

ROAD SAFETY AUDIT

Commerce Way at Industrial Park Road and Plaza Way

Plymouth, MA

June 10, 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

Table of Contents

Contents

Background	1
Project Data	1
Project Location and Description.....	3
Audit Observations and Potential Safety Enhancements.....	4
Summary of Road Safety Audit	6

List of Appendices

- Appendix A. RSA Meeting Agenda
- Appendix B. RSA Audit Team Contact List
- Appendix C. Detailed Crash Data
- Appendix D. [References](#)

List of Tables

Table 1: Participating Audit Team Members	2
Table 2: Estimated Time Frame and Costs Breakdown.....	6
Table 3: Potential Safety Enhancement Summary.....	7

Background

This Road Safety Audit for Commerce Way at Industrial Park Road 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. 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 had a calculated Equivalent to Property Damage Only (EPDO) index value of 177 based on crashes that occurred in a three-year period from January 1, 2018, through December 31, 2020, ranking #3 locally in the Town of Plymouth. The EPDO Index is a 21-Point weighted system that assigns a single point to crashes that result in property damage only and 21 points to crashes that result in an injury or fatality. This Road Safety Audit was prepared in conjunction with a Road Safety Audit for the adjacent intersection of Commerce Way at Christa McAuliffe Boulevard, which ranks #15 in the Town of Plymouth.

Colony Place is a large-scale commercial development featuring retail businesses, restaurants, and hotel space. The Plymouth Industrial Park is a large industrial park and is home to primarily office buildings with some light industrial and the Plymouth location of the Massachusetts Registry of Motor Vehicles (RMV).

A large 224-unit planned 55+ community (Sawyer's Reach) is currently under construction adjacent to Colony Place, which will bring a large influx of residents to the immediate area and will likely generate a substantial number of pedestrian and bicycle trips on the area roadways.

Project Data

This Road Safety Audit was conducted on June 10, 2021, in conjunction with a Road Safety Audit for the intersection of Commerce Way at Christa McAuliffe Boulevard and Colony Place. Due to the State of Emergency, which was in effect through June 15, 2021, in the Commonwealth of Massachusetts in response to the COVID-19 pandemic, 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.

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

During the audit, crash analysis, land use, and traffic data was discussed. 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.

Table 1 lists the participants present during the Road Safety Audit.

Table 1: Participating Audit Team Members

Audit Team Member	Agency/Affiliation
Bill McNulty	Old Colony Planning Council
Ray Guarino	Old Colony Planning Council
Charles Kilmer, AICP	Old Colony Planning Council
Guoqiang Li	Old Colony Planning Council
Shawn Bailey	Old Colony Planning Council
Kyle Mowatt	Old Colony Planning Council
Melissa Arrighi	Town Manager – Town of Plymouth
Deputy Chief Greg Kane	Plymouth Fire Department
Jonathan Beder	Director, Town of Plymouth Department of Public Works
Sheila Sgarzi, PE	Town Engineer - Town of Plymouth Department of Engineering
Kevin Manuel	Plymouth Police Department
James Downey	Town of Plymouth Department of Engineering
Jonathan Brown	MassDOT Traffic and Safety Section
Kevin Fitzgerald	MassDOT Traffic and Safety Section
Rob Fitzgerald	MassDOT
Bianca Marshall	MassDOT District Five Traffic Operations
David Soares, PE	MassDOT District Five Traffic Operations
Lauren McNaughton	MassDOT District Five
Jane Richardson	MassDOT District Five

Project Location and Description

The intersection of Commerce Way at Colony Place and Industrial Park Road is in northern Plymouth, south of the interchange of Route 44 and Commerce Way. It is a four-legged intersection, with Commerce Way running north to south, connecting Cherry Street at its northern end to Route 80 on the southern end. Plaza Way provides secondary access to Colony Place as well as to Sawyers Reach, a large-scale residential neighborhood currently under development. Colony Place is a major commercial and retail center, while Industrial Park Road provides access to the Plymouth Industrial Park. The intersection is features through lanes and turn lanes from each approach It is controlled by an actuated traffic signal system, which provides protected left turns from left turn lanes in each approach.

Figure 1 displays an aerial photograph of the location and study area.

