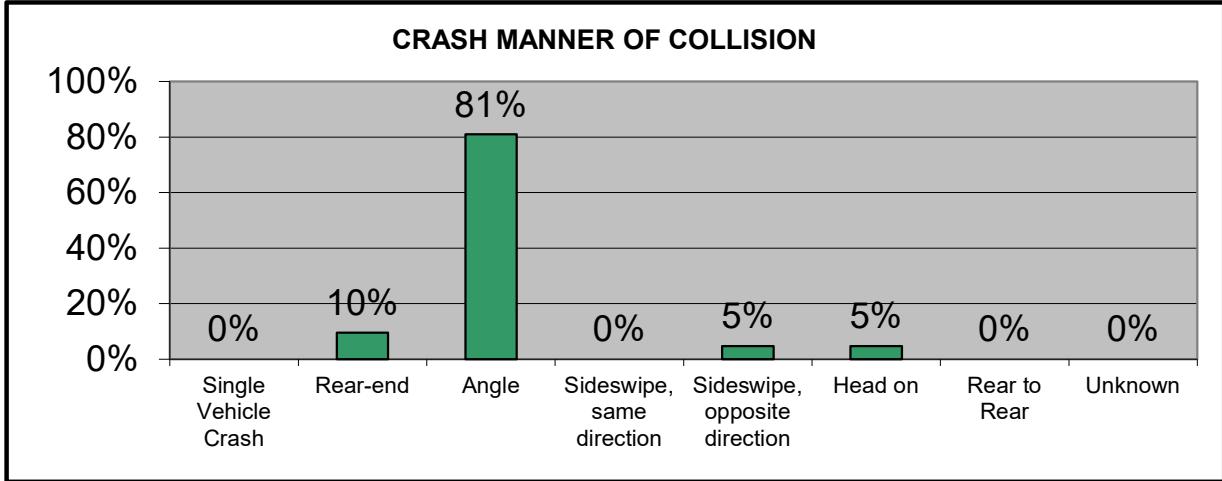
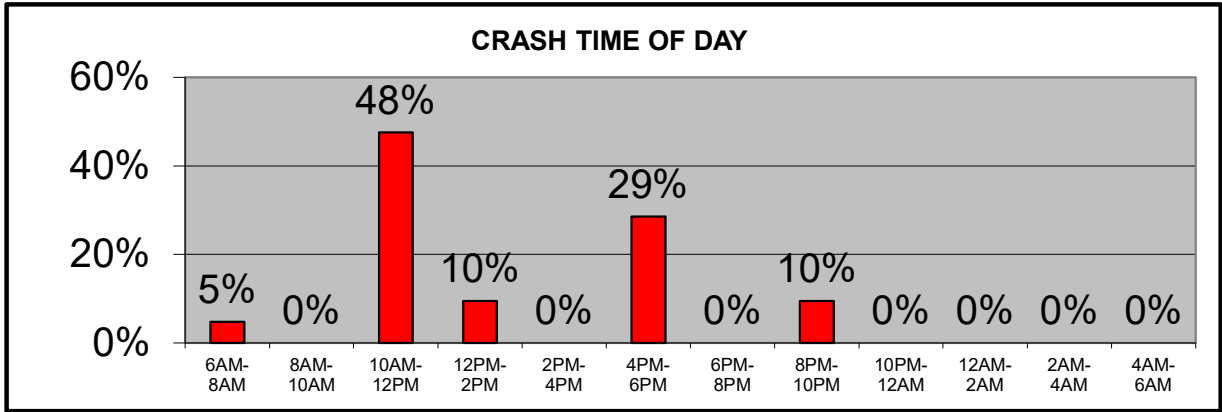
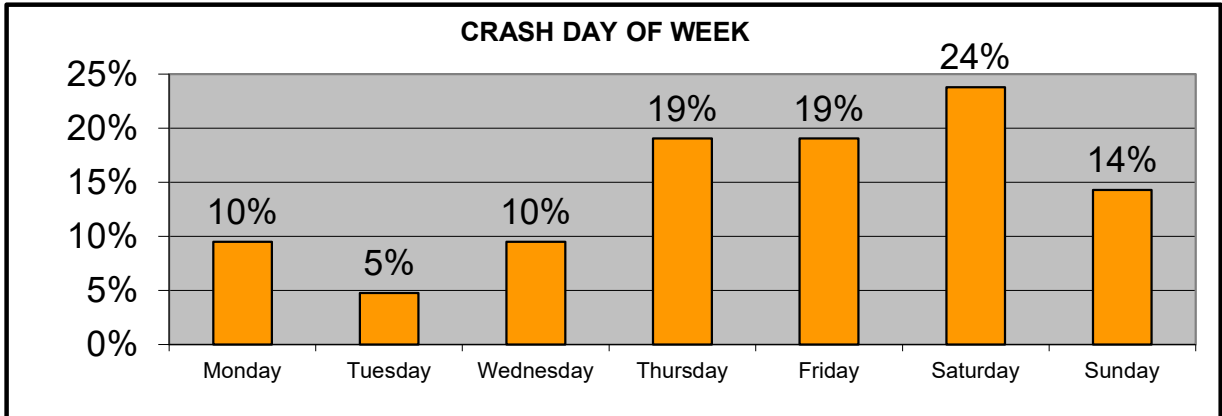
