

2022 Northern Middlesex Regional Transportation Safety Report

Prepared for the Northern Middlesex Metropolitan Planning Organization by
the Northern Middlesex Council of Governments.

June 2022

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Acronym Guide

DHS (Department of Homeland Security)
EMS (Emergency Medical Services)
EOPSS (Executive Office of Public Safety and Security)
EPDO (Equivalent Property Damage Only)
FAST Act (Fixing America's Surface Transportation Act)
FEMA (Federal Emergency Management Agency)
FTA (Federal Transit Administration)
HSIP (Highway Safety Improvement Program)
ITS (Intelligent Transportation System)
LEPCs (Local Emergency Planning Committees)
LRTA (Lowell Regional Transit Authority)
MEMA (Massachusetts Emergency Management Agency)
MPO (Metropolitan Planning Organization)
NMCOG (Northern Middlesex Council of Governments)
NMMPO (Northern Middlesex Metropolitan Planning Organization)
RMV (Registry of Motor Vehicles)
RSA (Road Safety Audit)
RTP (Regional Transportation Plan)
SHSP (Strategic Highway Safety Plan)
TIP (Transportation Improvement Plan)
UPWP (Unified Planning Work Program)
USDOT (US Department of Transportation)
VMT (Vehicle Miles Travelled)

INTRODUCTION

Local, state and federal transportation, law enforcement, and emergency response agencies work cooperatively to construct, maintain, and monitor transportation networks, and assist travelers in need. Similar to other issues that intertwined with the construction and operation of transportation facilities (e.g., air quality and economic development), travel safety is clearly an issue that is affected by how the transportation system is designed, constructed, operated, and maintained. Given that transportation-planning leads to changes in the transportation system, safety and security is thoroughly integrated into the planning process. The FFY 2022 Northern Middlesex Regional Safety Report examines transportation safety conditions across the region. Ensuring the safe travel of the public is the most important goal of this program.

Before one can identify the types of strategies or investments that can improve safety, safety issues and challenges must first be understood. This means not only understanding the “big picture” from the perspective of numbers and incidence of road-related fatalities and major injuries, but also analyzing the leading contributing factors. The best examples of safety conscious planning have begun with a comprehensive analysis of data. Over the past two decades, NMMPO staff has worked with MassDOT, FHWA, FTA and the LRTA to identify safety issues that need to be addressed and has strived to prioritize projects with safety benefits.

Assessments of regional safety conditions often lead to future detailed studies of top crash locations through the region’s Unified Planning Work Program (UPWP), MassDOT’s Roadway Safety Audit (RSA) Program, and the Highway Safety Improvement Program (HSIP). NMMPO staff provide technical assistance to local communities in determining the causes of identified safety problems. In addition, the NMMPO assigns priority to projects that address safety when developing the region’s Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP).

THE COST OF CRASHES

The National Safety Council estimates the cost of motor vehicle crashes based on severity in order to illustrate the impact on the nation’s economy. Those costs are based on dollars spent and lost income due to property damage, injury or death. The goal is to quantify the importance of preventing motor vehicle crashes. The calculable costs of motor vehicle crashes include wage and productivity losses, medical expenses, administrative expenses, vehicle damage and employers’ uninsured costs. Table 1 illustrates the estimated average cost for a motor vehicle related death, injury or property damage only crashes.

Table 1: The Cost of Crashes by Severity.

Crash Severity	Cost
Fatal Injury	\$1,750,000
Non-Fatal Injury	\$154,100
Property Damage Only	\$7,400

Source: National Safety Council. [Injuryfacts.nsc.org/all-injuries/costs/guide-to-calculating-costs/data-details/](https://www.injuryfacts.nsc.org/all-injuries/costs/guide-to-calculating-costs/data-details/)

A PERFORMANCE MANAGEMENT APPROACH TO TRANSPORTATION SAFETY

Transportation performance management is a data driven strategic process that uses system information to make investment and policy decisions in order to achieve performance goals. The Federal Highway Administration (FHWA) established the National Performance Management Rules addressing safety, effective as of April 14, 2016. Under these rules, MassDOT and the NMMPO are charged with establishing performance targets that address national safety performance measures, including the following:

- Number of fatalities.
- Rate of fatalities per 100 million Vehicle Miles Travelled (VMT).
- Number of serious injuries.
- Rate of serious injuries per 100 million VMT.
- Number of non-motorized fatalities and serious injuries.

MassDOT established statewide performance targets for each national measure outlined in the rulemaking in 2018. The NMMPO then collaborated with MassDOT and regional partners to establish and/or refine regional targets, adopting the state targets and updating them on an annual basis. In January 2022, the NMMPO adopted the latest statewide safety targets available based on 2020 crash data.

SAFETY PERFORMANCE MEASURES AND TARGETS

Included in Table 2 is a long-term target for the region, reflecting the 2020 Northern Middlesex Regional Transportation Plan goal of 20% reduction in fatalities and serious injuries by 2040. MassDOT does not provide specific targets to 2040 beyond the Commonwealth's long-term goal of zero roadway deaths and serious injuries.

Table 2 Safety Performance Measures and Targets

Performance Measure	Current State Performance (Rolling 5 Year Avg. 2016-2020)	MPO adopted CY 2022 State Targets (Rolling 5 Year Avg. 2017-2021)	Regional Rolling 5-Year Average (2015-2019)	2040 Regional Transportation Plan Targets
Fatalities	347	340	12.6	10.08
Rate of Fatalities per 100 mil VMT	0.56	0.56	0.42	0.34
Serious Injuries	2,689	2,504	123	98.4
Serious Injuries per 100 mil	4.3	4.11	4.23	3.38
Non-motorized Serious Injuries and Fatalities	505	471	21.6	17.28

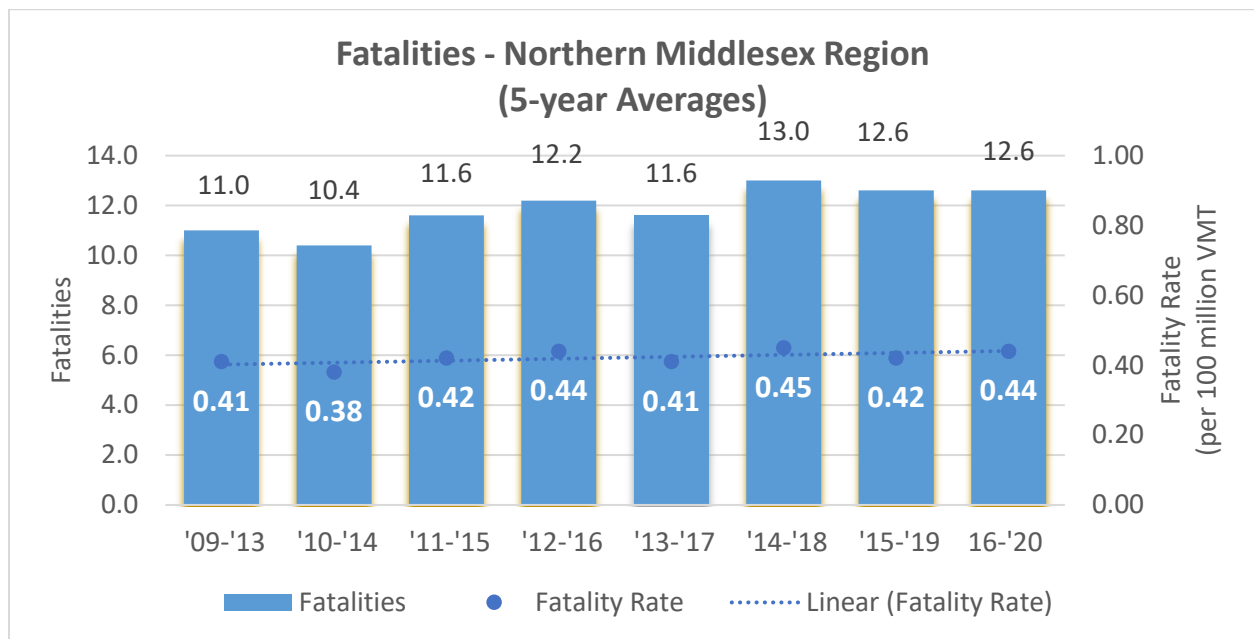
Source: MassDOT and NMMPO 2020-2040 Regional Transportation Plan

FATALITIES

Per Federal Highway Administration (FHWA) guidance, the CY22 target setting process began with a trend line projection based on the most recent available data. Due to reduced vehicle miles traveled (VMT) related to the pandemic, actual 2020 fatalities did not follow this trend, so CY21 projections were based on trends from CY19 with CY20 data disregarded given the unique circumstances surrounding data from that year. CY22 projections are based on a 2.5% reduction in fatalities from CY21 resulting in a five-year average fatalities projection of 340. It is projected that fatalities will decrease based on MassDOT efforts in the area of speed management and safe systems, among other safety strategies. MassDOT’s overarching goal is zero deaths, and this goal will be pursued by implementing Strategic Highway Safety Plan (SHSP) strategies.

Figure 1 displays the latest data for the Northern Middlesex region which shows an average of 12.6 fatalities per year (2016-2020), approximately 3.6% of the State total. The region has remained consistently in the 10-14 fatalities per year range since 2008.

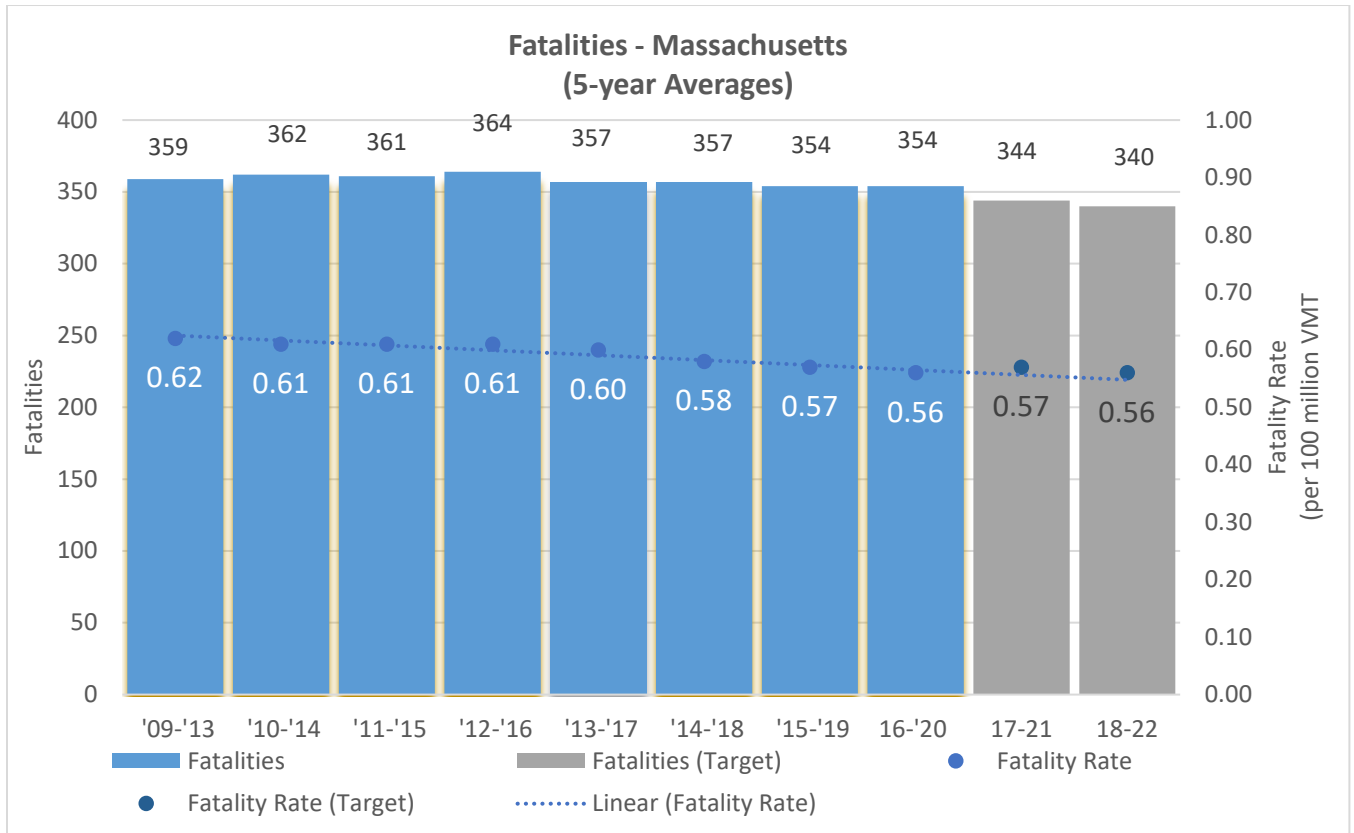
Figure 1: Regional 5-Year Fatality Averages and Rates.



Source: MassDOT CY22 Safety Performance Measures Targets (PM1)

Figure 2 shows the statewide fatalities averaged out over 5-year periods, fatality rates, as well as projected targets for calendar year 2022. The fatality rate for the Northern Middlesex Region has been consistently lower than the fatality rate for the Commonwealth of Massachusetts over the same period.

Figure 2: Statewide 5-Year Fatality Averages and Rates.

