

ROAD SAFETY AUDIT

West Chestnut Street at Southworth Street

Brockton, Massachusetts

May 6, 2022

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



Prepared By:
Old Colony Planning Council
70 School Street, Brockton, MA. 02301



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Background

This Road Safety Audit for West Chestnut Street at Southworth Street 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.

Project Data

This Road Safety Audit was held on May 6, 2022. Out of an abundance of caution and respect to the 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 were discussed. Aerial photographs of the intersection along with ground level photographs were provided.

A five-year crash history from January 1, 2017 through December 31, 2021 was analyzed and provided to audit participants. Based on MassDOT and Brockton Police Department data and reports, there were 18 crashes in this five-year period. Over half of the crashes at this intersection are single vehicle, roadway departure crashes. Three crashes were angled collisions between a vehicle exiting from Southworth Street and a westbound vehicle on West Chestnut Street. Five of the eighteen (28%) resulted in injury.

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
Brady Winsten	City of Brockton – Policy and Intergovernmental Affairs
Jay DeGrace	City of Brockton – Constituent Services Liasson
John Fay	City of Brockton – Planning
Chief Brian Nardelli	Brockton Fire Department
Michael Damon	Brockton Area Transit (BAT)
Kelly Forrester	Brockton Area Transit (BAT)
Al DiGirolamo	Office of State Senator Michael Brady
Dakota DelSignore	MassDOT Traffic and Safety Engineering Section
Kevin Fitzgerald	MassDOT Traffic and Safety Engineering Section
Raissah Kouame	MassDOT Office of Transportation Planning
Bianca Marshall	MassDOT District Five Traffic
Jason Walters	MassDOT District Five Projects
Michael Medeiros	MassDOT District Five Traffic
Ray Guarino	Old Colony Planning Council
Guoqiang Li	Old Colony Planning Council
Shawn Bailey	Old Colony Planning Council
Kyle Mowatt	Old Colony Planning Council
Bill McNulty	Old Colony Planning Council

Project Location and Description

The intersection of West Chestnut Street at Southworth Street is a three-legged unsignalized intersection, with a STOP sign control on Southworth Street. The intersection is located on a sweeping horizontal curve of West Chestnut Street, while Southworth Street also has significant curvature on approach to the intersection. Development around the intersection is primarily residential, although there is a church located on the southern corner. The intersection is about 0.7 miles from the South Middle School, and in an area where students could potentially be walking to and from school.

Figure 1 provides an aerial photo of the intersection.

- West Chestnut Street:** West Chestnut Street is a primarily an east-west roadway through the City of Brockton, connecting Pearl Street on its western end to Main Street on its eastern end. It is under the jurisdiction of the City of Brockton. It is a two-lane undivided roadway, functionally classified as a Principal Arterial, and is designated as part of the National Highway System network. There is a sidewalk primarily on the northern side (westbound direction) of West Chestnut Street for most of its length west of the intersection; however, a sidewalk on the southern side does start just west of the intersection in front of the church. This sidewalk on the southern side is only about 200 feet long, spanning the curvature of the intersection onto Southworth Street before ending. There are no sidewalks on West Chestnut Street northeast of the intersection.

According to Special Speed Regulation 1067, there is a speed limit of 20 MPH on West Chestnut Street in this area. However, there are no posted speed limits for 20 MPH.

- **Southworth Street:** Southworth Street is a two-lane Minor Arterial roadway under jurisdiction of the City of Brockton. It provides a connection between West Chestnut Street and Copeland Street. Signs on West Chestnut Street and Copeland Street on approaches to West Chestnut Street indicate commercial trucks are prohibited from Southworth Street. There is a sidewalk along Southworth Street on the northern side (westbound direction) of the roadway, with a short section of sidewalk on the southern side at the intersection. There is a crosswalk at the intersection across Southworth Street, connecting these two sections of sidewalk. There are no special speed regulations for Southworth Street; however, Brockton has a fundamental prima facie speed limit of 30 MPH throughout the City.