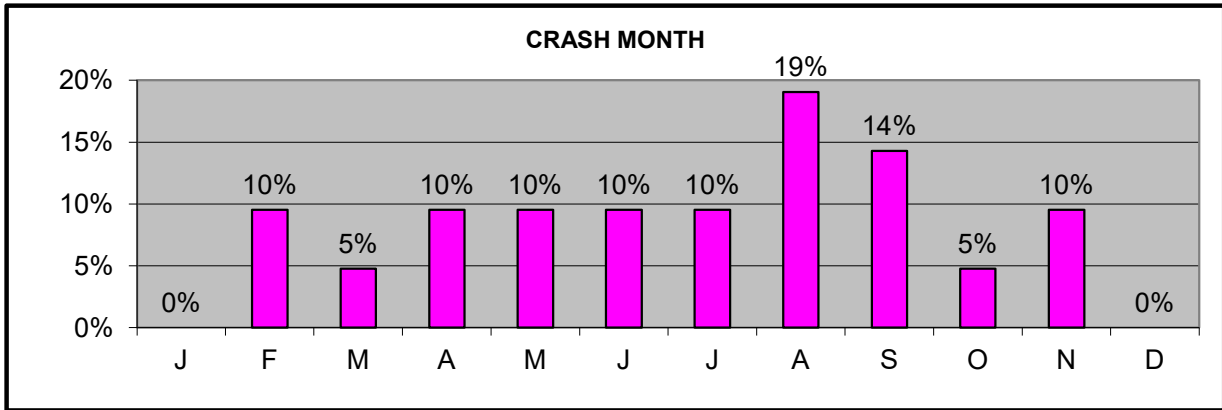
Route 3A (Enterprise Street/Tremont Street) at Route 139 (Church Street/Tremont Street), Duxbury, MA
2017-2020

