

CENTRAL MASSACHUSETTS METROPOLITAN PLANNING ORGANIZATION



2017-2019 CMMPO Regional Safety Report

March, 2022

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Prepared in cooperation with the Massachusetts Department of Transportation and the U.S. Department of Transportation – Federal Highway Administration and the Federal Transit Administration. The views and opinions of the Central Massachusetts Metropolitan Planning Organization expressed herein do not necessarily reflect those of the Massachusetts Department of Transportation or the U.S. Department of Transportation.

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Executive Summary

The Central Massachusetts Metropolitan Planning Organization (CMMPO) Safety Report uses data from the MassDOT impact portal for the 2017 to 2019 reporting period for motorized vehicle crashes, 2010 to 2019 for pedestrian and bicyclists related crashes, preliminary data for 2021, and performance measure targets for 2022. As well as the published listing of locations for the statewide Highway Safety Improvement Program (HSIP) eligible crash clusters and the Top 200 High Crash Locations. Communities are encouraged to use this report as guidance on where safety projects may be deemed necessary.

Crashes in the region during the period of 2017-2019 totaled 41,188 across the 40 communities that constitute the CMMPO region. Crashes in the region during the period of 2017-2019 have increased 7.1% compared to the previous reporting period of 2016-2018, which saw a total of 38,445 crashes across the region.

The communities with the most crashes during the 2017-2019 period are Worcester (40%, 16,493 crashes), Shrewsbury (5.5%, 2522 crashes) Auburn (4.9%, 2017 crashes), Westborough (4.9%, 2023 crashes), and Charlton (3.7%, 1532 crashes). The population density and the presence of major roads are contributing factors leading to higher numbers of crashes in a community. Conversely, there were six communities with less than 100 crashes Hardwick (0.24%, 98 crashes), Brookfield (0.21%, 88 crashes), East Brookfield (0.21%, crashes), New Braintree (0.13%, 54 crashes), West Brookfield (0.12%, 50 crashes) and Oakham (0.11%, 46 crashes).

The total number of fatal crashes in the region was 107 (0.3% of total crashes) with 112 total fatalities. Worcester led all communities in fatal crashes with 28 (26% of fatal crashes), with Auburn, Charlton, Shrewsbury, and Sturbridge rounding out the top five communities with five fatal crashes (4.7% of fatal crashes) each. Communities with zero fatal crashes from 2017-2019 are Blackstone, Brookfield, Douglas, Hardwick, Millville, Northbridge, North Brookfield, Princeton, Southbridge, and Webster.

MassDOT reviewed the methodology to assign a weight factor based on 2017 FHWA report: "Crash Costs for Highway Safety Analyses" to determine the crash clusters that will be included in the State's Top 200 High Crash Locations (2017-2019) and on the HSIP-eligible crash clusters list (2017-2019). Several of the locations that were identified in previous reports remain and many of them have higher "Equivalent Property Damage Only" (EPDO) values during this period.

The intersection with the highest EPDO in the region is Kelley Square and Interstate 290 (581), ranked 5th in the Commonwealth during this period. Additionally, the Kelley Square and Interstate

290 intersection led the state in total number of crashes during this reporting period, with 121 crashes.

The region has a total of 17 intersections included in the Top 200 High Crash Locations list. It is important to note that some of these locations had gone through major improvements in recent years, however the data included in this reporting cycle does not show the benefits of such improvements.

Pedestrian and bicyclist safety improvements are still needed. Worcester is the only community in the region with non-motorist's crash clusters for both, pedestrian and bicyclists. Accommodations for non-motorized modes are included in all new TIP funded projects. In addition to this, 33 off the communities in the region have adopted the Complete Streets policy, and most of them already have a prioritization plan or approved projects that will substantially improve the safety for pedestrians and bicyclists in the years to come.

Examples of pedestrian and bicycle safety improvements in the region in the reporting period include but are not limited to:

Mendon

Sidewalk Replacement and ADA Pedestrian Safety Improvements – Improvements to Main Street and Maple Street that include installation of new sidewalks, three crosswalks, and ADA curb cuts in the Village Center. There will be removal of safety obstacles and an improvement visibility and signage in addition to other traffic calming measures. The current situation downtown involves sidewalks that are not ADA accessible, and the current placement of crosswalks presents safety issues for pedestrians. Improvements will be intended to serve various services in town including the police station, town hall, post office, housing authority, and some commercial businesses.

Spencer

Main Street West Phase 1 – The construction of new sidewalk to fill an existing gap in the downtown pedestrian network that will provide safety improvements for pedestrians, improve *Safe Routes To School* eligible infrastructure for students, provide ADA accommodations, and transit improvements.

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1. Introduction

The Central Massachusetts Metropolitan Planning Organization (CMMPO) is responsible to undertake the comprehensive, continuing, and cooperative transportation planning process in the central Massachusetts region's forty member communities. Transportation planning in the region is rooted in encouraging an efficient, economical, and safe multimodal transportation system. Thus, improving safety on all public roads is one of many considerations in the transportation planning process.

Massachusetts is required to have a State Highway Safety Program (SHSP) that identifies and analyze safety problems and opportunities to use Highway Safety Improvement Program (HSIP) funds for new eligible activities under 23 USC 148. Fast Act continues the HSIP to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The HSIP requires a data-driven, strategic approach to improve highway safety and focuses on performance.

To create a baseline of the region's roadway safety status, data provided by MassDOT is analyzed, mapped, and published in this safety report for the CMMPO region. The report includes data for the period of 2017 to 2019 for auto crashes and 2010 to 2019 for non-motorist crashes. It also identifies regional safety needs and includes a list of top crash locations in the region. These lists can be used to guide future safety investments decisions for the CMMPO member communities.

1.1 Methodology

1.1.1 Approach to Safety

The AASHTO Highway Safety Manual, 1st Edition (2010) defines a crash as *"a set of events that result in injury or property damage due to the collision of at least one motorized vehicle and may involve collision with another motorized vehicle, a bicyclist, a pedestrian, or an object."* A crash is a rare and random event. A high frequency of crashes in a given location over a long period of time can be indicative of the need for improved safety for all users; as such, further analysis may be needed.

Since there are multiple factors that contribute to a crash (driver skills, attention or judgement, vehicle issues, roadway geometric alignment, or environmental factors, among others), safety analyses are approached from a broad perspective incorporating what is typically known as the 4 E's of safety: Engineering, Enforcement, Education and Emergency Response. More recently,

more E's have been added to the safety conversation, including Evaluation, Encouragement and Equity. Each one of these E's represents a unique perspective or approach to a safety issue. A description of each one follows.

- 1) **Engineering** – refers to highway design, planning, traffic controls, maintenance, management, and operations.
- 2) **Enforcement** – State and local law enforcement agencies focus on the road user behavior.
- 3) **Education** – It is carried by communication professionals, educators, citizens, and advocacy groups with an interest in prevention.
- 4) **Emergency Response** – refers to first responders, paramedics, fire, and rescue units which handle post-collision care.
- 5) **Evaluation** – refers to the data analysis and assessments which are frequently done by planners, consultants, citizen groups and transportation agencies before and after a project is completed.
- 6) **Encouragement** – refers to the impact of special events, often organized by State or local entities to encourage people to try walking or biking in support of a new or ongoing program related with health, physical activity, or modal shift.
- 7) **Equity** – refers to the safety considerations in access and opportunities to vulnerable populations, including population with disabilities, low income, minority communities, and beyond.

1.1.2 Data Sources

Crash data is essential to the highway safety planning. The data is chiefly generated by State and local police (both paper and electronic reports), and to an increasingly lesser amount, by vehicle operators who self-report crashes. The Registry of Motor Vehicles (RMV) Crash Records Section collects and manages this data, MassDOT then receives the data from the RMV and produces a listing of high crash locations by geocoding the crash data.

Each reporting cycle MassDOT identifies the Top 200 Crash Locations in the state derived from crash data obtained during the past three years. MassDOT then provides crash datasets to each of the Commonwealth's regional planning agencies. The CMMPO staff utilized Geographic Information Systems (GIS) technology to analyze MassDOT safety data for the region.

1.1.3 Criteria Used for Safety Analysis

MassDOT uses two important criteria to compare crashes throughout the state. The first is the “Equivalent Property Damage Only (EPDO)” and the second is the “Crash Cluster” methodology.

The Equivalent Property Damage Only (EPDO) method is defined in the AASHTO Highway Safety Manual as a method that *“assigns weighting factors to crashes by severity (fatal injury, non-fatal injury, property damage only) to develop a combined frequency and severity score per site. The weighting factors are calculated relative to Property Damage Only (PDO) crash costs. Crash costs include direct costs such as ambulance service, police and fire services, property damage, insurance and other costs directly related to the crashes. Crash costs also include indirect costs, i.e., the value society would place on pain and suffering, or loss of life associated with the crash.”* MassDOT weights crash types using the calculated crash costs based on the 2017 FHWA report, “Crash Costs for Highway Safety Analyses”.

The **Crash Cluster** method is a georeferenced analysis by merging adjacent crash locations into clusters. It finds nearby crashes then creates a search buffer with a 25-meter radius for automobile crashes and 100-meter radius for non-motorist crashes. The resulting polygons are merged and generate a crash cluster. The cluster methodology only includes crashes located at four-way intersections, T-intersections, Y-intersections, five-point or more; and excludes interchanges, weaving sections or intersections located at the ends of off-ramps or traffic circles / rotaries. To generate the crash cluster MassDOT uses a three-year period of auto crash data and a ten-year period for non-motorist crashes. The crash clusters are scored and ranked using the EPDO method described above.

MassDOT combines both the EPDO and crash clusters method to produce the Top High Crash Locations listing. The list is specifically for crashes located at intersections during a three-year period with the most recent available being 2017-2019. It also includes the weighted highest frequency bicycle-motor vehicle and pedestrian-motor vehicle crash locations for a ten-year period.

1.1.4 Data Quality and its Limitations

As previously mentioned, most crash data is generated by State or local law enforcement officers in the field. Over time, fewer operators are generating (and reporting) crash data. Many factors can affect data precision and usability, including variations in officers’ crash reporting, crash geocoded locations, and other data-entry factors.

