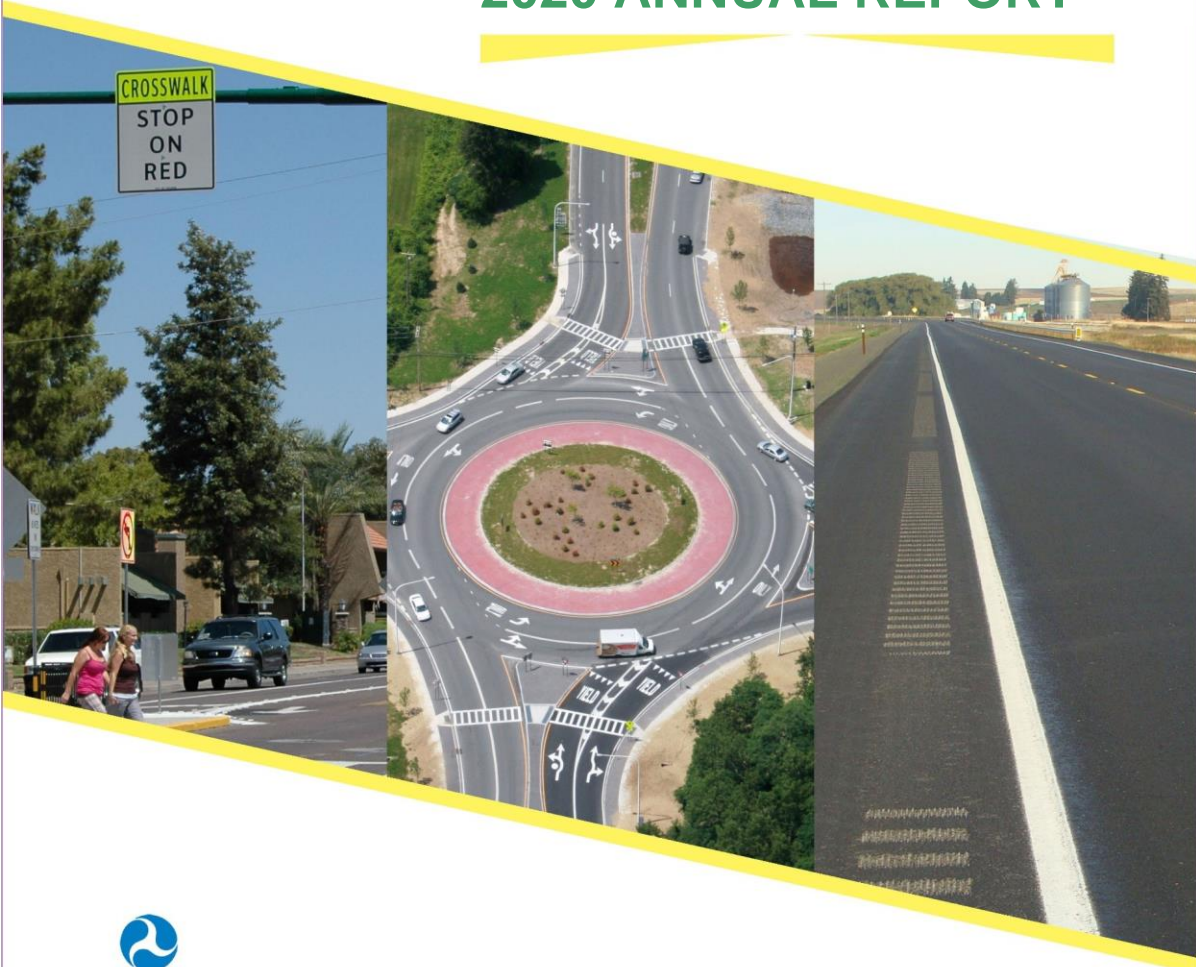




MASSACHUSETTS

HIGHWAY SAFETY IMPROVEMENT PROGRAM 2020 ANNUAL REPORT



U.S. Department of Transportation
Federal Highway Administration

Photo source: Federal Highway Administration

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Disclaimer

Protection of Data from Discovery Admission into Evidence

23 U.S.C. 148(h)(4) states “Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section[HSIP], 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 addressed in the reports, surveys, schedules, lists, or other data.

23 U.S.C. 148(h)(4) states “Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section[HSIP], 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 addressed in the reports, surveys, schedules, lists, or other data.23 U.S.C. 409 states “Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds 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 mentioned or addressed in such reports, surveys, schedules, lists, or data.”

Executive Summary

A Massachusetts HSIP Task Force was established in 2009 to develop guidelines for HSIP-eligible projects and programs. The Task Force consisted of FHWA, MassDOT Highway, MassDOT Planning and MARPA (Massachusetts Association of Regional Planning Agencies)/MPOs. Criteria for HSIP projects were defined. But the role of the Task Force was not to select individual projects and programs. The Task Force had met annually or as needed. In 2019, the Task Force was updated to include additional member in an effort to help move HSIP projects to advertise in a timely manner. MassDOT District Project Development Engineers were added and additional MPO members. The guidelines for HSIP projects was updated (in draft) to emphasize systemic projects and projects combined with other project types to broaden the impacts of the HSIP program. This should help to reinvigorate the HSIP Task Force so that the project selection for HSIP can be more fluid and nimble and responsive to the needs of SHSP strategies and ensure project readiness and ability of projects to be advertised in a timely manner. This should become more noticeable with the project selection for next year. Furthermore, a guide is being finalized to evaluate project alternatives to improve the efficiency of the HSIP program.

Introduction

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program with the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. As per 23 U.S.C. 148(h) and 23 CFR 924.15, States are required to report annually on the progress being made to advance HSIP implementation and evaluation efforts. The format of this report is consistent with the HSIP Reporting Guidance dated December 29, 2016 and consists of five sections: program structure, progress in implementing highway safety improvement projects, progress in achieving safety outcomes and performance targets, effectiveness of the improvements and compliance assessment.

Program Structure

Program Administration

Describe the general structure of the HSIP in the State.

A Massachusetts HSIP Task Force was initially established in 2009 to develop guidelines for HSIP-eligible projects and programs. The Task Forces role was to develop HSIP guidelines not to select individual projects. At the time, the Task Force consisted of FHWA, MassDOT Highway, MassDOT Planning and MARPA (Massachusetts Association of Regional Planning Agencies)/MPOs. It was determined that an HSIP eligible project was defined as one that contains a hot spot crash location (a cluster in which the total number of “equivalent property damage only” crashes in the cluster is within the top 5% of all clusters in a specific region), systemic fixes or any strategy, activity or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem.

The equivalent property damage only (EPDO) calculations were changed in 2018 to reflect the FHWA methodology for crash costs. Rather than the previous system of 10 points for a fatal crash, 5 points for an injury crash and 1 point for a property damage only crash, the new EPDO calculations are based on weighted average costs of crashes. So as not to be chasing fatal crashes only, the combined weighting of fatal and injury crashes is 21 times that of a property damage only crash. This new weighting was used in hot spot selection. This is described in the Top Crash Locations Report.

<https://www.mass.gov/files/documents/2019/03/01/dot-2016TopCrashLocationsRpt.pdf>. To view the HSIP eligible clusters, go to:

MassDOT Federal Aid Programming and Reimbursement Office and MassDOT Planning allocate the Federal funds into various categories for the Statewide Transportation Improvement Program (STIP), including Statewide HSIP funds and HSIP funds for each of the regions under “Intersection Improvements” and “Safety Improvements”. HSIP projects are selected based on the HSIP guidelines, the MPO processes, priority and readiness (regardless of roadway jurisdiction). Once an HSIP project (hot spot) has been identified, an early requirement is a Road Safety Audit which helps to guide the recommended improvements.

In late 2019, an expanded HSIP Task Force reconvened and slightly tweaked the HSIP Guidelines so that the project selection for HSIP can be more fluid and nimble and responsive to the needs of SHSP strategies. This is still a work in progress.

Where is HSIP staff located within the State DOT?