Crash Diagram Ref #	Crash Date <i>m/d/y</i>	Crash Day	Time of Day	Manner of Collision <i>Type</i>	Light Condition <i>Type</i>	Weather Condition <i>Type</i>	Road Surface <i>Type</i>	Driver Contributing Code <i>Type</i>	Comments
1	5/18/17	Thursday	10:40 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	17DUX-57-AC
2	7/27/17	Thursday	5:06 PM	Angle	Daylight	Rain	Wet	Inattention	17DUX-110-AC
3	9/20/17	Wednesday	11:17 AM	Angle	Daylight	Rain	Wet	Distracted	17DUX-136-AC
4	3/18/18	Sunday	11:57 AM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	18DUX-46-AC
5	7/7/18	Saturday	8:21 PM	Angle	Dusk	Clear	Dry	Disregarded traffic signs, signals, road markings	18DUX-103-AC
6	8/22/18	Wednesday	1:16 PM	Rear-end	Daylight	Clear	Dry	Failed to yield right of way	18DUX-127-AC
7	11/30/18	Friday	7:52 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	18DUX-180-AC
8	6/1/19	Saturday	8:30 PM	Head on	Dark - roadway not lighted	Cloudy	Dry	Disregarded traffic signs, signals, road markings	19DUX-77-AC
9	6/24/19	Monday	11:46 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	19DUX-93-AC
10	8/2/19	Friday	4:33 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	19DUX-117-AC
11	8/19/19	Monday	10:15 AM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	19DUX-123-AC
12	9/24/19	Tuesday	10:25 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	19DUX-139-AC
13	9/26/19	Thursday	4:28 PM	Angle	Daylight	Clear	Dry	No Improper Driving	19DUX-142-AC
14	11/23/19	Saturday	11:13 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	19DUX-162-AC
15	2/1/20	Saturday	11:12 AM	Rear-end	Daylight	Cloudy	Dry	Inattention	20DUX-11-AC
16	2/2/20	Sunday	12:12 PM	Angle	Daylight	Cloudy	Dry	Failed to yield right of way	20DUX-13-AC
17	4/10/20	Friday	5:52 PM	Angle	Daylight	Rain	Wet	No Improper Driving	20DUX-36-AC
18	4/18/20	Saturday	4:58 PM	Angle	Daylight	Rain	Wet	Disregarded traffic signs, signals, road markings	20DUX-39-AC
19	5/8/20	Friday	10:47 AM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	20DUX-44-AC
20	8/9/20	Sunday	11:54 AM	Sideswipe, opposite direction	Daylight	Clear	Dry	Failed to yield right of way	20DUX-76-AC
21	10/8/20	Thursday	4:49 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	20DUX-83-AC