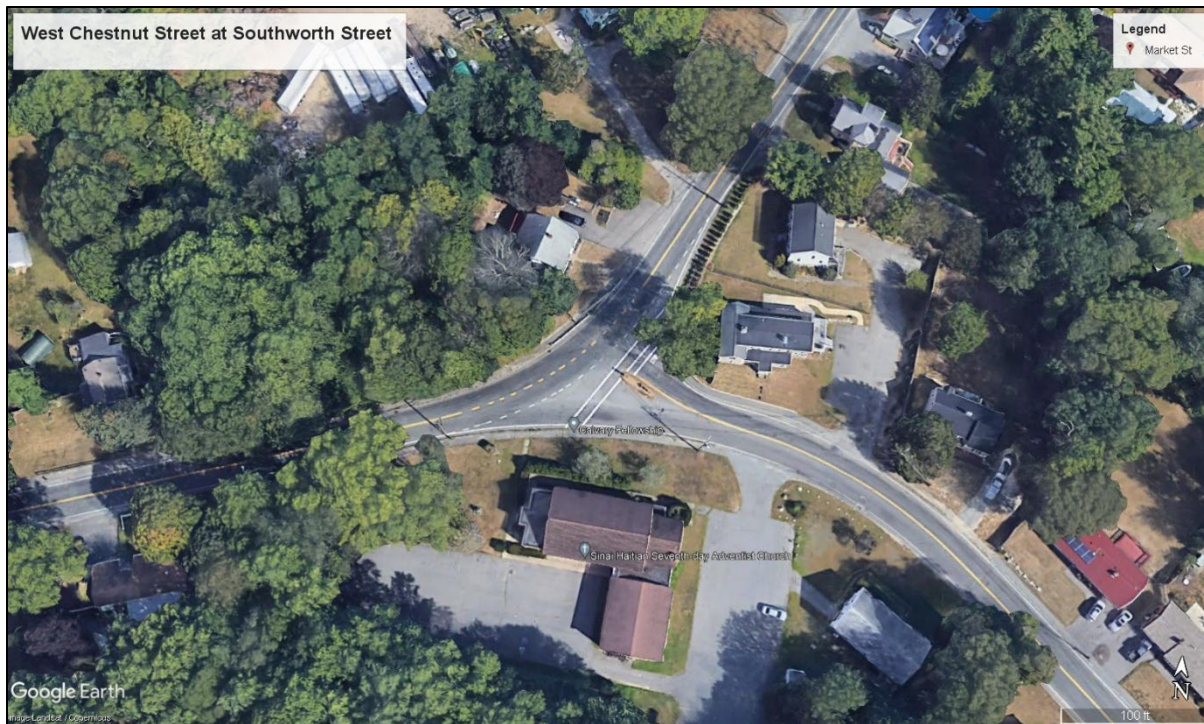


Figure 1: Locus Map

Audit Observations and Potential Safety Enhancements

The following safety issues along with potential safety enhancements were identified for the intersection of West Chestnut Street at Southworth Street.

Speed: Old Colony Planning Council traffic records indicate the 85th percentile speed of traffic on West Chestnut Street is 41 MPH, well above the speed limit of 30 MPH. Additionally, audit participants familiar with the area noted speeding is common on West Chestnut Street. Speed is likely a major factor in the frequency of loss of control and roadway departure single vehicle crashes at this location.

Potential Safety Enhancements:

1. *Short Term / Low Cost:* Install 20 MPH Speed Limit signs consistent with Special Speed Regulation 1067, and strictly enforce.
2. *Short-Term / Low-Cost:* Evaluate if this curve needs to be signed based on the difference between the 85th percentile speed and the curve speed. This would require adjusting the special speed regulation and then posting yellow curve warning speeds with appropriate speeds.
3. *Mid-Term / Low-Cost:* Consider use of radar speed signs and/or dynamic speed feedback signs on West Chestnut Street.
4. *Long Term / High Cost:* Consider reconstructing the intersection with a roundabout or traffic signal if warranted..

Pedestrian Safety: The crosswalk crossing Southworth Street at the intersection is long in length and located on a vertical curve that leaves pedestrians vulnerable to high-speed traffic on West Chestnut Street. There is no pedestrian refuge on the raised median on Southworth Street. There are no sidewalks on West Chestnut Street northeast of the intersection. There is no connection between the sidewalk on the northern side of West Chestnut Street, which extends to the west but ends at the intersection, to the sidewalk on the southern side of the intersection

Potential Safety Enhancements:

1. *Mid Term / Medium Cost:* Consider moving crosswalk crossing Southworth Street away from intersection, further southeast on Southworth Street. Use Rectangular Rapid Flashing Beacons (RRFBs) at crossing.
2. *Mid-Term / Medium-Cost:* Reduce crosswalk length and hence crossing time of pedestrians by reducing turn radii and tightening curb on southern corner.
3. *Long-Term / High Cost:* Add new sidewalks where sidewalk connections are missing.

Sight Distance: Both the curvature of West Chestnut Street and Southworth Street's alignment create reduced sight distances at the intersection. Vegetation also reduces sight distance. With reduced sight distances, there may not be adequate safe stopping sight distance.

Potential Safety Enhancements:

1. *Short-Term / Low-Cost:* Clear as much vegetation as possible within right of way on West Chestnut Street.
2. *Long-Term / High-Cost:* Reconstruct and realign intersection.