Engineering

The HSIP reporting responsibility sits within Traffic and Safety Engineering. However, it is a collaborative effort

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and many other departments and entities contribute (like Planning, Federal Aid Office, MPOS, Office of Performance Management, etc).

How are HSIP funds allocated in a State?

- Formula via MPOs
- Other-combination

MassDOT Planning Office develops the Statewide Capital Improvement Program with input from numerous stakeholders to refine the process and assign budgets for project categories. Planning works with the Highway Division and project proponent to determine project scope funding eligibility and assigns the sources accordingly. Projects are selected for the regional TIPs (by the MPOs) and statewide TIPs based on the project category types and then Planning assigns "the color of the money" to determine how the projects are funded.

Describe how local and tribal roads are addressed as part of HSIP.

Working with the 13 Regional Planning Agencies (RPAs) and the 13 Metropolitan Planning Organizations (MPOs) that encompass the entire geographic area of the Commonwealth of Massachusetts, HSIP funds are allocated not only to projects that are eligible within the statewide Highway Safety Improvements Program but also to eligible projects programmed by the MPOs, which may include local roads and tribal roads. Because most of the project proponents in the Commonwealth are municipalities, these projects are locally initiated, driven, and coordinated with MassDOT through the project initiation and development process. There is close coordination between our Traffic Safety division staff and RPA staff on the sharing of data and identifying crash cluster locations and prioritizing safety improvements to assist local entities and the MPOs in making sound safety investment decisions.

Identify which internal partners (e.g., State departments of transportation (DOTs) Bureaus, Divisions) are involved with HSIP planning.

- Design
- Districts/Regions
- Maintenance
- Operations
- Planning
- Traffic Engineering/Safety

Describe coordination with internal partners.

Previously, the HSIP Task Force consists of seven members: 2 FHWA representatives (one from Massachusetts Division Office in Planning and one from the Massachusetts Division Office in Safety), 2 representatives from MassDOT Highway Division (Chief Engineer and Safety Engineer), one from MassDOT Office of Transportation Planning and two representatives from the Regional Planning Agencies (RPAs), the technical arm of the Metropolitan Planning Organizations (MPOs). The initial role of the Task Force was to establish HSIP guidelines based on input and feedback from others. The continuing role of the Task Force is to meet annually or as needed, ("meetings" could be via email or in person) to review and update the HSIP guidelines. The HSIP Task Force does not select the individual projects / programs. However, in 2019, the Task Force was expanded to include additional members from MassDOT's Project Development Engineers and additional MPOs as a means to move projects along more quickly and to be more nimble and responsive to safety needs.

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Program and project selection occurs both in MassDOT HQ, MassDOT District and at the regional MPO level. Once projects are selected, the MassDOT Planning Office works with the MassDOT Safety Group to allocate the funding type to the STIP categories so that the full pot of HSIP funds are programmed.

For hot spot locations, Road Safety Audits are required and there is participation from a variety of disciplines both internal and external to MassDOT. MassDOT personnel include: MassDOT Safety and MassDOT District personnel as well as needed from MassDOT Highway Design, MassDOT Project Management, Complete Streets Engineer and others.

Identify which external partners are involved with HSIP planning.

- Academia/University
- FHWA
- Governors Highway Safety Office
- Law Enforcement Agency
- Local Government Agency
- Regional Planning Organizations (e.g. MPOs, RPOs, COGs)
- Other-SHSP Emphasis area team members
- Other-Advocacy groups
- Other-Public Health

Describe coordination with external partners.

All HSIP projects must be based on strategies identified in the SHSP which has been developed with the assistance from our internal and external partners. The SHSP was updated and approved in December 2018 and involved participation from over 200 participants from more than 25 agencies (including all of those external partners mentioned in the response to Question 9) and entities and the strategies identified in the SHSP are those that can be used for the HSIP eligible projects. Furthermore, all HSIP-eligible spot improvement projects require Road Safety Audits which ensures coordination with external partners. Project selection has a significant amount of external input through the MPO public process. Some specific programs are based on an Ad Hoc basis, as needed. As an example of this is when we were developing the pedestrian/bicyclist safety campaign (a Statewide HSIP program), we developed a committee consisting of Governors Highway Safety Office, Public Health, MPOs, advocacy groups, local police and community officials, etc. to assist with the specifics and to guide the program.

As stated earlier, there is an existing HSIP Task Force that develops the HSIP guidelines and identifies eligibility of HSIP projects (but does not select the specific projects).

Program Methodology

Does the State have an HSIP manual or similar that clearly describes HSIP planning, implementation and evaluation processes?

Yes
On the MassDOT website are links to the HSIP Criteria that defines what is HSP eligible.
<https://www.mass.gov/service-details/highway-safety-improvement-program>
Also, on that webpage is a link for MassDOT Safety: Analyses Analysis Guide which details how to evaluate effectiveness of project alternatives. The guide also include MA-preferred CMFs.

Select the programs that are administered under the HSIP.

- Intersection
- Pedestrian Safety

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- Sign Replacement And Improvement
- Other-Data

This years projects were intersection upgrades (geometry, conversion to roundabout, control upgrade), pedestrian improvements and sign projects. So the response to the question on HSIP programs is responding to this year's projects. However, generally, HSIP covers many other aspects including bicyclist crashes, horizontal curves, HRRR, some local safety, median barrier, roadway departure, Wrong Way driving. During previous years and future years, these other elements are covered.

Program: Intersection

Date of Program Methodology: 1/3/2020

What is the justification for this program?

- Addresses SHSP priority or emphasis area

What is the funding approach for this program?

Competes with all projects

What data types were used in the program methodology?

Crashes

Exposure

Roadway

- Other-EPDO

What project identification methodology was used for this program?

- Equivalent property damage only (EPDO Crash frequency)

Are local roads (non-state owned and operated) included or addressed in this program?

Yes

Are local road projects identified using the same methodology as state roads?

Yes

How are projects under this program advanced for implementation?

- Other-MPO
- Other-statewide selection based on ranking and readiness

Select the processes used to prioritize projects for implementation. For the methods selected, indicate the relative importance of each process in project prioritization. Enter either the weights or numerical rankings. If weights are entered, the sum must equal 100. If ranks are entered, indicate ties by giving both processes the same rank and skip the next highest rank (as an example: 1, 2, 2, 4).

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Relative Weight in Scoring

Other-HSIP eligibility criteria and project readiness:100

Total Relative Weight:100

Program: Pedestrian Safety

Date of Program Methodology:1/3/2020

What is the justification for this program?

- Addresses SHSP priority or emphasis area

What is the funding approach for this program?

Competes with all projects

What data types were used in the program methodology?

Crashes

Exposure

Roadway

- Other-EPDO

What project identification methodology was used for this program?

- Equivalent property damage only (EPDO Crash frequency)

Are local roads (non-state owned and operated) included or addressed in this program?

Yes

Are local road projects identified using the same methodology as state roads?

Yes

How are projects under this program advanced for implementation?

- Other-Selected by MPO, and others

Select the processes used to prioritize projects for implementation. For the methods selected, indicate the relative importance of each process in project prioritization. Enter either the weights or numerical rankings. If weights are entered, the sum must equal 100. If ranks are entered, indicate ties by giving both processes the same rank and skip the next highest rank (as an example: 1, 2, 2, 4).

Program: Sign Replacement And Improvement

Date of Program Methodology:12/31/2014

What is the justification for this program?

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- Other-Specifically called out in 23 U.S.C.148(a)(6)

What is the funding approach for this program?

Competes with all projects

What data types were used in the program methodology?

Crashes

Exposure

Roadway

- Other-cycle of sign improvements based on

What project identification methodology was used for this program?

- Other-cycle of sign upgrades
- Other-on secondary roads, it is systemwide per district

Are local roads (non-state owned and operated) included or addressed in this program?

No

Are local road projects identified using the same methodology as state roads?

How are projects under this program advanced for implementation?