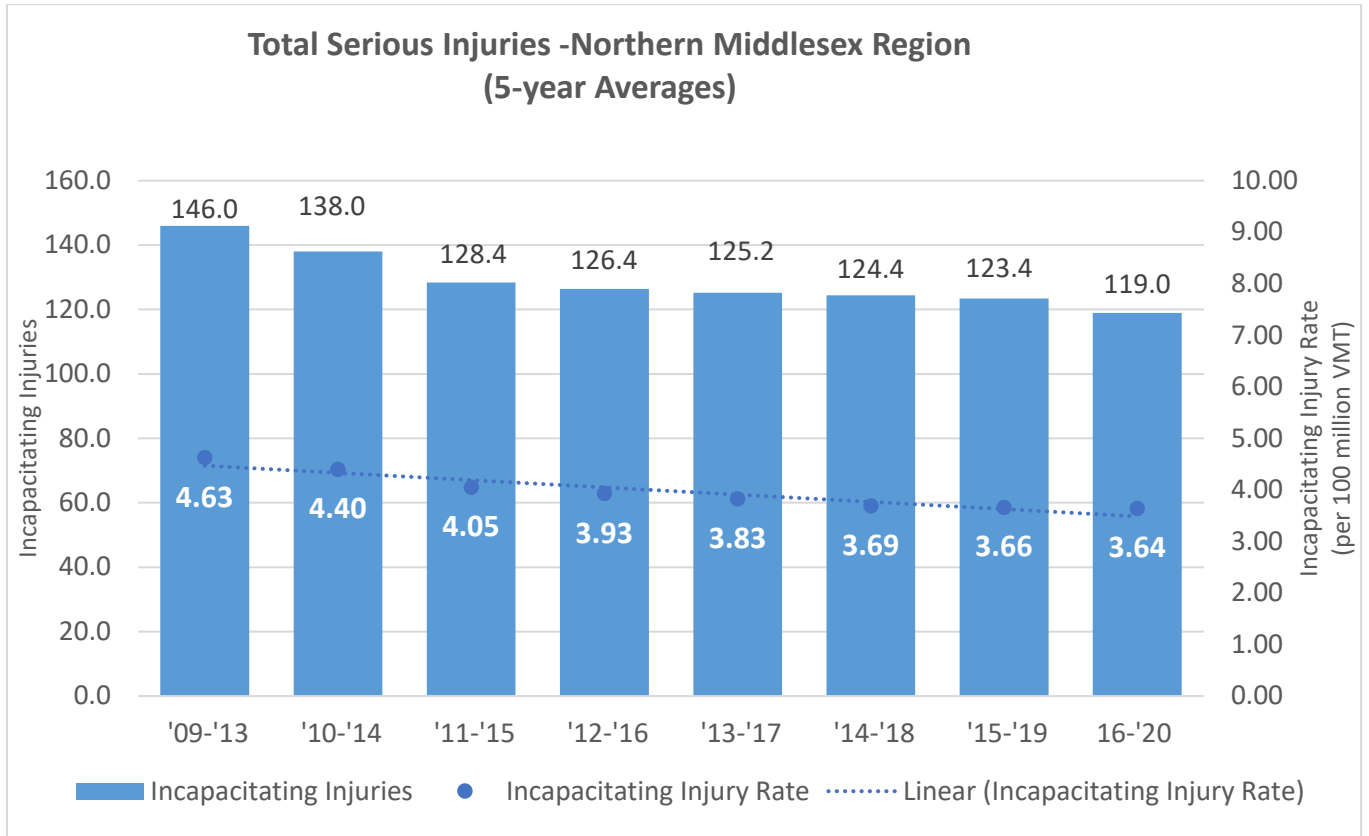


Source: MassDOT CY22 Safety Performance Measures Targets (PM1)

SERIOUS INJURIES

As shown in Figure 3, the Northern Middlesex Region’s latest 5-year average (2016-2020) is 119 serious injuries, which is about 4.5% of the State total. There was an average of two thousand six hundred and forty-one (2,641) reported serious injuries in the Commonwealth during the same period. Achieving the regional target of a 20% reduction by 2040 would result in 95 serious injury crashes.

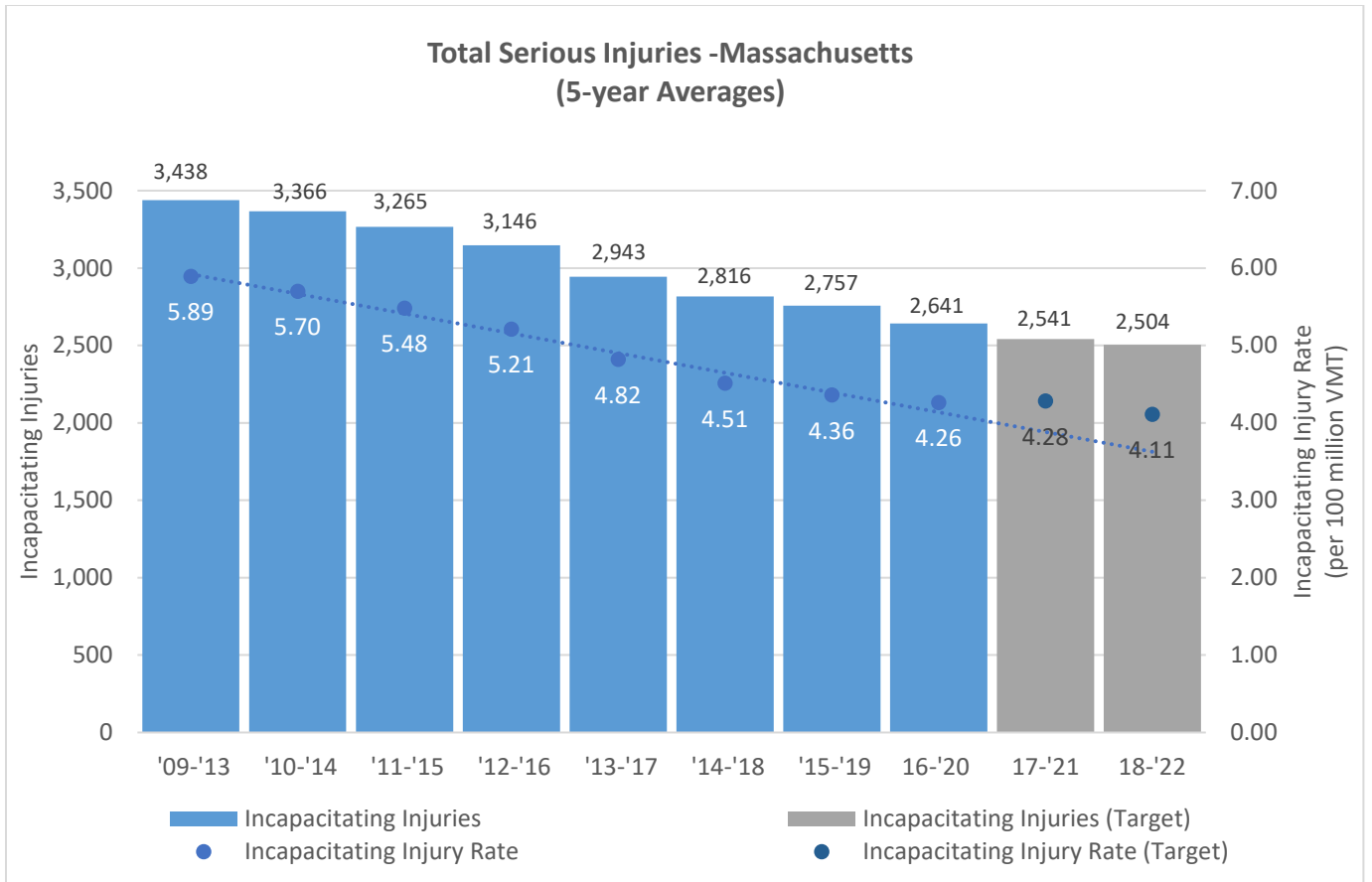
Figure 3: Regional 5-Year Serious Injury Averages and Rates.



Source: MassDOT CY22 Safety Performance Measures Targets (PM1)

Figure 4 shows the total serious injuries and injury rates, as well as the projected targets for calendar year 2022, for the Commonwealth. Injuries and injury rates have steadily declined in the State and the NMMPO will continue to partner and collaborate strategies with Federal, State, Regional, and local partners to reduce serious injuries on Massachusetts roadways.

Figure 4: Statewide 5-Year Serious Injury Averages and Rates.

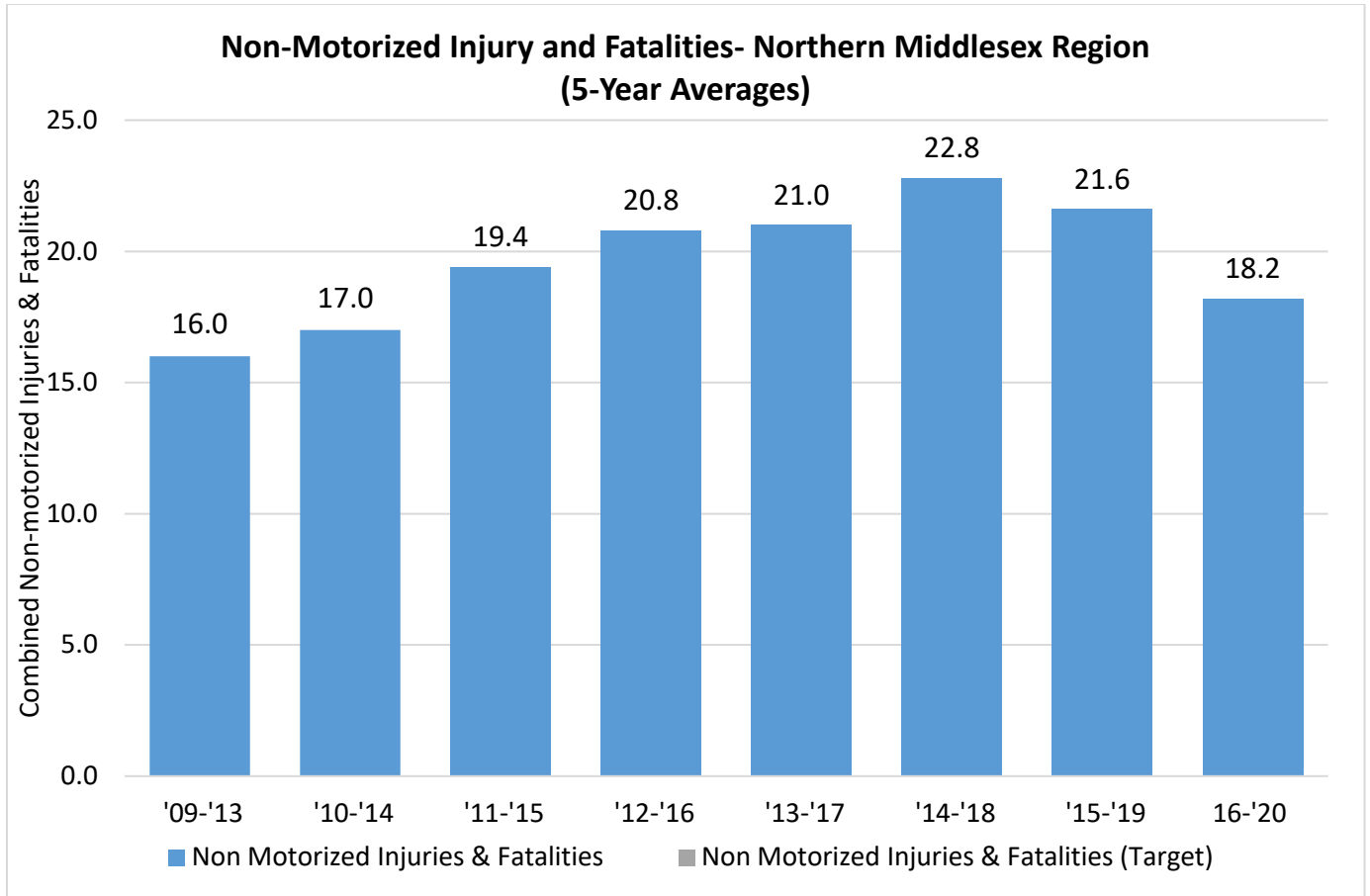


Source: MassDOT CY22 Safety Performance Measures Targets (PM1)

TOTAL NUMBER OF NON-MOTORIZED SERIOUS INJURIES AND FATALITIES

In the Northern Middlesex Region, there was an average of 18.2 non-motorized serious injuries and fatalities due to motor vehicle crashes between 2016 and 2020 as shown in Figure 5.. This data shows a decrease from 21.6 in 2015-2019 and continues the downward trend, which started during the 2014-2018 period.

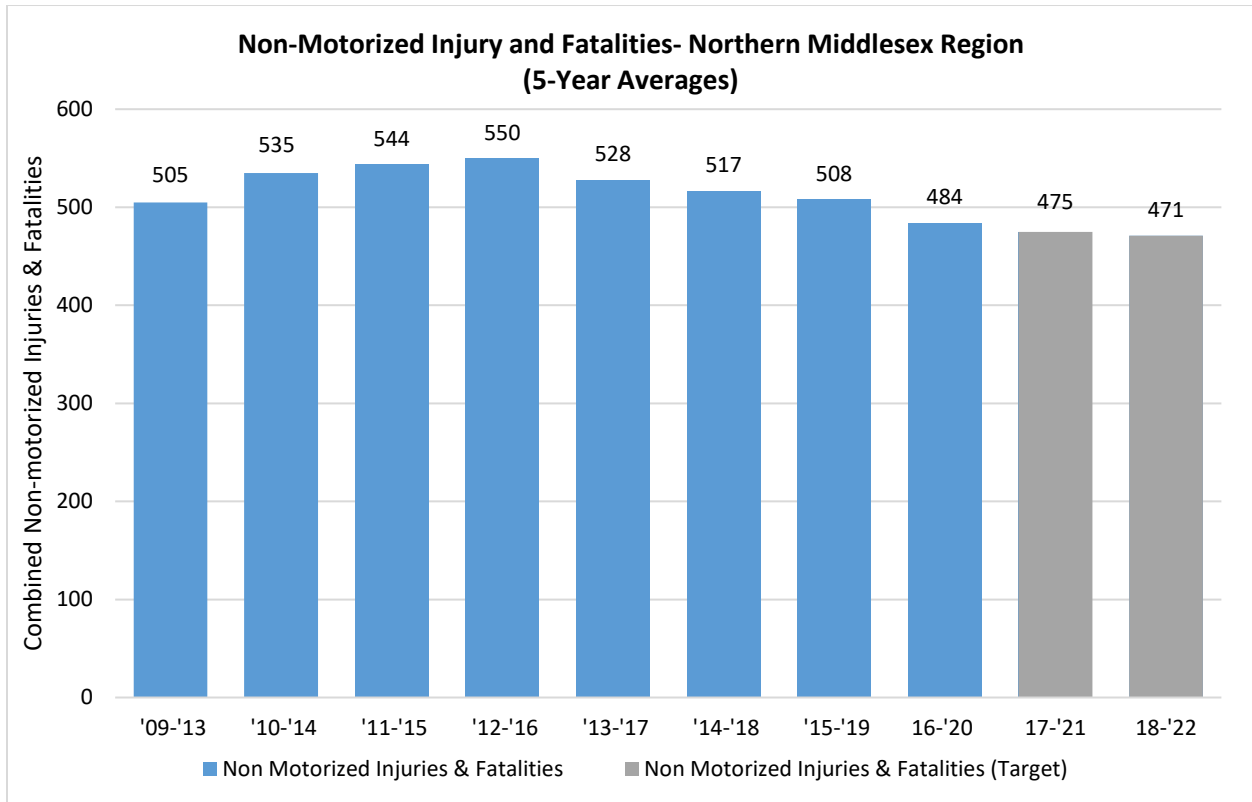
Figure 5: Regional 5-Year Combined Non-Motorized Injury and Fatality Averages.