Crashes in West Conditions: Over 60 percent of the crashes reviewed for this Audit occurred on wet roadway surface conditions.

Potential Safety Enhancements:

1. *Short-Term / Low-Cost:* Improve drainage by maintaining clear catch basins and evaluating crown of roadway allowing proper drainage.
2. *Mid-Term / High Cost:* Apply high friction pavement treatment along curvature of West Chestnut Street.

Exposed Utility Pole: A utility pole on the southern corner of the intersection is very close to the roadway and vulnerable in a position where roadway departures have occurred.

Potential Safety Enhancements:

1. *Long-Term / Medium-Cost:* Relocate utility pole away from roadway.

Missing or Outdated Signage: There is no advance warning signage of the intersection of any of the approaches. The "Curve Ahead" sign on the westbound approach of West Chestnut Street is not supported by the MUTCD. There are no advance warning signs for the STOP on the Southworth Street approach. Southworth Street only has a STOP sign posted on the median, and there is no sign on the right-hand side of the stop. The signage indicating no commercial truck traffic on Southworth Street is not consistent with the Massachusetts Amendments to the MUTCD regarding Heavy Commercial Vehicle Exclusion Zones. The roadway is not listed as a truck exclusion in the state trucking network system.

Potential Safety Enhancements:

1. *Short-Term / Low-Cost:* Install MUTCD compliant intersection and curve ahead warning signs on both approaches of West Chestnut Street. Consider using flashing beacons on curve ahead warning signs to increase awareness.
2. *Short-Term / Low-Cost:* Install MUTCD compliant STOP ahead warning signs on both sides of the Southworth Street approach.
3. *Short-Term / Low-Cost:* Install a STOP sign on the right-hand side of the Southworth Street stop.
4. *Short-Term / Low-Cost:* Establish Southworth Street as a Heavy Commercial Vehicle Exclusion (HCVE) zone with the Commonwealth of Massachusetts, and sign accordingly.

Lighting: About 40 percent of the crashes reviewed as part of this Audit occurred under dark conditions, indicating poor lighting may be an issue.

Potential Safety Enhancements:

1. *Short-Term / Low-Cost:* Enhance nighttime visibility of intersection with retroreflective signage and roadway striping.
2. *Mid Term / Medium Cost:* Improve area lighting with LED streetlamps.
3. *Mid Term / Medium Cost:* Consider installation of flashing warning beacon.

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

Potential Safety Enhancements:

1. *Long term / High Cost:* Consider adding bicycle lanes or shared use path 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
Speed	Install 20 MPH Speed Limit Signs and enforce	High	Short-Term	Low	City of Brockton
Speed	Evaluate curve speed and adjust special speed regulation and signage if necessary.	High	Short-Term	Low	City of Brockton
Speed	Consider speed feedback signs	High	Mid-Term	Low	City of Brockton
Speed	Reconstruct intersection as a roundabout or traffic signal.	High	Long-Term	High	City of Brockton
Pedestrian Safety	Relocate Southworth Street crosswalk further southeast on Southworth Street away from intersection	Medium	Mid-Term	Medium	City of Brockton
Pedestrian Safety	Shorten crosswalk by tightening curb radii on southern corner	High	Mid-Term	Medium	City of Brockton
Pedestrian Safety	Consider adding sidewalks	Medium	Long-Term	High	City of Brockton
Sight Distance	Clear vegetation	Medium	Short-Term	Low	City of Brockton
Sight Distance	Realign Southworth Street	Medium	Long-Term	High	City of Brockton
Crashes in Wet Conditions	Improve drainage	High	Short-Term	Medium	City of Brockton
Crashes in Wet Conditions	Use high friction surface treatment	High	Mid-Term	Medium	City of Brockton
Exposed utility pole on south corner	Relocate pole	Medium	Mid-Term	Medium	National Grid
Substandard or missing signage	Install MUTCD compliant intersection ahead advance warning signs	High	Short-Term	Low	City of Brockton
Substandard or missing signage	Install MUTCD compliant STOP ahead advance warning signs	Medium	Short-Term	Low	City of Brockton

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Substandard or missing signage	Install a STOP sign on the right-hand side of Southworth Street	Medium	Short-Term	Low	City of Brockton
Substandard or missing signage	Establish Southworth Street as an HCVE and use proper signage	Low	Short-Term	Low	City of Brockton
Lighton	Use retroreflective signage and delineation	High	Short-Term	Low	City of Brockton
Lighting	Enhance overhead lighting	High	Mid-Term	Medium	City of Brockton
Lighting	Consider installation of a flashing beacon	High	Mid-Term	Medium	City of Brockton
No bicycle accommodations	Consider adding bike lanes or shared use path.	Medium	Mid-Term	Medium	City of Brockton