- **Commerce Way** Commerce Way is a four-lane Urban Minor Arterial divided roadway, with a raised median. It is under the jurisdiction of the Town of Plymouth. The roadway is a “Complete Street”, with an on-street non separated bicycle lane in each direction and a sidewalk on wone side of the street. There is a “Continental Style” crosswalk with ADA compliant ramps across Commerce Way on the northern side of the intersection. Pavement is in good condition. Commerce Way does not have a speed limit but is rather governed by Massachusetts General Laws prima facia speed limit of 50 MPH for a divided highway in a non-thickly settled area. The southbound approach features a shared right turn and through movement lane; an exclusive through lane; and an exclusive left turn lane for left turns into Industrial Park Road. The northbound approach features three lanes: a through movement lane, an exclusive left turn lane, and a shared through movement and right turn lane.
- **Industrial Park Road:** Industrial Park Road is a two-lane roadway, divided by a raised vegetated median. It is functionally classified as an Urban Collector and is under the jurisdiction of the Town of Plymouth. The roadway is one of three access points to the Plymouth Industrial Park. The approach to the intersection features two lanes: a shared though and right turn lane and an exclusive left turn lane. There are sidewalks on both sides of the roadway. There is a “Continental Style” crosswalk with ADA compliant ramps across Industrial Park Road at the intersection, there are no bike lanes, sharrows, and useable shoulders.
- **Plaza Way:** Plaza Way is a private roadway, with two lanes in each direction separated by a vegetated median. The Plaza Way approach to the intersection features two lanes: an exclusive left run lanes and a shared though movement

and right turn lane. There is a sidewalk on the northern inbound) side of the roadway. There are no bike lanes, sharrows, and useable shoulders.



Figure 1: Locus Map

Audit Observations and Potential Safety Enhancements

Crashes between left turning and through moving vehicles: Analysis of crash reports provided by the Plymouth Police Department revealed seven of the fifteen crashes (47%) that occurred at this location from 2017 through 2020 were collisions between vehicles making left turns from either direction of Commerce Way, and oncoming through moving vehicles. Four of these seven crashes resulted in injury. Left turns from Commerce Way are given a protected left turn lead phase on a GREEN arrow, followed by a permitted phase. Archived traffic count data from the Old Colony Planning Council indicates that prevailing speeds on Commerce Way are around 50 PH. Drivers from either Commerce Way approach attempting left turns



Image 1: Drivers attempt left turns against oncoming through movements traveling at high rates of speed.

on the unprotected permitted phase may be underestimating the approach speeds of oncoming traffic.

Potential Safety Enhancements: Making left turns permitted on protected phases only should be considered at this location, given the frequency of these collisions and percentage of these crashes resulting in injury. Potentially increasing intersection clearance time (All-Red Time) may also help mitigate this issue. Consider adding a left turn yield on green ball sign on eastbound and westbound approaches.

Prevailing speeds high for shared use with bicycles: Prevailing speeds on this roadway make it unattractive for bicyclists, even with the striped bike lane. Lowering the speed limit to one preferred by bicyclists for comfort and safety (<35 MPH) does not appear feasible at this location based on existing design.

Potential Safety Enhancements: Separate bicycle lane from travel lane with physical barrier or replace with a shared use separated path.

Lack of bicycle conflict markings: There are no bicycle conflict markings painted in the intersection.

Potential Safety Enhancement: Stipe bicycle conflict markings in intersection.

Lack of advance warning signs: Neither direction of Commerce Way has advance signage to warn drivers of a signalized intersection coming up.

Potential Safety Enhancements: Install MUTCD compliant advance warning signage on each approach.

High volumes of turning movements: Trip generation from both the Colony Place development on the west side of the intersection and the industrial park on the east side of the intersection results in high volumes of turning movements. These volumes of turning movements not only require large queuing spaces but may also be a factor in several of the collisions occurring here.

Potential Safety Enhancements: Long term, consider reconstructing the intersection with a multi-lane roundabout. A roundabout would reduce conflicts between through moving and turning vehicles while also reducing severity of crashes that occur.