Source: MassDOT CY22 Safety Performance Measures Targets (PM1)

Figure 6 shows total non-motorized serious injuries and fatalities, as well as projected targets for calendar years 2021 and 2022, for the Commonwealth. Massachusetts has seen a steady decline in non-motorized crashes that result in serious injury and fatalities since the 2012-2016 5-year average with 550 non-motorized crashes reported in the Commonwealth.

Figure 6: Statewide 5-Year Combined Non-Motorized Injury and Fatality Rate.



Source: MassDOT CY22 Safety Performance Measures Targets (PM1)

ADDRESSING PERFORMANCE MEASURES AND TARGETS

The NMMPO’s safety program incorporates the following actions to achieve the goals set out in the program.

- High crash location identification.
- Determination of project eligible for HSIP funding.
- Programming of safety-related projects into the regional RTP and TIP documents.

IDENTIFYING REGIONAL HIGH CRASH LOCATIONS

As part of its overall traffic safety program, the NMMPO has developed four principal goals:

- Identify locations with transportation safety problems.
- Notify local and state officials, and the public of safety problems and concerns.

- Provide technical assistance to local communities in determining the cause of the crashes at problem locations.
- Identify strategies for addressing and mitigating identified safety deficiencies.

In Massachusetts, MassDOT and the Massachusetts Registry of Motor Vehicles (RMV) collect crash data. The NMMPO uses this data to determine the Top 100 most hazardous intersections within the region over a three-year period. The data is also used to assess the need for safety improvements at locations deemed to be problematic. The most recent data available through the Commonwealth covers calendar years 2017 through 2019.

Regional Overview

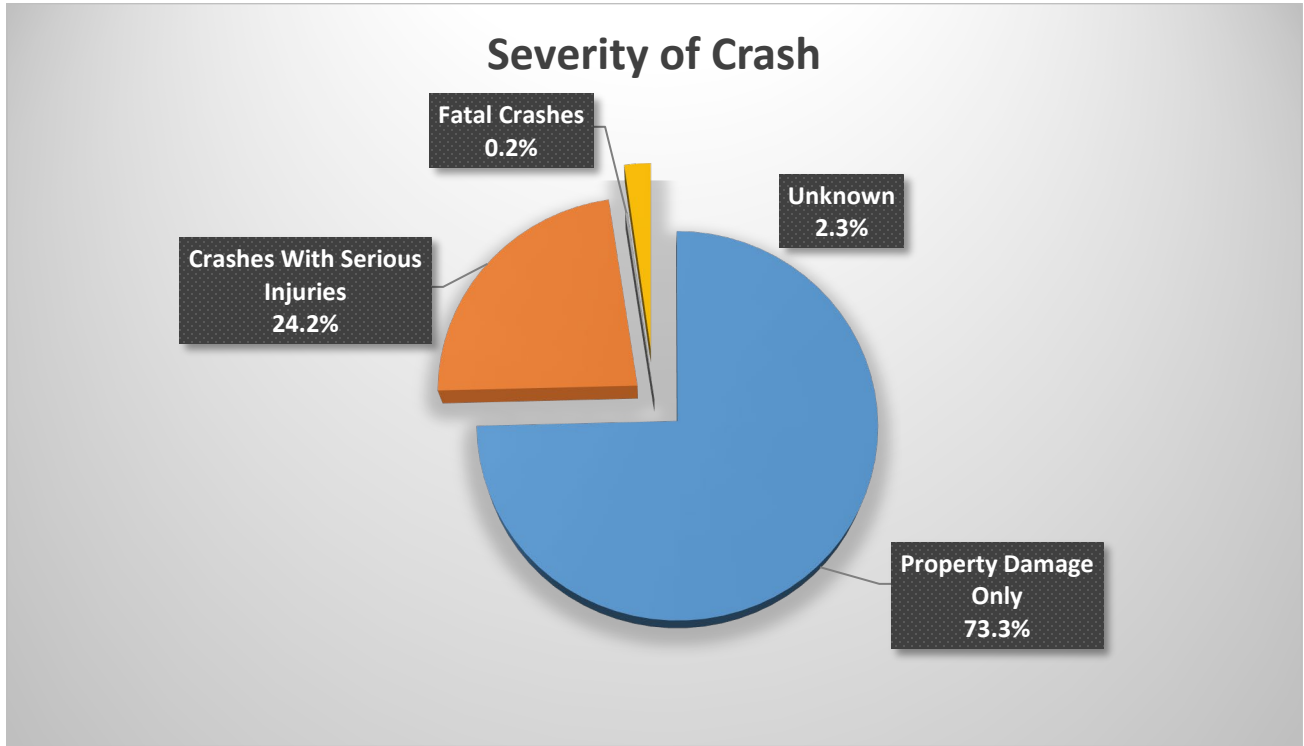
From 2017 to 2019, there were 20,669 reported crashes within the nine communities comprising the NMCOG Region. Table 3 summarizes the total number of crashes by year and severity. Serious injuries accounted for 24.2% (4,595) of crashes, while 0.2% (33) of crashes resulted in fatalities.

Table 3: Regional Number of Crashes by Severity.

Severity of Crash	2017	2018	2019	2017-2019
Property Damage Only	4,788	4,829	4,660	14,277
Crashes With Serious Injuries	1,611	1,524	1,460	4,595
Fatal Crashes	10	16	7	33
Unknown	608	523	633	1,764
Total Crashes	7,017	6,892	6,760	20,669

Source: NMCOG Crash Data

Figure 7: Regional Motor Vehicle Crashes by Severity 2017-2019.



Source: NMCOG Crash Data

When comparing the number of crashes from 2014-2016 with those reported in 2017-2019, there was a 0.4% decrease in total crashes. Injury crashes decreased by 2.7%, while the number of fatalities dropped by almost 11% during the same period. “Property Damage Only” crashes rose by 2.0% as shown in Table 4.

Table 4: Regional Comparison of Crash Data 2014-2016 and 2017-2019.

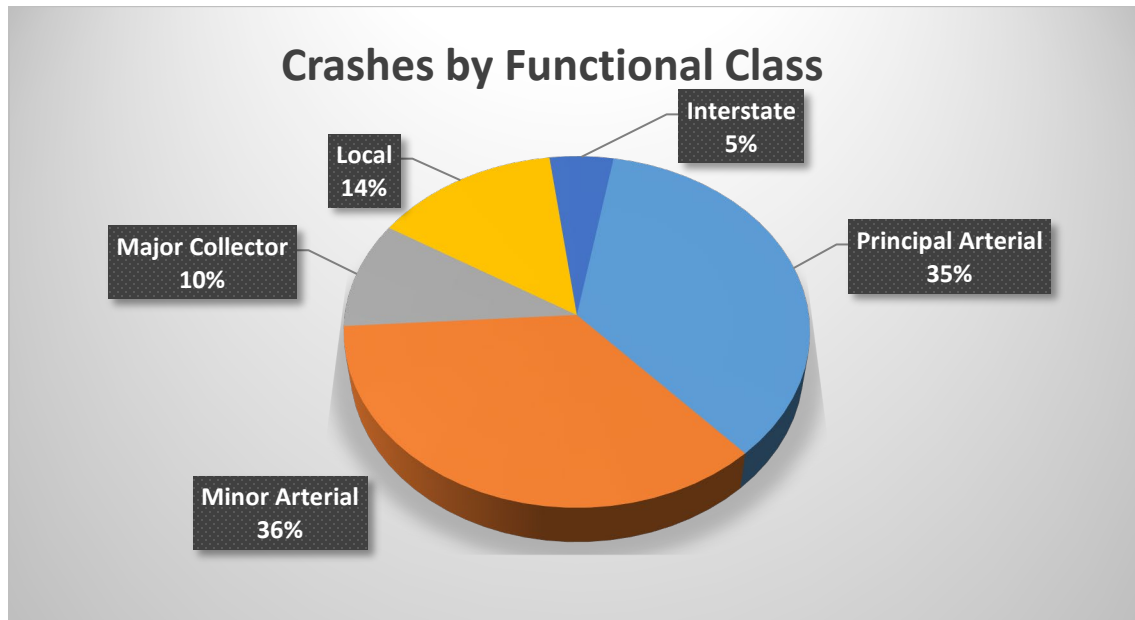
Severity	2014-2016	2017-2019	Total Change	Percent Change
Property Damage Only	13,991	14,277	286	2.0%
Crashes With Serious Injuries	4,724	4,595	-129	-2.7%
Fatal Crashes	37	33	-4	-10.8%
Unknown	2,001	1,764	-237	-11.8%
Total Crashes	20,753	20,669	-84	-0.4%

Source: NMCOG Crash Data

Figure 8 illustrates the percentage of crashes in the NMCOG region by Functional Roadway Class. The functional classification of a road is based on the type of service the road provides to the public and each class of roadway has its own design standards to adhere to like land and shoulder widths. In the NMCOG Region during the 2017-2019 period, seventy (70) percent of the crashes took place along minor or principal arterial roadways. Local roads made up

fourteen (14) percent of crash locations, while interstates reported five (5) percent of the crashes for the region.

Figure 8: Regional Motor Vehicle Crashes by Functional Class 2017-2019.



Source: MassDOT Impact Portal

WORK ZONE RELATED CRASHES

During the period of 2015-2019, five hundred and five (505) crashes were classified as “work zone related”. Of those five hundred and five (505) crashes ten (10) crashes involved collisions with work zone maintenance vehicles or equipment with all but one crash resulting in property damage only, the other crash resulted in a non-fatal injury. The majority of the crashes happened during daylight hours with only three (3) crashes taking place during non-daylight hours. Five (5) out of ten (10) crashes involved single vehicles with four (4) angle and one (1) rear to side type of crash. MassDOT has taken steps to try to reduce work zone related crashes in recent years. One example is the implementation and enforcement of the “Move Over” law which requires drivers approaching a stationary emergency or maintenance vehicle with flashing lights to move to the next adjacent lane and slow down if it is safe to do so.

ANIMAL RELATED CRASHES

In the time spanning 2015-2019, the Northern Middlesex Region recorded five hundred and seventy seven (577) crashes involving animals. Five hundred and twenty four (524) of those crashes involved a vehicle colliding with deer while fifty-three (53) crashes involved collision with an animal classified as other. The vast majority of those crashes, five hundred and forty (540) to be exact were single vehicle crashes, with head-on and angle crashes following with twelve (12) crashes each. Westford had the highest number of crashes involving animals with one hundred and forty five (145) crashes, which was twice as much as the next community Pepperell that recorded 76 crashes during the same time. The City of Lowell recorded the least

amount of crashes involving animals with twenty-eight (28) crashes followed by Dunstable with thirty-two (32) crashes during the same period.

DISTRACTED AND IMPAIRED DRIVING

As the popularity of cell phones and other electronic devices have exploded over the last two decades, the number of crashes involving a driver distracted by an electronic device has also increased exponentially. Table 5 shows the total crashes in which using or talking into an electronic device was involved in the actions that lead up to the crash for each community during the years 2015 - 2019. The communities of Billerica and Lowell saw substantial drops in crashes that were caused by drivers distracted by electronic devices by 2018 only to rise again in 2019. Other communities saw modest decreases in electronic device caused crashes but continue to trend downward. Overall for the region crashes due to distracted driving caused by an electronic device is down 44% from a high of 198 distracted driver crashes due to electronic devices in 2015 to 111 crashes in 2019. In February 2020, the Baker-Polito Administration's "hands-free" law went into effect. The "hands-free" law states that operators of motor vehicles cannot use an electronic device unless the device is being used in hands free mode. Operators cannot read or view text, images or videos, unless what is being viewed is helping with navigation, and the device is mounted in an appropriate location. Motorists also cannot make phone calls unless they can do so without holding their phones, by utilizing technology such as Bluetooth. The use of phones and all electronic devices including phones in hands-free mode, remain illegal for drivers under 18 years of age. Legislation like the "hands-free" law will help to move the Commonwealth towards MassDOT's goal of zero fatalities and serious injury crashes.

Table 5: Total Crashes Involving "Manually Operating an Electronic Device" or "Talking on Hand-Held Electronic Device".

Community	2015	2016	2017	2018	2019	Total
Billerica	36	32	9	5	10	92
Chelmsford	4	9	8	9	9	39
Dracut	9	11	6	10	4	40
Dunstable	2	1	0	0	2	5
Lowell	132	102	83	65	76	458
Pepperell	1	4	1	3	1	10
Tewksbury	7	9	13	4	2	35
Tyngsborough	3	3	5	2	3	16
Westford	4	9	3	2	4	22
Total Crashes	198	180	128	100	111	717

Source: MassDOT Impact Portal

Along with distracted driving, alcohol, drugs and excessive speeds are contributing factors in preventable crashes around the Commonwealth. It should be noted that one, two or all three of the contributing factors shown below might be involved in a singular crash. In the NMMPO Region for the years 2015-2019, alcohol was suspected in playing a role in 898 crashes almost doubling the amount of crashes caused by speeding and at 2.5 times the amount of crashes by operators who were suspected of being under the influence of drugs at the time of the crash.

Table 6: Number of Crashes where Alcohol, Drugs and Speed were Contributing Factors in Crashes for the NMMPO Region, 2015-2019.

Geography		2015	2016	2017	2018	2019	Total
NMMPO	Total Alcohol Suspected crashes	156	212	208	167	155	898
	Total Drug Suspected crashes	50	99	110	66	57	382
	Total Speed Related crashes	90	97	110	98	92	487

Source: MassDOT Impact Portal

TOP 100 HIGH CRASH INTERSECTIONS IN THE NORTHERN MIDDLESEX REGION

NMMPO staff determine which intersections will make their Top 100 crash intersections list using three years of crash data, to account for annual variations caused by construction, road closures, or discrepancies in crash reporting practices of local police departments and the RMV. The RMV receives crash reports from local and state police departments and the data is used to create a database for the entire state. MassDOT uses the database to map the crashes using Geographic Information Systems (GIS). NMMPO staff then further examine the data.

To develop the list, NMMPO staff flags intersections that experience fifteen (15) or more crashes in a three-year period as candidate locations. A detailed review of each record associated with each candidate intersection is performed. The high crash intersection ranking system is based on the Equivalent Property Damage Only (EPDO) methodology. Each crash is assigned a numeric value based on reported severity. Property damage only crashes are assigned one (1) point, injury crashes are assigned five (5) points and fatal crashes are assigned ten (10) points. The points assigned to each crash at a given location are added to determine the intersection's EPDO value.