- Other-interstates and principal arterials are selected by State Sign Engineer based on a cycle of replacements
- Other-secondary roadways are systemwide and done by district

Select the processes used to prioritize projects for implementation. For the methods selected, indicate the relative importance of each process in project prioritization. Enter either the weights or numerical rankings. If weights are entered, the sum must equal 100. If ranks are entered, indicate ties by giving both processes the same rank and skip the next highest rank (as an example: 1, 2, 2, 4).

Rank of Priority Consideration

Available funding:1

Other-readiness:2

Program: Other-Data

Date of Program Methodology:10/1/2004

What is the justification for this program?

- FHWA focused approach to safety

What is the funding approach for this program?

Competes with all projects

What data types were used in the program methodology?

- | | | |
|---|----------|---------|
| Crashes | Exposure | Roadway |
| <ul style="list-style-type: none">Other-Data quality need | | |

What project identification methodology was used for this program?

- Other-Need based on outdated system and changes to roadway file

Are local roads (non-state owned and operated) included or addressed in this program?

Yes

Are local road projects identified using the same methodology as state roads?

Yes

How are projects under this program advanced for implementation?

- Other-determined need based on changes to outdated systems

Select the processes used to prioritize projects for implementation. For the methods selected, indicate the relative importance of each process in project prioritization. Enter either the weights or numerical rankings. If weights are entered, the sum must equal 100. If ranks are entered, indicate ties by giving both processes the same rank and skip the next highest rank (as an example: 1, 2, 2, 4).

Relative Weight in Scoring

Available funding:100

Total Relative Weight:100

What percentage of HSIP funds address systemic improvements?

27.2

HSIP funds are used to address which of the following systemic improvements?

- Add/Upgrade/Modify/Remove Traffic Signal
- Install/Improve Signing

The above lists the systemic projects used during this year. It should be noted that the signage upgrade projects are listed as systemic because they are replaced based on age/quality of signs (loosely translated to risk) but in fact this is really more systematic.

What process is used to identify potential countermeasures?

- Crash data analysis
- Data-driven safety analysis tools (HSM, CMF Clearinghouse, SafetyAnalyst, usRAP)
- Engineering Study
- Road Safety Assessment
- Stakeholder input

Does the State HSIP consider connected vehicles and ITS technologies?

Yes

Describe how the State HSIP considers connected vehicles and ITS technologies.

MassDOT definitely considers connected vehicles and ITS technologies as part of the safety solution. However, no HSIP funds were spent on the V2I technologies during this Federal Fiscal Year. Previously, MassDOT worked with WAZE to install beacons in our tunnel system to aid driver navigation where GPS is lost. (Although no Federal funds were used for this). As drivers have become more reliant on their GPS/smart phones for directions, there are more crashes occurring in our tunnels where GPS connectivity was lost and drivers were confused. The beacon technology is providing for an open platform seamless connection to navigation systems and recently Google Maps started using the beacons as well. MassDOT signed on for the EDC Use of Crowdsourcing in Operations. FHWA and the contractor have begun helping us to pilot this. There are aspects of this that will help with Safety as well. MassDOT has been implementing smart work zone technologies that are designed to provide real time feedback to drivers regarding travel times and congestion information, incidents, temporary closures and other information that will enhance the safety of road users and workers. This started in 2009 and has been increasing in use, where appropriate. New for this year, MassDOT contracted with INRIX and obtained RITIS to make use of speed and volume data to be used on our projects and in Planning features. We continue to look forward to other technologies that will enhance safety and reduce fatalities and injuries on the public roadways. We are in the process of implementing dynamic wrong way warning at several interchange ramps around Massachusetts. This will be implemented during the coming year.

Does the State use the Highway Safety Manual to support HSIP efforts?

Yes

Please describe how the State uses the HSM to support HSIP efforts.

MassDOT uses both the predictive methodology and the empirical-Bayes method described in the Highway Safety Manual to support administrating the HSIP. MassDOT is in the process of updating the network screening process to consider the difference between expected and predicted crashes using HSM methodologies and Massachusetts-specific safety performance functions.

During RSAs (especially for HSIP projects), MassDOT uses HSM methodologies so expected crash frequency can be used for discussion, diagnosis, and countermeasure selection.

MassDOT also uses HSM methodologies to evaluate HSIP projects at the site-, project-, and countermeasure level. The empirical-Bayes method is used to estimate the number of crashes expected in the after period had no change occurred to compare with what was observed in the after period.

New this year, we have developed network screening level SPFs for arterials and collectors roadways and will begin to use top scoring locations as HSIP eligible. We are also working on risk factor identification for systemic type projects (which is not in HSM but will be covered in HSM2).

Project Implementation

Funds Programmed

Reporting period for HSIP funding.

Federal Fiscal Year

Enter the programmed and obligated funding for each applicable funding category.

FUNDING CATEGORY	PROGRAMMED	OBLIGATED	% OBLIGATED/PROGRAMMED
HSIP (23 U.S.C. 148)	\$32,594,907	\$32,440,556	99.53%
HRRR Special Rule (23 U.S.C. 148(g)(1))	\$0	\$0	0%
Penalty Funds (23 U.S.C. 154)	\$0	\$0	0%
Penalty Funds (23 U.S.C. 164)	\$0	\$0	0%
RHCP (for HSIP purposes) (23 U.S.C. 130(e)(2))	\$0	\$0	0%
Other Federal-aid Funds (i.e. STBG, NHPP)	\$43,230,525	\$40,546,587	93.79%
State and Local Funds	\$14,429,288	\$22,211,731	153.94%
Totals	\$90,254,720	\$95,198,874	105.48%

Information contained in this response come directly from a file provided by the MassDOT Federal Aid and Procurement Office (FAPRO) on 6/9/2020.

The \$22,211,731 obligated State and local funds is actually State and other funds.

We did not meet the HRRR Special Rule this year.

How much funding is programmed to local (non-state owned and operated) or tribal safety projects?

49%

How much funding is obligated to local or tribal safety projects?

52%

How much funding is programmed to non-infrastructure safety projects?

0%

How much funding is obligated to non-infrastructure safety projects?

0%

Generally, we use non-infrastructure funds for SHSP updates and for data. However, because of the cycle, there were no non-infrastructure HSIP funds used this year.

How much funding was transferred in to the HSIP from other core program areas during the reporting period under 23 U.S.C. 126?

0%

How much funding was transferred out of the HSIP to other core program areas during the reporting period under 23 U.S.C. 126?

0%

Discuss impediments to obligating HSIP funds and plans to overcome this challenge in the future.

There are two main impediments to obligating HSIP funds. One is project readiness. If a programmed project is not able to advertise (for any number of reasons), it is very difficult to just swap in another HSIP project because there are limited projects that already designed and ready to advertise. This could be because projects are rarely designed unless they are already programmed on the STIP and even then, they are designed and reviewed to meet the advertising date. So if a programmed project is not able to advertise, we are often left with a hole to try and fill in a replacement project.

The second major impediment to obligating HSIP funds is that we are struggling to develop low cost-short term systemic projects here in Massachusetts. We are not able to have local communities self-certify that project work all occurs within the public way. This must only be done with layout plans or survey. Therefore, any simple pavement marking and/or signage project (typically the low cost/short term type systemic projects) must include a survey which adds time and expense and precludes the short term / low cost projects.

Based on the above two factors, it sometimes makes it challenging for MassDOT to obligate funds. This is especially true in cases in which we have short notice such as for High Risk Rural Roads Projects when we are informed 18 months before they must be obligated that we fall within the rule and must obligate a certain amount of money. It is too short of a time frame to develop a project (including ROW, environmental processes, etc.) so we struggle with what can be done.

There are steps we have taken to resolve these issues. With regards to readiness, we actually anticipated the need for a HRRR project and started working on one in advance of the notification. In addition, a Project Manager from the MassDOT Design Section will be providing assistance to push projects along. With regards to the difficulties we face for systemic project, MassDOT Traffic and Safety Engineering has been meeting with FHWA ROW Section and MassDOT ROW Section to prepare a white paper and try to resolve ROW issues with regards to low cost systemic projects. This is also a topic of discussion with our EDC FoRRRwd initiative.