Appendix A. RSA Meeting Agenda

Agenda	<p align="center">Road Safety Audits for Warren Avenue at Market Street, and West Chestnut Street at Southworth Street and Mercedes Road, Brockton, MA</p> <p align="right">Friday, May 6, 2022 10:00 AM – 11:30 AM</p>
Contact:	Bill McNulty, Old Colony Planning Council (508) 583-1833 ext. 207 wmcnulty@ocpcrpa.org
Attendees:	Invited Participants Include a Multidisciplinary Team including Brockton Officials (Chief Elected Officials, DPW, Police, Fire, Traffic Commission, Brockton Public Schools), MassDOT, FHWA, Legislative Delegation
Please Bring:	Thoughts and Suggestions
Meeting Location:	<p>Virtual Meeting (Zoom): https://us02web.zoom.us/j/82365052171?pwd=ZW5TRIRIVndyTDJqR2cwQk5mYzdtZ09 Webinar ID: 823 6505 2171 Password: 216824</p>
10:00 AM	Welcome and Introductions
10:10 AM	<p>Virtual Road Safety Audit of Warren Avenue at Market Street</p> <ul style="list-style-type: none"> • Review of Traffic Data • Existing Conditions and Known Challenges • Identification of Potential Safety Improvements
10:40 AM	<p>Virtual Road Safety Audit of West Chestnut Street at Southworth Street and Mercedes Road</p> <ul style="list-style-type: none"> • Review of Traffic Data • Existing Conditions and Known Challenges • Identification of Potential Safety Improvements
11:10 AM	Wrap-Up Site Audit; Discussion of Next Steps
<p>Instructions For Participants:</p> <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: May 6 2022

Location: Warren Avenue at Market Street, Brockton

Audit Team Members	Agency/Affiliation
Brady Winsten	City of Brockton – Policy and Intergovernmental Affairs
Jay DeGrace	City of Brockton – Constituent Services Liasson
John Fay	City of Brockton – Planning
Chief Brian Nardelli	Brockton Fire Department
Michael Damon	Brockton Area Transit (BAT)
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Appendix C. Detailed Crash Data