Table 5 provides a summary of the total crashes within each community from 2017-2019 and identifies the number of intersections that are ranked in the Top 100. The City of Lowell had the greatest number of crashes (10,087) between 2017-2019 and had the largest number of intersections (80) on the Top 100 High Crash List. The City is by far the most urbanized and densely populated community in the region and has the greatest number of roadways per square mile when compared to other municipalities. This dense, urban setting creates more opportunities for vehicle conflicts and crashes than one would typically find in a suburban or rural community. Due to its rural nature and limited roadway miles, the Town of Dunstable recorded the fewest number of crashes of the communities within the region.

Table 7: Regional Crash Breakdown by Community, 2017-2019.

Community	2017	2018	2019	Crashes 2017 - 2019	Intersections on Regional Top 100 High Crash Intersections List
Billerica	661	624	632	1,919	8
Chelmsford	686	743	770	2,198	3
Dracut	364	445	442	1,251	3
Dunstable	72	49	54	175	0
Lowell	3,543	3,323	3,221	10,087	80
Pepperell	192	191	155	538	1
Tewksbury	705	721	583	2,008	3
Tyngsborough	346	284	341	971	4
Westford	448	512	562	1,522	1

Source: NMCOG Crash Data

Table 8 identifies the Top 100 High Crash Intersection location within each community for the 2017-2019 reporting period. The intersection of VFW Highway at Bridge Street in Lowell, with 121 crashes and an EPDO of 221, ranked as the top high crash intersection. During the 2015-2017 reporting period, this same intersection reported 232 crashes and an EPDO of 277. The reduction of crashes and the EPDO score shows that safety upgrades implemented at this intersection is having some effect on lowering the number and severity of crashes at this intersection. Locations in Dunstable are not listed in the Top 100 for the region or identified as a MassDOT HSIP cluster. Thus, there are no locations in Dunstable that are eligible for HSIP funding.

Table 8: Highest Crash Intersection in Each NMCOG Community, 2017-2019.

Community	Intersection	Intersection Control	Total Crashes Reported	EPDO 2017-2019	Regional Rank
Billerica	Rte. 129 (Salem Rd) at Gray St	Stop	37	97	21
Chelmsford	Rte. 110 (Chelmsford St) at Stedman St	Traffic Signal	29	85	28
Dracut	Rte. 113 (Pleasant St) at Lakeview Ave.	Traffic Signal	47	99	20
Dunstable	Rte. 113 (Pleasant St) at Main St	Stop	5	13	235
Lowell	VFW Highway at Bridge St.	Traffic Signal	121	221	1

Community	Intersection	Intersection Control	Total Crashes Reported	EPDO 2017-2019	Regional Rank
Pepperell	Rte. 113 (Main St) at Park/ Elm Streets	Stop	29	65	51
Tewksbury	Salem St. at South St.	Stop	55	107	14
Tyngsborough	Rte. 113 (Kendall Rd) at Rte. 3A (Middlesex St)	Traffic Signal	45	101	16
Westford	Rte. 110 (Littleton Rd) at Boston Rd	Traffic Signal	93	145	4

Source: NMCOG Crash Data

Table 9 contains the Top 100 High Crash Intersection list for the region based on 2017-2019 data. Eighty percent (80%) of the intersections on the Top 100 list are located in the City of Lowell, including nine (9) of the top ten (10) crash locations. Map 1 shows the location of each intersection listed in the Top 100 list, while Map 2 provides a more detailed view of locations within the City of Lowell.

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Table 9: Regional Top 100 High Crash Intersections

Regional Rank	Intersection	Community	Intersection Control	Total Crashes	Property Damage Only	Non-Fatal Injuries	Fatal Injuries	EPDO 2017-2019
1	VFW Highway at Bridge St	Lowell	Traffic Signal	121	96	52	0	221
2	Wood St at Middlesex St	Lowell	Traffic Signal	86	60	41	0	190
3	VFW Highway/Varnum Ave at School St/Mammoth Rd	Lowell	Traffic Signal	100	78	55	0	188
4	Rte. 110 (Littleton Rd) at Boston Rd	Westford	Traffic Signal	93	80	31	0	145
5	Plain St at Manufacturers St	Lowell	Stop	79	63	24	0	143
6	VFW Highway at Aiken St	Lowell	Traffic Signal	69	51	19	0	141
7	Wood St at Rte. 113 (Pawtucket Blvd)	Lowell	Traffic Signal	64	46	28	0	136
8	School St at Branch St	Lowell	Traffic Signal	55	35	26	0	135
9	VFW Highway at University Ave	Lowell	Traffic Signal	61	43	30	0	133
10	Appleton St/Church St at Central St	Lowell	Traffic Signal	60	42	26	0	132
11	Rte. 38 (Nesmith St) at Rte. 133 (Andover St)	Lowell	Traffic Signal	67	53	35	0	123
12	Church St at Warren St	Lowell	Stop	63	50	23	1	120
13	Rte. 3A (Princeton St) at Wood St	Lowell	Traffic Signal	48	32	17	0	112
14	Salem St at South St	Tewksbury	Stop	55	42	21	0	107
15	Rte. 110 (Chelmsford St) at Plain St/Powell St	Lowell	Traffic Signal	52	39	25	0	104
16	Rte. 113 (Kendall Rd) at Rte. 3A (Middlesex Rd)	Tyngsborough	Traffic Signal	45	31	18	0	101
17	Rte. 3A (Westford St) at Wilder St	Lowell	All Way Stop	56	45	25	0	100

2022 NORTHERN MIDDLESEX REGIONAL TRANSPORTATION SAFETY REPORT

Table 9: Regional Top 100 High Crash Intersections

Regional Rank	Intersection	Community	Intersection Control	Total Crashes	Property Damage Only	Non-Fatal Injuries	Fatal Injuries	EPDO 2017-2019
18	Church St at Lawrence St	Lowell	Stop	48	35	21	0	100
19	Gorham St at Appleton St	Lowell	Traffic Signal	44	30	20	0	100
20	Rte. 113 (Pleasant St) at Lakeview Ave	Dracut	Traffic Signal	47	34	18	0	99
21	Rte. 129 (Salem Rd) at Gray St	Billerica	Stop	37	22	16	0	97
22	Rte. 38 (Main St) at Shawsheen St	Tewksbury	Traffic Signal	59	50	26	0	95
23	Bridge St/Prescott St at Merrimack St (Kearney Square)	Lowell	Traffic Signal	47	36	8	0	91
24	Central St at Middlesex St/Green St	Lowell	Traffic Signal	42	30	19	0	90
25	Lakeview Ave at Aiken St	Lowell	Traffic Signal	47	37	17	0	87
26	Rte. 110 (Chelmsford St) at Stevens St/Industrial Ave	Lowell	Traffic Signal	35	22	14	0	87
27	Rte. 110 (Chelmsford St) at Rte. 3A (Westford St)	Lowell	Traffic Signal	38	26	17	0	86
28	Rte. 110 (Chelmsford St) at Stedman St	Chelmsford	Traffic Signal	29	15	15	0	85
29	Gorham St at Elm St/Highland St	Lowell	Traffic Signal	48	40	18	0	80
30	Fletcher St at Bowers St	Lowell	Stop	48	40	16	0	80
31	Rte. 3A (Westford St) at School St	Lowell	Traffic Signal	31	19	15	0	79
32	Andover St at Concord St	Lowell	Stop	43	34	20	0	79
33	Rte. 38 (Nesmith St) at East Merrimack St	Lowell	Traffic Signal	38	28	11	0	78

2022 NORTHERN MIDDLESEX REGIONAL TRANSPORTATION SAFETY REPORT

Table 9: Regional Top 100 High Crash Intersections

Regional Rank	Intersection	Community	Intersection Control	Total Crashes	Property Damage Only	Non-Fatal Injuries	Fatal Injuries	EPDO 2017-2019
34	Route 113 (Riverside St) at Sparks St	Lowell	Stop	33	22	17	0	77
35	Rte. 3A (Thorndike St) at Highland St	Lowell	Traffic Signal	44	36	21	0	76
36	Dutton St at Fletcher St	Lowell	Traffic Signal	51	45	19	0	75
37	Central St at Warren St	Lowell	Stop	35	25	14	0	75
38	Broadway at Fletcher St	Lowell	Traffic Signal	32	22	12	0	72
39	Andover Rd/Shawsheen St at Whipple Rd	Billerica/Tewksbury	Stop	31	21	15	0	71
40	Rte. 38 (Main St) at Astle St/Pike St/Veranda Ave	Tewksbury	Traffic Signal	37	29	14	0	69
41	School St at Pawtucket St	Lowell	Traffic Signal	44	38	15	0	68
42	Rte. 113 (Riverside St) at University Ave	Lowell	Traffic Signal	40	33	12	0	68
43	Rte. 38 (Bridge St) at Second St	Lowell	Stop	44	38	20	0	68
44	Central St at Market St	Lowell	Traffic Signal	47	42	16	0	67
45	Wood St at Westford St	Lowell	Traffic Signal	38	31	12	0	66
46	Rte. 38 (Nesmith St) at Stackpole St	Lowell	Traffic Signal	30	21	12	0	66
47	Rte. 38 (Bridge St) at W. Sixth St	Lowell	Traffic Signal	29	20	16	0	65
48	Middlesex St at Wilder St	Lowell	All Way Stop	33	25	14	0	65
49	Gorham St at Union St	Lowell	Stop	29	20	15	0	65
50	Merrimack St at Central St	Lowell	Traffic Signal	32	25	10	1	65
51	Route 113 (Main Street) at Park/Elm Streets	Pepperell	Stop	29	20	16	0	65

2022 NORTHERN MIDDLESEX REGIONAL TRANSPORTATION SAFETY REPORT

Table 9: Regional Top 100 High Crash Intersections

Regional Rank	Intersection	Community	Intersection Control	Total Crashes	Property Damage Only	Non-Fatal Injuries	Fatal Injuries	EPDO 2017-2019
52	Rte. 3A (Princeton St) at Baldwin St	Lowell	Traffic Signal	28	19	11	0	64
53	Rte. 38 (Rogers St) at Douglas Rd/Phoenix Ave	Lowell	Traffic Signal	30	22	11	0	62
54	Rte. 3A (Boston Rd) at Treble Cove Rd	Billerica	Traffic Signal	30	22	10	0	62
55	Aiken St at Perkins St	Lowell	Stop	30	22	13	0	62
56	Broadway at School St	Lowell	Traffic Signal	33	26	9	0	61
57	Rte. 113 (Pleasant St) at Hildreth St	Dracut	Traffic Signal	25	16	13	0	61
58	Rte. 3A (Gorham St) at Moore/Dix St	Lowell	Traffic Signal	28	20	11	0	60
59	Rte. 3A (Boston Rd) at Cook St	Billerica	Traffic Signal	22	13	5	0	58
60	East Merrimack St at Fayette St	Lowell		34	28	18	0	58
61	Middlesex St at School St	Lowell	Traffic Signal	29	22	10	0	57
62	Middlesex St at Baldwin St	Lowell	Stop	28	21	13	0	56
63	Rte. 3A (Westford St) at Smith St	Lowell	Stop	28	21	14	0	56
64	Rte. 110 (Chelmsford St) at Parker St	Lowell	Stop	24	16	12	0	56
65	Lakeview Ave at Mammoth Rd	Dracut	Traffic Signal	31	25	11	0	55
66	Drum Hill Rd at Parkhurst Rd	Chelmsford	Traffic Signal	23	15	14	0	55
67	Andover St at High St	Lowell	Traffic Signal	30	24	8	0	54
68	East Merrimack St at High St	Lowell	Stop	46	44	18	0	54
69	Rte. 3A (Gorham St) at London St	Lowell	Stop	26	19	13	0	54
70	Rte. 38 (Rogers St) at Boylston St	Lowell	Traffic Signal	32	27	14	0	52

2022 NORTHERN MIDDLESEX REGIONAL TRANSPORTATION SAFETY REPORT

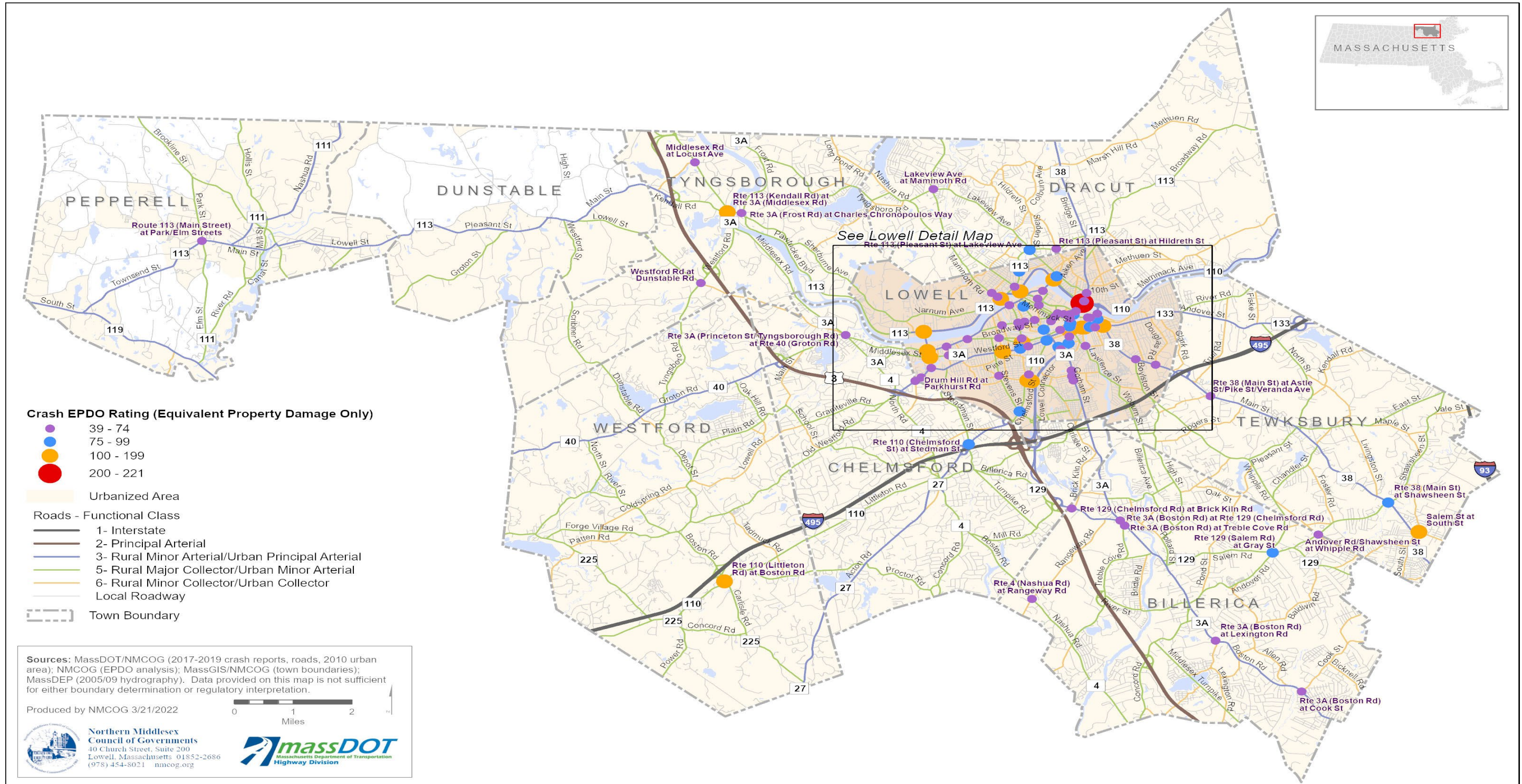
Table 9: Regional Top 100 High Crash Intersections

