

ROAD SAFETY AUDIT

Main Street at Nilsson Street and East Nilsson Street

City of Brockton

July 21, 2021

Prepared through Old Colony MPO FFY 2021 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



OLD COLONY
PLANNING COUNCIL

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Background

This Road Safety Audit (RSA) for the intersection of Main Street at Nilsson Street and East Nilsson 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 2021 Unified Planning Work Program and conducted in conjunction with Road Safety Audits for Main Street at Forest Avenue and Forest Avenue between Belmont Street (Route 123) and Gordon Street. The objective of the Road Safety Audits at Multiple Locations program 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 conducted on July 21, 2021. This Road Safety Audit was conducted virtually due to the Covid pandemic through a webinar format for the health and safety of all participants. 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, speeds, heavy vehicle traffic) along with surrounding land use were discussed during the Audit.

Photographs of the intersection from each approach were provided. There was an Old Colony Planning Council staff planner on site at the intersection, providing live video links and commentary for each location, and responding to on-demand inquiries. The RSA participants formed a multidisciplinary team representing many fields, including planning, engineering, enforcement/emergency response, and advocacy. A list of RSA attendees is in Table One.

Table 1: Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Bill McNulty	Old Colony Planning Council
Mary Waldron	Old Colony Planning Council
Charles Kilmer, AICP	Old Colony Planning Council
Guoqiang Li	Old Colony Planning Council
Ray Guarino	Old Colony Planning Council
Shawn Bailey	Old Colony Planning Council
Kyle Mowatt	Old Colony Planning Council
Captain Mark Porcaro	Brockton Police Department
Damon Rivard	Brockton Area Transit Authority
Glenn Geiler	Brockton Area Transit Authority
Deputy Chief Joseph Solomon	Brockton Fire Department
Rob May	Director of Planning and Development, City of Brockton
Brady Winsten	Office of Mayor Robert Sullivan – City of Brockton
Dr. James Cobbs	Brockton Public Schools
Michael Munchbach	Office of Senator Michael Brady
Ben Mueller	MassDOT Office of Transportation Planning
Bianca Marshall	MassDOT District Five Traffic
Jason Walters	MassDOT District Five Projects
Dakota DelSignore	MassDOT Traffic Safety
Jonathan Brown	MassDOT Traffic Safety
Iten Beshay	MassDOT Traffic Safety
Vivian Ortiz	Massachusetts Safe Routes to School
David Soares	MassDOT District Five Traffic Operations
Nathan Shay	CDM Smith
Lisa Sherman	CDM Smith
Kim Trahn	CDM Smith
Connor Lozeau	CDM Smith
Gloria Anderson Armstrong	Resident

Project Location and Description

The intersection of Main Street at Nilsson Street and East Nilsson Street is a four-way, unsignalized intersection located in Brockton. It is STOP sign controlled on the Nilsson Street and East Nilsson Street minor street approaches, supplemented by a stop bar and “STOP” markings painted on the pavement in advance of the stop bar. Parallel bar crosswalk markings are provided across all legs of the intersection.

The Main Street at Nilsson Street and East Nilsson Street intersection was included in the *2020 Brockton Main Street Corridor Study*, which was prepared by OCPC. Based on this study, the intersection's crash rate was calculated at 2.34 crashes per million entering vehicles (MEV), which is four times the state and MassDOT District 5 average. MassDOT's Top Crash Locations data viewer shows that this intersection was a Top 200 crash cluster for the periods 2013-2015, 2014-2016, and 2015-2017, signifying it as one of the most hazardous intersections in the state. The intersection was also part of a pedestrian cluster for the periods 2007-2016 and 2008-2017. One pedestrian crash in 2012 resulted in a fatality. MassDOT uses the Equivalent Property Damage Only (EPDO) methodology, which ranks crash locations based on crash severity in addition to frequency.

This area is densely developed with churches and businesses along the Main Street corridor. There are at least seven churches in close proximity within walking distance to the intersection, and the area is busy on weekends, as well as during the week, with restaurants and shops attracting vehicles and pedestrians. The intersection is within walking distance of residential neighborhoods (multi-family residential). In addition, there is parking allowed on both sides of Main Street and frequent parking maneuvers conflict with the traffic flow on Main Street.