General Listing of Projects

List the projects obligated using HSIP funds for the reporting period.

PROJECT NAME	IMPROVEMENT CATEGORY	SUBCATEGORY	OUTPUTS	OUTPUT TYPE	HSIP PROJECT COST(\$)	TOTAL PROJECT COST(\$)	FUNDING CATEGORY	LAND USE/AREA TYPE	FUNCTIONAL CLASSIFICATION	AADT	SPEED	OWNERSHIP	METHOD FOR SITE SELECTION	SHSP EMPHASIS AREA	SHSP STRATEGY
WORCESTER - RESURFACING & RELATED WORK ON ROUTE 122 (GRAFTON STREET), FROM WASHINGTON SQUARE TO RICE SQUARE (1.4 MILES)	Intersection geometry	Intersection geometrics - miscellaneous/other/unspecified	6	Intersections	\$1647743	\$8634311.76	Other Federal-aid Funds (i.e. STBG, NHPP)	Urban	Principal Arterial-Other	10,121	30	City or Municipal Highway Agency	Spot	Pedestrians	Incorporate pedestrian safety elements into infrastructure design and engineering
UPTON - RECONSTRUCTION OF HIGH STREET AND HOPKINTON ROAD (PHASE I)	Intersection traffic control	Intersection traffic control - other	1	Intersections	\$2975252.4	\$6616118.39	Other Federal-aid Funds (i.e. STBG, NHPP)	Urban	Minor Arterial	13,736	40	City or Municipal Highway Agency	Spot	Intersections	Incorporate safety elements into intersection design and maintenance
NORTH ANDOVER- INTERSECTION & SIGNAL IMPROVEMENTS AT ROUTE 125 & MASSACHUSETTS AVENUE	Intersection geometry	Intersection geometry - other	1	Intersections	\$451014	\$5749282.73	Other Federal-aid Funds (i.e. STBG, NHPP)	Urban	Principal Arterial-Other	24,146	40	State Highway Agency	Spot	Intersections	Incorporate safety elements into intersection design and maintenance
BARNSTABLE- INTERSECTION IMPROVEMENTS AT IYANOUGH ROAD (ROUTE 28) AND YARMOUTH ROAD	Intersection geometry	Intersection geometrics - miscellaneous/other/unspecified	1	Intersections	\$183028.48	\$9695632.54	Other Federal-aid Funds (i.e. STBG, NHPP)	Urban	Principal Arterial-Other	22,330	35	State Highway Agency	Spot	Intersections	Incorporate safety elements into intersection design and maintenance
NEEDHAM- NEWTON- RECONSTRUCTION OF HIGHLAND AVENUE, NEEDHAM STREET & CHARLES RIVER BRIDGE, N-04-002, FROM WEBSTER STREET (NEEDHAM) TO	Pedestrians and bicyclists	Miscellaneous pedestrians and bicyclists	2	Miles	\$3133414.01	\$10945645.71	Other Federal-aid Funds (i.e. STBG, NHPP)	Urban	Principal Arterial-Other	28,864	30	State Highway Agency	Spot	Bicyclists	Improve design and engineering of bicycle facilities on and off roadways

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PROJECT NAME	IMPROVEMENT CATEGORY	SUBCATEGORY	OUTPUTS	OUTPUT TYPE	HSIP PROJECT COST(\$)	TOTAL PROJECT COST(\$)	FUNDING CATEGORY	LAND USE/AREA TYPE	FUNCTIONAL CLASSIFICATION	AADT	SPEED	OWNERSHIP	METHOD FOR SITE SELECTION	SHSP EMPHASIS AREA	SHSP STRATEGY
ROUTE 9 (NEWTON)															
NEW BEDFORD-CORRIDOR IMPROVEMENTS AND RELATED WORK ON KINGS HIGHWAY, FROM CHURCH STREET TO THE KINGS HIGHWAY BRIDGE (N-06-036) OVER ROUTE 140	Pedestrians and bicyclists	Miscellaneous pedestrians and bicyclists	0.75	Miles	\$845310	\$10396906	Other Federal-aid Funds (i.e. STBG, NHPP)	Urban	Minor Arterial	13,776	35	City or Municipal Highway Agency	Spot	Pedestrians	Incorporate pedestrian safety elements into infrastructure design and engineering
SUDBURY-INTERSECTION IMPROVEMENTS @ ROUTE 20 & LANDHAM ROAD	Intersection geometry	Intersection geometrics - miscellaneous/other/unspecified	1	Intersections	\$2072693.2	\$2072693.2	HSIP (23 U.S.C. 148)	Urban	Principal Arterial-Other	23,055	30	State Highway Agency	Spot	Intersections	Incorporate safety elements into intersection design and maintenance
HOPEDALE-MILFORD-RESURFACING & INTERSECTION IMPROVEMENTS ON ROUTE 16 (MAIN STREET), FROM WATER STREET WEST TO APPROXIMATELY 120 FEET WEST OF THE	Pedestrians and bicyclists	Miscellaneous pedestrians and bicyclists	0.5	Miles	\$2307781.19	\$3307658.52	HSIP (23 U.S.C. 148)	Urban	Principal Arterial-Other	11,409	35	City or Municipal Highway Agency	Spot	Bicyclists	Improve design and engineering of bicycle facilities on and off roadways
CHICOPEE-SIGNAL & INTERSECTION IMPROVEMENTS AT 13 INTERSECTIONS ALONG ROUTE 33 (MEMORIAL DRIVE), FROM FULLER ROAD TO ABBEY STREET	Intersection traffic control	Systemic improvements - signal-controlled	13	Locations	\$6811745.76	\$6811745.76	HSIP (23 U.S.C. 148)	Urban	Principal Arterial-Other	7,878	40	State Highway Agency	Systemic	Intersections	Incorporate safety elements into intersection design and maintenance
PITTSFIELD-INTERSECTION & SIGNAL IMPROVEMENTS AT 9 LOCATIONS ALONG SR 8 & SR 9	Intersection traffic control	Modify traffic signal timing - signal coordination	9	Locations	\$3984712.8	\$3984712.8	HSIP (23 U.S.C. 148)	Urban	Principal Arterial-Other	16,979	30	State Highway Agency	Systemic	Intersections	Incorporate safety elements into intersection design and maintenance

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PROJECT NAME	IMPROVEMENT CATEGORY	SUBCATEGORY	OUTPUTS	OUTPUT TYPE	HSIP PROJECT COST(\$)	TOTAL PROJECT COST(\$)	FUNDING CATEGORY	LAND USE/AREA TYPE	FUNCTIONAL CLASSIFICATION	AADT	SPEED	OWNERSHIP	METHOD FOR SITE SELECTION	SHSP EMPHASIS AREA	SHSP STRATEGY
ABINGTON/BROCKTON - NORTH QUINCY STREET, CHESTNUT STREET, AND BOUNDARY AVENUE ROUNDABOUT AND GEOMETRIC IMPROVEMENTS	Intersection traffic control	Modify control - two-way stop to roundabout	1	Intersections	\$79740	\$2400179.48	Other Federal-aid Funds (i.e. STBG, NHPP)	Urban	Minor Arterial	7,174	30	City or Municipal Highway Agency	Spot	Intersections	Incorporate safety elements into intersection design and maintenance
SPRINGFIELD-INTERSECTION IMPROVEMENTS AT BAY STREET AND BERKSHIRE AVENUE	Intersection geometry	Intersection geometrics - miscellaneous/other/unspecified	1	Intersections	\$1651987.65	\$2537163.65	HSIP (23 U.S.C. 148)	Urban	Minor Arterial	8,565	35	City or Municipal Highway Agency	Spot	Intersections	Incorporate safety elements into intersection design and maintenance
BOURNE TO FALMOUTH-GUIDE AND TRAFFIC SIGN REPLACEMENT ON A SECTION OF ROUTE 28	Roadway signs and traffic control	Roadway signs (including post) - new or updated	9.6	Miles	\$820628.13	\$820628.13	HSIP (23 U.S.C. 148)	Urban	Principal Arterial-Other	32,660	55	State Highway Agency	Systemic	Older Drivers	Develop infrastructure improvements that accommodate the needs of older road users
BOSTON-INTERSECTION IMPROVEMENTS AT MORTON STREET AND HARVARD STREET	Pedestrians and bicyclists	Miscellaneous pedestrians and bicyclists	0.4	Miles	\$2817608.8	\$2817608.8	HSIP (23 U.S.C. 148)	Urban	Principal Arterial-Other	15,894	30	State Highway Agency	Spot	Bicyclists	Improve design and engineering of bicycle facilities on and off roadways
WORCESTER - KELLEY SQUARE SAFETY IMPROVEMENTS ON MADISON STREET AND VERNON STREET	Intersection traffic control	Modify control - no control to roundabout	1	Locations	\$12923520.58	\$18408586.46	HSIP (23 U.S.C. 148)	Urban	Principal Arterial-Other	20,152	30	City or Municipal Highway Agency	Spot	Intersections	Incorporate safety elements into intersection design and maintenance

When completing this listing, the predominant type was selected (the emphasis area selected was how it was characterized in the write-up, if the jurisdiction was mostly municipally owned, then that was how it was listed, etc.)