Regional Rank	Intersection	Community	Intersection Control	Total Crashes	Property Damage Only	Non-Fatal Injuries	Fatal Injuries	EPDO 2017-2019
71	Rte. 3A (Princeton St/ Tyngsborough Rd) at Rte. 40 (Groton Rd)	Chelmsford	Traffic Signal	16	7	7	0	52
72	Mammoth Rd at Fourth Ave	Lowell	Stop	31	26	17	0	51
73	Dutton St at Market St	Lowell	Traffic Signal	26	20	13	0	50
74	Middlesex Rd at Locust Ave	Tyngsborough	Traffic Signal	26	20	6	0	50
75	Rte. 3A (Gorham St) at Manchester St	Lowell	Stop	17	10	9	1	50
76	Rte. 4 (Nashua Rd) at Rangeway Rd	Billerica	Stop	17	9	9	0	49
77	Rte. 3A (Thorndike St) at YMCA Dr./Hale St	Lowell	Traffic Signal	37	34	13	0	49
78	Westford St at Technology Dr	Lowell	Stop	28	23	14	0	48
79	Stevens St at Parker St	Lowell	Traffic Signal	24	18	7	0	48
80	Middlesex St at South St	Lowell	Stop	24	18	11	0	48
81	Merrimack St at Palmer St	Lowell	Traffic Signal	32	28	14	0	48
82	Dutton St at Broadway St	Lowell	Traffic Signal	23	17	14	0	47
83	Middlesex St at Pawtucket St	Lowell	Traffic Signal	19	12	6	0	47
84	Merrimack St at DuttonSt/Arcand Dr.	Lowell	Traffic Signal	35	32	13	0	47
85	Merrimack St at Cabot St	Lowell	Stop	26	21	12	0	46
86	Rte. 3A (Frost Rd) at Charles Chronopoulos Way	Tyngsborough	Traffic Signal	22	16	9	0	46
87	Rte. 110 (Chelmsford St) at Lincoln St	Lowell	Traffic Signal	21	15	4	0	45
88	Westford Rd at Dunstable Rd	Tyngsborough	Traffic Signal	25	20	7	0	45
89	Bridge St at French St	Lowell	Traffic Signal	32	29	10	0	44
90	School St at Rock St	Lowell	Stop	20	14	6	0	44

Table 9: Regional Top 100 High Crash Intersections

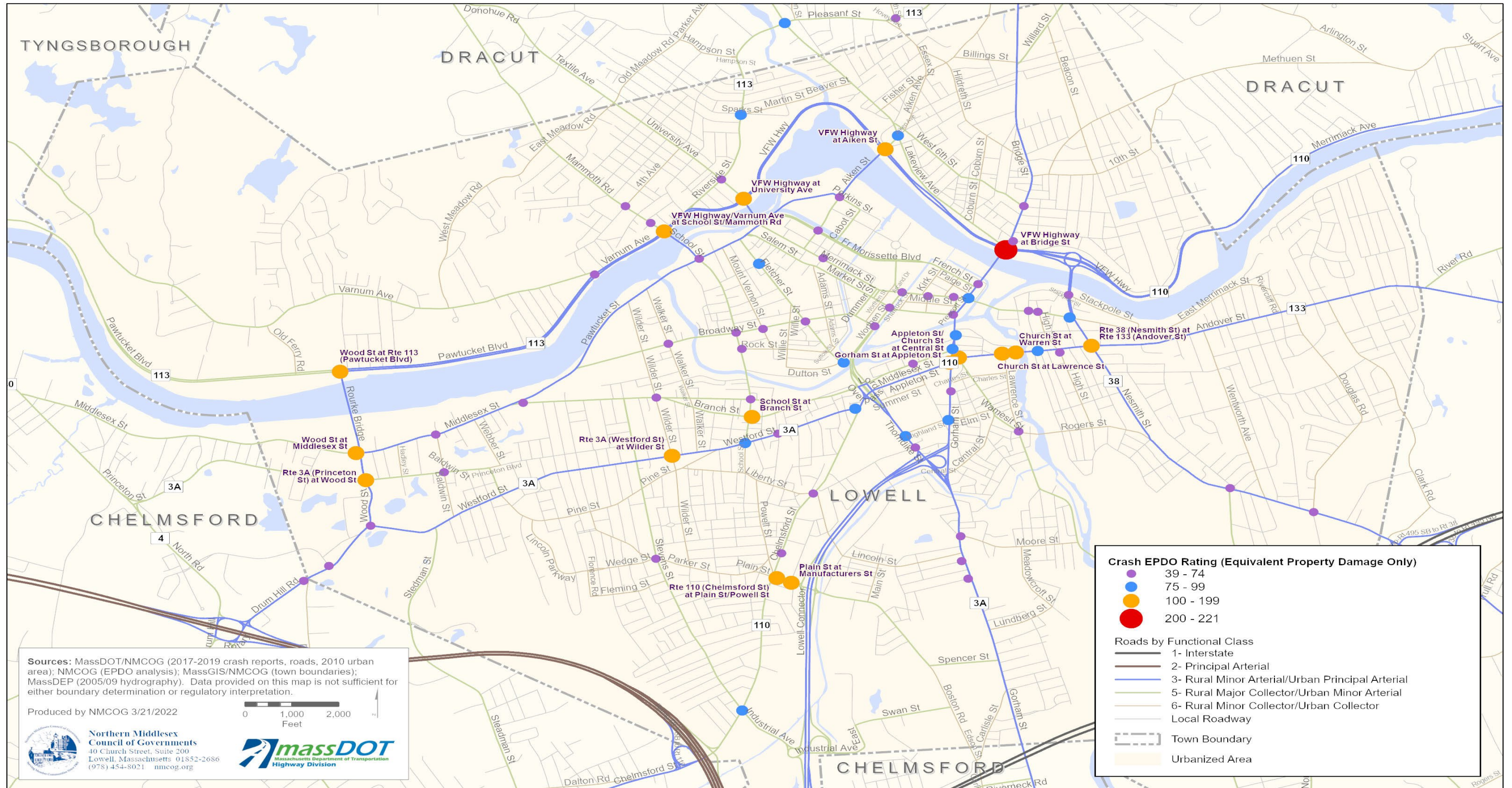
Regional Rank	Intersection	Community	Intersection Control	Total Crashes	Property Damage Only	Non-Fatal Injuries	Fatal Injuries	EPDO 2017-2019
91	Rte. 3A (Boston Rd) at Lexington Rd	Billerica	Stop	28	24	14	0	44
92	Mammoth Rd at Second Ave	Lowell	Stop	20	14	12	0	44
93	Broadway at Walker St	Lowell	Stop	22	17	9	0	42
94	Broadway at Mt. Vernon St	Lowell	Stop	18	12	6	0	42
95	Lawrence St at Rogers St	Lowell	Traffic Signal	17	11	3	0	41
96	Rte. 113 (Pawtucket Blvd) at Varnum Ave	Lowell	Traffic Signal	24	20	10	0	40
97	Father Morrisette Boulevard at Aiken St	Lowell	Traffic Signal	20	15	11	0	40
98	Rte. 3A (Boston Rd) at Rte. 129 (Chelmsford Rd)	Billerica	Stop	16	10	10	0	40
99	Rte. 129 (Chelmsford Rd) at Brick Kiln Rd	Billerica	Stop	20	15	9	0	40
100	VFW Highway at Riverside St	Lowell	Stop	23	19	10	0	39

Map 1: "Top 100" High Crash Intersections.



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Map 2: "Top 100 Crash Locations" Lowell, MA.



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MASSDOT TOP 200 CRASH REPORT

MassDOT maintains a “Top 200” list of high crash locations around the Commonwealth. There are sixteen (16) locations shown in the rankings that lie within the Northern Middlesex region, as presented in Table 8. Each of these locations aside from one are also listed in the regional Top 100 and are eligible for funding. As of August 2022, the 2017 version of this report is the latest found on-line.

Table 10: NMCOG Region Intersections in MassDOT "Top 200".

Intersection	MassDOT "Top 200" Rank	Community	Intersection Control	2019 Regional Rank
VFW Highway at Bridge St	24	Lowell	Traffic Signal	1
VFW Hwy./Varnum Ave at School Street	30	Lowell	Traffic Signal	3
Branch St at School St	31	Lowell	Traffic Signal	8
Central St at Church St	41	Lowell	Traffic Signal	10
Middlesex St at Wood St	53	Lowell	Traffic Signal	2
Aiken St at VFW. Hwy.	69	Lowell	Traffic Signal	6
VFW Hwy. at University Ave.	71	Lowell	Traffic Signal	9
Rte. 133 (Andover St) at Rte. 38 (Nesmith St)	77	Lowell	Traffic Signal	11
Appleton St. at Gorham St.	109	Lowell	Traffic Signal	19
Princeton Blvd. at Wood St.	111	Lowell	Traffic Signal	13
South St. at Salem Rd.	117	Tewksbury	Stop Sign	14
Chelmsford St. at Stedman St.	132	Chelmsford	Traffic Signal	28
Foster St. at Princeton Blvd.	179	Lowell	Stop Sign	N/A
Church St. at Warren St.	182	Lowell	Stop Sign	12
Salem Rd. at Gray St.	195	Billerica	Stop Sign	21
Wilder St. at Westford St.	199	Lowell	All Way Stop	17

Source: MassDOT/ NMCOG Crash Data

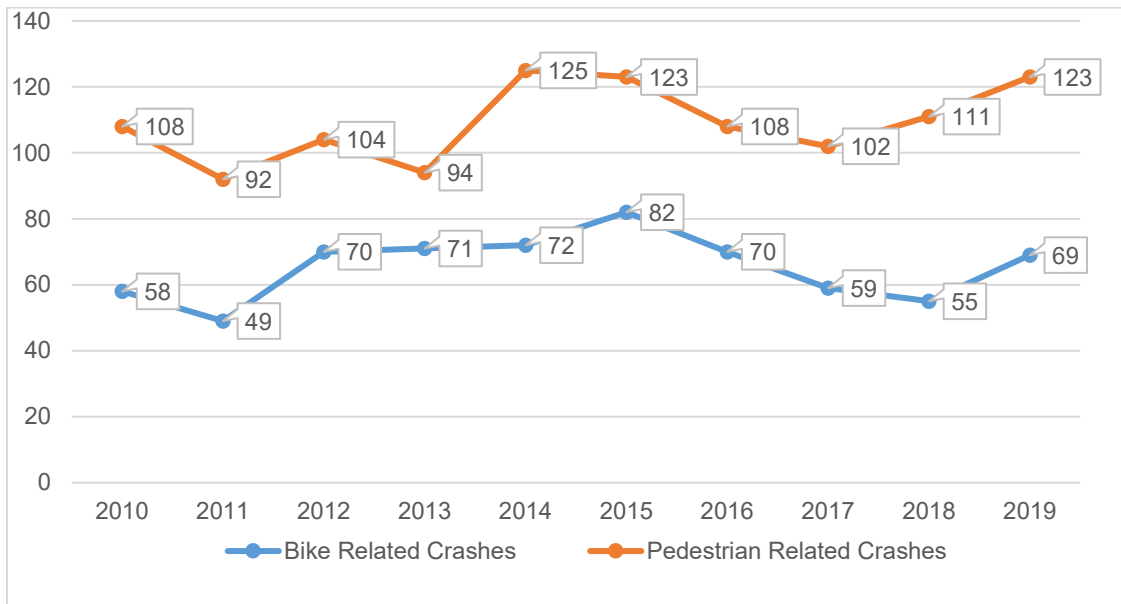
BIKE AND PEDESTRIAN SAFETY

According to FHWA, each year bicycle and pedestrian fatalities comprise about 19 percent of all traffic fatalities and there are approximately 6,000 pedestrian and 850 bicyclist deaths. Another 76,000 pedestrians and 47,000 bicyclists are injured in roadway crashes annually.¹ It is important that the planning, design, operation and maintenance of transportation facilities consider the needs of bicyclists and pedestrians. MassDOT Directive E-98-003, which was adopted in 1998, requires that design engineers use sound engineering practices in making reasonable provisions for the accommodation of bicyclists and pedestrians in project design.

Figure eight below shows bicycle and pedestrian crashes between 2010 and 2019. Pedestrian crashes from 2010 through 2013 saw relatively minor fluctuations and showed decreases in crashes in 2011 and 2013, which would prove to be the lowest crash numbers for pedestrians in the 2010-2019 reporting period. In 2014, pedestrian crashes rose almost 33% from the previous year before slowly decreasing 18% by 2017. 2018 and 2019 saw the number of pedestrian crashes rise once again with an increase in pedestrian crashes of 20% by 2019.

The number of bicycle crashes dropped by 15% in 2011 before rising almost 43% in 2012. From there the number of crashes remained relatively flat in 2013 and 2014 before rising by 13% in 2015 with 82 crashes reported. A steady drop in crashes followed with a 32% decrease in crashes reported by 2018. Bicycle crashes rose again in 2019 by 25%.

Figure 8: Regional Bike and Pedestrian Crashes 2010-2019.



Source: NMCOG Crash Data

¹ FHWA https://safety.fhwa.dot.gov/ped_bike Updated June 15, 2022

Table 11: Regional Bike and Pedestrian Related Crashes 2015-2019.

Category	2015	2016	2017	2018	2019	Total
Bike Related Crashes	82	70	59	55	69	335
Pedestrian Related Crashes	123	108	102	111	123	567
Total	205	178	161	166	192	902

Source: NMCOG Crash Data

In the reporting period 2015 - 2019, there were a total of 567 crashes involving pedestrians and 335 crashes involving bicyclists within the Northern Middlesex region. Of the pedestrian crashes, 405 resulted in injury of which 394 were incapacitating and 11 fatal. There were 177 injury-related bicycle crashes with 176 reported incapacitating and one fatal between 2015 and 2019. Furthermore, The City of Lowell had the highest incidence of pedestrian and bicycle related crashes in the region while Dunstable had only one (1) crash for bike and pedestrians combined for the same period. Tables 10 and 11 show the number of pedestrian and bicycle crashes based on severity and community.