Incomplete pedestrian network: Only one side of Commerce Way has a sidewalk. The side of Commerce Way where a large scale planned residential community (Sawyers Reach) is currently under construction does not have sidewalks. Pedestrian connections do not currently extend into the industrial park.

Potential Safety Enhancements: Construct new sidewalks and crosswalks to complete pedestrian network.

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
Crashes between left turning vehicles and through movements	Adjust signal phasing to increase intersection clearance time. Make left turns permitted on protected arrow only. Consider adding a left turn yield on green ball sign on eastbound and westbound approaches	High	Mid-Term	Low	Town of Plymouth
Prevailing speeds high for shared use with bicyclists	Separate bike lane from travel lane with barrier or replace with separated, shared use path	High	Long Term	High	Town of Plymouth
No bicycle conflict markings	Add bicycle conduct markings through intersection.	Medium	Short Term	Low	Town of Plymouth
Lack of Advance Warning Signs	Install MUTCD Compliant Signage	Medium	Short Term	Low	Town of Plymouth
High volumes of turning movements.	Replace traffic signal with multi-lane roundabout.	High	Long Term	High	Town of Plymouth
Incomplete pedestrian network	Complete sidewalk and crosswalk network into industrial park.	High	Long Term	High	Town of Plymouth

Appendix A. RSA Meeting Agenda

Agenda	<p align="center">Virtual Road Safety Audit for Commerce Way (Plymouth) Intersections Commerce Way at Christa McAuliffe Boulevard and Colony Place Commerce Way at Industrial Park Road Plymouth, MA Thursday, June 10, 2021 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 Plymouth Officials (Chief Elected Officials, DPW, Police, Fire, Administration, Planning), MassDOT, FHWA, Legislative Delegation
Please Bring:	Thoughts and Suggestions
Meeting Location:	Virtual Meeting (Zoom): https://us02web.zoom.us/j/85316852872?pwd=MDFaZkpUNIF6V1VNTFRUKRnbXRhUT09 Webinar ID: 853 1685 2872 Password: 747072
10:00 AM	Welcome and Introductions
10:05 AM	Study Background and Review of Study Area
10:10 AM	Virtual Road Safety Audit of Commerce Way at Christa McAuliffe Boulevard / Colony Place <ul style="list-style-type: none"> • Review of Crash Data • Existing Conditions and Known Challenges • Identification of Potential Safety Improvements
10:40 AM	Virtual Road Safety Audit of Commerce Way at Industrial Park Road / Plaza Way <ul style="list-style-type: none"> • Review of Crash Data • Existing Conditions and Known Challenges • Identification of Potential Safety Improvements
11:10 AM	Wrap-Up Site Audit; Discussion of Next Steps
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: June 10, 2021

Location: Commerce Way at Industrial Park Road

Audit Team Members	Agency/Affiliation
Bill McNulty	Old Colony Planning Council
Ray Guarino	Old Colony Planning Council
Charles Kilmer, AICP	Old Colony Planning Council
Guoqiang Li	Old Colony Planning Council
Shawn Bailey	Old Colony Planning Council
Kyle Mowatt	Old Colony Planning Council
Melissa Arrighi	Town Manager – Town of Plymouth
Deputy Chief Greg Kane	Plymouth Fire Department
Jonathan Beder	Director, Town of Plymouth Department of Public Works
Sheila Sgarzi, PE	Town Engineer - Town of Plymouth Department of Engineering
Kevin Manuel	Plymouth Police Department
James Downey	Town of Plymouth Department of Engineering
Jonathan Brown	MassDOT Traffic and Safety Section
Kevin Fitzgerald	MassDOT Traffic and Safety Section
Rob Fitzgerald	MassDOT
Bianca Marshall	MassDOT District Five Traffic Operations
David Soares, PE	MassDOT District Five Traffic Operations
Lauren McNaughton	MassDOT District Five
Jane Richardson	MassDOT District Five