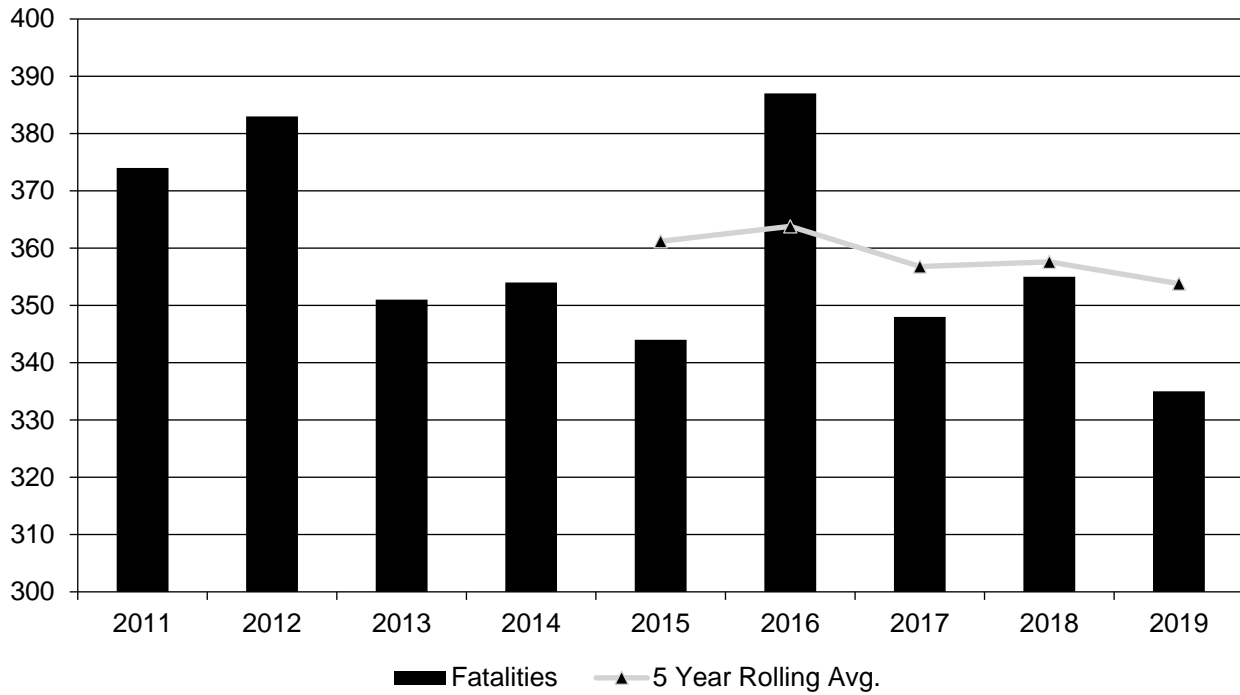
Safety Performance

General Highway Safety Trends

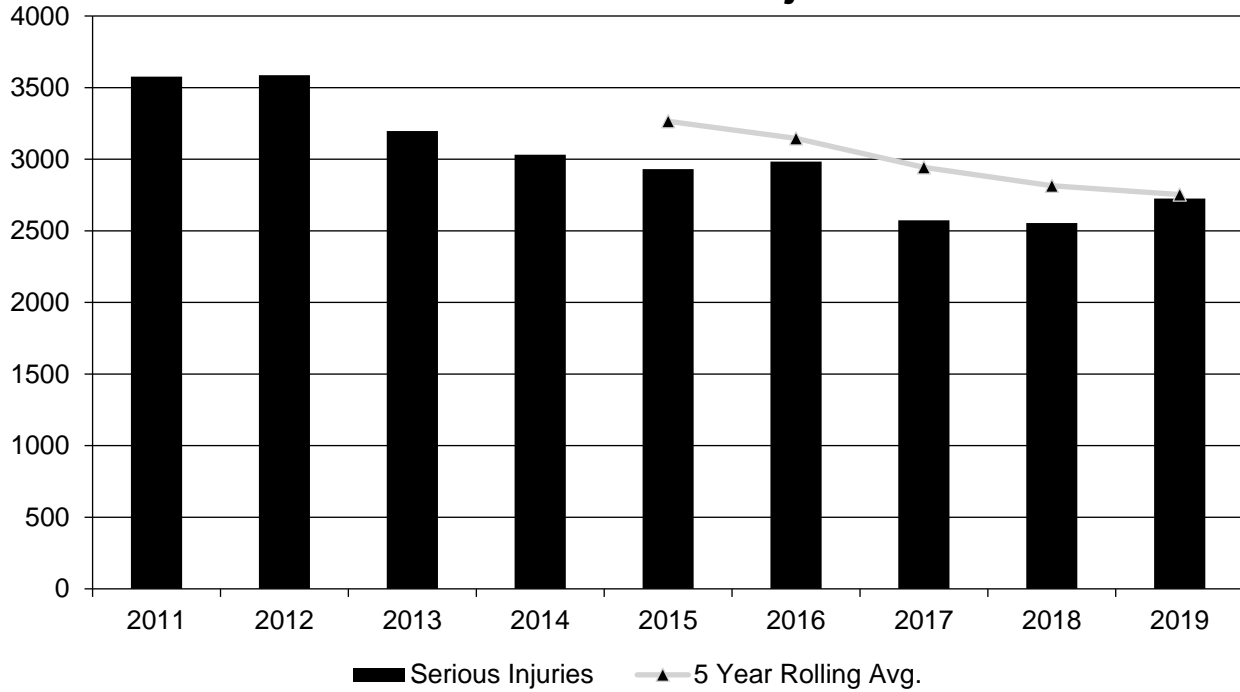
Present data showing the general highway safety trends in the State for the past five years.