Table 12: Regional Pedestrian Related Crashes by Severity and Community, 2015-2019.

Community	Property Damage Only	Serious Injury Crashes	Fatal Crashes	Unknown/ Not Reported	Total
Billerica	3	15	2	0	20
Chelmsford	3	26	2	1	32
Dracut	2	17	1	0	20
Dunstable	0	0	0	0	0
Lowell	114	289	3	44	450
Pepperell	1	7	0	0	8
Tewksbury	11	32	1	0	44
Tyngsborough	1	3	1	0	5
Westford	8	5	1	0	14
Total	143	394	11	45	593

Source: NMCOG Crash Data

Table 13: Regional Bike Related Crashes by Severity and Community, 2015-2019.

Community	Property Damage Only	Serious Injury Crashes	Fatal Crashes	Unknown/ Not Reported	Total
Billerica	4	15	0	0	19
Chelmsford	1	10	1	0	12
Dracut	8	6	0	2	16
Dunstable	0	1	0	0	1
Lowell	93	118	0	25	236
Pepperell	1	3	0	0	4
Tewksbury	2	11	0	1	14
Tyngsborough	2	1	0	0	3
Westford	2	11	0	0	13

Source: NMCOG Crash Data

ADDRESSING SAFETY

ADDRESSING SAFETY THROUGH THE TIP

The Northern Middlesex MPO works collaboratively with Federal, State, and local officials and stakeholders to address transportation safety throughout the region. Through development of a data driven, performance based approach to addressing safety; improvements throughout the region can be monitored and quantified to assess progress in achieving goals set in the Regional Transportation Plan. Through the TIP process, the NMMPO programs Federal funds for transportation projects in the region, thereby addressing identified safety issues in the TIP process.

HIGHWAY SAFETY IMPROVEMENT PROGRAM AND STRATEGIC HIGHWAY SAFETY PLAN

Congress established the Highway Safety Improvement Program under SAFETEA-LU and continued it through FAST, in order to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. The Highway Safety Improvement Program (HSIP) requires states to develop and implement a strategic highway safety plan, and to submit annual reports to the

U.S. Secretary of Transportation that describe at least 5% of the state's most hazardous locations, show progress in implementing highway safety improvement projects, and evaluate the effectiveness of the projects in reducing injuries and fatalities.

A Massachusetts HSIP Task Force was established to develop guidelines for HSIP-eligible projects and programs. The Task Force consists of FHWA, MassDOT Highway, MassDOT Planning and the

Regional Planning Agencies. In 2009, Massachusetts began obligating funds from the HSIP funding category and is now in the eleventh year of an active HSIP program.

In March 2020, the Commonwealth of Massachusetts updated its Strategic Highway Safety Plan (SHSP), which provides the framework, and specific goals and objectives for reducing highway fatalities and serious injuries on all public roads. The SHSP is a data-driven, comprehensive plan that integrates the four E's - engineering, education, enforcement and emergency medical services (EMS). The SHSP is developed in consultation with Federal, State, local and private sector safety stakeholders. Since the development of the first SHSP in 2006, highway fatalities in the Commonwealth have dropped by 19% and serious injuries have dropped by 44%. The Commonwealth's long-range goal is known as Vision Zero, which envisions zero fatalities on the State's roadways.

The primary goal of the SHSP is to decrease traffic-related fatalities and injuries through improvements in the following fourteen (14) strategic emphasis areas, each representing at least ten (10) percent of annual fatalities or severe injuries on Massachusetts roadways:

- Lane departures;
- Impaired driving;
- Occupant protection;
- Speeding/aggressive driving;
- Intersection crashes;
- Pedestrians;
- Older drivers;
- Motorcycles;
- Young drivers
- Truck/bus-involved crashes;
- Driver distraction;
- Bicycles;
- At-grade rail crossings; and
- Safety of persons working on roadways.

In addition to strategies for emphasis areas, five policies are recommended by the SHSP to help reduce the frequency and severity of roadway crashes. These are legislative measures designed to address the interconnected nature of crashes, focusing on speeding, driver distraction and impaired driving. These include hands free laws, primary seat belts laws, work zone safety laws, ignition interlock for all OUI offenders, truck side guards, and automated enforcement authority for municipalities. Table 14 highlights projects in the NMCOG Region that currently programmed to receive Highway Safety Improvement Plan (HSIP) funding.

Table 14: NMCOG Projects Receiving HSIP Funding

Project ID	Project Description	Community	HSIP Funding Award	Current Programmed TIP Year	Project Status
608774	Lowell- Tewksbury- Route 38 Intersection Improvements	Lowell & Tewksbury	\$3,339,235.00	2023	Design

Source: Northern Middlesex Transportation Improvement Program

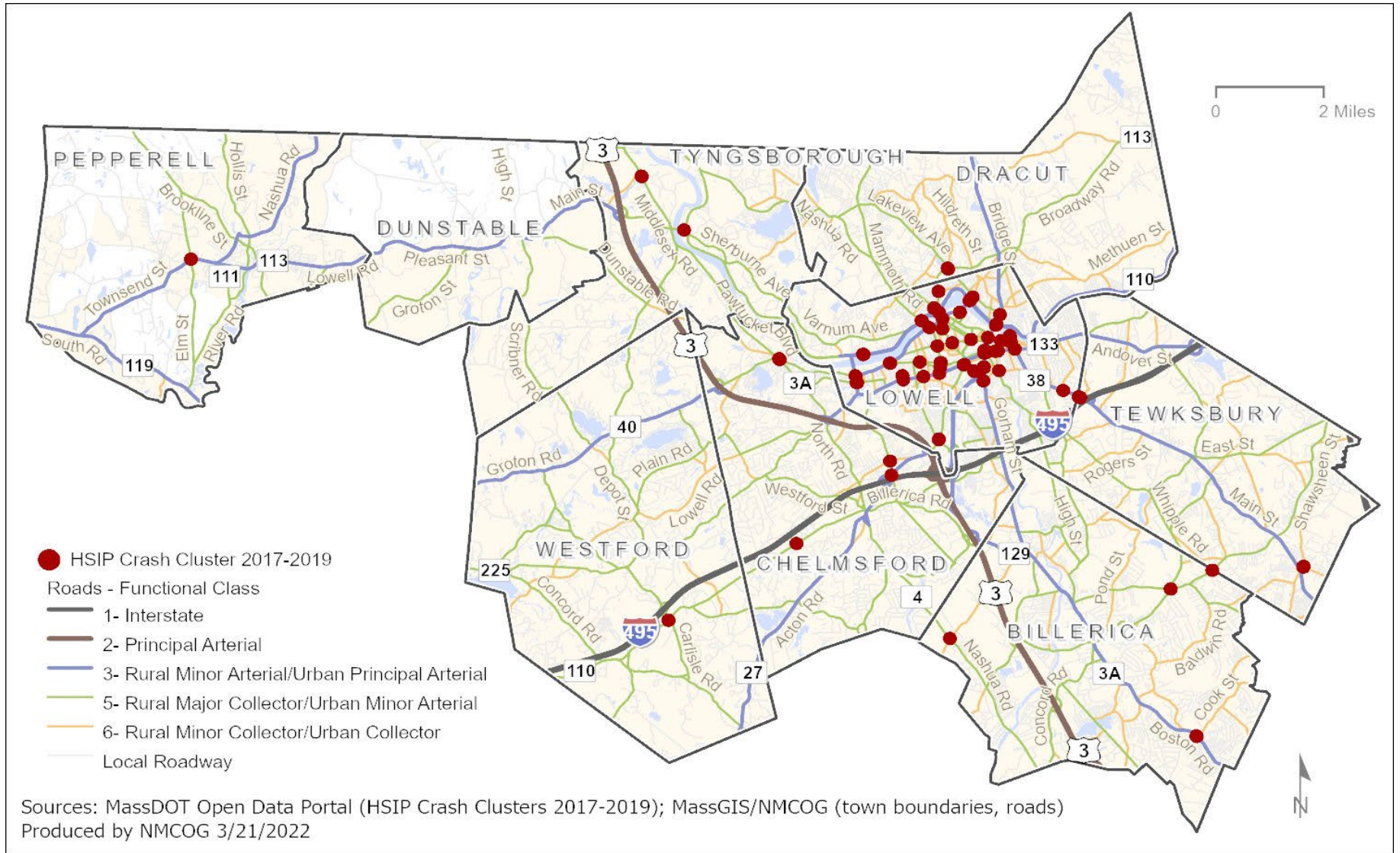
MASSDOT'S HIGH CRASH CLUSTER METHOD FOR DETERMINING HSIP FUNDING ELIGIBILITY

MassDOT maintains an interactive map displaying the vehicular crash locations throughout the entire Commonwealth. The map is used by MassDOT to identify locations that are eligible for Federal assistance through the Highway Safety Improvement Program (HSIP). An HSIP-eligible location is a "crash cluster" that ranks within the top 5% within each region, based on a combination of factors, including crash incidence and severity. According to the MassDOT 2017 Top Crash Locations Report, crash clusters are determined using a 25-meter (82-foot) fixed search distance around each crash and merging nearby crashes together to create clusters.

MOTOR VEHICLE RELATED CRASH CLUSTERS

Map 3 displays the high crash clusters located in the Northern Middlesex region. These locations are eligible for Highway Safety Improvement Program funding through the Northern Middlesex Transportation Improvement Program.

Map 3: High Crash Clusters in the NMCOG Region.

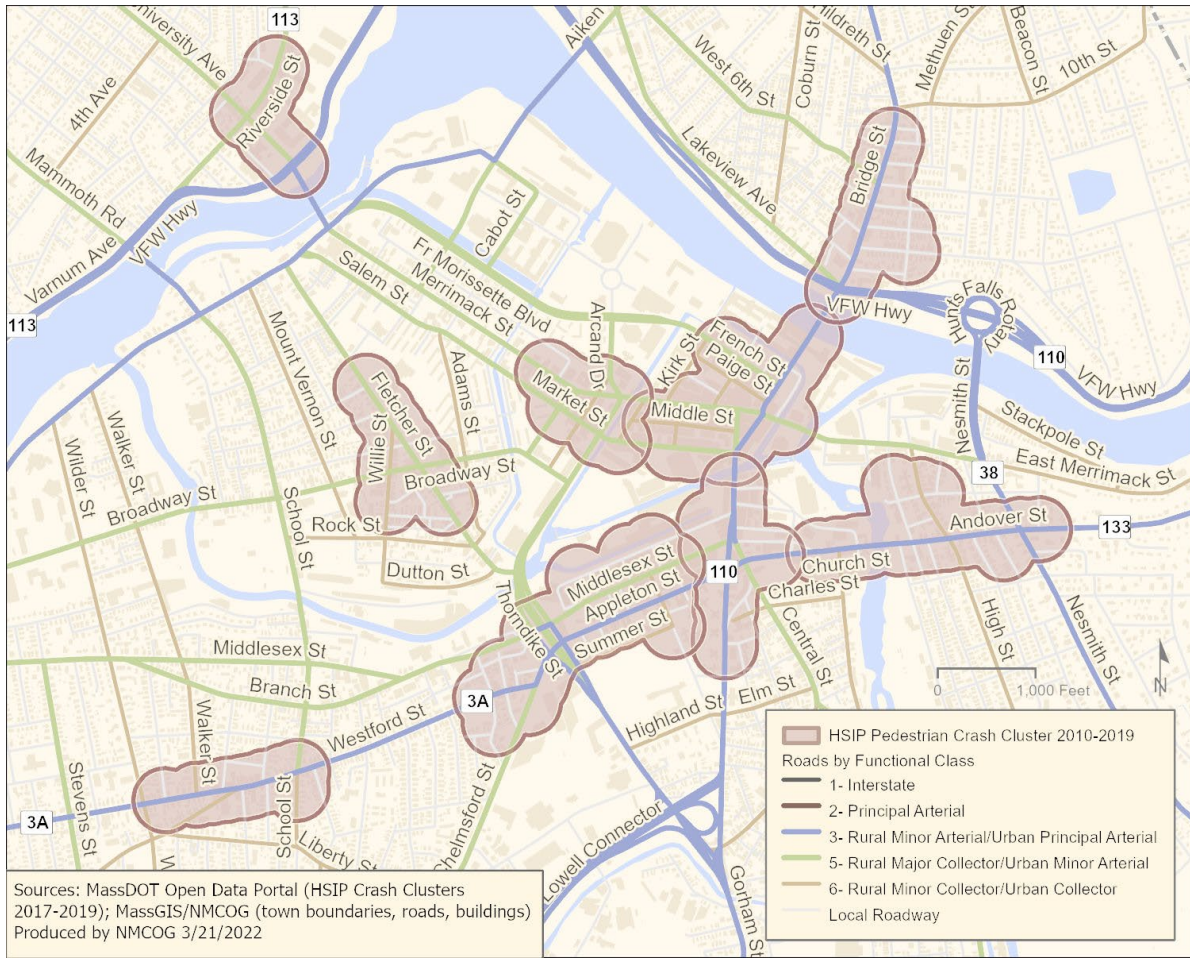


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PEDESTRIAN RELATED CRASH CLUSTERS

Map four and Table 15 detail pedestrian related “crash clusters” for 2010-2019, as identified by MassDOT. Improvements at these locations are eligible for HSIP funding. All of the “crash clusters” are located within the City of Lowell.

Map 4: Pedestrian Related "Crash Clusters" 2010-2019 as Identified by MassDOT.