Given these limitations, all data depicted in this Report should be used solely for planning purposes, as prescribed by the United States Code Title 23, Section 148, Highway Safety

Program is subject to the following limitations: *“reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section, shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addresses in the reports, surveys, schedules, lists, or other data.”* [23 USC, Section 148 (h)(4)]

Communities are encouraged to contact CMMPO staff for further analysis of the locations included in this report. Also, it is important to note that this Report contains data for the years 2017 to 2019. Some communities may have programmed or completed a highway project during this period, and the reported data may not reflect the safety improvements already made in these locations.

2. Performance Measures

The CMMPO is supportive of the vision to eliminate fatalities and serious injuries on the National Highway System (NHS) by working collaboratively on strategies with local stakeholders, other MPOs and MassDOT. Safety is a top priority on the federal, state, and regional levels. The Safety Performance Management Measures (PM1) regulation supports the Highway Safety Improvement Program (HSIP) and requires State Departments of Transportation and MPOs to set HSIP targets for five safety performance measures.

The CMMPO has the option to follow the State's quantifiable performance targets or develop their own quantifiable performance targets. The CMMPO voted to adopt MassDOT's calendar year 2022 (CY22) highway safety targets for five federally required highway safety performance measures at a meeting held on February 19, 2022. These safety performance measure areas are:

1. Number of fatalities
2. Rate of fatalities per 100 million vehicle-miles traveled (VMT)
3. Number of serious injuries
4. Rate of serious injuries per 100 million VMT
5. Number of non-motorized fatalities and serious injuries

FHWA requires states to submit the five performance targets annually in an HSIP report. Whereas state DOTs submit their targets to FHWA via the HSIP report, MPOs must present the safety measures and targets in their Long-Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP).

2.1 Massachusetts Highway Safety Performance Measures Trends

FHWA requires the use of five-year rolling averages when setting performance targets. These targets are used for the required HSIP report due on August 31st each year, or alternatively MPOs can set their own quantifiable targets by February 27th of the calendar year. In past years, targets were developed by estimating safety measure trend values based on linear trend lines calculated using five-year rolling averages. However, because of the COVID-19 global pandemic, data from 2020 and 2021 has been impacted. As a result, changes in performance measure settings occurred in all five categories.

2.2 Changes in Methodology

In 2020 there was an increase in fatalities with a decrease in vehicle miles traveled (VMT) due to the pandemic. This statistical anomaly impacted the reported data. The number of actual fatalities in 2020 did not follow the established trend towards zero fatalities and serious injuries. To continue towards the goal of zero fatalities and serious injuries, changes were made

in the CY21 data so that the projections are based on trends continued from CY19 to move in a positive direction towards zero deaths.

Since there were anomalies in the data from CY20, given the unique circumstances from that year, it was disregarded. Instead, the CY22 projections are based on a 2.5% reduction in fatalities from CY21 resulting in a five-year average fatalities projection of 340 for the State, as shown in **Table II-1**.

Table II.1: Massachusetts Statewide Highway Safety Performance Trends

Statewide Highway Safety Performance Measure	2016 Statewide Safety Measure Value (2012-16) Rolling Average)	2019 Statewide Safety Measure Value (2015-19) Rolling Average)	2020 Statewide Safety Measure Value (2016-20) Rolling Average)	2021 Statewide Safety Measure Target (Expected 2017-21 Rolling Average)	2022 (2018-2022 Target)
Number of fatalities	364	353	354	344	340
Rate of fatalities per 100 million VMT	0.61	0.58	0.61	0.56	0.56
Number of serious injuries	3146	2801	2641	2542	2504
Rate of serious injuries per 100 million VMT	5.24	4.37	4.28	4.17	4.11
Number of non-motorized fatalities and serious injuries	540.8	540.8	484	475	471

Normally the fatality rate represents the five-year average of fatalities divided by the five-year average of VMTs. However, there was a noticeable reduction in VMTs and slight increase in fatalities causing fatality rates to spike. The 2022 projection is now 0.56 fatalities per 100 million VMTs for 2022 (five-year average of 2018-2022) as seen in **Table II-1**. The goal of safety initiatives is to move the fatality rate closer and eventually too, zero fatalities per 100 million VMTs.

Additionally, it is anticipated that there will be an overall decrease in the number of serious injuries due to a continual downward trend line as well as the implementation of countermeasures that are being developed as part of the 2018 Strategic Highway Safety Plan.

The MassDOT projections for serious injuries use CY19 data as a base to reflect changes in VMT due to the pandemic, and the CY22 target of 2,504 was set to reflect this trend. Due to unpredictable fluctuations between 2019 and 2020 data and an overall decreasing trendline, a 3% reduction in annual serious injuries from 2018 to 2021, and a 4% annual reduction from 2021 to 2022, were assumed to calculate the CY22 target of 2,504 serious injury crashes.

Like the fatality rate, it is anticipated that the downward trend line will result in a drop in the rate of serious injuries from 4.28 per 100 million VMT between 2017–2021 to 4.11 between 2018–2022 as seen in **Table II-1**. Five-year VMT data were used between 2018 – 2022 to calculate this rate.

2.3 CMMPO Highway Safety Performance Trends

MassDOT and the CMMPO will continue to work together and strategize planning and programming at the state and MPO levels to support improvements in highway safety outcomes. The CMMPO supports the state’s highway safety targets (**Table II-2**) thus the CMMPO’s Safety Performance Trends are like the state’s Safety Performance Trends. FHWA guidance indicates to start with a trend line as the target for CY 2022 and then consider external factors and planned implementation to set targets for the following performance periods.

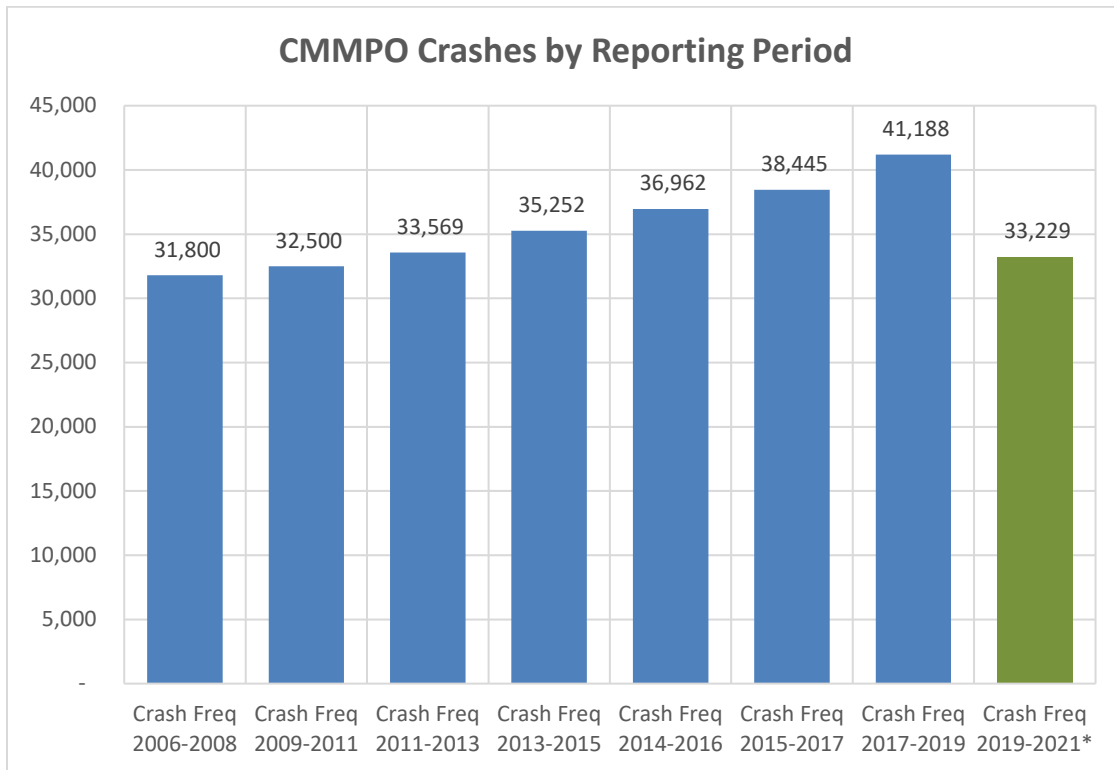
Table II.2: CMMPO Safety Performance Trends

Highway Safety Performance Measure	2016 Safety Measure Value (2012-16) Rolling Average)	2019 Safety Measure Value (2015-19) Rolling Average)	2020 Safety Measure Value (2016-20) Rolling Average)	2021 Safety Measure Target (Expected 2017-21 Rolling Average)	2022 (2018-2022 Target)
Number of fatalities	36	35	34	33	32
Rate of fatalities per 100 million VMT	0.62	0.6	0.58	0.58	0.58
Number of serious injuries	264	195	242	234	238
Rate of serious injuries per 100 million VMT	4.54	3.8	4.19	4.13	4.23
Number of non-motorized fatalities and serious injuries	35	35	33	29	28

3. Regional Overview

During the period of January 1, 2017, to December 31, 2019, the CMMPO region had 37,755 reported crashes, and 3,433 unreported or unknown crashes, for a total of 41,188 crashes (shown in **Figure III-1**), an average of 13,730 crashes per year. The crash frequency, or number of crashes per year, increased 7.1% during the period of 2017-2019, compared with the 2015-2017 period which had 38,445 crashes.

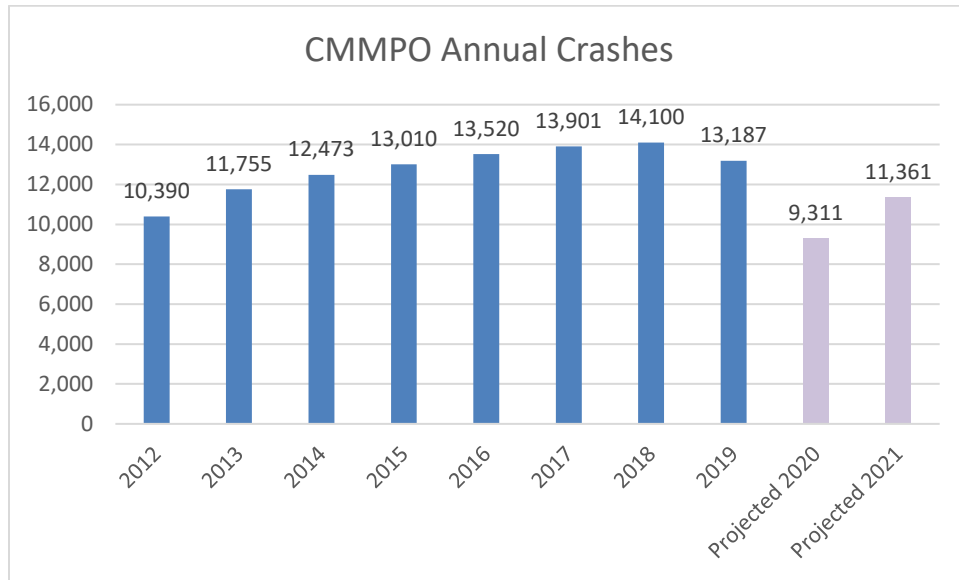
Figure III-1: Crashes in CMMPO Region by Reporting Period



Data from the 2019 – 2021 period is not complete

This crash frequency data can be broken down annually as shown in **Figure III-2**.