Businesses and parking, along with walking access to and from neighborhoods, generate a high volume of pedestrian activity at the intersection. In addition to pedestrian movement across the intersection, pedestrians also cross mid-block along Main Street between parked cars. There are also many curb cuts along Main Street north and south of the intersection with vehicles turning in and out of lots to and from Main Street. A Brockton fire station is located just south of the intersection. In addition, the Gilmore Elementary School is located to the east with students crossing the intersection in the morning and afternoon when school is in session.

Main Street is a major north-south roadway through the city of Brockton, serving residential and commercial areas. Main Street connects Route 28 from the south providing direct connection to Downtown Brockton to the north of the intersection. Although vehicle speed is hindered through the intersection due to parking maneuvers, speed on Main Street is problematic.

Main Street is a two-lane roadway under local jurisdiction of the City of Brockton. It is functionally classified as an Urban Minor Arterial. There are sidewalks on both sides of Main Street. Main Street does not have any bicycle accommodations, although there is a

shoulder that is used by both bicyclists and for on-street parking right up to the intersection. There are no posted speed limits. Brockton Area Transit Route 2 runs along the roadway. Bus stops are located on Main Street just north of East Nilsson on the northbound side and just north of Nilsson Street on the southbound side.

Nilsson Street and East Nilsson Street are classified as local roads running east-west in Brockton. East Nilsson connects Main Street to Montello Street (Route 28) to the east. There are sidewalks on both sides of Nilsson Street and East Nilsson Street. There is limited parking on Nilsson Street and East Nilsson with no parking posted on one side of each of these streets. Nilsson Street provides connection to residential neighborhoods with residential use primarily along the street. There are no posted speed limit signs along Nilsson Street and East Nilsson Street. Sidewalks are provided along both sides of both streets, but there are no existing bicycle facilities. Figure 1 shows the intersection location.