Crash Data Summary Table

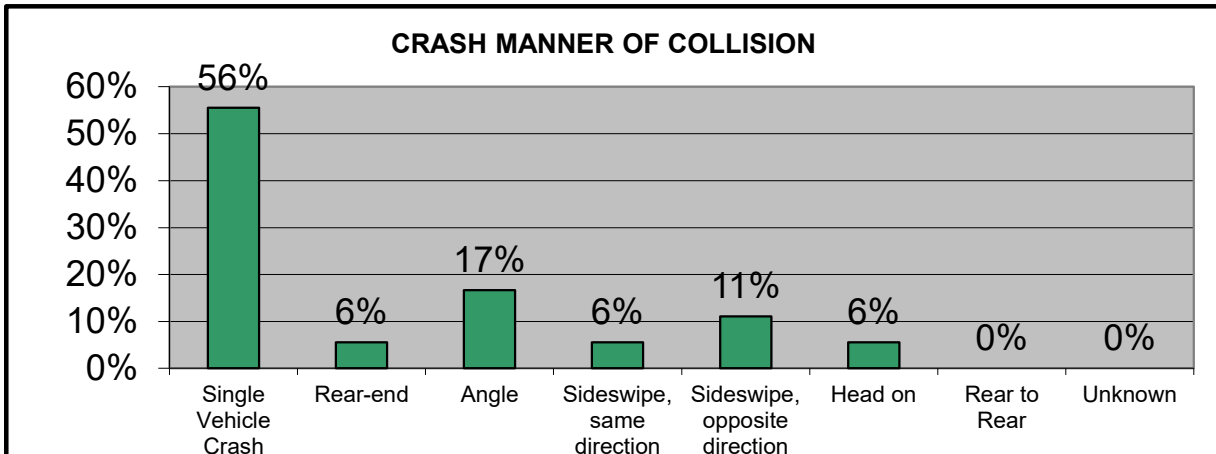
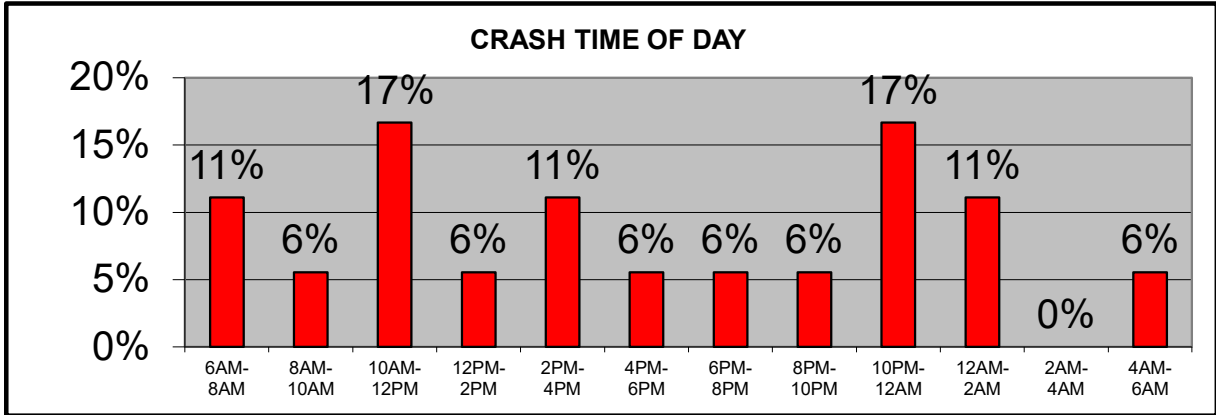
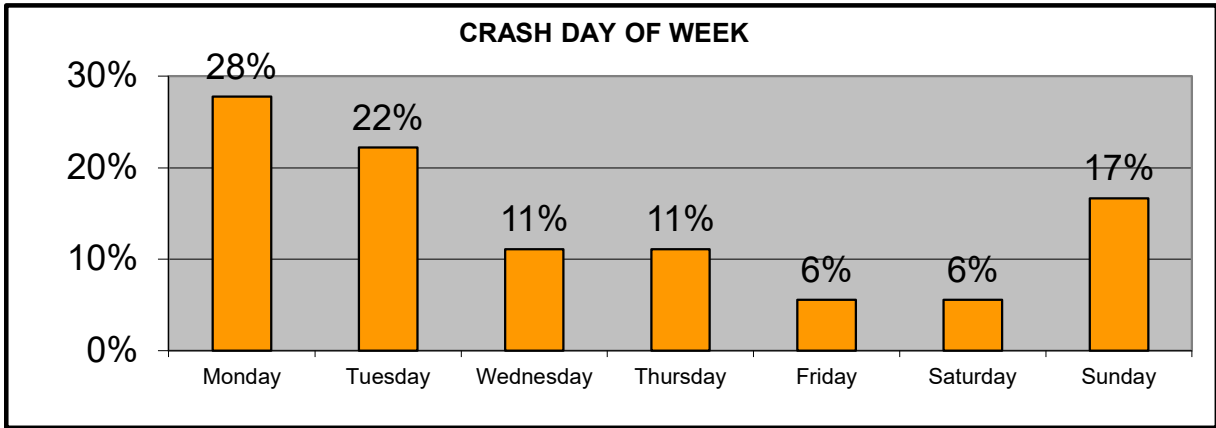
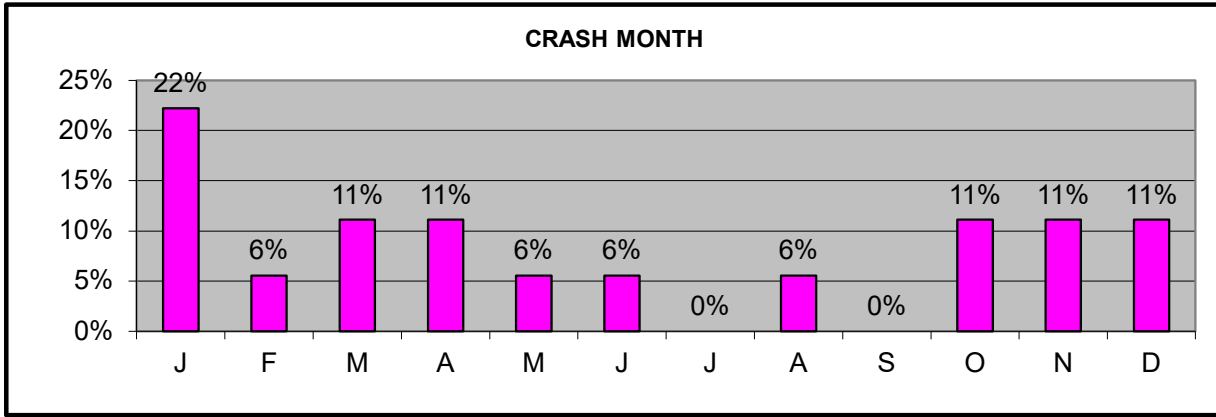
West Chestnut Street at Southworth Street, Brockton, MA