Source: MassDOT “Top Crash Portal” <https://gis.massdot.state.ma.us/topcrashlocations/>

Table 15: Pedestrian Related "Crash Clusters" 2010-2019

Intersection	Non-Injury Crashes	Non-Serious & Possible Injury Crashes	Fatal & Serious Injury Crashes	EPDO Score
Bridge St from VFW Highway to 10th Street	14	33	2	749
Merrimack/ Market St. Downtown	29	29	7	788
Moody/ Merrimack St City Hall	17	18	5	437

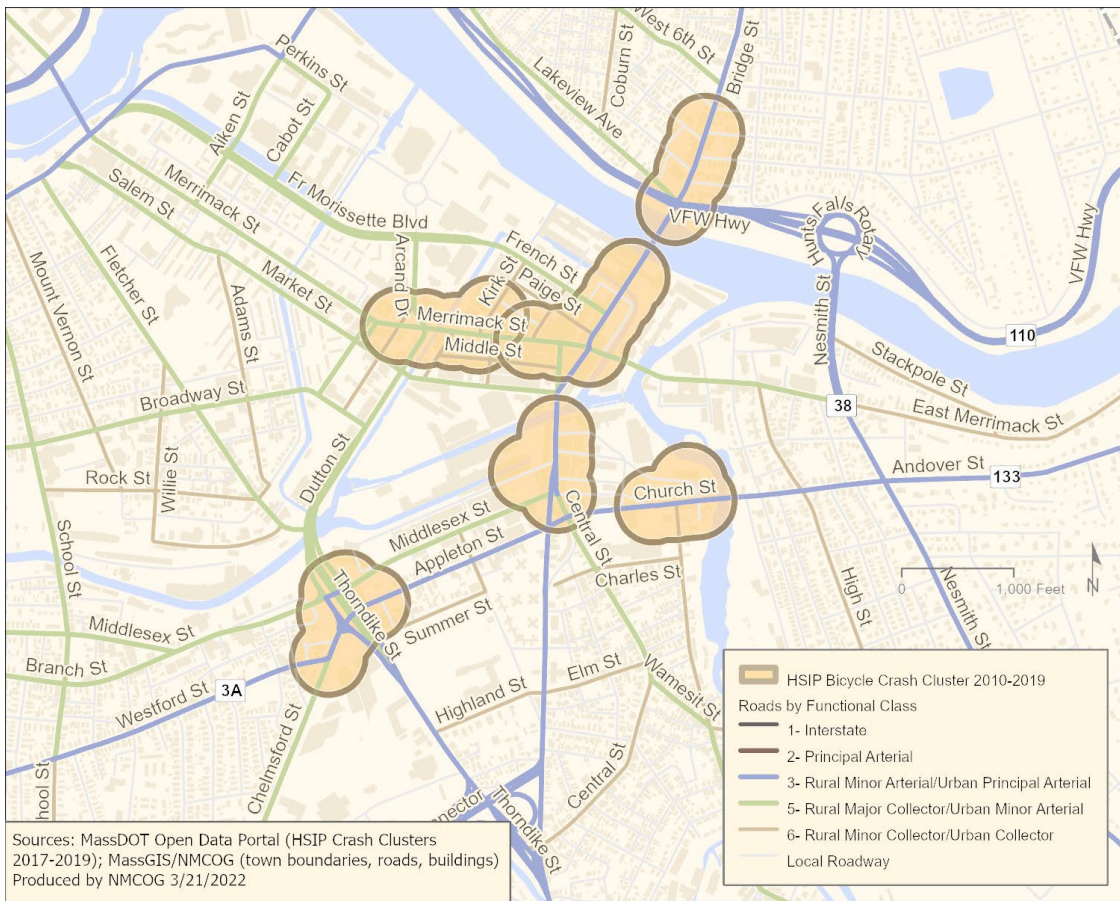
Intersection	Non-Injury Crashes	Non-Serious & Possible Injury Crashes	Fatal & Serious Injury Crashes	EPDO Score
Fletcher/ Broadway St	10	12	2	304
Jackson/ Appleton/ Middlesex St	24	35	7	906
Gorham/ Central St Corridor	22	29	1	652
Church/ Nesmith/ Andover St	24	25	7	696
Westford/ School St	6	12	2	300
University Ave/ Riverside St	6	12	6	384

Source: MassDOT “Top Crash Portal” <https://gis.massdot.state.ma.us/topcrashlocations/>

BICYCLE RELATED CRASH CLUSTERS

Map 5 and Table 16, detail bicycle-related “crash clusters” for 2010 through 2019, as identified by MassDOT. Improvements at these locations are eligible for HSIP funding. All of the “crash clusters” identified are located within the City of Lowell.

Map 5: Bicycle-Related "Crash Clusters" 2010-2019, as Identified by MassDOT.



Source: MassDOT “Top Crash Portal” <https://gis.massdot.state.ma.us/topcrashlocations/>

Table 16: Bicycle-Related "Crash Clusters" 2010-2019 as Identified by MassDOT.

Intersection	Non-Injury Crashes	Non-Serious & Possible Injury Crashes	Fatal & Serious Injury Crashes	EPDO Score
Bridge St/ Veterans of Foreign Wars Hwy	8	17	0	365
Kearney Square/ Merrimack/ Bridge St	5	9	2	236
Merrimack/ Moody St/ City Hall	6	1	1	150
Central St	4	6	1	150
Church/ Lawrence St	4	4	3	151
Lord Overpass/ Thorndike/ Middlesex/ Appleton St	6	9	0	195

Source: MassDOT "Top Crash Portal" <https://gis.massdot.state.ma.us/topcrashlocations/>

ROADWAY SAFETY AUDITS ROLE IN HSIP FUNDING DETERMINATION

The Federal Highway Administration (FHWA) defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. The RSA program was implemented in 2007, in accordance with the Commonwealth's role as a Lead State in preventing lane departure crashes, in conjunction with the SHSP. Since then, RSAs have become an integral part of the HSIP program in Massachusetts and the region.

HSIP guidelines state, "All HSIP candidate locations will require an accompanying RSA report, or an engineering or planning report to determine eligibility". Thus, the RSA program has expanded to encompass any location in the State identified as a high crash location. Additionally, if all or a portion of a project area is considered HSIP-eligible, an RSA must be conducted in the Northern Middlesex Region. Many of the recommendations of these RSAs have been incorporated into construction projects programmed in the Northern Middlesex Transportation Improvement Program (TIP) using HSIP funding.

Table 17: NMCOG Projects Receiving HSIP Funding.

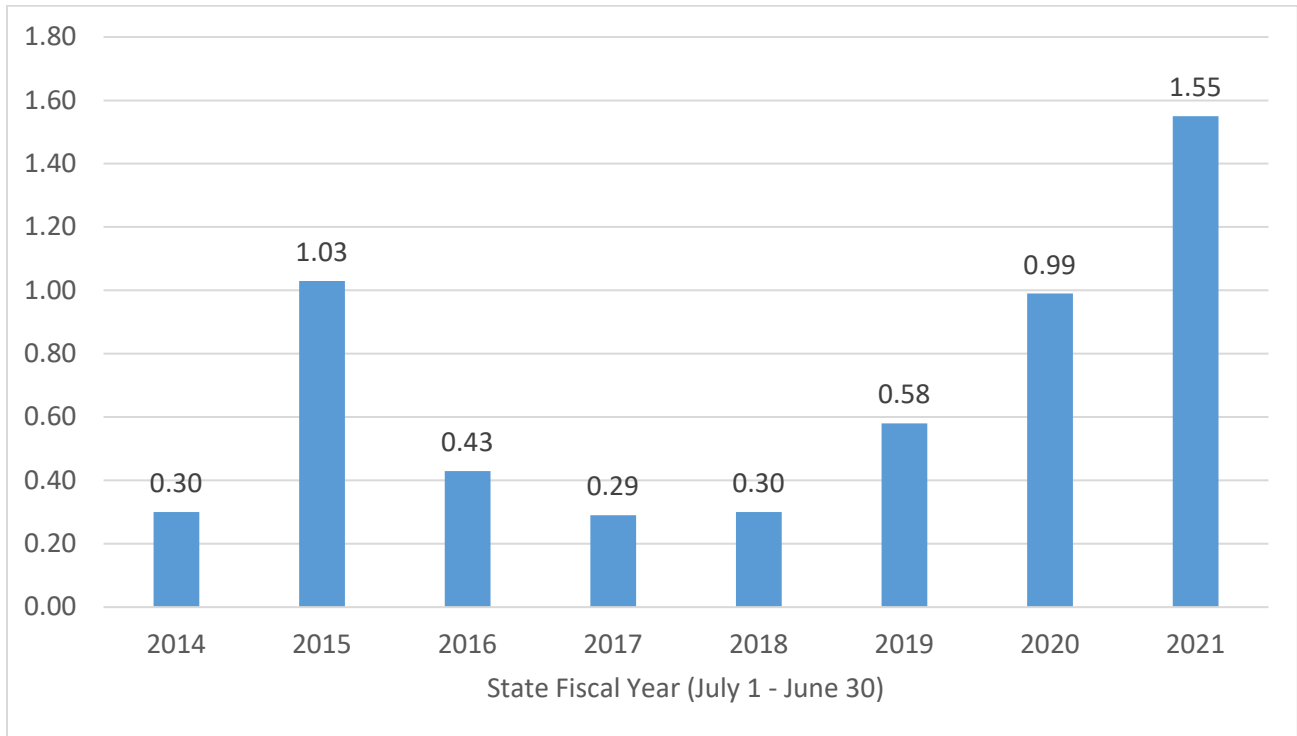
RSA Location	RSA Completion Date	Project Status
US Route 3 in Billerica & Chelmsford	2007	Construction Complete
Intersection of VFW Highway & Bridge Street in Lowell	2007	Construction Complete
VFW Highway Corridor in Lowell	2010	RTP project recommendation FFY 2025-2029; Preliminary Design
Route 38 in Lowell	2010	Construction Underway
East Street at Livingston Street in Tewksbury	2011	Construction Underway
Route 40 at Oak Hill Road in Westford	2013	Construction Underway
Forge Village Road at Cold Spring Road in Westford	2014	Planning study underway by Town of Westford
Route 40 at Dunstable Road in Westford	2014	Construction Complete
Route 3A and Charnstaffe Lane in Billerica	2014	Construction Complete
Lowell Connector at Gorham Street in Lowell	2016	RTP project recommendation FFY 2025-2029; Preliminary Design
Route 225 and Carlisle, Griffin Road in Westford	2016	Town response to residents complaining of cut through traffic.
Pawtucket Boulevard at Wood Street (Rourke Bridge)	2017	Improvements made in conjecture with Rourke Bridge Replacement project.
Bridge Street Corridor in Lowell	2017	In conjunction with City's resurfacing project between VFW Highway and Sixth Street.
Church Street in Lowell	2018	RTP project recommendation FFY 2025-2029; Preliminary Design
South/Salem/Main Street in Tewksbury	2018	Under Construction
Route 38 in Tewksbury	2018	Programmed on TIP for construction in FFY 2023
University Avenue in Lowell	2019	RTP Universe of Projects

Source: NMCOG Regional Transportation Plan (TIP)

TRANSIT SAFETY

The Lowell Regional Transit Authority (LRTA) is focused on providing safe public transportation systems and facilities for its riders and users. For the riding public, the LRTA maintains one of the newest bus fleets in the State. Vehicle maintenance is a priority and the addition of low-floor buses makes the service comfortable for senior and disabled passengers, while eliminating most of the mechanical problems associated with lifts for individuals with disabilities. Additionally, the vehicles are equipped with on-board video surveillance for added safety and security.

Figure 9: LRTA Preventable Accident Rate per 100,000 Miles.



Source: LRTA Crash Database

LRTA tracks preventable accidents per 100,000 miles as a safety performance measure. The National Safety Council defines a preventable accident as “one in which the driver failed to do everything that they reasonably could have done to avoid the accident”. Figure 9 above shows preventable accident data for the LRTA from 2014-2021. In general, preventable accidents occur more often during the winter months, when city streets are narrowed by snow banks and cars are parked further into the roadway than is the case during the spring, summer and fall. In 2015, the severity of the winter season led to a higher than typical accident rate. The increase from 2019 to 2021 reflects the expanded reporting as required by the Federal Transit Administration’s requirements included in the LRTA’s Public Transportation Agency Safety Plan (PTASP). Under the PTASP, minor incidents are now being included in the annual reporting. The higher rate of preventable crashes is likely to continue into the future.

LRTA PUBLIC TRANSPORTATION AGENCY SAFETY PLAN

The Lowell Regional Transit Authority (LRTA) has developed a regional Public Transportation Agency Safety Plan (PTASP), which details the safety processes and procedures for the Authority. The plan utilizes existing agency safety practices and best practices to be implemented to meet the new regulation set in 49 CFR Part 673.

The PTASP includes formal documentation to guide the agency in proactive safety management policy, safety risk management, safety assurance, and safety promotion. The goal is to provide management and labor with a comprehensive, collaborative approach to managing safety. The plan includes the process and schedule for reviewing the plan annually relative to safety performance measures and update processes that may be needed to improve the organization's safety practices.

The NMMPO adopted the updated transit performance measures and targets outlined in the PTASP at its July 27, 2022 meeting. Table 18 details the safety performance measures adopted.

Table 18: LRTA Safety Performance Measures adopted by the 2022 PTASP.

Mode of Transit Service	Fatalities (Total)	Fatalities (Rate*)	Injuries (Total)	Injuries (Rate)	Safety Events (Total)	Safety Events (Rate)	System Reliability (Miles between Failure)
Fixed Route	0	0	3	2	30	23	39,400
Demand Response	0	0	1	2	4	15	71,700

* Rates are per 1,000,000 vehicle revenue miles.

Source: LRTA Public Transportation Agency Safety Plan. July 2022.

SECURITY OF THE TRANSPORTATION SYSTEM

There are many important transportation assets that are potentially vulnerable to security threats, including components of the transit, highway and intermodal freight system. Emergency response procedures are built largely from natural disasters and experience in responding to special disasters, such as the attacks of 9/11 and the Boston Marathon bombing. The response to terrorism occurs at many levels of government including local, regional, state and federal. Immediately after the terrorists' attacks on September 11, 2001, travel experience and behavior was forever altered. Transportation officials continue to evaluate ways to include security measures into the planning, design, implementation and operation of transportation facilities and services.

One of the most important lessons learned from past incidents is that effective and reliable communication among all levels of government is essential in responding to such disasters. Key agencies must work together to protect critical transportation assets, such as bridges and highway interchanges, enhance the region's traffic management capabilities and improve emergency response. Terrorists' objectives are assumed to be focused upon political, economic,

or social disruption of our society through destruction and public demoralization. Transportation facilities could be targeted for attack, which would play a vital role in disaster response. Terrorists tend to select targets with symbolic value, with a history of targeting transportation vehicles, such as buses and trains, with explosives or gunfire. The tactics of terrorists continue to evolve, from isolated bombings to coordinated acts that create massive casualties. The World Trade Center attacks, as well as the attacks on Madrid's Commuter Rail system and London's Underground Subway systems are a few notable examples. Transit and rail systems are regarded by law enforcement officials to be more likely terrorist targets than highway structures. Terrorist threats to the transportation system could include:

- Structural/ functional damage from explosives or fire.
- Casualties from explosives or fire.
- Facility or system shut down due to exposure or contamination from biological, radiological or chemical weapons.
- Collateral damage to other services or infrastructure such as telecommunications, power and pipelines carried along roadways or bridges.