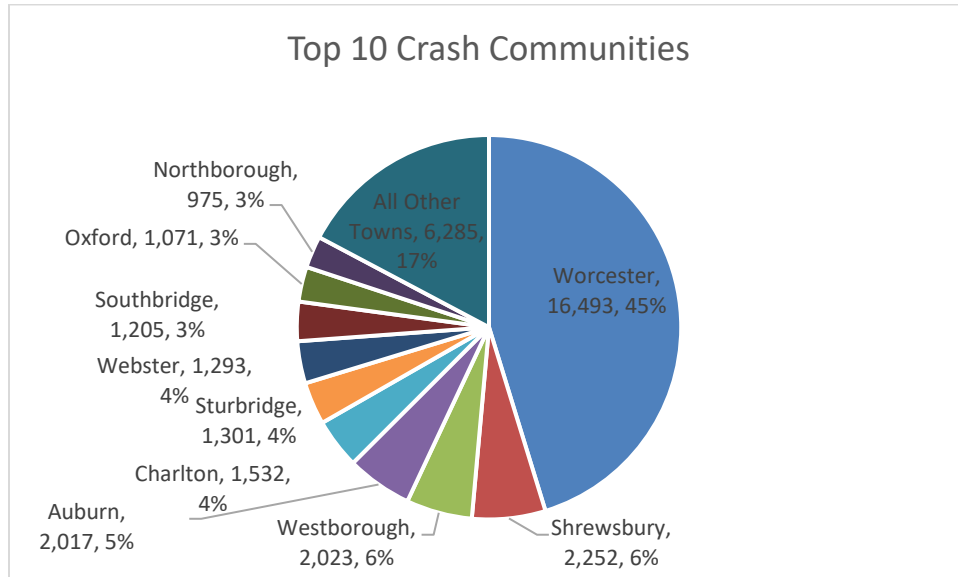
Figure III-2: CMMPO Region Annual Crashes



The annual number of crashes increased every year from 2012 until 2018. In 2019, crashes were trending down before the widespread prevalence of COVID-19. The pandemic would greatly affect projected data from 2020 (9,311 crashes) and 2021 (11,361 crashes) as seen in **Figure III-2**, where crashes numbers appear to have reduced dramatically as less people were traveling for work.

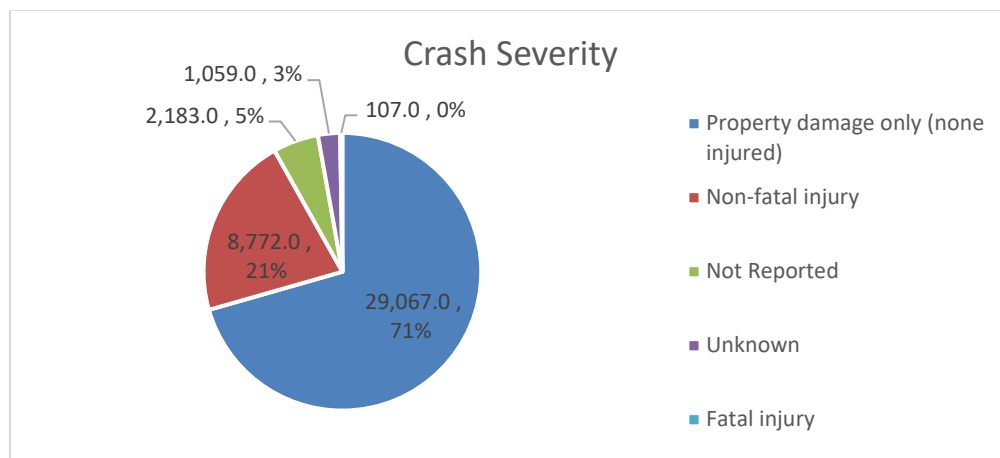
As shown in **Figure III-3**, the top five CMMPO communities for crash frequency are Worcester (16,493 crashes, 40%), Shrewsbury (2,252 crashes, 5.47%) Westborough (2,023 crashes, 4.9%), Auburn (2,017 crashes, 4.9%), and Charlton (1,532 crashes, 3.72%). Communities with a crash frequency of less than 100 crashes are Hardwick (98 crashes, 0.24%), Brookfield (88 crashes, 0.21%), East Brookfield (88 crashes, 0.21%), New Braintree (54 crashes, 0.13%), West Brookfield (50 crashes, 0.12%) and Oakham (46 crashes, 0.11%).

Figure III-3: Top 10 Communities by Total Crash Frequency (2017 – 2019)



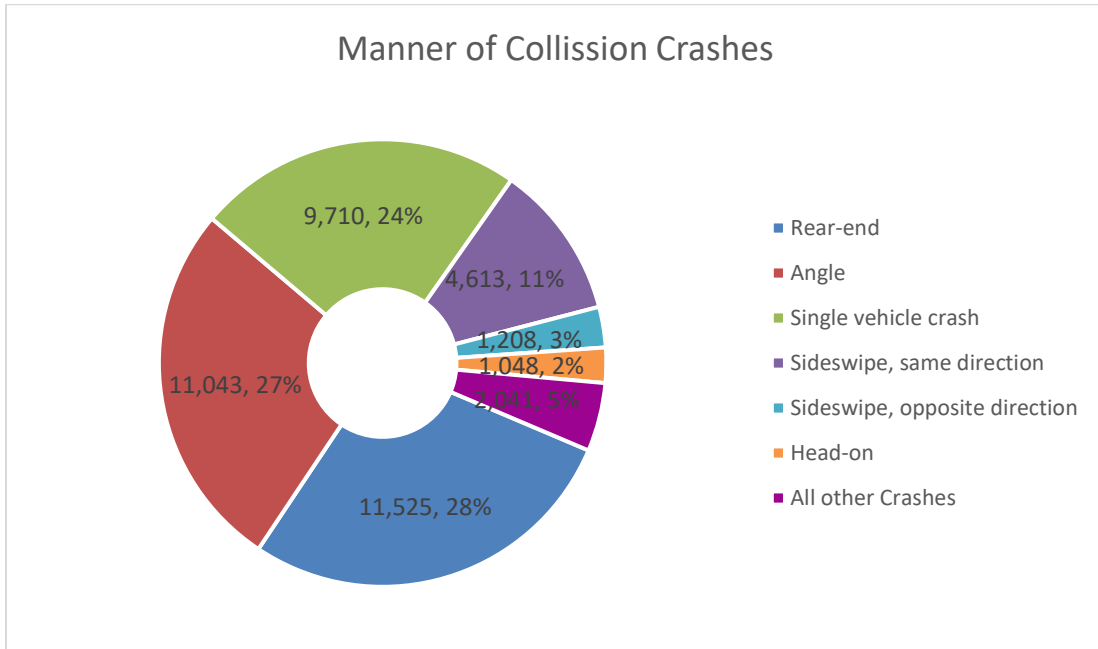
Crash severity is shown in **Figure III-4**. Most of the crashes (29,067 crashes, 70.6%) were property damage only type of crashes, like previous reporting periods. During the period of 2017 to 2019, injury crashes represented another 21.3% with 8,772 injury crashes. During this period, 107 fatal crashes were reported in the region, a proportion of 0.3% of all crashes.

Figure III-4: Crash Severity in Region (2017 - 2019)



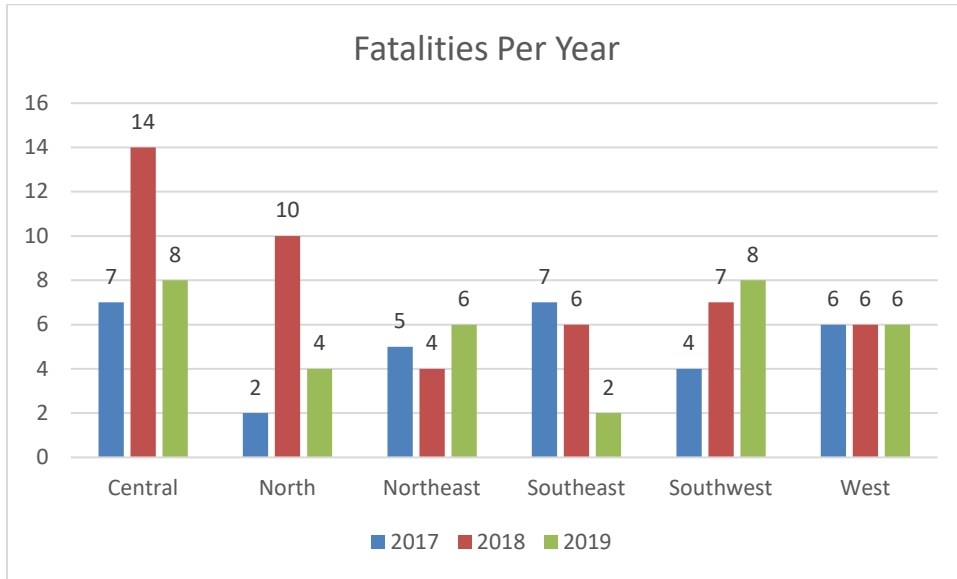
Related with the manner of collision, 28% (11,525 crashes) of all crashes were rear-end crashes. As shown in **Figure III-3**, the next most common manner of collision was angle crashes with 26.8% (11,043 crashes), followed by single vehicle crashes (9,710 crashes, 23.6% rounding out the top three manners of collision.