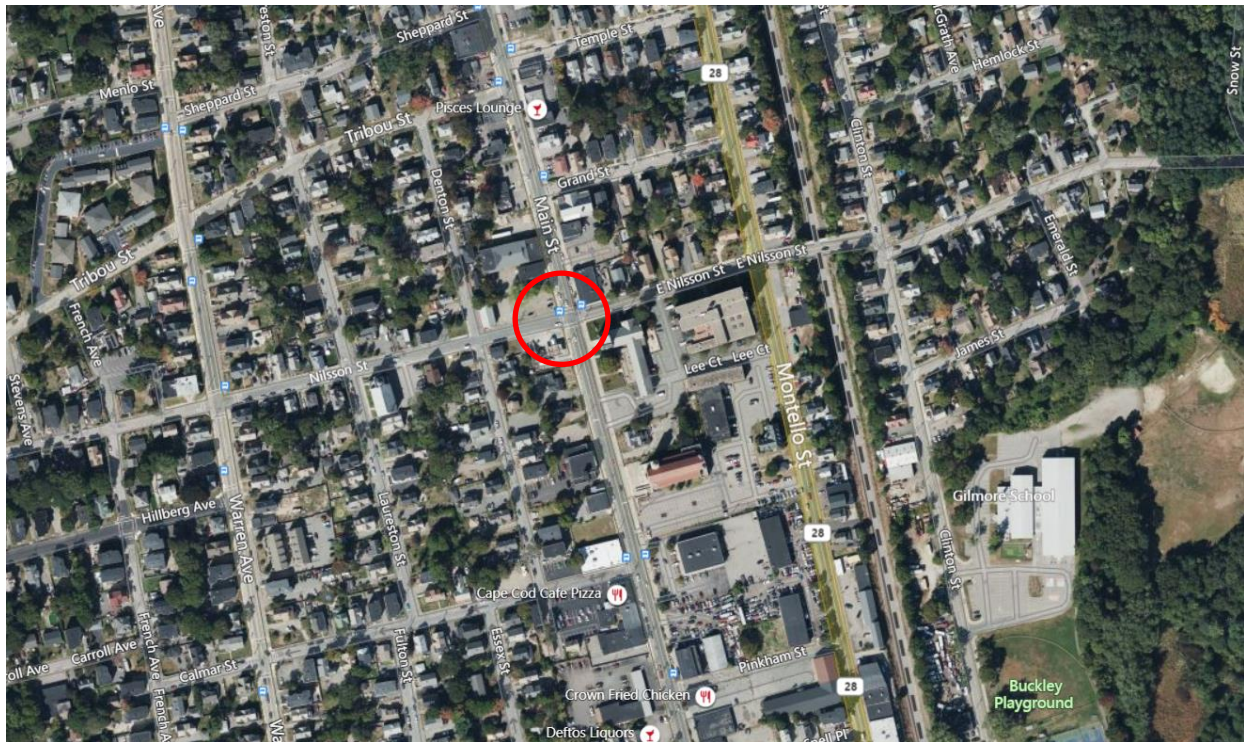


Figure 1: Locus Map

Audit Observations and Potential Safety Enhancements

Drivers from Nilsson Street and East Nilsson Street force their way into traffic flow on Main Street during the peak hours without adequate gaps: The intersection experiences “forced flow” congested conditions, particularly during peak hours with a Level of Service of “F” during both the morning and afternoon peak time frames on the minor streets. Twenty-seven percent of the crashes analyzed in the 2017-2020 time period occurred between the hours of 4:00 to 6:00 PM coinciding with the afternoon peak. In increasingly congested conditions with lengthy delays, drivers become frustrated and attempt to force their way onto Main Street. Many of the crashes that occurred at this intersection were a result of drivers from the minor streets entering Main Street into the path of north and south bound vehicles.



Image 1: Vehicle entering from side streets (view from Nilsson Street eastbound approach).

Potential Safety Enhancement: Install traffic signals to mitigate congestion. This will increase safety by providing drivers safer access to Main Street as they enter Main Street from the side street approaches. This will also improve safety for pedestrians with the inclusion of pedestrian crossing phases. The intersection satisfies Warrant 1 Eight-Hour Vehicular Volume, Warrant 2 Four-Hour Volume, and Warrant 3 Peak Hour Delay/Volumes of the *Manual on Uniform Traffic Control Devices* for signal installation

Potential Safety Enhancement: As an interim measure until traffic signals are installed, install overhead flashing beacons, with flashing red on the side streets and flashing yellow on Main Street.

Potential Safety Enhancement: As an interim measures until traffic signals are installed, install advanced intersection warning signage and stop ahead signs on Nilsson Street and East Nilsson Street. In addition, install flashing LED stop signs on the minor street approaches for enhanced visibility and to increase right of way compliance.

Pedestrian crossing at the intersection is challenging due to parking maneuvers and traffic congestion: The area features a high volume of pedestrian trips, supported by businesses along Main Street near dense residential development, a bus route (Brockton Area Transit Route 2) along the roadway, and parking along Main Street. In addition, pedestrian traffic is higher when school is in session due to students walking to and from the Gilmore School, which is located approximately one-quarter mile from the intersection. Pedestrians frequently cross at the intersection although pedestrians also cross mid-block along Main Street.

Potential Safety Enhancements: Enhance existing intersection crossing with bump outs to slow traffic and reduce the walking distance of pedestrians. In addition, replace the existing bar crosswalks with enhanced high-visibility (ladder or continental style) crosswalks. Ensure all crossings are fully ADA accessible and signage should be updated and properly placed.

Potential Safety Enhancement: The Safe Routes to School Coordinator will contact the Gilmore School to develop safety methods and education for walking students.

The area is dark at night: Audit participants noted that the area is dark at night, despite the presence of overhead streetlights on utility poles in the area. Twenty-nine percent of the crashes at the intersection during the analyzed time period occurred at night. In addition, the need for better lighting throughout the Main Street corridor was noted in the *2020 Brockton Main Street Corridor Study*.

Potential Safety Enhancements: Coordinate with electric utility on the conversion of existing street lighting to LED lighting. Consider the installation of supplemental streetscape lighting to further enhance nighttime visibility and safety, particularly for pedestrians.

Lack of bicycle lanes: Main Street, Nilsson Street, and East Nilsson Street lack bicycle lanes and bicyclists have to share the road with motorists.

Potential Safety Enhancement: Add bicycle lanes with signage if feasible or add Sharrows pavement markings to alert motorists to share the road.

Parking signs violation create visibility issues: Cars park too close to the intersection at the corners of Main Street despite the posted "NO PARKING CORNER TO HERE"

signs. This leads to visibility issues when cars are merging onto Main Street from the side streets and also creates visibility issues when pedestrians cross.

Potential Safety Enhancement: Evaluate and update parking signage, consider striping the part of the lane where parking is not allowed with parallel solid pavement markings. Increased enforcement of parking restrictions.