The Northern Middlesex Council of Governments worked with the Federal Emergency Management Agency (FEMA), Massachusetts Emergency Management Agency (MEMA) and the Massachusetts Department of Conservation and Recreation to develop a Regional Hazard Mitigation Plan to identify disaster risks and develop strategies for mitigation. The Plan focuses primarily on natural hazards, although it does address non-natural hazards as well. While the cause of a disaster may differ, there are many similarities in emergency response to natural disasters and acts of terrorism.

NMCOG implemented a "Pre-Disaster Mitigation Plan" for the region in 2006, which was revised and updated in 2015 and approved by FEMA. The plan outlines actions that could be taken to reduce the impacts of a natural disaster when and if they were to occur. Many of these mitigation measures would also help reduce the impacts of a possible terrorist attack. This plan could be modified to include additional supporting emergency operations plans for responding to security threats and incidents. In either a natural disaster or terrorism related event, the transportation network will be called upon to accommodate the following functions:

- Evacuate the population in the area of the event.
- Provide emergency access to the site of the incident
- Allow the public to bypass the affected area.
- Respond to impacts of restrictions to access in the affected area.

NMCOG assisted the Northeast Homeland Security Council in updating the Regional Homeland Security Plan, which included work in identifying critical infrastructure and evacuation routes within each community. As the refined emergency management plans continue to be developed, the Regional Transportation Plan may be amended to reflect identified priorities.

In response to the COVID-19 pandemic, the LRTA put together protocol for maintaining the safety of riders and drivers. This includes requiring both riders and drivers to wear masks while riding, asking anyone found loitering on the bus to de-board, and putting together a schedule for disinfecting all facilities throughout the system. Furthermore, the LRTA conducts daily manager's meetings and calls regarding COVID-19 and continues to run an awareness campaign.

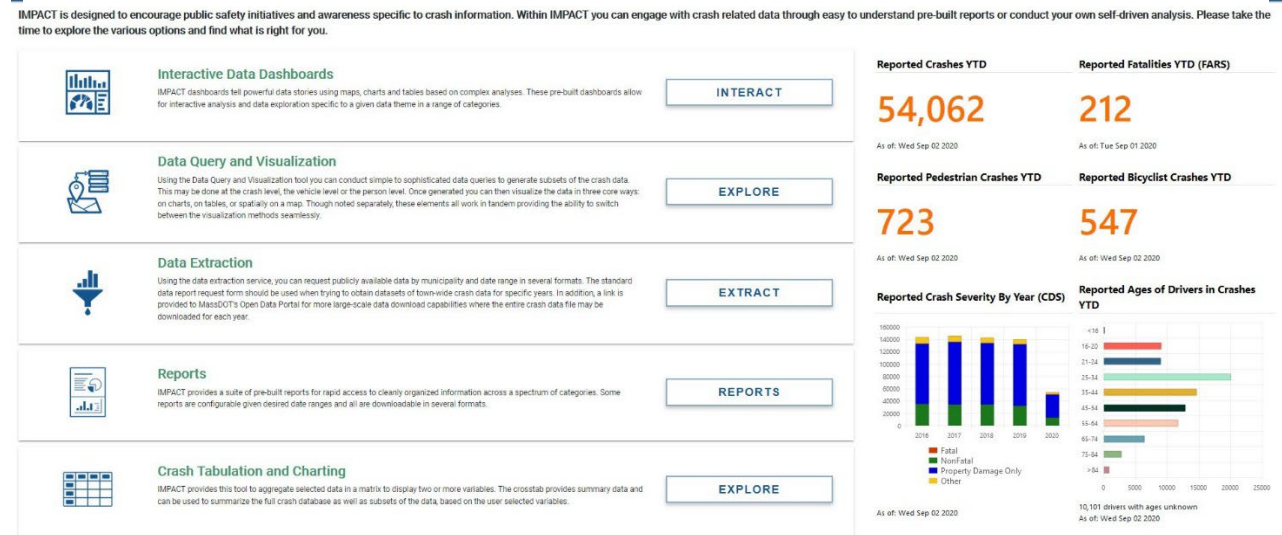
STATE SAFETY INITIATIVES

MASSDOT CRASH PORTAL

MassDOT launched their IMPACT online tool in early 2020. The tool was designed to encourage public safety initiatives that center on crash data. This portal tracks and analyzes crashes throughout the state and displays them on an easy to use map, providing data that goes back to 2002 and is updated daily.

The portal can be utilized in five different ways including: interactive data dashboards; data query and visualizations; data extraction; report generation; and cross tabulation and charting. It can also be searched and displayed by state, Metropolitan Planning Organization, municipality or even as granular as a single intersection

Image 1: MassDOT Crash Portal



Source: MassDOT IMPACT Portal; <https://apps.impact.dot.state.ma.us/cdp/home>

COMPLETE STREETS

A complete street is one that provides safe and accessible options for all travel modes – walking, biking, and transit, automobile – and for all ages and abilities. While many existing roadways are designed to optimize automobile travel, the complete streets design requirement has sought to increase the role of non-motorized and transit options by providing continuous sidewalks, bicycle lanes, or wide shoulders. Instead of simply focusing on main streets or downtown corridors, a complete streets policy creates a safe, accessible environment throughout a transportation network. By increasing the recognition and importance of the pedestrian, bicyclist and public transit rider in roadway design and operation standards, complete streets policies are meant to ensure that safe travel options exist for all users. MassDOT’s Project Development and Design Guide, which was published in 2006, embraces this approach to roadway design, and serves as a useful guide on how to implement the Complete Streets design approach.

In 2013, MassDOT strengthened its Complete Streets approach by unveiling a Healthy Transportation Policy Directive that requires all state transportation projects to increase bicycling, transit and walking options. The directive was intended to build a healthy, sustainable transportation system and to promote multimodal access for transportation customers. The directive built on MassDOT's mode shift goal, which calls for tripling the share of travel in Massachusetts by bicycling, transit and walking by 2030. Together, these initiatives seek to improve service to transportation customers while improving the health of the public and the natural environment. As part of the policy directive implementation, MassDOT reviews all projects currently in design to ensure they are consistent with the directive goals. Other elements of the directive include:

- All MassDOT facilities consider adjacent land uses and are designed to include wider sidewalks, landscaping, crossing opportunities, and other features to enhance healthy transportation options.
- Reviews of cluster crash sites where incidents have occurred.
- MassDOT provides a guide to assist communities proposing shared use paths on or along rail beds in order to accelerate the path design process.

COMPLETE STREETS FUNDING PROGRAM

The Complete Streets Funding Program was created with the intent of rewarding municipalities that demonstrate a commitment to embedding Complete Streets in policy and practice. The program assists eligible local communities in implementing and constructing bicycle and pedestrian facilities. In order to be eligible, a community must adopt a Complete Streets Policy, complete, and submit a Complete Streets Prioritization Plan to the state. The process of achieving eligibility follows a three- tiered system, the completion of which will allow the community to receive Complete Streets funding for a project. The three tiers are:

1. The municipality demonstrates commitment by adopting a Complete Streets Policy by its highest elected official or board.
2. The municipality develops a Complete Streets Prioritization Plan, examining priorities that align with local and regional planning efforts. By completing Tiers 1 and 2, the Municipality is considered eligible to receive Complete Streets funding.
3. The Municipality identifies projects for competitive funding. MassDOT selects approved projects to be funded through the program

The communities in the Greater Lowell Region have been very active in this program, with all of communities participating as of 2020. All NMCOG communities have approved Prioritizations Plans. Five of the nine communities (Tewksbury, Lowell, Tyngsborough, Chelmsford, and Westford) have been approved or will be approved for project funding. Since 2016, nine Complete Streets grants have been awarded to the five communities in the Northern Middlesex Region. Table 17 describes the projects that have been funded and the amount of the grant awarded.

Image 2: Pedestrian bump out with ADA compliant wheelchair ramps at the intersection of Boston Rd. and Lincoln St. in Westford. These improvements to pedestrian safety were part of the Complete Street Town Center Pedestrian Improvements project.



Source: NMCOG.

Table 19: Regional Complete Streets Projects.

Year	City/ Town	Project Name	Project Description	Grant
2016	Lowell	South Common Shared Use Path	Shared use path built along South Common (City Park) to connect Bishop Markham low-income apartment buildings to Gallagher Intermodal Terminal.	\$400,000
2016	Westford	Town Center Pedestrian Improvements	Construction of new sidewalk connection along Main Street and Boston Road to a new pedestrian crossing to the Town Common. Construction of a bump out with ADA compliant wheelchair ramps to provide traffic calming at the intersection of Lincoln Street and Boston Road. Construction of the pedestrian crossing safety improvements and ADA compliant wheelchair ramps at the entrance of Town Hall.	\$200,000
2016	Westford	Robinson School Sidewalk Connection	600' of sidewalk along Concord Road from an existing sidewalk to the Robinson School front door. ADA compliant wheelchair ramps and safety improvements at the intersection of Robinson Road. Construction of pedestrian safety improvements and ADA compliant wheelchair ramps at Concord Road/ Kelly Road intersection.	\$200,000
2016	Westford	Norman E. Day School Crossing	Construction of pedestrian safety improvements and ADA compliant wheelchair ramps at the North Main Street pedestrian crossing to the front door of the Norman E. Day School. Project will improve safety/ access at the primary crossing to the school.	\$50,000
2017	Chelmsford	Crosswalk across North Road at Parkhurst	One additional crosswalk to line up with existing sidewalks on adjacent streets. Changes to traffic island, new ramps, changes to the signal cycle and additional pedestrian heads for existing signal.	\$35,000
2017	Chelmsford	Billerica Road Sidewalk	Sidewalk and ADA improvements from Chelmsford Center School.	\$108,000
2017	Chelmsford	Richardson Road Multimodal Improvements	Sidewalk construction from Edgelawn Ave. to Princeton Street (Route 3A).	\$185,000
2018	Tewksbury	East Street - Chandler Street Sidewalk Improvements	East Street at Chandler Street intersection plus approximately 500 feet west and 300 feet east along East Street, and 200 feet north and south along Chandler Street.	\$400,000
2018	Tyngsborough	Kendall Road (Route 3A) Improvement Projects	Construction of ADA compliant sidewalk and curb ramps. Installation of a shared use path and rectangular rapid flashing beacons at upgraded pedestrian crossings and intersection reconstruction to reduce travel speed and enhance pedestrian safety in the Town Common area.	\$396,631
2020	Billerica	Glad Valley Drive Traffic Calming and Sidewalk	Stripe 5' (min) bike lanes and add bicycle lane markings along Glad Valley Drive from Boston Road to French Street (4,100 LF), reconstruct 5' sidewalk with 3' (typ) grass strip buffer on Glad Valley Drive from Boston Road to French Street (4,100 LF), add 5.5 FT sidewalks along Ed Hayes Way to Town recreational area and Boys & Girls Club (420 +/- LF).	\$227,565
2020	Billerica	Campbell Road Sidewalk	Construct 5.5 FT sidewalk with granite curbing along Campbell Road connecting Concord Road sidewalk to Boys & Girls Club (850 LF). A crosswalk will be provided at the Boys & Girls Club.	\$151,150

Source: MassDOT & NMCOG RTP

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SAFE ROUTES TO SCHOOL

The Infrastructure Investment and Jobs Act (P.L. 117-58) of 2021 also known as the Bipartisan Infrastructure Law was signed in November of 2021. This piece of legislation authorizes transportation funding for five years (2022-2026) as well as affecting policy decisions for programs that fund walking, bicycling and Safe Routes to School.

The Federal Highway Administration (FHWA) under the FAST Transportation Alternatives Program (TA) funds Massachusetts Safe Routes to School (SRTS) program. It is a key initiative of the Healthy



Transportation Compact. The program provides funding to improve the ability of primary and middle

school students to walk and bicycle to school. Increasing the number of students who walk and bicycle improves students' health, reduces traffic congestion, and improves air quality.

According to the US Department of Transportation, fewer than 16 percent of children walk or bicycle to classes. At the same time, school-related traffic can contribute more than 10 percent of morning rush hour traffic volumes in some communities, as well as significant air pollution.

As shown in Table 18, schools located in the communities of Chelmsford, Dracut, Lowell, Tewksbury, Tyngsborough and Westford currently participate in the SRTS program.

Table 20: Schools Participating in the Safe Routes to School Program.

Community	School Name
Chelmsford	Byam Elementary School
	Center Elementary School
	Charles D. Harrington Elementary School
	Col. Moses Parker School
	McCarthy Middle School
	South Row School
Dracut	Brookside Elementary School
	George H. Englesby Elementary School
	Greenmont Avenue Elementary School
	Joseph A. Campbell Elementary School
	Justus C. Richardson Middle School
Lowell	Abraham Lincoln Elementary School
	Kathryn P. Stoklosa Middle School
	Lowell Community Charter Public School
	Moody Elementary School
	Rogers STEM Academy

Community	School Name
	S. Christa McAuliffe Elementary School
Tewksbury	Heath-Brook Elementary School
	Loella F. Dewing Elementary School
	Louise Davy Trahan Elementary School
	North Street Elementary School
Tyngsborough	Tyngsborough Elementary School
	Tyngsborough Middle School
Westford	Abbot Elementary School
	Blanchard Middle School
	Col. John Robinson School
	John A. Crisafulli Elementary School
	Nabnasset School
	Norman E. Day School
	Rita Edwards Miller School
Stony Brook Middle School	

Source: mass.gov/safe-routes-to-school/resources. Updated 1/21/2022

CONCLUSIONS AND NEXT STEPS

The NMMPO continues to work with local, regional and federal partners to improve overall safety on the region's transportation network. By prioritizing projects that address known safety concerns, the NMMPO is striving to achieve the performance targets set and reported in the 2020 Northern Middlesex Regional Transportation Plan, the LRTA Public Transit Agency Safety Plan and annual updates presented within this report.

The MPO will continue to assist communities with State and Federal grant opportunities designed address safety issues in the region. Items like the Complete Streets Program, the Safe Routes to Schools Program, the Shared Streets and Spaces Program, as well as Chapter 90 funding are all examples of state funding available to municipalities and the NMMPO will publicize these grant opportunities and offer technical assistance. On the federal funding side, projects can be funded through the region's Transportation Improvement Program (TIP) as well as other grant opportunities including a Safe Streets For All (SS4A) grant program to develop a regional safety action plan. The MPO is currently applying for this grant jointly with the Merrimack Valley MPO on behalf of all communities in the two regions.

Communities looking to participate in the process by initiating safety improvement TIP projects, learning about Federal and State grant opportunities, or conducting UPWP safety studies can contact NMMPO staff at jhoward@nmcog.org or (978) 454-8021.