Figure III-5: Manner of Collision of Crashes in Region (2017 - 2019)



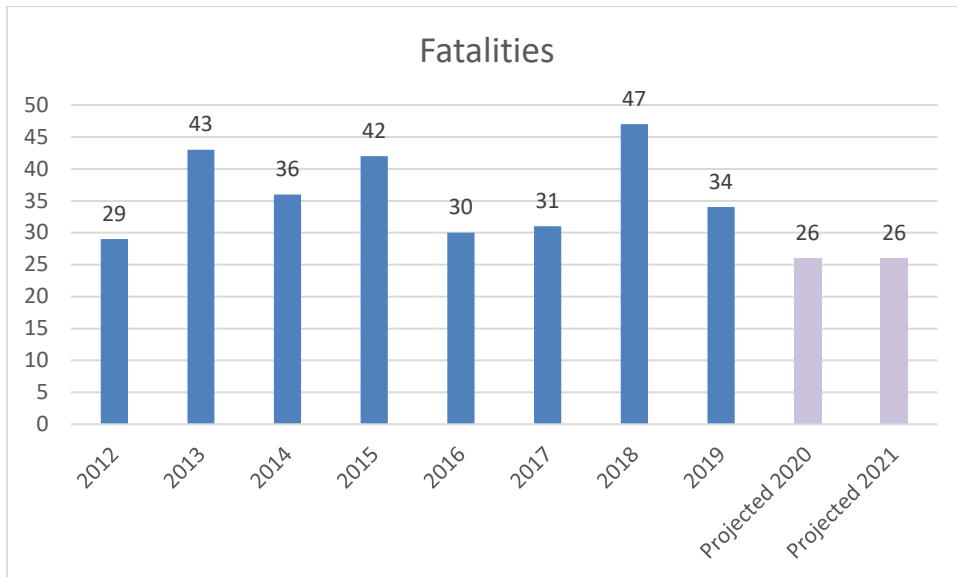
There were 112 fatalities in the region during the reporting period. The breakdown of fatalities by region is shown in **Figure III-6**. The Central subregion (Worcester) had the most fatalities with 29, followed by Southwest (19 fatalities), West (18 fatalities), North (16 fatalities) and then both Northeast and Southeast with 15 fatalities each.

Figure III-6: Crash Fatalities in Subregions with Annual Breakdown (2017 - 2019)



Shown in **Figure III-7**, fatalities jumped 52% from 2017 to 2018 in the region, going from 31 fatalities to 47 fatalities. This jump occurred before the COVID-19 pandemic which saw leveling fatalities with a substantial decrease in vehicle miles traveled in 2020 and 2021.

Figure III-7: Annual Fatalities in Region (2012 - 2019) with 2020-1 Projections



4. High-Crash Locations

4.1 Top 200 Intersections

Every year, MassDOT publishes a report with the State’s top 200 priority intersections (3-year reporting period) and the top 10 pedestrian and top 10 bicycle high crash locations (10 years reporting period). The locations are ranked by EPDO. From the state’s Top 200 list (3-year reporting period) shown in **Table IV-1**, there are 17 intersections located in the CMMPO region, 14 of which are in Worcester. Other communities included in the Top 200 list are: Charlton, Mendon, and Sutton.

Table IV-1: Region's Intersections Included in Top 200 High Crash Locations

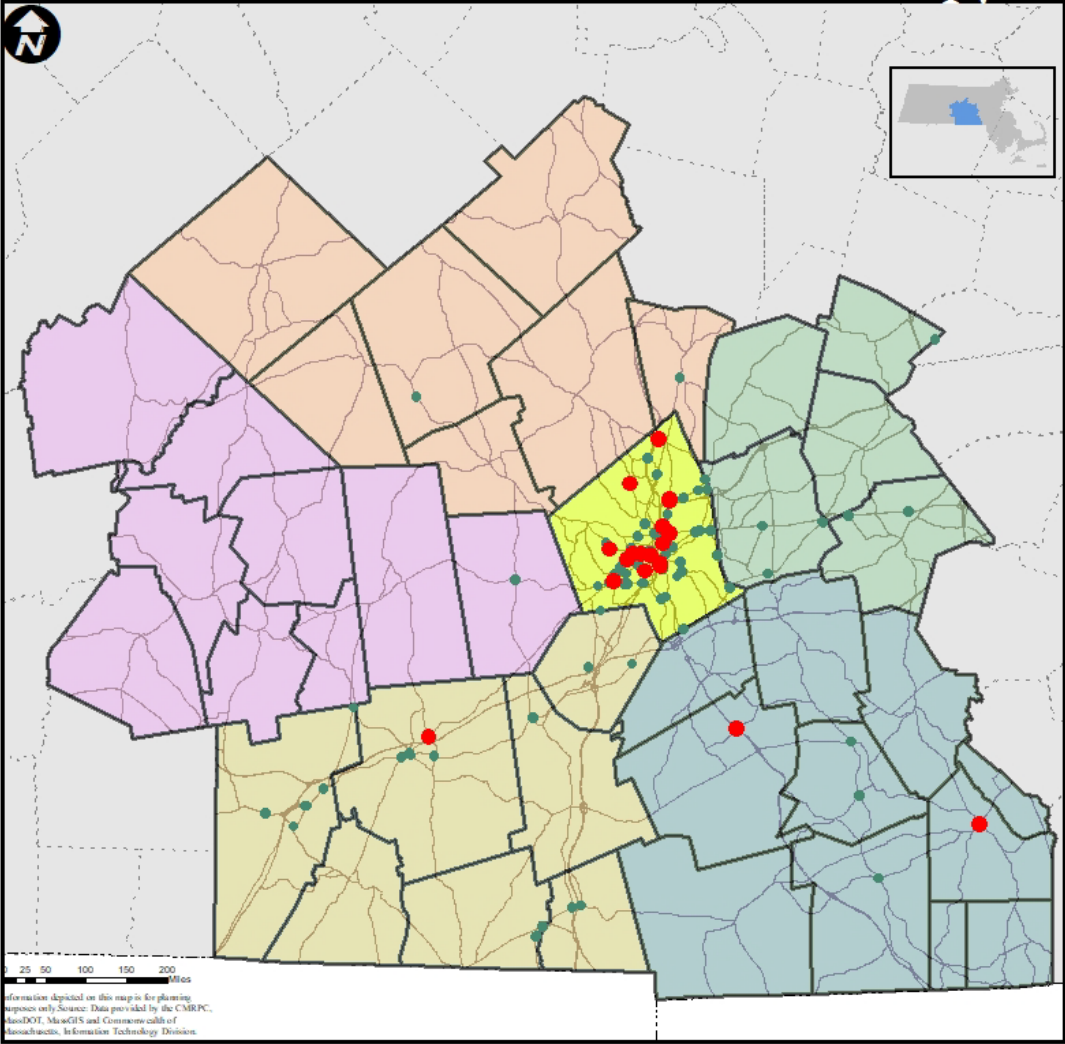
Rank	Community	Intersection	EPDO
5	Worcester	Kelley Square / Interstate 290	581
33	Worcester	Southbridge Street / Hammond Street	421
38	Worcester	Chandler Street / Mason Street	395
47	Worcester	Park Avenue / May Street	374
50	Worcester	Chandler Street / Piedmont	371
59	Worcester	Summer Street / East Central Street	360
82	Worcester	Lincoln Street / Catharine Street	332
85	Worcester	Burncoat Street / Millbrook Street	329
88	Sutton	Worcester Providence Turnpike / Boston Road	328
98	Worcester	May Street / June Street	311
135	Worcester	Main Street / Mill Street	283
143	Charlton	Stafford Street / Center Depot Road	277
148	Worcester	Grove Street / Chester Street	273
155	Worcester	Mountain Street West / Interstate 290	269
160	Mendon	Main Street / Milford Street	267
186	Worcester	Belmont Street / Hooper Street	255
195	Worcester	Main Street / Chandler Street	251

4.2 HSIP-Eligible Locations

MassDOT provides a list with the HSIP-eligible crash clusters in the CMMPO region. During the period of 2017 to 2019, 101 crash clusters were identified as HSIP-eligible; including the Top 200 Intersections which are **all** HSIP-eligible locations, thus represent the highest priority. The threshold to determine HSIP eligibility is an EPDO of 135. These HSIP locations are displayed in **Figure IV-1** Any location in the region with a crash cluster and an EPDO lower than 135 is not HSIP-eligible. A complete list of the HSIP-eligible crash clusters in the region is included in Appendix A.

Figure IV-1: Top 200 Statewide High Crash Locations and HSIP Eligible Intersections in CMMPO Region

CMMPO 2017 - 2019 Safety Report



CMMPO HSIP & Top 200 Crash Locations

	 CMMPO TOP 200 Locations	
	 CMMPO HSIP 2017 2019	CENTRAL MASSACHUSETTS Regional Planning Commission

5. Non-Motorists High-Crash Locations

5.1 Top 200 Locations

During the period of 2010 to 2019 there were two locations that ranked in the top Statewide for EPDO for the region, both occurring in Worcester. These two locations, in essence cover the entire CBD of Worcester and have a combined EPDO of 3490, (Main Street and Foster Street, EPDO 1924, Rank 5; Main Street and Chandler Street, EPDO 1572, Rank 8) (See MassDOT Map **Figure V-1**). During this period, a total of 144 crashes were included in the Main Street and Foster Street cluster and a total of 112 in the Main Street and Chandler Street cluster. More than half of the crashes (52%, 133 crashes) were non-serious injury or potential injury crashes. There were 29 (11.3%) serious injury or fatal crashes. The remaining crashes, totaling 94 crashes (36.7%), were made up of property damage only or not reported crashes.