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
Drivers forcing their way into traffic flow without adequate gaps	Reconstruct intersection with the installation of traffic signals	High	Long-Term	High	City of Brockton
	As an interim measure until signal installation, install overhead flashing beacons, flashing red on side streets, yellow on Main Street.	Medium	Mid-Term	Medium	
	As an interim measure until signal installation, install advanced intersection warning and stop ahead signs on minor streets. Install flashing LED stop signs on the minor street approaches for enhanced visibility.	Medium	Short-term	Low	
Pedestrian crossing is challenging	Consider curb bump outs, enhanced design crosswalks, ADA accessibility and update signage.	High	Mid-Term / Long-Term	Medium	City of Brockton
	SRTS coordinator will contact the Gilmore School to develop safety methods and education for walkers.	Medium	Short-Term	Low	SRTS Coordinator
Area is dark at night	Replace existing overhead streetlights with LED. Consider enhancing lighting with streetscaping.	Medium	Mid-Term	Medium (Utility may pay for LED conversion)	City of Brockton
Main Street, Nilsson Street, and East Nilsson Street lack bicycle lanes.	Add bicycle lanes if feasible or add Sharrows pavement markings.	Medium	Short-Term	Low	City of Brockton
Vehicles park too close to the intersection at the corners of Main Street creating visibility issues.	Consider striping where parking is not allowed with pavement markings and enhance enforcement.	Low	Short-Term	Low	City of Brockton

Appendix A. RSA Meeting Agenda

Agenda	<p>Virtual Road Safety Audit for Forest Avenue and Main Street, Brockton</p> <ul style="list-style-type: none"> • Forest Avenue, from Belmont Street (Route 123) to Gordon Street <ul style="list-style-type: none"> • Intersection of Main Street and Forest Avenue • Intersection of Main Street at Nilsson Street <p style="text-align: right;">Brockton, MA Wednesday, July 21, 2021 1:00 PM – 3:00 PM</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, Schools, Administration, Planning), Brockton Area Transit Authority, MassDOT, FHWA, Legislative Delegation
Please Bring:	Thoughts and Suggestions
Meeting Location:	<p>Virtual Meeting (Zoom): https://us02web.zoom.us/j/86978966259?pwd=ZmFsSFZmcFIJQWZmU1bkxQQmhdz09 Webinar ID: 869 7896 6259 Password: 467803</p>
1:00 PM	Welcome and Introductions
1:05 PM	Study Background and Review of Study Area
1:10 PM	Virtual Road Safety Audit of Forest Avenue, from Belmont Street (Route 123) to Gordon Street <ul style="list-style-type: none"> • Review of Crash Data • Existing Conditions and Known Challenges • Identification of Potential Safety Improvements
2:00 PM	Virtual Road Safety Audit of Main Street at Forest Avenue <ul style="list-style-type: none"> • Review of Crash Data • Existing Conditions and Known Challenges • Identification of Potential Safety Improvements
2:25 PM	Virtual Road Safety Audit of Main Street at Nilsson Street / East Nilsson Street <ul style="list-style-type: none"> • Review of Crash Data • Existing Conditions and Known Challenges • Identification of Potential Safety Improvements
2:50 PM	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 	