PERFORMANCE MEASURES	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fatalities	374	383	351	354	344	387	348	355	335
Serious Injuries	3,577	3,587	3,197	3,031	2,931	2,983	2,573	2,554	2,725
Fatality rate (per HMVMT)	0.645	0.649	0.589	0.581	0.569	0.639	0.555	0.532	0.516
Serious injury rate (per HMVMT)	6.169	6.076	5.365	4.977	4.848	4.926	4.106	3.825	4.199
Number non-motorized fatalities	76	99	86	84	93	89	84	83	81
Number of non-motorized serious injuries	478	531	451	496	449	465	432	416	430

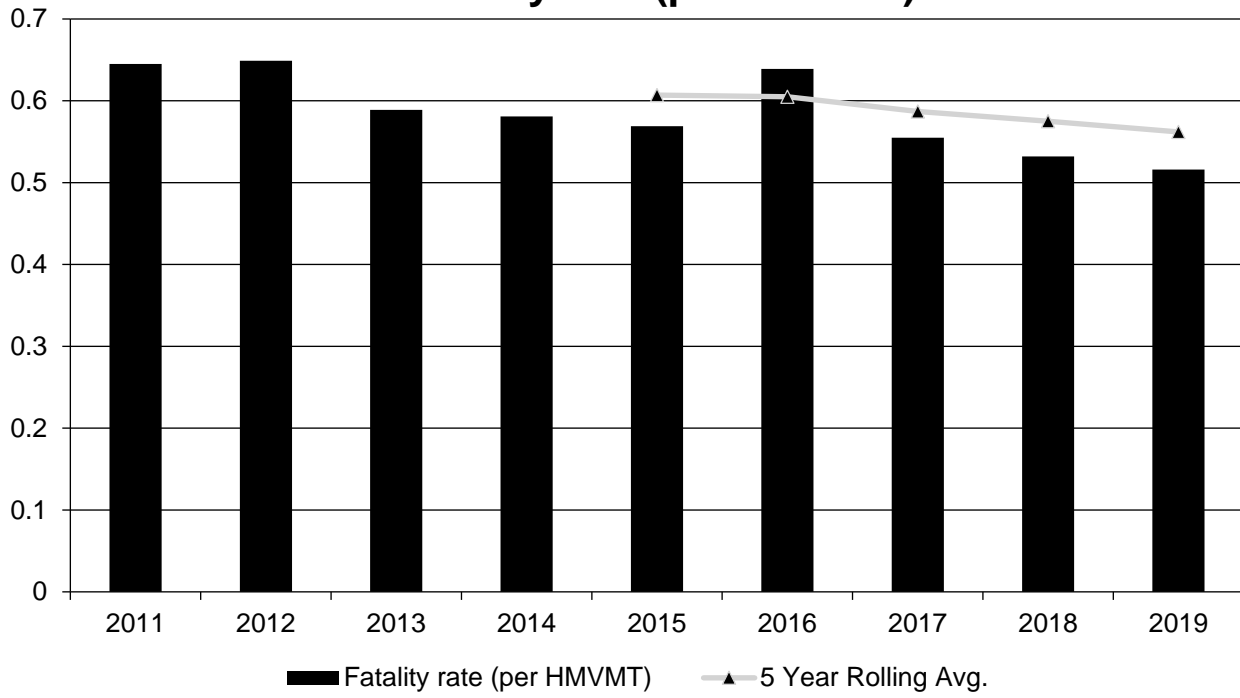
Annual Fatalities



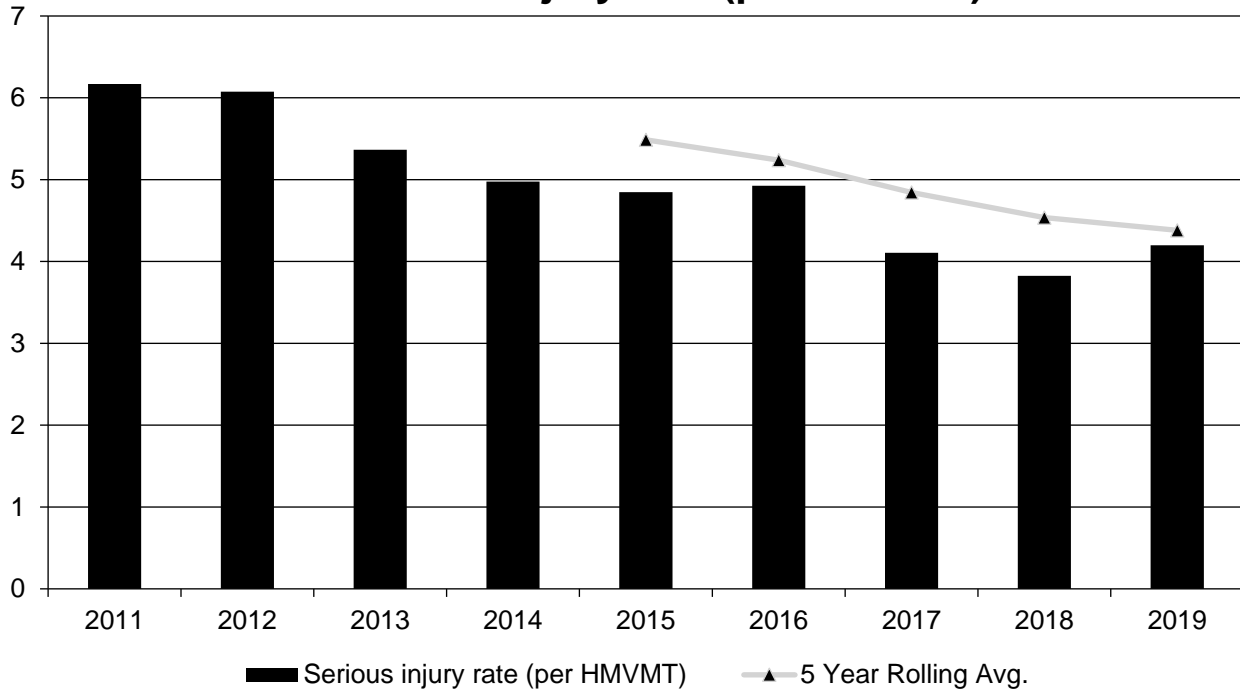
Annual Serious Injuries



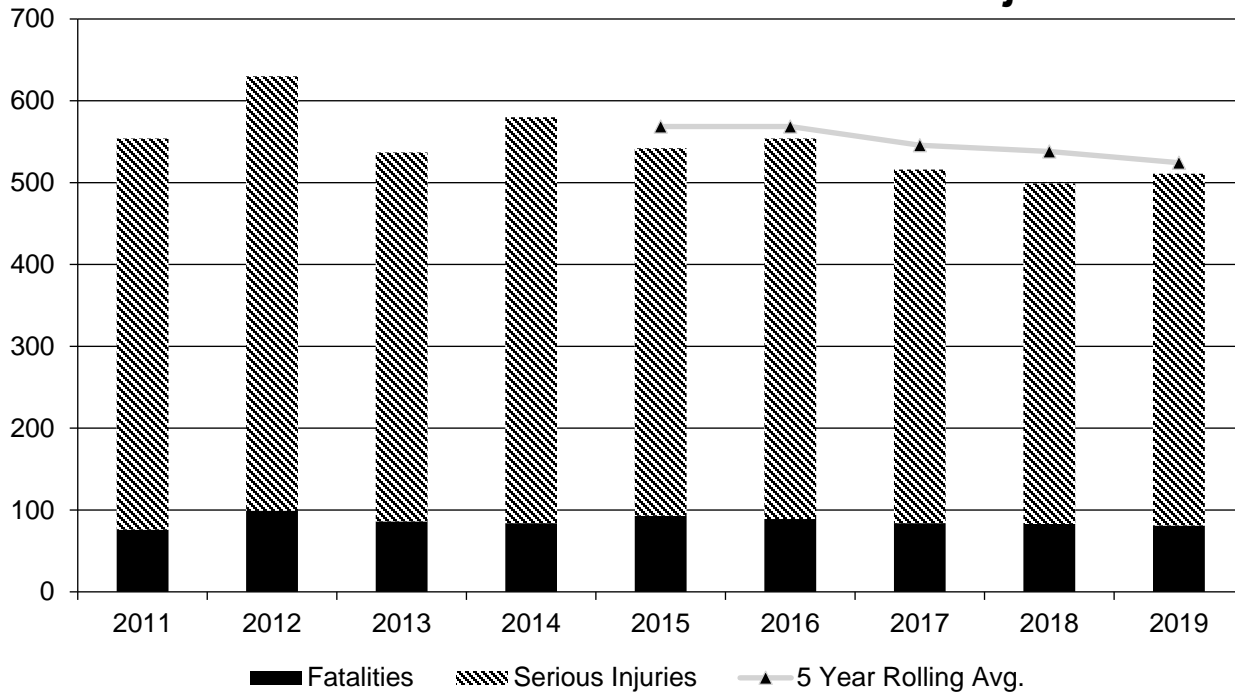
Fatality rate (per HMVMT)



Serious injury rate (per HMVMT)



Non Motorized Fatalities and Serious Injuries



Describe fatality data source.