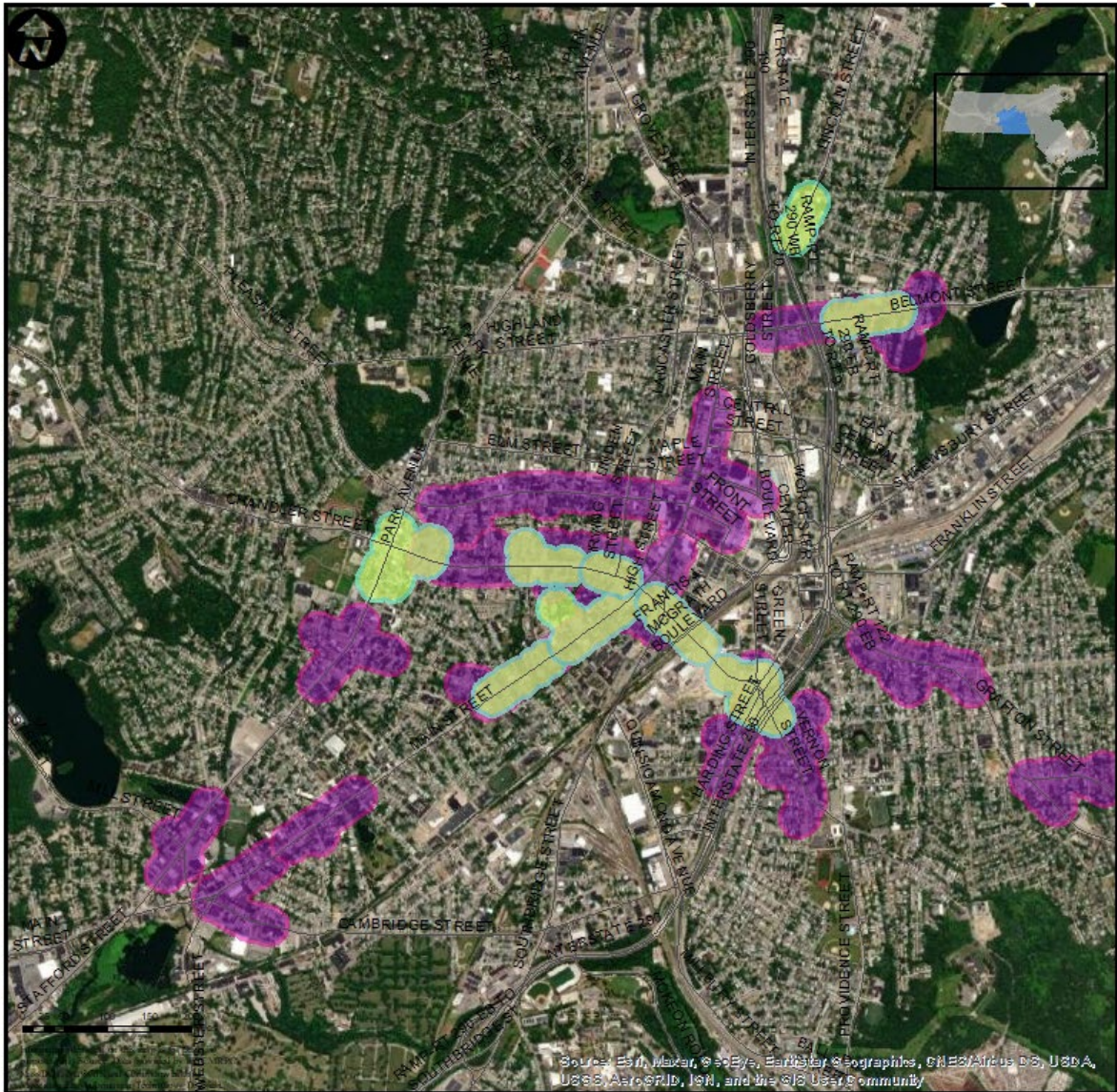
There are no high crash bicycle-motor vehicle locations in the CMMPO region listed on the State's top 10 high crash locations priority list for this period. The highest position cluster in the region is at Interstate 290 and Harding Street, ranked 43rd with an EPDO of 245.

5.2 HSIP-Eligible Non-Motorists Crash Clusters



From 2010 to 2019, there were 14 HSIP-eligible crash clusters in the region. 13 of the 14 clusters occurred in Worcester, with the one exception occurring in Webster/Dudley (Main Street/West Main Street). These HSIP-eligible clusters accounted for 79 fatal and serious injury crashes (12.34%). More than half of the HSIP-eligible cluster crashes, 327 (51.09%) resulted in a non-serious injury or possible injury crash and over a third, 234 crashes (36.56%) of all the pedestrian crashes in these clusters were property damage only or not reported. The main corridors with HSIP-eligible pedestrian crash clusters are Main Street, Chandler Street, Kelley Square, and Lincoln Street in Worcester and constitute a majority of Worcester's Central Business District (CBD), shown in **Figure V-1**.

Figure V-1: Non-Motorized Crash Clusters in Downtown Worcester

CMMPO 2017 - 2019 Non-Motorized Crash Clusters



Downtown Worcester Bicycle and Pedestrian Crash Locations

	<ul style="list-style-type: none"> Bicycle Crash Clusters Pedestrian Crash Clusters 	
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Since 13 of 14 (93%) of non-motorists HSIP-eligible crash clusters are in Worcester (**Table V-1**), the City should consider prioritizing these corridors with safety countermeasures and the required accommodations through programs like Complete Streets or the Transportation Alternatives Program. Additionally, the Towns of Dudley and Webster should examine partnerships to explore safety ideas for the Main Street and Davis Street area (**Figure V-2**).

The region has a total of 9 HSIP-eligible bicycle crash clusters during the same period and all of them located in Worcester. The main corridors with HSIP-eligible bicycle crash clusters are Main Street, Chandler Street, Kelley Square and Lincoln Street (**Table V-2**). The clusters include a total of 128 crashes, of which 4.7% were fatal or serious injury crashes. Just under half of the crashes were minor or possible injury crashes, 49.2% and 46.1% were property damage only crashes.

Table V-1: HSIP-Eligible Pedestrian Crash Clusters

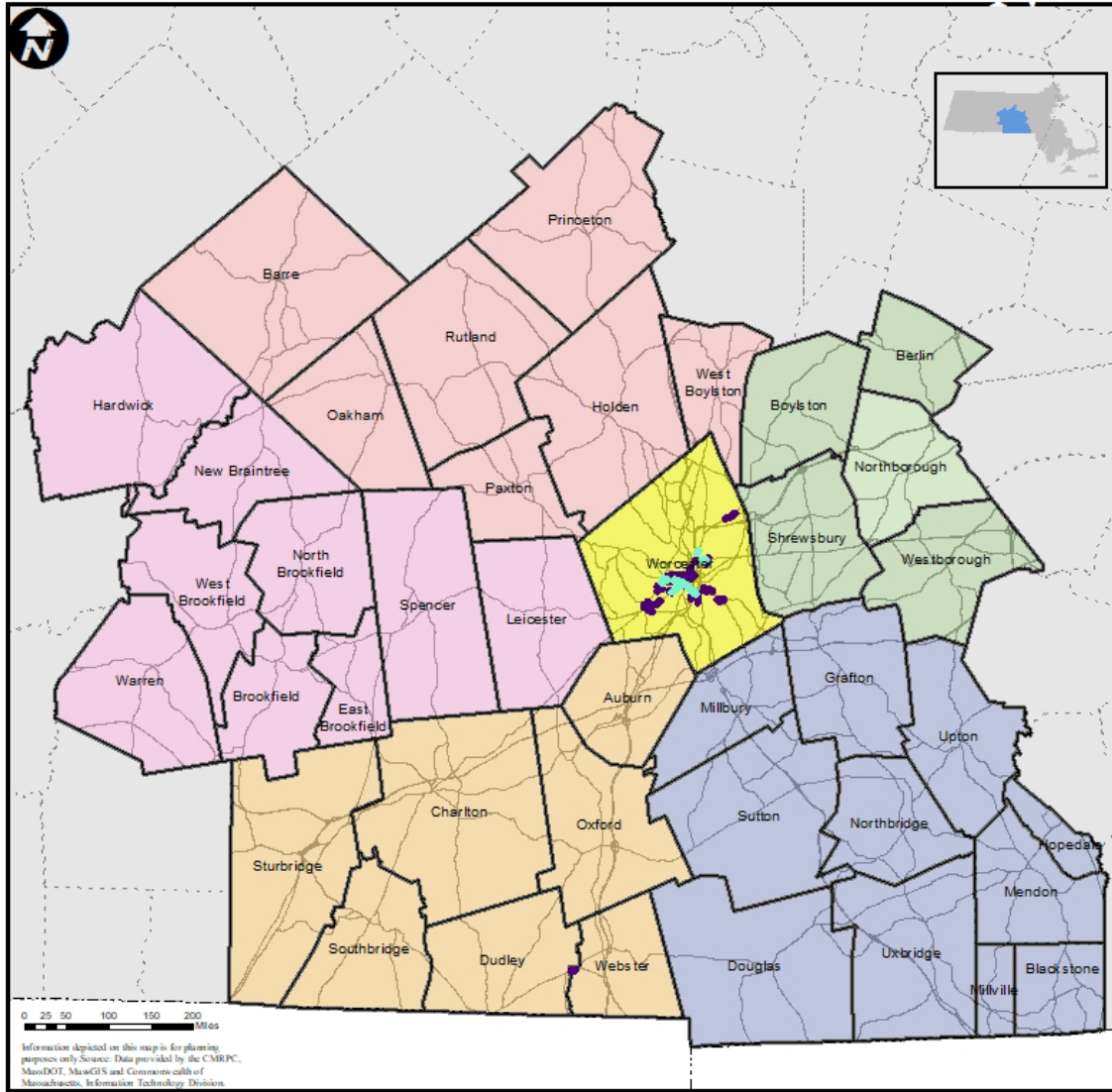
EPDO	Location	Fatal and Injury Crashes	Non-Serious Injury and Possible Injury Crashes	PDO Only or Not-Reported Crashes	Crash Counts	Town
1572	Pleasant Street / Main Street	14	59	39	112	Worcester
344	Belmont Street / Eastern Avenue	3	13	8	24	Worcester
373	May Street / Park Avenue	2	15	16	33	Worcester
448	Main Street / Cambridge Street	7	14	7	28	Worcester
304	Lincoln Street / Pasadena Parkway	5	9	10	24	Worcester
618	Belmont Street / Interstate 290	2	27	9	38	Worcester
426	Main Street / Freeland Street	4	16	6	26	Worcester
393	Chandler Street / Austin Street	6	12	15	33	Worcester
1924	Main Street / Austin Street	15	74	55	144	Worcester
261	Park Avenue / Mill Street	1	11	9	21	Worcester
253	Main Street / Davis Street	2	10	1	13	Webster, Dudley
597	Grafton Street / Mendon Street	7	21	9	37	Worcester
277	Grafton Street / Massasoit Road	2	11	4	17	Worcester
970	Interstate 290 / Vernon Street	9	35	46	90	Worcester

Table V-2 HSIP-Eligible Bicycle Crash Clusters

EPDO	Location	Fatal and Injury Crashes	Non-Serious Injury and Possible Injury Crashes	PDO Only or Not-Reported Crashes	Crash Counts
155	Park Avenue / Chandler Street	0	7	8	15
152	Chandler Street / Austin Street	0	7	5	12
128	Lincoln Street / Interstate 290	1	5	2	8
199	Main Street / King Street	2	7	10	19
152	Main Street / Murray Avenue	1	6	5	12
110	Chandler Street / Irving Street	0	5	5	10
245	Interstate 290 / Harding Street	1	10	14	25
217	Madison Street / Southbridge Street	1	9	7	17
150	Belmont Street / Eastern Avenue	0	7	3	10

Figure V-2 Non-Motorist Crash Clusters in Region (2017 – 2019)

CMMPO 2017 - 2019 Safety Report



CMMPO Bicycle and Pedestrian Crash Locations



6. Special Considerations

6.1 Safety in Rural Areas

For this report, the CMMPO relies on the 2010 Census Urban and Rural Classification definition. For the Census, an urban area comprises a dense settled core of census tracts and/or census blocks that meet the minimum population density requirements, along with adjacent territory containing non-residential urban land uses, among other criteria. On the other hand, a rural area encompasses all population, housing, and territory not included within an urban area.