*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

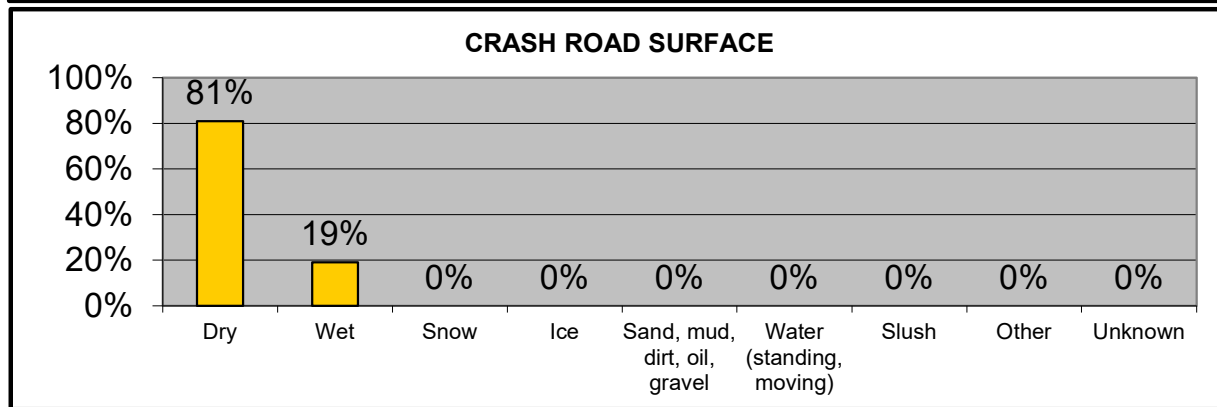
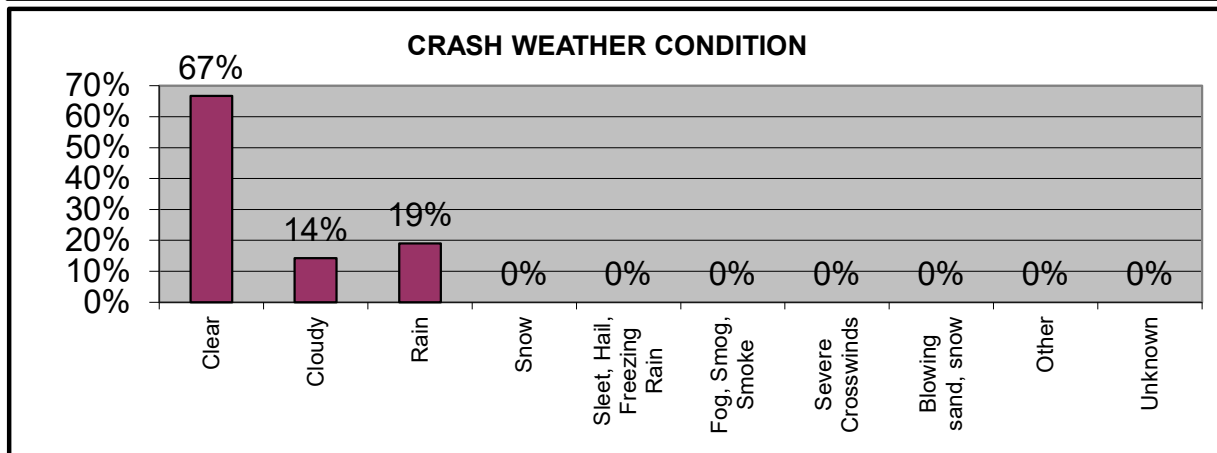
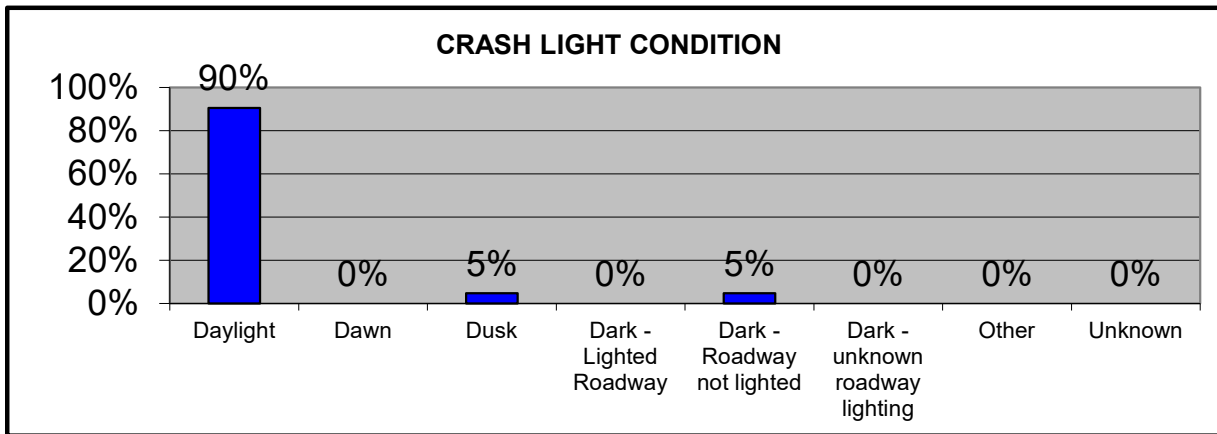
Crash Data Summary Tables and Charts

Route 3A (Enterprise Street/Tremont Street) at Route 139 (Church Street/Tremont Street), Duxbury, MA