2021

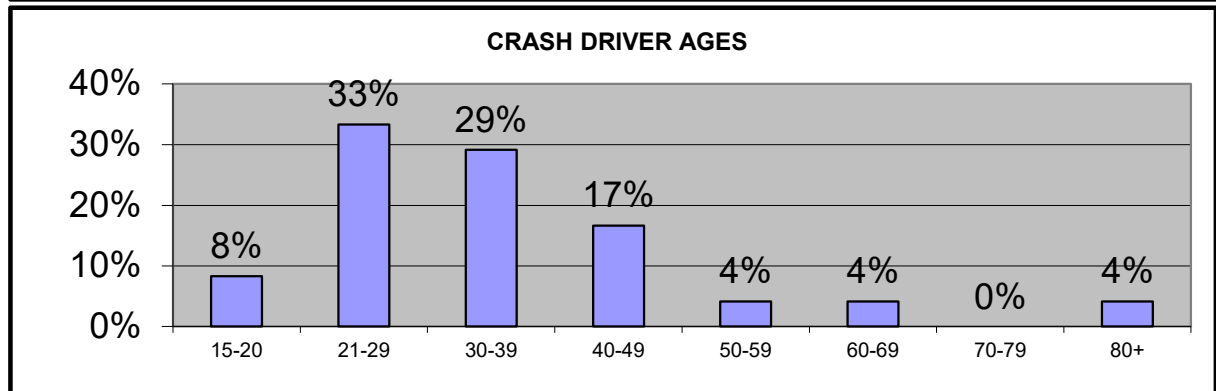
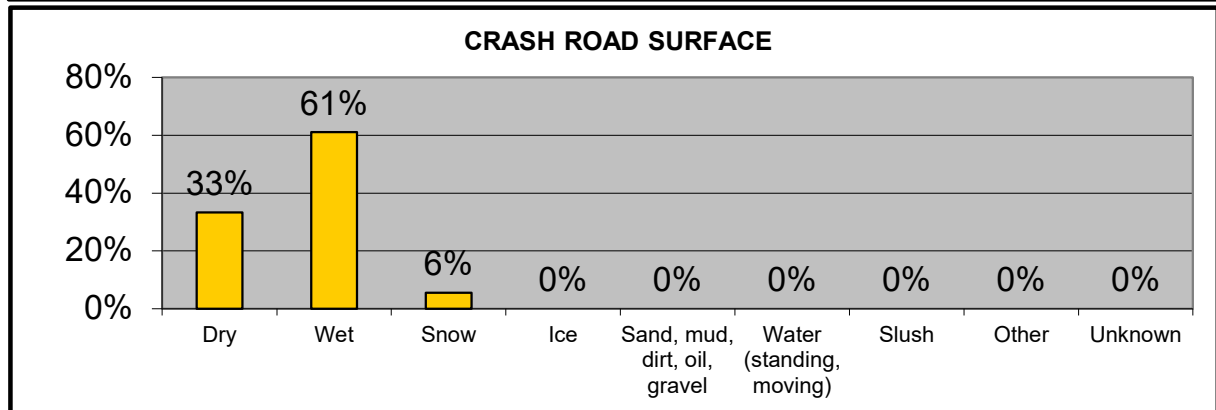
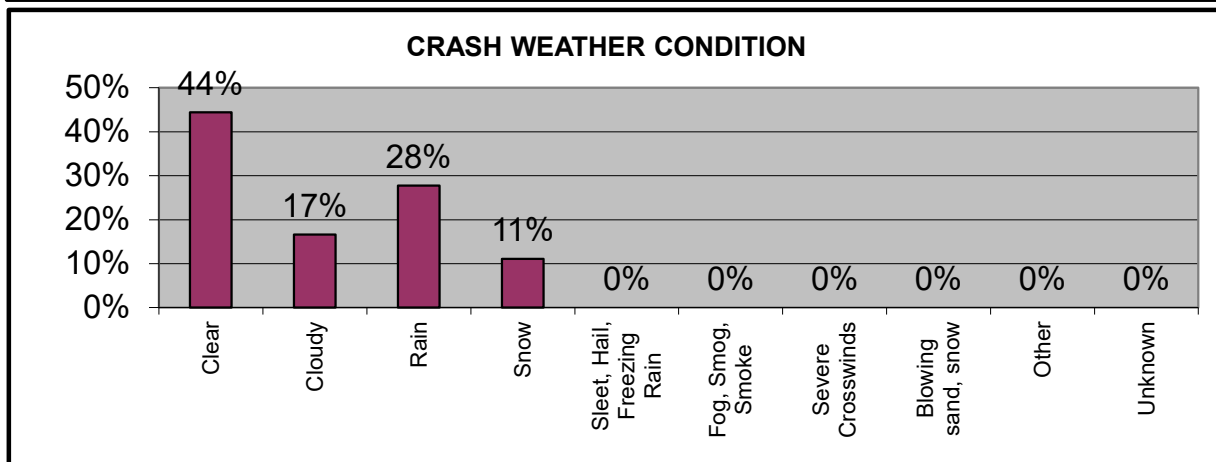
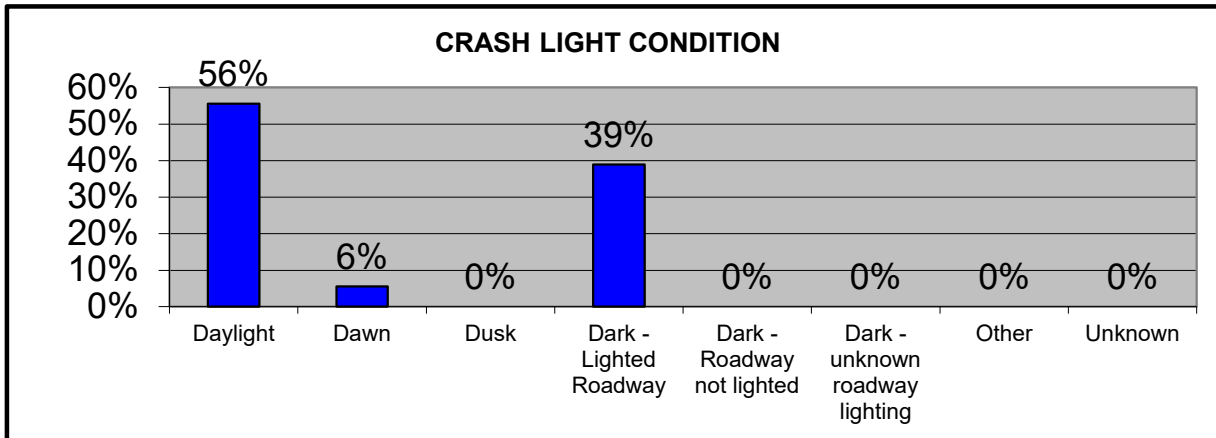
Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision <i>Type</i>	Light Condition <i>Type</i>	Weather Condition <i>Type</i>	Road Surface <i>Type</i>	Driver Contributing Code <i>Type</i>	Ages			Comments
	<i>m/d/y</i>								<i>D1</i>	<i>D2</i>	<i>D3</i>	
1	11/22/17	Wednesday	7:29 AM	Single Vehicle Crash	Daylight	Rain	Wet	Over-correcting/over-steering	17			17-2146-AC
2	12/3/18	Monday	11:16 AM	Angle	Daylight	Clear	Dry	Unknown	92	50		18-2248-AC
3	1/1/19	Tuesday	8:39 AM	Single Vehicle Crash	Daylight	Cloudy	Wet	Failure to keep in proper lane or running off road	25			19-4-AC
4	2/5/19	Tuesday	11:05 PM	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner	31	34		19-232-AC
5	3/24/19	Sunday	10:35 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	32	28		19-527-AC
6	4/8/19	Monday	12:53 PM	Sideswipe, opposite direction	Daylight	Cloudy	Wet	Unknown	34	33	23	19-622-AC
7	5/5/19	Sunday	4:12 PM	Sideswipe, opposite direction	Daylight	Clear	Dry	Operating Vehicle in erratic, reckless, careless, negligent, or aggressive manner			26	19-793-AC