Appendix C. Detailed Crash Data

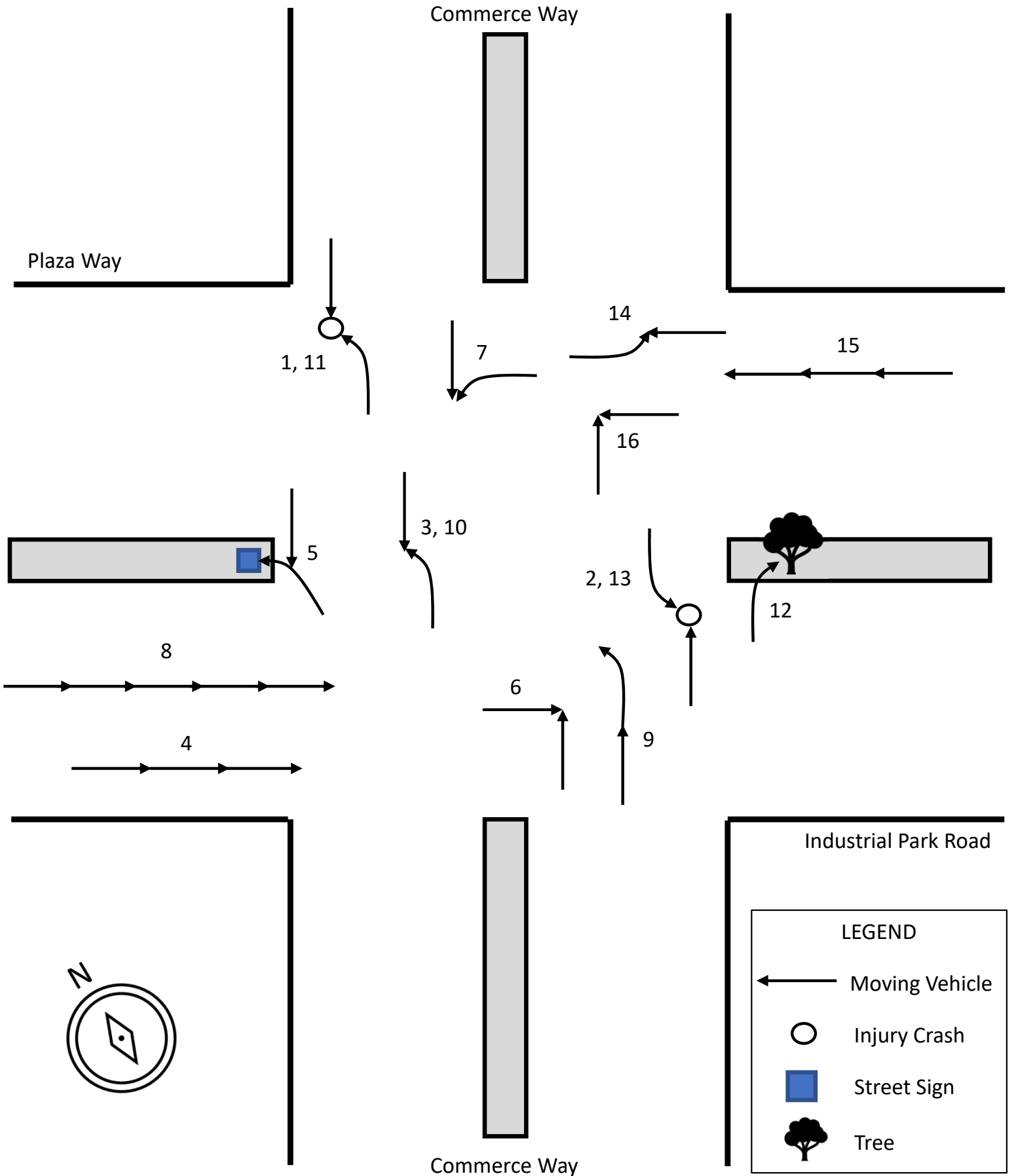
Crash Data Summary Table

Commerce Way at Industrial Park Road & Plaza Way - Plymouth, 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>	Ages				Comments
									D1	D2	D3	D4	
1	3/16/18	Friday	7:26 PM	Angle	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	72	19			18PLY-6254-AC
2	7/30/18	Monday	3:12 PM	Angle	Daylight	Cloudy	Dry	Failed to yield right of way	67	70			18PLY-17430-AC
3	11/24/18	Saturday	4:57 PM	Sideswipe, opposite direction	Dark - lighted roadway	Clear	Dry	Made an improper turn	59	24			18PLY-26920-AC
4	4/4/19	Thursday	2:33 PM	Rear-end	Daylight	Clear	Dry	Distracted	57	79			19PLY-7040-AC
5	5/31/19	Friday	9:09 PM	Angle	Dark - lighted roadway	Clear	Dry	Other improper action	119	18			19PLY-11475-AC
6	6/21/19	Friday	7:46 AM	Angle	Daylight	Rain	Wet	Failed to yield right of way	63	27			19PLY-13491-AC
7	11/4/19	Monday	11:14 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	31	63			19PLY-27069-AC
8	12/19/19	Thursday	4:17 PM	Rear-end	Daylight	Clear	Dry	Other improper action	57	72	55	29	19PLY-30992-AC
9	6/10/20	Wednesday	12:43 PM	Rear-end	Daylight	Clear	Dry	Other improper action	36	80			20PLY-15545-AC
10	10/16/20	Friday	10:26 AM	Angle	Daylight	Cloudy	Wet	Failed to yield right of way	75	20			20PLY-32515-AC
11	11/21/20	Saturday	8:06 PM	Sideswipe, opposite direction	Dark - lighted roadway	Clear	Dry	Failed to yield right of way	21	52			20PLY-36997-AC
12	12/8/20	Tuesday	10:39 AM	Single Vehicle Crash	Daylight	Cloudy	Ice	Driving too fast for conditions	21	120			20PLY-38827-AC
13	12/18/20	Friday	10:50 AM	Head on	Daylight	Cloudy	Wet	Failed to yield right of way	24	23			20PLY-39856-AC
14	12/31/20	Thursday	4:51 PM	Angle	Dark - lighted roadway	Clear	Dry	Unknown	47	31			20PLY-41117-AC
15	4/11/17	Tuesday	2:55 PM	Rear-end	Daylight	Clear	Dry	No Improper Driving	117	117			2017000007790
16	1/29/19	Tuesday	1:33 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	119	119			19PLY-2134-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.

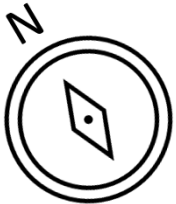
COLLISION DIAGRAM
 Commerce Way at Industrial Park Road & Plaza Way
 Collision Diagram for Crashes (2017-2020)
 Prepared by OCPC (SB 04/2021) (Source: Plymouth Police Dept.)