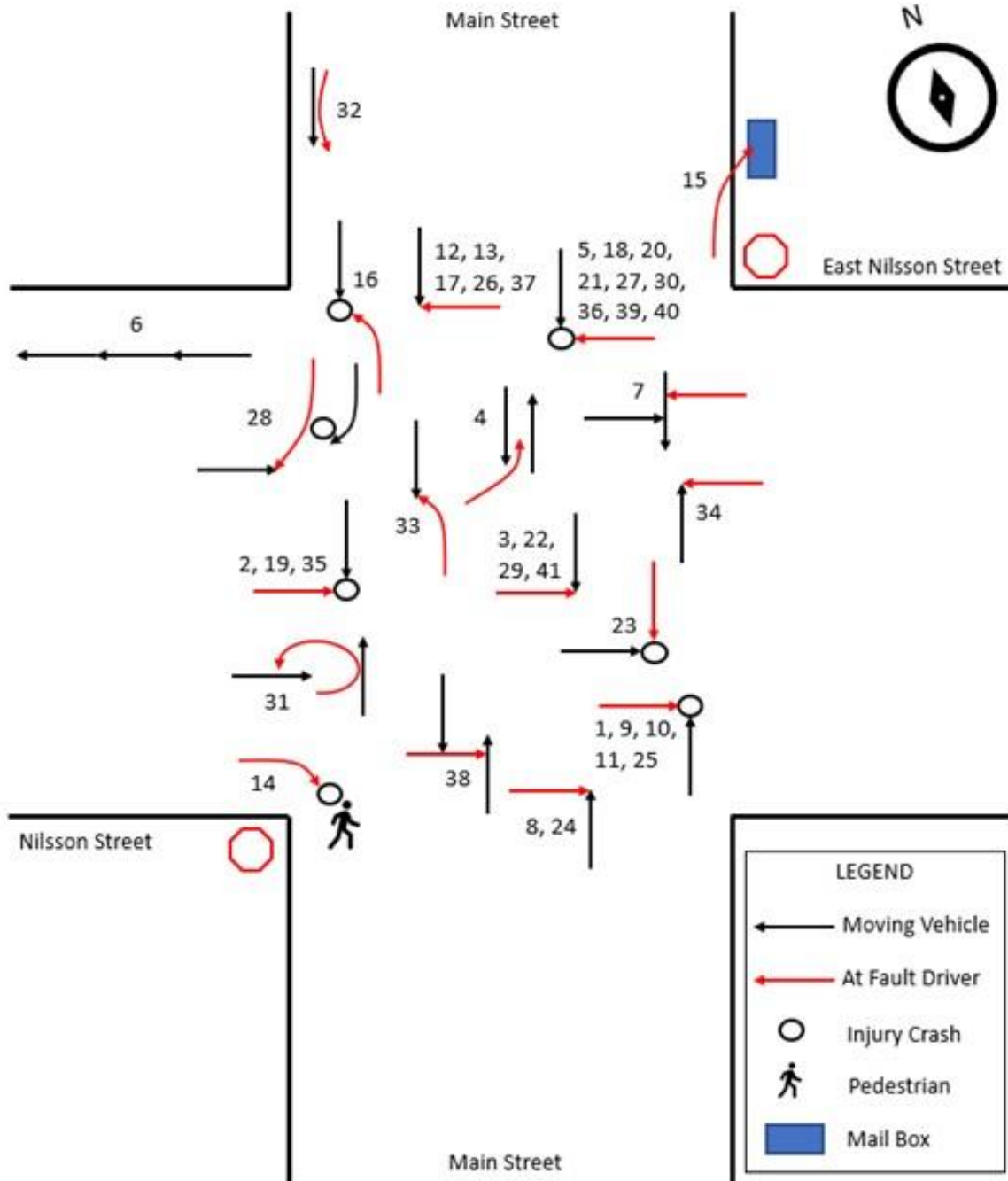
Appendix B. Audit Team Members

Participating Audit Team Members

Date:	July 21, 2021	Location:	Main Street at Forest Avenue, Brockton
Audit Team Members		Agency/Affiliation	
Bill McNulty		Old Colony Planning Council	
Mary Waldron		Old Colony Planning Council	
Charles Kilmer, AICP		Old Colony Planning Council	
Guoqiang Li		Old Colony Planning Council	
Ray Guarino		Old Colony Planning Council	
Shawn Bailey		Old Colony Planning Council	
Kyle Mowatt		Old Colony Planning Council	
Captain Mark Porcaro		Brockton Police Department	
Damon Rivard		Brockton Area Transit Authority	
Glenn Geiler		Brockton Area Transit Authority	
Deputy Chief Joseph Solomon		Brockton Fire Department	
Rob May		Director of Planning and Development, City of Brockton	
Brady Winsten		Office of Mayor Robert Sullivan – City of Brockton	
Dr. James Cobbs		Brockton Public Schools	
Michael Munchbach		Office of Senator Michael brady	
Ben Mueller		MassDOT Office of Transportation Planning	
Bianca Marshall		MassDOT District Five Traffic	
Jason Walters		MassDOT District Five Projects	
Dakota DelSignore		MassDOT Traffic Safety	
Jonathan Brown		MassDOT Traffic Safety	
Itan Bishay		MassDOT Traffic Safety	
Vivian Ortiz		Massachusetts Safe Routes to School	
David Soares		MassDOT District Five Traffic Operations	
Nathan Shea		CDM Smith	
Lisa Sherman		CDM Smith	
Kim Tran		CDM Smith	
Connor Lozeau		CDM Smith	
Gloria Anderson Armstrong		Resident	

Appendix C. Crash Data

COLLISION DIAGRAM
 Main Street at Nilsson Street
 Collision Diagram for Crashes (2017-2020)
 Prepared by OCPC (SB 07/2021) (Source: Brockton Police Dept.)