8	10/22/19	Tuesday	3:18 PM	Head on	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	22	67		19-1926-AC
9	10/28/19	Monday	12:23 AM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Failure to keep in proper lane or running off road	32			19-1975-AC
10	12/30/19	Monday	10:09 PM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Unknown	26			19-2478-AC
11	1/7/20	Tuesday	11:14 PM	Single Vehicle Crash	Dark - lighted roadway	Snow	Wet	Unknown	44			20-43-AC
12	1/18/20	Saturday	7:36 PM	Single Vehicle Crash	Dawn	Snow	Snow	Unknown	43			20-120-AC
13	1/26/20	Sunday	1:21 AM	Single Vehicle Crash	Dark - lighted roadway	Clear	Wet	Failure to keep in proper lane or running off road	28			20-167-AC
14	4/2/20	Thursday	10:36 AM	Single Vehicle Crash	Daylight	Cloudy	Wet	Unknown				20-521-AC
15	8/17/20	Monday	4:21 AM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Unknown				20-1155-AC
16	11/13/20	Friday	9:00 PM	Single Vehicle Crash	Dark - lighted roadway	Rain	Wet	Unknown	40			20-1690-AC
17	3/25/21	Thursday	7:54 AM	Angle	Daylight	Clear	Wet	Failed to yield right of way	26	45		21-418-AC
18	6/30/21	Wednesday	3:22 PM	Rear-end	Daylight	Clear	Dry	Followed too closely	30	18		21-1067-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 another driver.