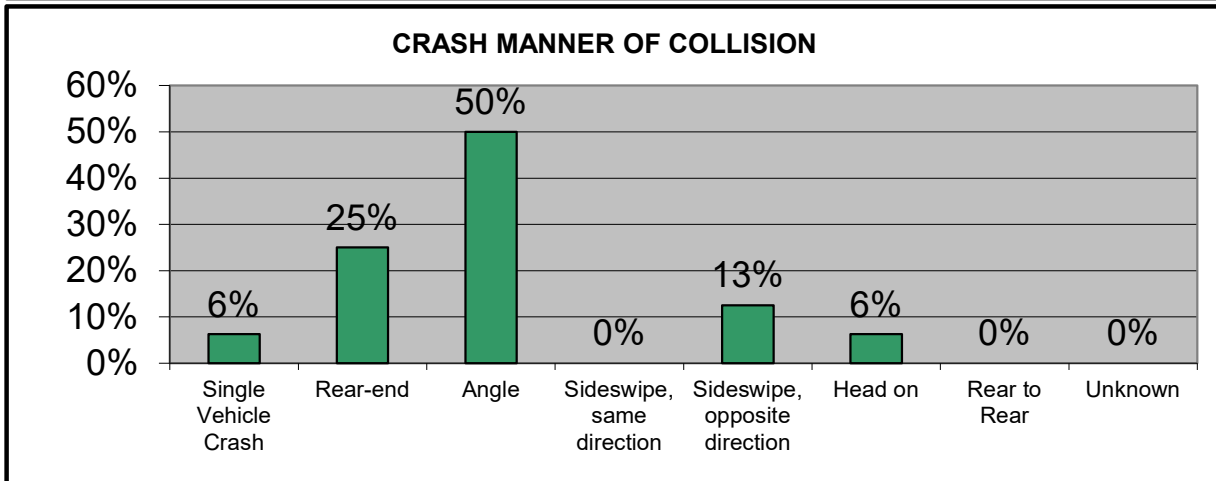
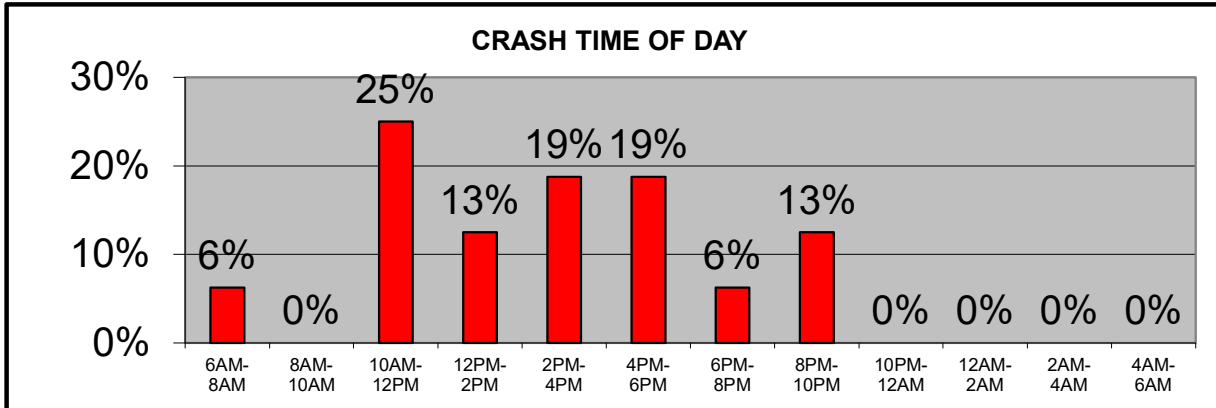