During the 2017 to 2019 period, 4.4% crashes occurred in the non-urbanized area. In addition to this, there are three HSIP-eligible locations in the CMMPO Rural Area. The locations are:

1. Sturbridge – Route 49 and Putnam Road – EPDO: 239
2. Rutland – Route 122; Barre Paxton Road and Pleasantdale Road – EPDO: 184
3. Charlton – Charlton Road and Fiske Hill Road – EPDO: 136

The CMMPO plans to work with these communities to improve safety in these locations.

6.2 Single Vehicle Crashes Travelling Straight Ahead

During the period between 2017 and 2019, single vehicle crashes represented 23.6% of all the crashes in the region, or a total of 9,710 crashes. Of the 107 fatal crashes that occurred in the region, 60 were related to single vehicle crashes. A quarter of the fatal single vehicle crashes took place in Worcester, with a total of 17 crashes. The second most crashes occurred in Holden (4) and the third most crashes occurred in Oxford (3).

The other towns of Barre, Berlin, East Brookfield, Grafton, Hopedale, Leicester, New Braintree, Oakham, Paxton, Sutton, Warren, and West Brookfield each had one single vehicle crash.

6.3 Crashes with Animals

Crashes with animals include deer and animals like ducks, turtles, among others. Of all the crashes in the region during the period of 2017 to 2019, 796 crashes were collisions with a deer, whereas 107 were collisions with other animals. Most of the crashes with animals were property damage only crashes. Nevertheless, there were 31 nonserious injury crashes in the region related with animals and 11 crashes involving animals that were unknown or not reported.

There were five injury crashes with animals in Charlton, three in Sturbridge, two in East Brookfield, Dudley, Northborough, and Westborough, and one in Auburn, Barre, Mendon,

Millbury, Northbridge, New Braintree, Oakham, Oxford, Shrewsbury, Spencer, Uxbridge, Upton Webster, West Boylston, and Worcester.




































6.4 Work Zone Crashes

Data for the most harmful event includes collision with work zone maintenance equipment. In the region, during the period of 2017 to 2019, there were a total of 35 collisions with work zone maintenance equipment, 19 of which occurred under daylight conditions. Most of the crashes were property damage only crashes (71%), but eight were injury crashes (23%). Among the injury crashes, Worcester accounted for four injury crashes and Auburn, Holden, Oxford, and Millbury accounted for one injury crash each. There were no fatal crashes.

6.5 Heavy Vehicle Crashes

With the prevalence of warehouses, distribution centers, and delivery services becoming common place, there is speculation that there will be an uptick in crashes involving heavy vehicles. Heavy vehicles, in this case, are classified as anything Class 5 or higher in the FHWA **Figure-VI-1**. There were 3,003 (7.3%) crashes involving heavy vehicles in the region from 2017-2019. Of these 3,003 crashes, 13 crashes were fatal. Additionally, 210 of the crashes occurred in HSIP locations, including two fatality crashes. There were 67 heavy vehicle crashes that occurred in MassDOT Top 200 intersections, all 17 of the region's intersections in the top 200 had heavy vehicle crashes occur from 2017-2019. These numbers represent the start of a baseline for reporting on heavy vehicle crashes as the demand for delivery services increase.

Figure VI-1: FHWA Vehicle Classification Chart

Class 1 Motorcycles		Class 7 Four or more axle, single unit	
Class 2 Passenger cars		Class 8 Four or less axle, single trailer	
			
			
			
Class 3 Four tire, single unit		Class 9 5-Axle tractor semitrailer	
			
			
Class 4 Buses		Class 10 Six or more axle, single trailer	
			
		Class 11 Five or less axle, multi trailer	
Class 5 Two axle, six tire, single unit		Class 12 Six axle, multi-trailer	
			
		Class 13 Seven or more axle, multi-trailer	
Class 6 Three axle, single unit			
			
			
			

6.6 Impaired Driving

There were 312 crashes that involved an impaired operator in the region from 2017 – 2019, including one fatality, which occurred in Oakham and 122 non-fatal injury crashes. The most crashes occurred in Worcester with 62 impaired crashes (19.87%) followed by Auburn (22 impaired crashes, 7.05%), Charlton (20 impaired crashes, 6.41%), Shrewsbury (20 impaired crashes, 6.41%) and Mendon (18 impaired crashes, 5.77%) rounding out the top five communities. The six communities of East Brookfield, New Braintree, North Brookfield, Princeton, Warren, and West Brookfield had no impaired crashes.

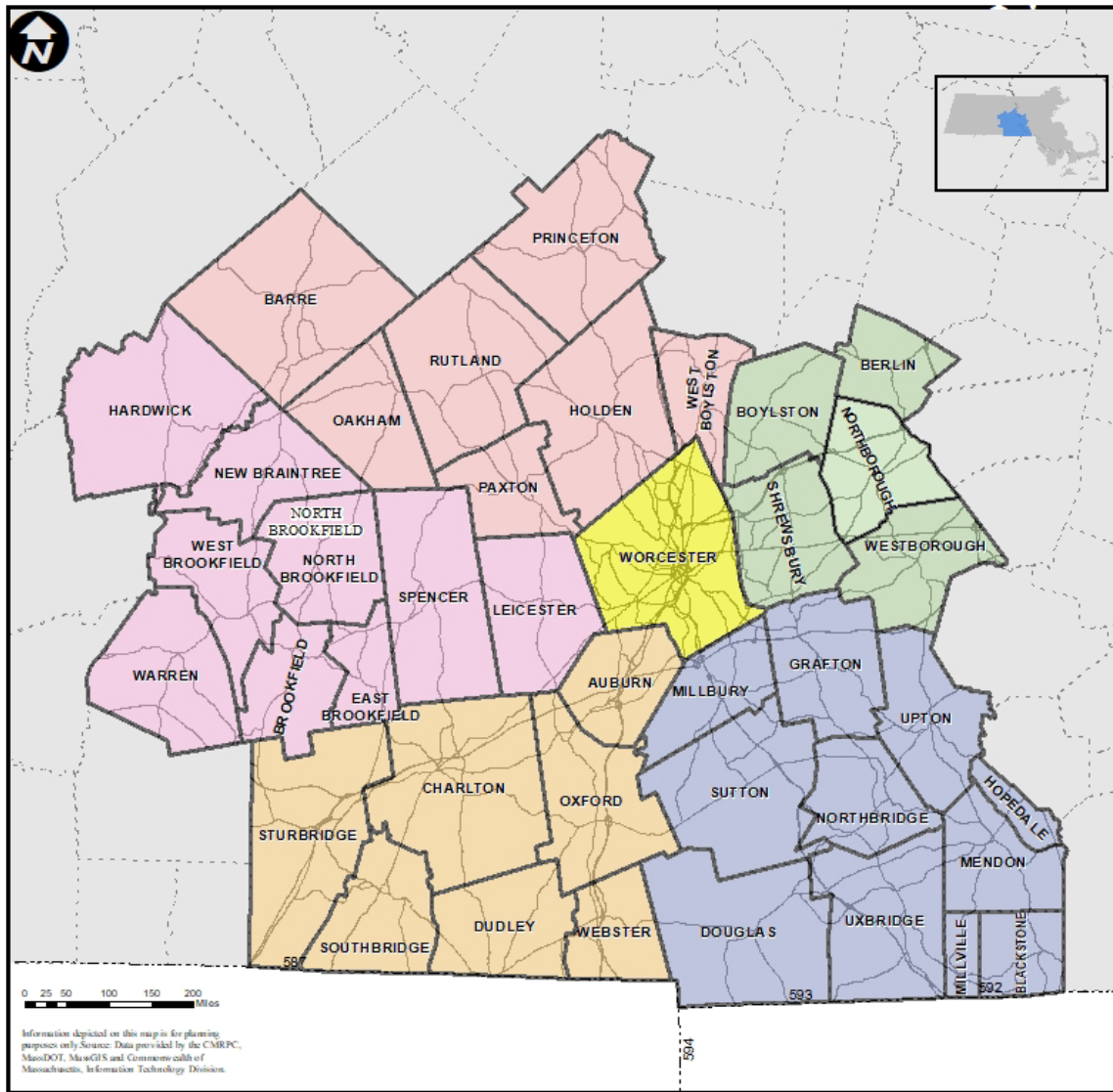
Ten impaired crashes occurred in the region's HSIP locations, including two locations in Westborough, which are the intersections of Turnpike Road (Route 9) and Otis Street. There was one impaired crash in the region that occurred in a Massachusetts Top 200 location, which was in Charlton at the intersection of Stafford Street and Center Depot Street.