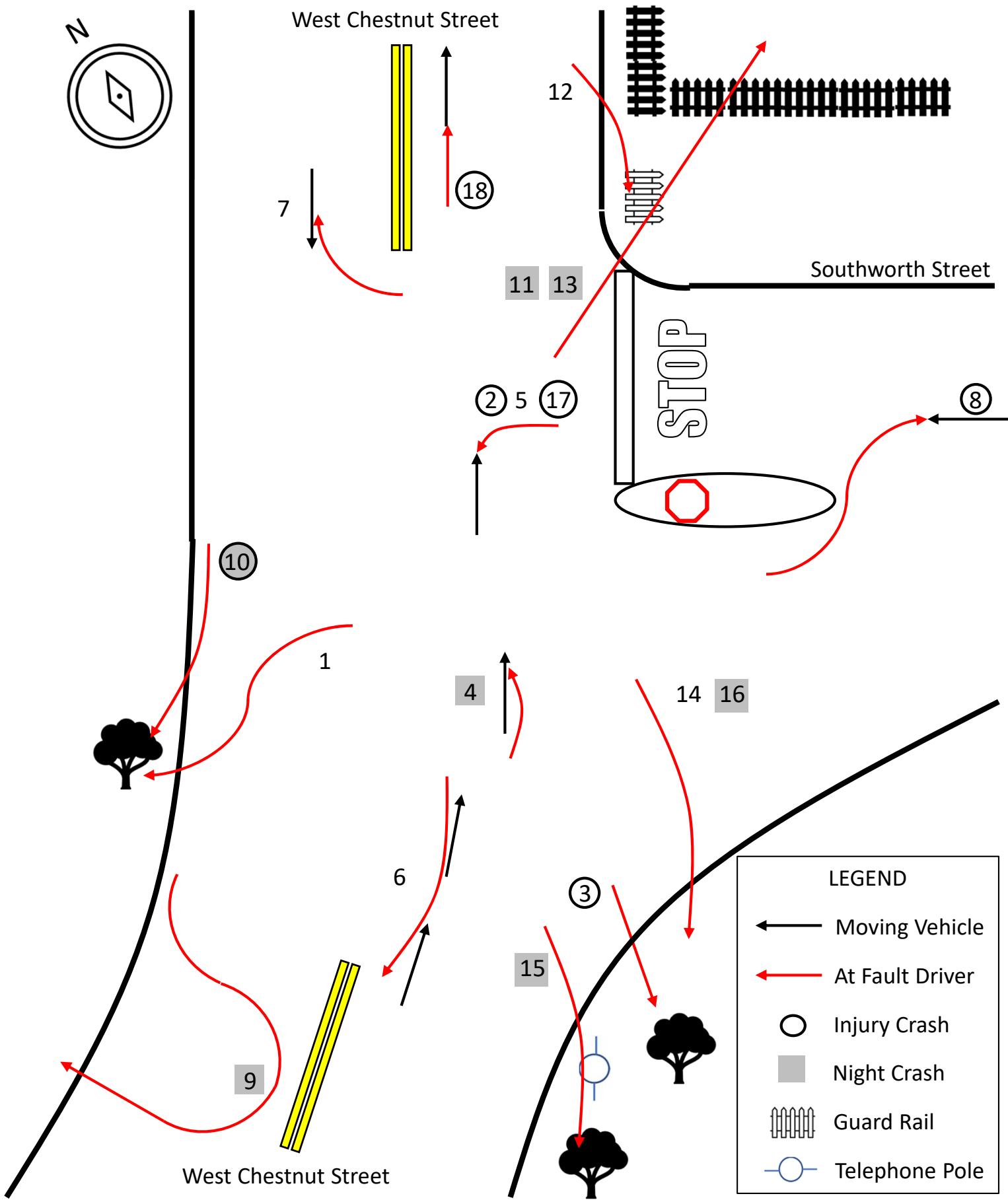
Crash Data Summary Tables and Charts
West Chestnut Street at Southworth Street, Brockton, MA



Crash Data Summary Tables and Charts
West Chestnut Street at Southworth Street, Brockton, MA



COLLISION DIAGRAM
 West Chestnut Street at Southworth Street
 Collision Diagram for Crashes (2017-2021)
 Prepared by OCPC (SB 2/2022) (Source: Brockton Police Dept.)



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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