FARS

To the maximum extent possible, present this data by functional classification and ownership.

Year 2019

Functional Classification	Number of Fatalities (5-yr avg)	Number of Serious Injuries (5-yr avg)	Fatality Rate (per HMVMT) (5-yr avg)	Serious Injury Rate (per HMVMT) (5-yr avg)
Rural Principal Arterial (RPA) - Interstate	2.8	10.2	0.33	1.16
Rural Principal Arterial (RPA) - Other Freeways and Expressways	0.8	3	0.91	3.27
Rural Principal Arterial (RPA) - Other	3	10.4	1.12	3.42
Rural Minor Arterial	4.6	16	0.98	3.46
Rural Minor Collector	3.6	13.6	3.12	11.84
Rural Major Collector	5.6	24.4	1.07	4.72

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Functional Classification	Number of Fatalities (5-yr avg)	Number of Serious Injuries (5-yr avg)	Fatality Rate (per HMVMT) (5-yr avg)	Serious Injury Rate (per HMVMT) (5-yr avg)
Rural Local Road or Street	6.4	23.2	1.18	4.26
Urban Principal Arterial (UPA) - Interstate	54.8	240	0.33	1.44
Urban Principal Arterial (UPA) - Other Freeways and Expressways	9.4	126.6	0.15	2.04
Urban Principal Arterial (UPA) - Other	104.2	862.8	0.85	7.03
Urban Minor Arterial	82.2	819.2	0.72	7.28
Urban Minor Collector	1.2	0	0.98	0
Urban Major Collector	24.6	266	0.65	7.19
Urban Local Road or Street	55.6	259.8	0.69	3.21

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Year 2019

Roadways	Number of Fatalities (5-yr avg)	Number of Serious Injuries (5-yr avg)	Fatality Rate (per HMVMT) (5-yr avg)	Serious Injury Rate (per HMVMT) (5-yr avg)
State Highway Agency	149.6	867.6	0.44	2.58
County Highway Agency	0	0	0	0
Town or Township Highway Agency	0	0	0	0
City or Municipal Highway Agency	0	0	0	0
State Park, Forest, or Reservation Agency	0.4	0.8	0.48	0.93
Local Park, Forest or Reservation Agency	0	0	0	0
Other State Agency	8	53.4	0.86	5.73
Other Local Agency	0	0	0	0
Private (Other than Railroad)	0.4	0.2	1.68	0
Railroad	0	0	0	0
State Toll Authority	0	0	0	0
Local Toll Authority	0	0	0	0
Other Public Instrumentality (e.g. Airport, School, University)	0.2	0.6	0.53	1.55
Indian Tribe Nation	0	0	0	0
Local Highway Agency	187.6	1,695.2	0.72	6.53
Federal/Army/Navy/Air Force	0	0.2	0	0.39
Unaccepted Roads	3.4	32.2	0.27	2.59

- Vehicle mile traveled data are taken from the MassDOT GIS VMT Viewer (<https://gis.massdot.state.ma.us/dataviewers/vmt/>) for 2017 and 2018 with adjustments from the Planning office. Earlier years are from Federal Highway Administration Office of Policy Information website <https://www.fhwa.dot.gov/policyinformation/statistics/2007/vm2.cfm> (link shown for 2007 but used for other years) and then checked against VMT information provided by the MassDOT Planning Office.

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- The fatality data for functional classification and jurisdiction came from FARS where available but updated based on updated data in the statewide system. The serious injury data for functional classification and for jurisdiction was obtained from IMPACT crash portal (<https://apps.impact.dot.state.ma.us/cdp/home>) from the Cross Tabulation tool.
- Although the crash data is separated by urban major and minor collector, the VMTs are not and therefore, the two categories were combined.
- Non-geocoded crashes that contain no jurisdiction or functional classification were not included so totals may not add up.
- The category of “City OR Town Highway Agency” was added because Massachusetts did not make a distinction between these roads and the FARS data may not have been allocated to the official governance of the municipality type.

MassDOT Code	MassDOT Jurisdiction	FARS Code	FARS Ownership
0	Unaccepted by city or town	? 26	Private (other than Railroad)
1	MassDOT	? 01	State Highway Agency
2	City or Town accepted road	? 03 OR 04	Town or Township Highway Agency OR City or Municipal Highway Agency (use chart)
3	Dept. of Conservation and Recreation	? 21	Other State Agency
5	Massachusetts Port Authority	? 21	Other State Agency
6	State Park or Forest	? 11	State Park, Forest, or Reservation Agency
7	State Institutional	? 40	Other Public Instrumentality (i.e., Airport)
8	Federal Park or Forest	? 66	National Park Service
9	County Institutional	? 40	Other Public Instrumentality (i.e., Airport)
B	State college or university	? 40	Other Public Instrumentality (i.e., Airport)
C	US Air Force	? 72	Air Force
D	US Army Corps of Engineers	? 72	Air Force
E	Federal Institution	? 40	Other Public Instrumentality (i.e., Airport)
F	Other Federal	? 60	Other Federal Agency
G	Federal Bureau of Indian Affairs	? 62	Bureau of Indian Affairs
H	Private	? 26	Private (other than Railroad) OR (only if open to public travel, otherwise null)
I	US Army	? 74	Navy/Marines
J	US Navy	? 74	Navy/Marines

Safety Performance Targets

Safety Performance Targets

Calendar Year 2021 Targets *

Number of Fatalities:339.0

Describe the basis for established target, including how it supports SHSP goals.

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Per FHWA guidance, our target setting process began with a trend line projection based on the most recent available data. However, this all changed when COVID hit and our VMTs dropped precipitously due to stay at home orders. The decline in VMTs is a change in trends from previous years, and dictated that we had to first calculate a fatality rate that would reflect a continued decrease to align with our towards zero death goals. Our previous safety target fatality rate for the 2020 5 year average was 0.56 and using our new VMT projections, we set the fatality rate to 0.55 for 2021 5 year average. We then worked backwards with the VMT projections we had for 2020 and 2021 to get reasonable fatal projections. Using our 2020 5 year average of 347, we assumed a linear 1.5% annual drop, which brings our 2021 5 year average projection to 339. Our active HSIP program, closely aligned work with our Highway Safety Office (NHTSA funded), joint efforts with our Sustainable transportation (bicyclist and pedestrian safety), commitment on several EDC programs and new Hands-free law (which went into effect in 2020 will help us to achieve our targets and our ultimate goal of zero fatalities. This target was developed in coordination with the Executive Office of Public Safety and Security – Highway Safety Division (EOPSS/HSD) (required to submit targets to NHTSA), the MassDOT Office of Transportation Planning (OTP) working closely with the MPOs, and the Office of Performance Management and Innovation (OPMI), which produces an annual performance report called Tracker that serves the public and State Legislature. Moreover, it should be noted that our overarching goal is towards zero deaths and we will continue to work towards that goal by implementing SHSP strategies. To be consistent with the HSP Safety Targets provided to NHTSA, we used whole numbers for our 5-year average targets.

Number of Serious Injuries:2580.0

Describe the basis for established target, including how it supports SHSP goals.