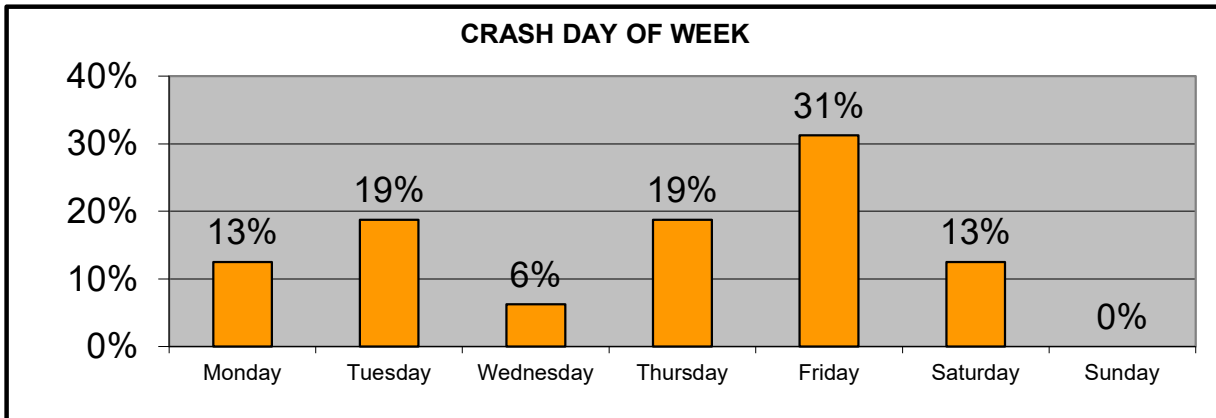
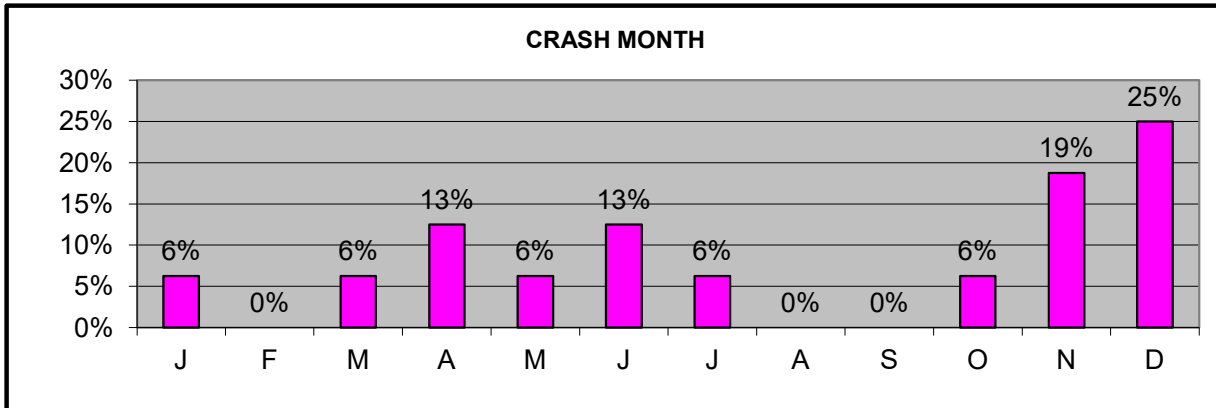
Industrial Park Road