7. Subregion Breakdown

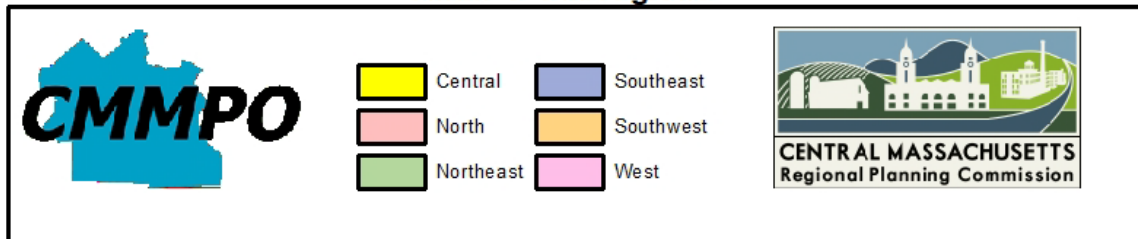
The CMMPO region is very diverse, from New England's second largest city, Worcester, to small rural communities like New Braintree, with a population 996 people as of the 2020 census. With this being the case, **Figure VII-1** shows the CMMPO region is split into five sub-regions, Central (Worcester), North, Northeast, Southeast, Southwest, and West.

Figure VII-1: CMMPO Subregions

CMMPO Subregions



CMMPO Subregions



The Central subregion is the region’s largest and includes the entire City of Worcester. As shown in **Figure VII-2**, the Central subregion had 16,849 crashes, accounting for 40% of the entire region’s crash in the reporting period. The North and West subregions both made up less than 5% of the total crashes in the reporting period. The West subregion had 2,057 crashes (5%) and the North region had 1950 (4.7%).

Figure VII-2: Number of Crashes by CMMPO Subregion

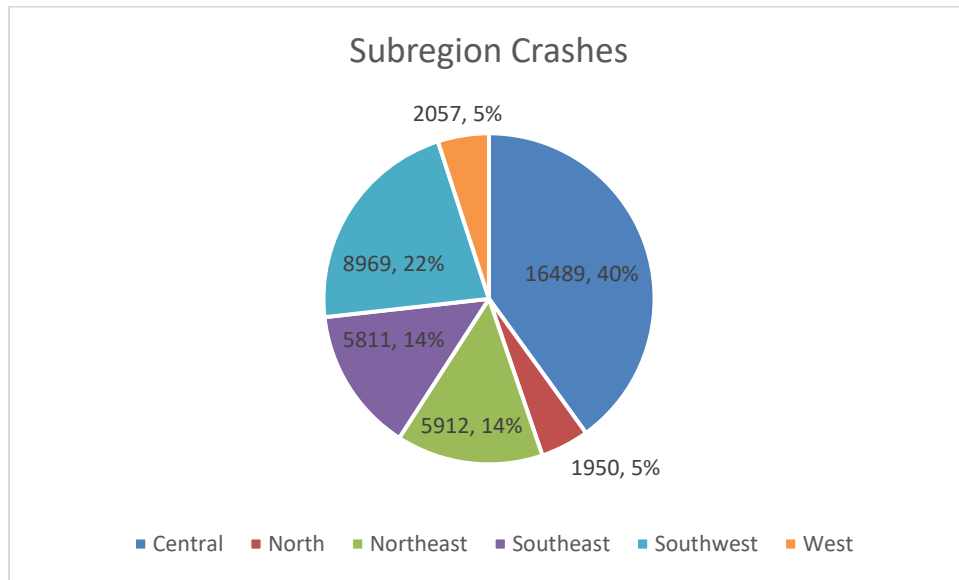
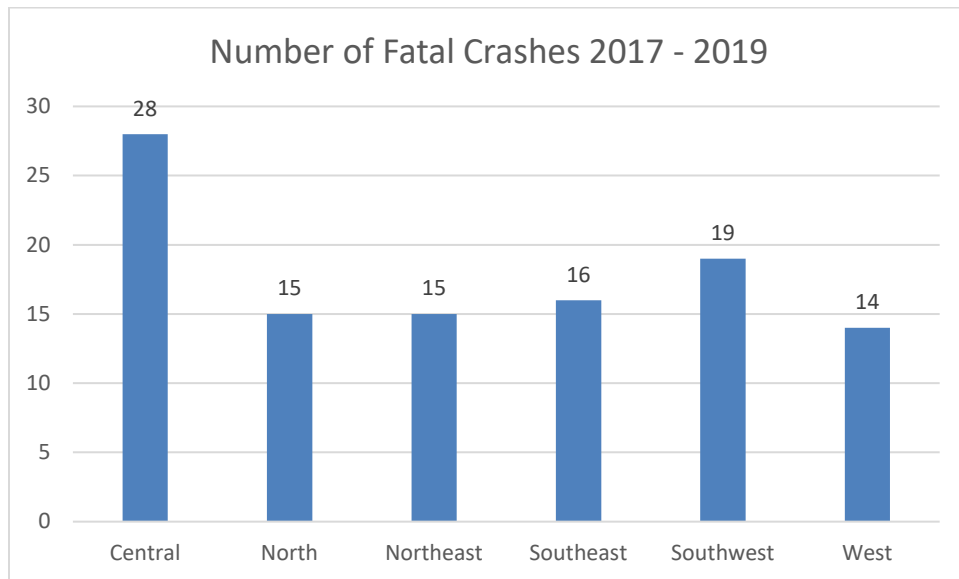


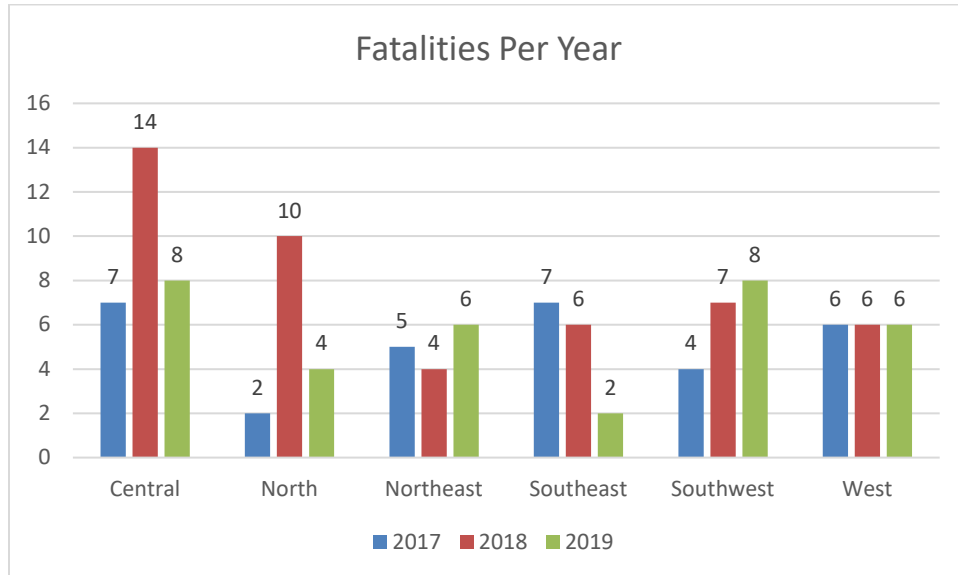
Figure VII-3 shows the fatal crashes in the subregion ranged from 14 in the West subregion to being double to 28 in the Central subregion.

Figure VII-3: Number of Fatal Crashes in Reporting Period (2017 - 2019)



The average number of fatal crashes in the 2017 - 2019 reporting period is 35.7 (107 fatal crashes between 2017 – 2019). The average number of total fatalities per year is slightly higher, with 37.7 fatalities per year (112 fatalities between 2017 - 2019). Shown in **Figure VII-4**, the Central subregion had the most fatalities (29) followed by the Southwest subregion (19), and West subregion (18). The North subregion had 16 fatalities while the Northeast and Southeast subregions had 15 fatalities, totaling 112 fatalities in the region from 2017 – 2019.

Figure VII-4: CMMPO Fatalities Per Year by Subregion in Reporting Period (2017 - 2019)



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Appendix A: 2017-2019 HSIP-Eligible Auto Crash Cluster Regional List by Town

EPDO	Location	Fatal and Injury Crashes	Non-Serious and Possible Injury Crashes	PDO or Not Reported Crashes	Crash Count	Town
581	KELLEY SQUARE / INTERSTATE 290	0	22	98	121	WORCESTER
421	SOUTHBRIDGE STREET / HAMMOND STREET	0	17	22	41	WORCESTER
395	CHANDLER STREET / MASON STREET	0	16	38	55	WORCESTER
374	PARK AVENUE / MAY STREET	1	15	38	54	WORCESTER
371	CHANDLER STREET / PIEDMONT STREET	0	15	35	51	WORCESTER
360	SUMMER STREET / EAST CENTRAL STREET	2	14	24	40	WORCESTER
332	LINCOLN STREET / CATHARINE STREET	0	13	17	32	WORCESTER
329	BURNCOAT STREET / MILLBROOK STREET	0	14	35	49	WORCESTER
328	WORCESTER PROVIDENCE TURNPIKE / BOSTON ROAD	0	14	34	48	SUTTON

311	MAY STREET / JUNE STREET	0	13	17	31	WORCESTER
283	MAIN STREET / MILL STREET	1	10	31	43	WORCESTER
277	STAFFORD STREET / CENTER DEPOT ROAD	0	11	25	37	CHARLTON
273	GROVE STREET / CHESTER STREET	0	11	21	33	WORCESTER
269	MOUNTAIN STREET WEST / INTERSTATE 190 SB CD ROAD	1	11	17	29	WORCESTER
267	MAIN STREET / MILFORD STREET	1	11	36	47	MENDON
255	BELMONT STREET / HOOPER STREET	1	10	24	35	WORCESTER
251	MAIN STREET / CHANDLER STREET	0	10	20	31	WORCESTER
245	HEARD STREET / CLOVER STREET	0	10	35	45	WORCESTER
241	BOYLSTON STREET / NORTHEAST CUTOFF	0	11	10	21	WORCESTER
239	ROUTE 49 / PUTNAM ROAD	0	10	8	19	STURBRIDGE
227	PLANTATION STREET / LINCOLN STREET	0	10	17	27	WORCESTER
227	CAMBRIDGE STREET / MCKEON ROAD	1	9	17	27	WORCESTER