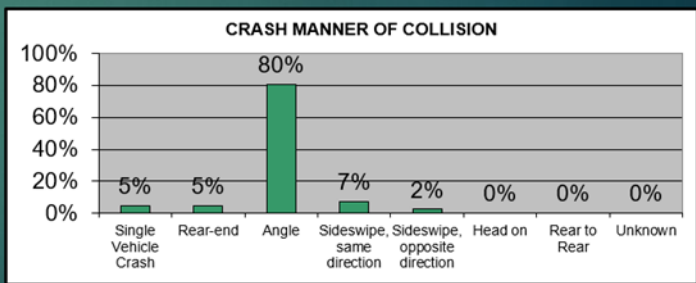
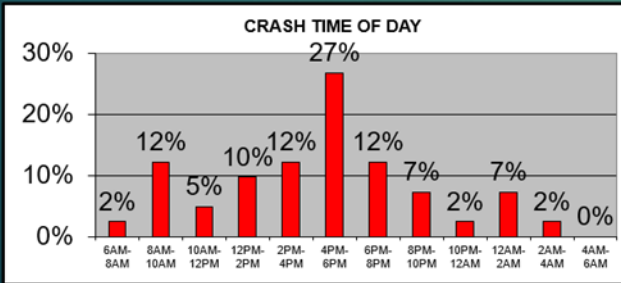
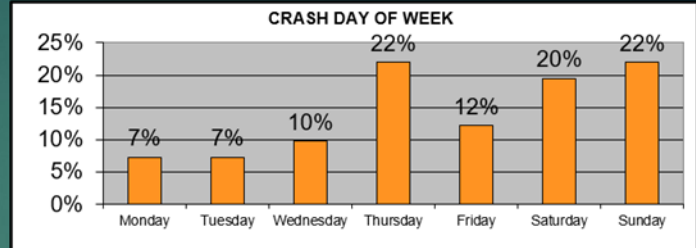
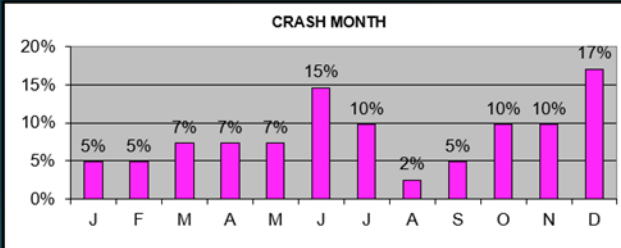


Crash Diagram Ref #	Crash Date <i>m/d/y</i>	Time of Day	Manner of Collision <i>Type</i>	Light Condition <i>Type</i>	Weather Condition <i>Type</i>	Road Surface <i>Type</i>	Driver Contributing <i>Type</i>
1	5/11/2017	2:39 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
2	6/4/2017	2:48 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings
3	10/15/2017	10:33 AM	Angle	Daylight	Cloudy	Dry	Failed to yield right of way
4	11/2/2017	4:20 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
5	12/17/2017	9:38 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way
6	12/21/2017	2:22 PM	Rear-end	Daylight	Clear	Dry	Operating defective equipment
7	12/22/2017	5:20 PM	Angle	Dark - lighted roadway	Snow	Wet	Failed to yield right of way
8	12/30/2017	11:56 PM	Angle	Dark - lighted roadway	Clear	Snow	Failed to yield right of way
9	2/3/2018	6:05 PM	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	Other improper action
10	2/8/2018	9:08 AM	Rear-end	Daylight	Clear	Dry	Failed to yield right of way
11	4/16/2018	12:52 AM	Angle	Dark - lighted roadway	Rain	Wet	Failed to yield right of way
12	5/15/2018	7:12 AM	Angle	Daylight	Cloudy	Dry	Inattention
13	5/27/2018	1:34 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
14	10/4/2018	5:55 PM	Single Vehicle Crash	Daylight	Clear	Dry	Inattention
15	10/7/2018	10:33 AM	Single Vehicle Crash	Daylight	Clear	Dry	Over-correcting/over-steering
16	12/2/2018	1:57 AM	Sideswipe, opposite direction	Dark - lighted roadway	Cloudy	Dry	Failed to yield right of way