LEGEND

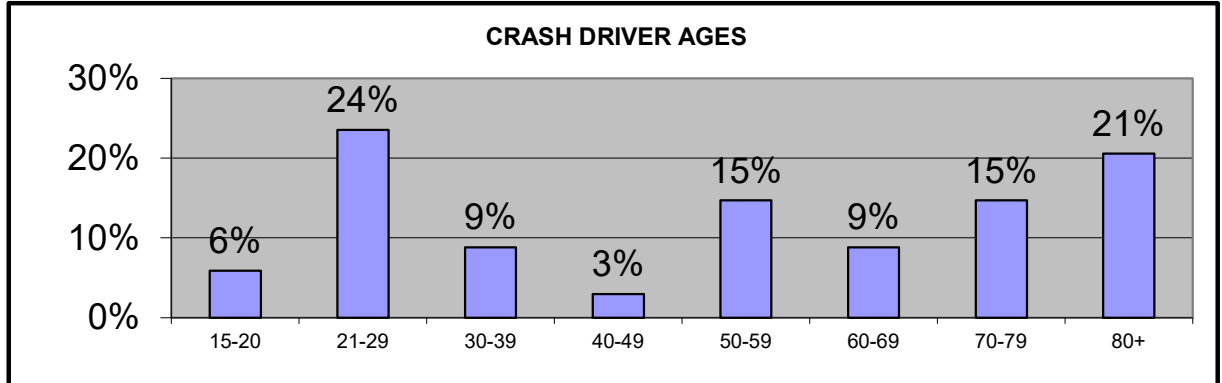
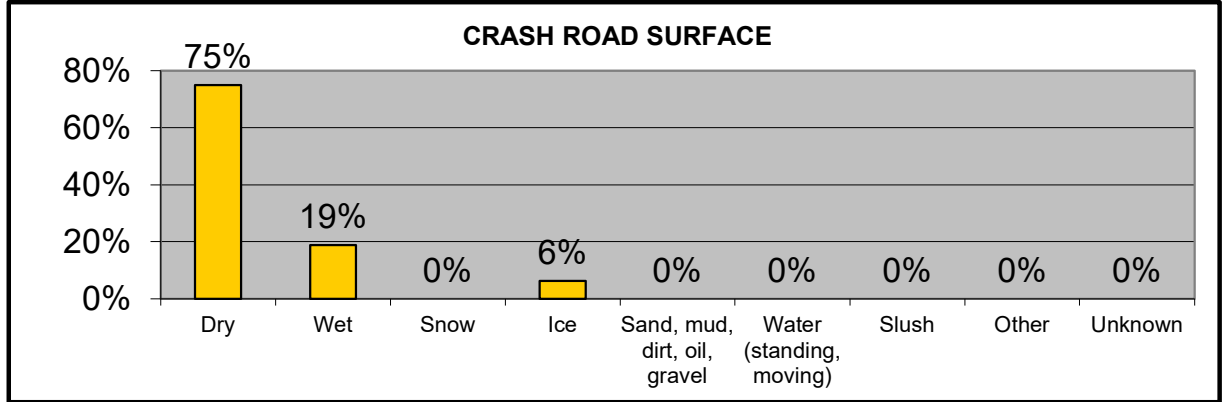
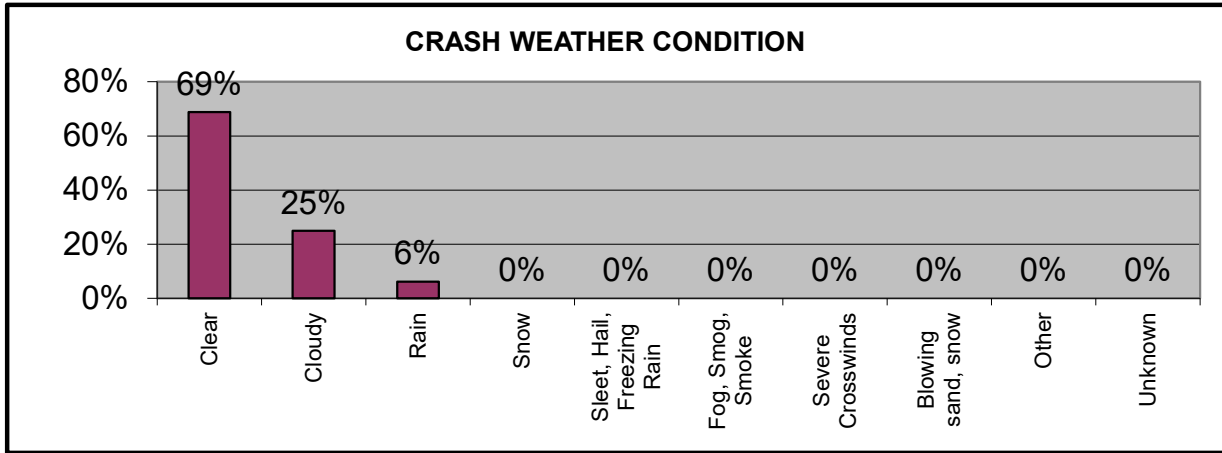
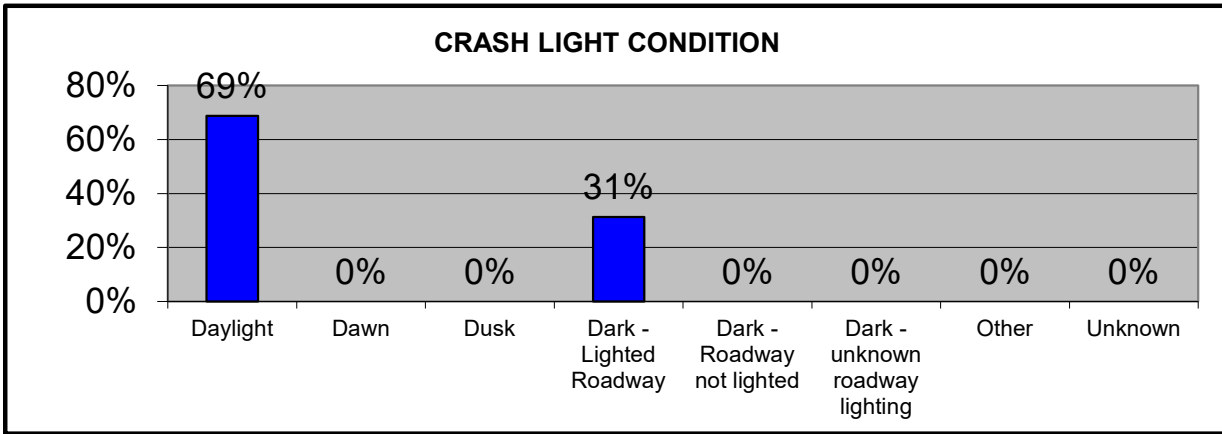
- ← Moving Vehicle
- Injury Crash
- Street Sign
- 🌳 Tree



Crash Data Summary Tables and Charts
 Commerce Way at Industrial Park Road & Plaza Way - Plymouth, MA



Crash Data Summary Tables and Charts
 Commerce Way at Industrial Park Road & Plaza Way - Plymouth, MA



Appendix D. Road Safety Audit References

Road Safety Audit References

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

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

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

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

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

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