227	BURNCOAT STREET / MELROSE STREET	0	9	17	27	WORCESTER
221	BELMONT STREET / EDWARD STREET	0	9	11	21	WORCESTER
213	BOSTON TURNPIKE / LAKE STREET	0	8	24	33	SHREWSBURY
211	TURNPIKE ROAD / LYMAN STREET	0	8	43	51	WESTBOROUGH
208	LINCOLN STREET / GOLDSBERRY STREET	0	9	19	28	WORCESTER
206	LINCOLN SQUARE / MAIN STREET	1	9	17	26	WORCESTER
203	PURPLE HEART HIGHWAY / MCKEON ROAD	0	9	14	23	WORCESTER
200	BELMONT STREET / EASTERN AVENUE	1	8	11	20	WORCESTER
198	INTERSTATE 190 SB CD ROAD / ARARAT STREET	2	9	9	18	WORCESTER
196	PLEASANT STREET / PARK AVENUE	0	8	28	36	WORCESTER
195	GRAFTON STREET / HARTFORD TURNPIKE	0	7	27	35	SHREWSBURY

195	CAMBRIDGE STREET / SOUTHBRIDGE STREET	1	8	27	35	WORCESTER
193	CHARLTON ROAD / Unnamed Street	0	7	4	13	STURBRIDGE
192	WORCESTER ROAD / BROOKFIELD ROAD	0	8	24	32	CHARLTON
189	WORCESTER ROAD / SOUTHBRIDGE ROAD	0	8	21	29	CHARLTON
189	MAIN STREET / MAY STREET	0	8	21	29	WORCESTER
187	WASHINGTON STREET / MILLBURY STREET	0	7	19	27	AUBURN
185	CHANDLER STREET / DEWEY STREET	1	8	17	25	WORCESTER
184	PLEASANTDALE ROAD / BARRE PAXTON ROAD	0	8	16	24	RUTLAND
183	BELMONT STREET / CONVERSE STREET	0	7	15	23	WORCESTER
183	DORCHESTER STREET / VERNON STREET	1	8	15	23	WORCESTER
183	LINCOLN STREET / BEVERLY ROAD	0	7	15	23	WORCESTER
182	PARK AVENUE / MAYWOOD STREET	0	8	14	22	WORCESTER

182	CAMBRIDGE STREET / RICHARDS STREET	0	8	14	22	WORCESTER
181	PROVIDENCE ROAD / SUTTON STREET	0	7	34	41	NORTHBRIDGE
181	FRANKLIN STREET / WEST BOYLSTON STREET	0	7	13	21	WEST BOYLSTON
181	CHANDLER STREET / IRVING STREET	0	8	13	21	WORCESTER
180	BROOKFIELD ROAD / STAFFORD STREET	1	7	33	40	CHARLTON
179	SUNDERLAND ROAD / SOUTHWEST CUTOFF	0	7	11	19	WORCESTER
175	LAKE AVENUE / HAMILTON STREET	0	7	7	15	WORCESTER
174	SALISBURY STREET / GROVE STREET	0	7	27	34	WORCESTER
174	PROVIDENCE ROAD / CHURCH STREET	0	8	6	14	NORTHBRIDGE
170	SHREWSBURY STREET / AITCHISON STREET	0	8	2	10	WORCESTER
166	WORCESTER ROAD / CENTER DEPOT ROAD	0	6	19	26	CHARLTON
165	SUTTON ROAD / RAMP-RT 395 NB TO RT 16	0	7	18	25	WEBSTER

165	MAIN STREET / Unnamed Street	0	7	18	25	STURBRIDGE
163	HAMILTON STREET / PLANTATION STREET	1	6	16	23	WORCESTER
163	SOUTHBRIDGE ROAD / LEICESTER STREET	1	7	16	23	OXFORD
163	RUSSELL STREET / HIGHLAND STREET	0	7	16	23	WORCESTER
162	TURNPIKE ROAD / OTIS STREET	0	6	36	42	WESTBOROUGH
161	SOUTH MAIN STREET / PLEASANT STREET	0	7	14	21	LEICESTER
161	CHANDLER STREET / MURRAY AVENUE	0	7	14	21	WORCESTER
160	BELMONT STREET / PLANTATION STREET	1	6	13	20	WORCESTER
160	HEYWOOD STREET / HOUGHTON STREET	2	7	13	20	WORCESTER
159	LINCOLN SQUARE / LINCOLN STREET	1	5	33	39	WORCESTER
159	INSTITUTE ROAD / TUCKERMAN STREET	1	7	12	19	WORCESTER

158	CAMBRIDGE STREET / FREMONT STREET	1	6	11	18	WORCESTER
158	LINCOLN STREET / MCKINLEY ROAD	2	6	11	18	WORCESTER
157	MAIN STREET / MYRTLE STREET	2	7	10	17	WORCESTER
157	MAIN STREET / MAYWOOD STREET	0	7	10	17	WORCESTER
156	MCKEON ROAD / BLACKSTONE RIVER ROAD	0	7	9	16	WORCESTER
154	CHANDLER STREET / HADWEN ROAD	1	7	7	14	WORCESTER
153	CHANDLER STREET / QUEEN STREET	2	6	6	13	WORCESTER
152	MAIN STREET / HALL ROAD	1	6	5	12	STURBRIDGE
151	MAIN STREET / STAFFORD STREET	1	6	25	31	WORCESTER
149	GRAFTON STREET / FRANKLIN STREET	1	6	23	29	WORCESTER
149	LAKE AVENUE / BELMONT STREET	0	6	23	29	WORCESTER
146	PARK AVENUE / SALISBURY STREET	1	5	20	26	WORCESTER
143	MAIN STREET / PLEASANT STREET	1	6	17	23	WEBSTER

143	SOUTHWEST CUTOFF / ROUTE 20	0	4	17	23	WORCESTER, MILLBURY
141	GRAFTON STREET / PLANTATION STREET	0	6	15	21	WORCESTER
140	WORCESTER ROAD / EAST MAIN STREET	1	6	14	20	WEBSTER
139	NORTH MAIN STREET / DOUGLAS STREET	0	6	13	19	UXBRIDGE
138	HIGH STREET / CHATHAM STREET	1	6	12	18	WORCESTER
137	TURNPIKE ROAD / OTIS STREET	1	5	32	37	WESTBOROUGH
137	PARK AVENUE / COES STREET	1	6	11	17	WORCESTER
136	CHARLTON ROAD / FISKE HILL ROAD	1	6	10	16	STURBRIDGE
136	MAIN STREET / CURTIS PARKWAY	0	4	10	16	WORCESTER
135	LINCOLN STREET / ORIOLE DRIVE	0	5	9	15	WORCESTER
134	BRYN MAWR AVENUE / LEICESTER STREET	0	4	8	14	AUBURN
134	WEST BOYLSTON STREET / WHITMARSH AVENUE	0	6	8	14	WORCESTER

133	MADISON STREET / SOUTHBRIDGE STREET	1	6	7	13	WORCESTER
133	SHREWSBURY STREET / EAST CENTRAL STREET	0	6	7	13	WORCESTER
133	HARTFORD TURNPIKE / VALENTE DRIVE	0	5	7	13	SHREWSBURY
133	BRANDON ROAD / SCHOFIELD AVENUE	1	5	7	13	DUDLEY
133	DEWEY STREET / MAY STREET	0	6	7	13	WORCESTER
131	MASON STREET / PARKER STREET	2	6	5	11	WORCESTER
131	IRVING STREET / CHATHAM STREET	0	6	5	11	WORCESTER
180	MARLBORO ROAD / RIVER ROAD EAST	0	8	12	20	BERLIN,HUDSON

Community	EPDO	Location	Crash Count	Fatal Crashes	Injury Crashes	Non-Injury Crashes
Auburn	217	Washington Street / Millbury Street	37	0	9	28
Auburn	159	Washington Street / Prospect Street	19	2	5	12
Berlin	140	River Road East / River Road	20	0	6	14
Charlton	225	Stafford Street / Center Depot Road	25	1	9	15
Charlton	220	Worcester Road / Southbridge Road	40	0	9	31

Community	EPDO	Location	Crash Count	Fatal Crashes	Injury Crashes	Non-Injury Crashes
Dudley	174	Brandon Road / Schofield Avenue	14	0	8	6
Leicester	136	South Main Street / Main Street	16	0	6	10
Millbury, Worcester	183	Southwest Cutoff / Granite Street	23	2	6	15
Northborough	142	Main Street / Bartlett Street	22	0	6	16
Northbridge	163	Main Street / Hill Street	23	1	6	16
Northbridge	144	Providence Road / Upton Street	24	0	6	18
Oxford	163	Southbridge Road / Leicester Street	23	0	7	16
Rutland	187	Pleasantdale Road / Barre Paxton Road	27	1	7	19
Shrewsbury	244	Hartford Turnpike / Grafton Street	44	2	8	34
Shrewsbury	169	Route 9 / Oak Street	29	1	6	22
Shrewsbury	149	Route 9 / South Street	49	1	4	44
Sturbridge	257	Route 49 / Putnam Road	17	1	11	5
Sturbridge	137	Charlton Road / Fiske Hill Road	17	1	5	11
Sturbridge	135	Main Street	15	0	6	9
Sutton	197	Worcester Providence Turnpike / Boston Road	37	0	8	29
Webster	364	Worcester Road / East Main Street	44	0	16	28
Webster	176	Sutton Road / Gore Road	36	0	7	29
West Boylston	167	Franklin Street / West Boylston Street	27	1	6	20
Westborough	272	Route 9 / Lyman Street	52	0	11	41
Westborough	193	Route 9 / Otis Street	53	0	7	46
Worcester	457	Southbridge Street / Hammond Street	57	1	19	37
Worcester	423	Chandler Street / Mason Street	63	0	18	45
Worcester	380	Kelley Square / Vernon Street	80	0	15	65
Worcester	315	Park Avenue / Pleasant Street	35	0	14	21
Worcester	314	Canterbury Street / Gardner Street	34	1	13	20
Worcester	312	Park Avenue / May Street	52	0	13	39

Central Massachusetts Regional Planning Commission

Member Communities

Auburn	
Barre	Northbridge
Berlin	Oakham
Blackstone	Oxford
Boylston	Paxton
Charlton	Princeton
Douglas	Rutland
Dudley	Shrewsbury
East Brookfield	Southbridge
Grafton	Spencer
Hardwick	Sturbridge
Holden	Sutton
Hopedale	Upton
Leicester	Uxbridge
Mendon	Warren
Millbury	Webster
Millville	West Boylston
New Braintree	West Brookfield
North Brookfield	Westborough
Northborough	Worcester

Central Mass Regional Planning Commission

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