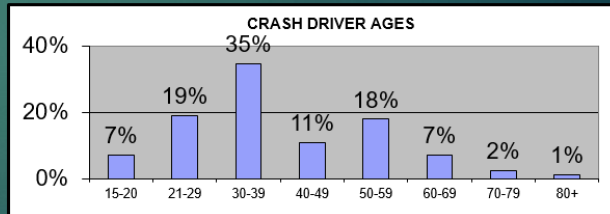
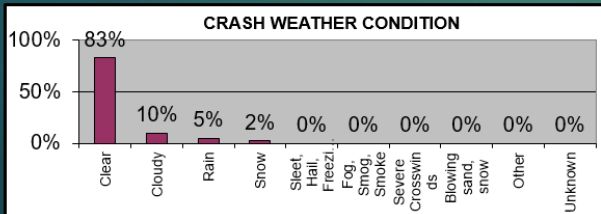
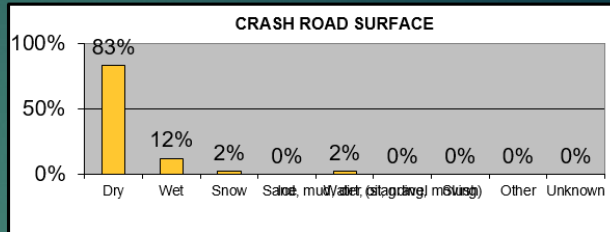
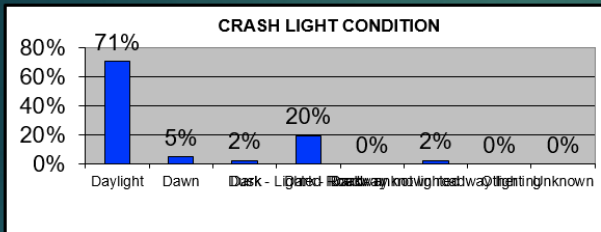
17	12/14/2018	9:44 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way
18	1/21/2019	12:55 PM	Angle	Daylight	Clear	Sand, mud, dirt, oil, gravel	Failed to yield right of way
19	3/1/2019	6:32 PM	Angle	Dusk	Clear	Dry	Unknown
20	4/20/2019	2:25 AM	Angle	Dark, unknown roadway lighting	Rain	Wet	Unknown
21	6/1/2019	4:42 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
22	6/7/2019	4:12 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
23	6/12/2019	8:30 PM	Angle	Dark - lighted roadway	Clear	Dry	Failure to keep in proper lane or running off road
24	6/27/2019	1:03 AM	Angle	Dark - lighted roadway	Clear	Dry	Inattention
25	7/10/2019	5:19 PM	Angle	Daylight	Clear	Dry	Other improper action
26	7/11/2019	4:55 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
27	7/20/2019	12:11 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
28	7/22/2019	4:11 PM	Sideswipe, same direction	Daylight	Clear	Dry	No Improper Driving
29	8/31/2019	5:48 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
30	11/16/2019	9:54 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way
31	11/19/2019	8:49 AM	Angle	Daylight	Cloudy	Wet	Failed to yield right of way
32	12/7/2019	1:07 PM	Sideswipe, same direction	Daylight	Clear	Dry	Unknown
33	1/5/2020	3:48 PM	Angle	Daylight	Clear	Dry	Unknown
34	3/6/2020	4:59 PM	Angle	Dawn	Clear	Dry	Failed to yield right of way

35	3/8/2020	3:42 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
36	4/16/2020	6:23 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
37	6/14/2020	9:07 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
38	9/15/2020	6:41 PM	Angle	Dawn	Clear	Dry	Failed to yield right of way
39	9/16/2020	4:32 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way
40	10/8/2020	6:01 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings
41	11/25/2020	9:53 PM	Angle	Dark - lighted roadway	Clear	Wet	Unknown

Main Street at Nilsson Street



Main Street at Nilsson Street



Appendix D. RSA References

Road Safety Audit References

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