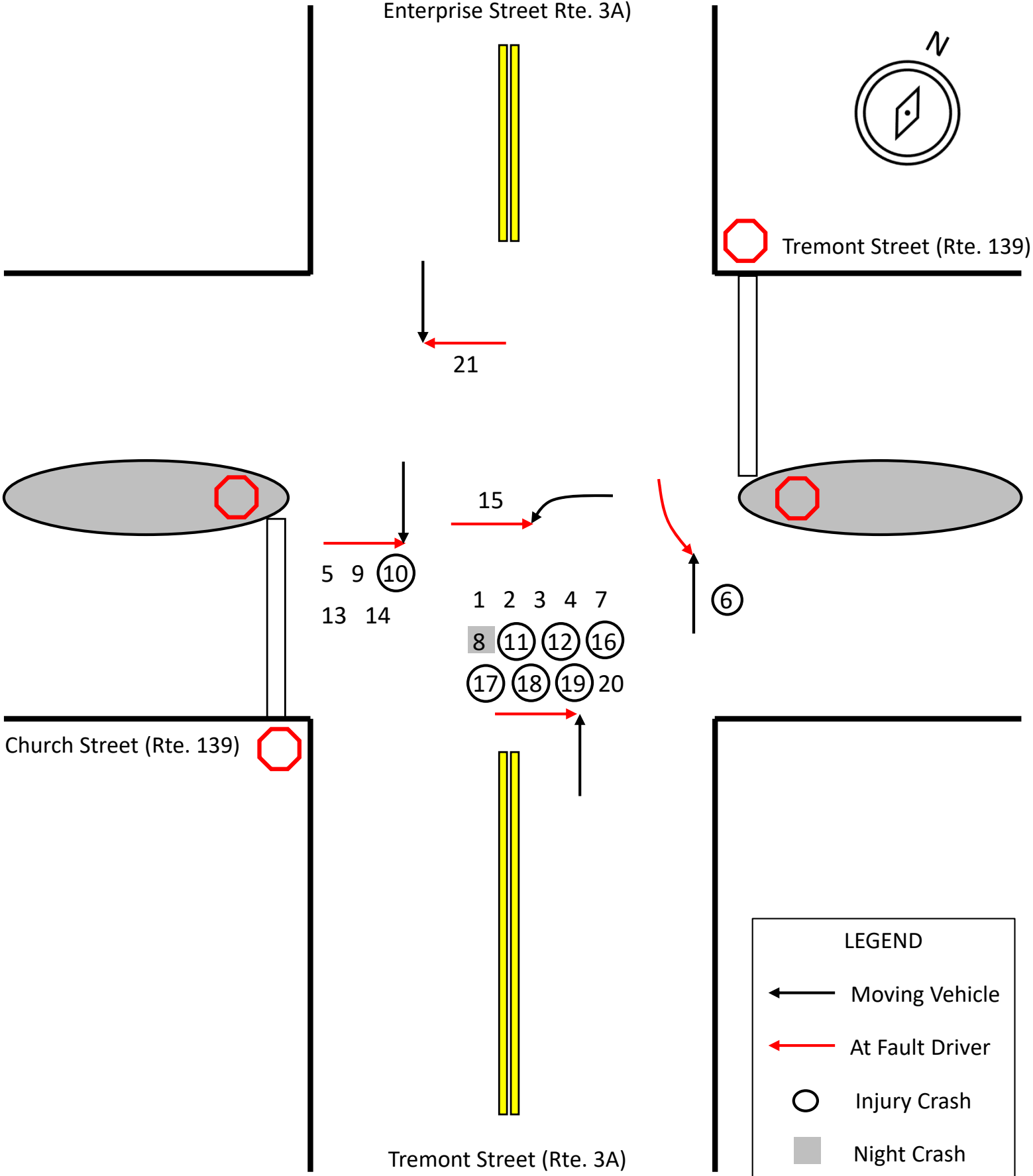


Crash Data Summary Tables and Charts

Route 3A (Enterprise Street/Tremont Street) at Route 139 (Church Street/Tremont Street), Duxbury, MA



COLLISION DIAGRAM
 Route 3A (Enterprise Street/Tremont Street) at Route 139 (Church Street/Tremont Street)
 Collision Diagram for Crashes (2017-2020)
 Prepared by OCPC (SB 11/2021) (Source: Duxbury Police Dept.)



LEGEND

- Moving Vehicle
- At Fault Driver
- Injury Crash
- Night Crash

Appendix D. Additional Information

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/>.

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

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