FHWA guidance, our target setting process began with a trend line projection based on the most recent available data. However, this all changed when COVID hit and our VMTs dropped precipitously. The decline in VMTs is a change in trends from previous years and dictated that we had to first calculate a serious injury rate that would reflect a continued decrease to align with our agency goals. Our previous safety target for serious injury rates for the 2020 5 year average was 4.30 so our serious injury rate had to be below that. Once we had the serious injury rate set to 4.23 for 2021 5 year average, we worked backwards with the VMT projections we had for 2020 and 2021 to get reasonable serious injury projections. Using this methodology and building off of our serious injury target of 2869 for the 2020 5 year average, we assumed a linear 5% annual drop, which brings our 2021 5 year average projection of serious injuries to 2,580. Our active HSIP program, closely aligned work with our Highway Safety Office (NHTSA funded), joint efforts with our Sustainable transportation (bicyclist and pedestrian safety), commitment on several EDC programs and new Hands-free law (which went into effect in 2020) will help us to achieve our targets and our ultimate goal of zero fatalities and serious injuries. The serious injury targets were even more challenging because of the change in terminology for injury severity on crash reports. On January 1st, 2019, Massachusetts moved from incapacitating injuries to suspected serious injuries, as per Federal requirements. Some police departments have not yet fully converted over so 2019 is still a mix of injury severities and the full impact of moving to suspected serious injury is still not fully known. This target was developed in coordination with the Executive Office of Public Safety and Security – Highway Safety Division (EOPSS/HSD) (required to submit targets to NHTSA), the MassDOT Office of Transportation Planning (OTP) working closely with the MPOs, and the Office of Performance Management and Innovation (OPMI), which produces an annual performance report called Tracker that serves the public and State Legislature. Moreover, it should be noted that our overarching goal is towards zero deaths and serious injuries and we will continue to work towards that goal by implementing SHSP strategies. To be consistent with the HSP Safety Targets provided to NHTSA, we used whole numbers for our 5-year average targets.

Fatality Rate:0.550

Describe the basis for established target, including how it supports SHSP goals.

Due to dramatic shifts in decreasing VMTS, we had to start with a desired reduction in fatality rates and back into targets for fatalities. To align with agency goals, we need a fatality rate that shows a decline over the

2020 Massachusetts Highway Safety Improvement Program

previous year. MassDOT's 2021 target fatality rate had to be reduced from the 5 year average of 2016-2020 of 0.56 fatalities per 100 million vehicle miles traveled, and we assumed a reduction so that the target is now 0.55 fatalities per 100 million vehicle miles traveled for 2021 (2017-2021). The long term goal is towards zero deaths, so the long term fatality rate target is 0.0 fatalities per 100 million VMTs.

Serious Injury Rate:4.230

Describe the basis for established target, including how it supports SHSP goals.

Due to dramatic shifts in decreasing VMTs, we had to start with a desired reduction in serious injury rates and back into targets for serious injuries. To align with agency goals, we need a serious injury rate that shows a decline over the previous year. To get the 2021 target, we simply took our 5 year average fatality rate from 2016-2020 of 4.30 serious injuries per 100 million vehicle miles traveled and assumed a reduction so that the target is now 4.23 serious injuries per 100 million vehicle miles traveled for 2021 (2017-2021). The long term goal is towards zero deaths and serious injuries, so the long term fatality rate target is 0.0 serious injuries per 100 million VMTs.

Total Number of Non-Motorized Fatalities and Serious Injuries:506.0

Describe the basis for established target, including how it supports SHSP goals.

As with all the other target setting measures, FHWA's guidance is to start with a trend line forecast and then consider external factors and planned implementation in order to set targets. Using historical data to create a trend line, the number of fatalities and serious injuries for non-motorists had been going up until the past two years when the trend was reversed and the numbers started coming down. As with other targets, Massachusetts wanted to reflect on the concept that we are moving towards zero deaths and serious injuries so our targets would need to move in that direction. In 2020, our safety target for the 5 year average of pedestrian and bicyclist fatal and serious injuries was 517. To reflect a reduction, we assumed a 2% annual reduction in fatalities and 1% reduction in serious injuries. Overall, this translated to a 2021 5 year average of 506 fatalities and serious injuries for non-motorists. Massachusetts is actively working on strategies to ameliorate non-motorist fatality and injuries, while promoting and encouraging walking and cycling. The 2018 Strategic Highway Safety Plan, the 2019 Statewide Pedestrian Plan and the 2019 Statewide Bicycle Plan identify new multi-disciplined and multi-agency strategies to eliminate fatalities and serious injuries of people walking and bicycling. There also may be some implementation of low-cost systemic projects related to pedestrian safety in an effort to further drive down fatalities and serious injuries. Therefore, we hope to see at least this reduction in non-motorist fatalities and serious injuries, which is working towards our ultimate goal towards zero deaths and serious injuries. To be consistent with the HSP Safety Targets provided to NHTSA, we used whole numbers for our 5-year average targets.

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2020 Massachusetts Highway Safety Improvement Program

least this reduction in non-motorist fatalities and serious injuries, which is working towards our ultimate goal towards zero deaths and serious injuries.

Describe efforts to coordinate with other stakeholders (e.g. MPOs, SHSO) to establish safety performance targets.

We work closely with the Highway Safety Division Office of EOPSS (Executive Office of Public Safety and Security) which sits in a different State Secretariat (our states SHSO office). Starting in March we go over the data and agree on the trends and start discussing targets by following trend lines and factoring in external factors. We then bring in the Office of Performance Management and Innovation (OPMI) within the MassDOT and discuss this so we all come to an agreement. The targets are then raised up the food chains to the Secretaries of each agency to obtain approval. This process has taken a lot longer because of the unknowns with COVID-19. The targets are then presented to the MPOs. The MPOs and others have access to a public facing dashboard with the data on all measures (<https://apps.impact.dot.state.ma.us/cdp/dashboard-view/24>). The resulting targets and other performance targets are available in the MassDOT Tracker (<https://www.mass.gov/doc/2019-annual-performance-report/download>) which is available on our website for download or review.

Does the State want to report additional optional targets?

No

Describe progress toward meeting the State's 2019 Safety Performance Targets (based on data available at the time of reporting). For each target, include a discussion of any reasons for differences in the actual outcomes and targets.

PERFORMANCE MEASURES	TARGETS	ACTUALS
Number of Fatalities	353.0	353.8
Number of Serious Injuries	2801.0	2753.2
Fatality Rate	0.580	0.562
Serious Injury Rate	4.370	4.381
Non-Motorized Fatalities and Serious Injuries	541.0	524.4

Massachusetts met three of the five targets (fatality rate, serious injuries and non-motorist fatalities and serious injuries). The two targets that were not met were fatalities (353.8 vs. 353.0) and serious injury rates (4.381 vs. 4.370) but those two targets did meet the baseline. It is interesting to note that the fatalities did not meet the targets but the fatality rate did and that the serious injury rate did not meet the target but the serious injuries did. Since the relationship to the number (fatalities and injuries) is directly related to the rate by the VMTs, one would expect if the fatalities target was met and the serious injuries target was met then both rates would be met and vice versa. Therefore, it is mostly that targets were not met because of data quality issues and time lag of reporting. As an example, as of the date of responding to this in July 2020, the 2018 crash file has still not closed so it is not finalized and subject to change. Typically, there is a 2-3 year lag in finalizing the data. When the 2017 performance targets were set, the serious injuries for 2015 and 2016 were 2,867 and 2,980 for the actual years. However, when preparing the HSIP report for this year and repulling the data, the serious injuries for 2015 and 2016 are now 2,931 and 2,983 for the actual years. Likewise, the fatal reporting that was used in the previous HSIP report, had 350 and 395 for the 2015 and 2016 individual years. However, now the fatalities are finalized at 344 and 387 for the 2015 and 2016 individual years. To complicate things even more is the VMTs have changed. A new process was used so the VMTs changed for previous years. We

2020 Massachusetts Highway Safety Improvement Program

believe this is the reason for not consistently meeting the targets between the numbers and the rates. We are putting processes in place to better improve the quality of the data to minimize these issues.

However, the one target that was met and is different than the others is the combination target for non-motorists. Massachusetts has really been focusing multipronged efforts to reduce fatalities and serious injuries of pedestrian and bicyclists while actively promoting these modes of transportation. Between the very active Completes Streets program, infrastructure enhancements, Safe Routes to School, the active awareness campaign “Scan the Streets for Wheels and feet”, the stepped up enforcement and the updated multimodal design guidance with significant internal and external training, highly visible statewide Pedestrian Plan and Bicycle Plan, the Commonwealth has really stepped up activities in these two critical focus areas. While we are seeing trends moving in the right direction, we are continuing with this push and are targeting for further reductions as we move towards zero deaths and injuries. This is being helped and enhanced with local communities Vision Zero strategies and legislative changes in posting speed limits and allowing slower speed limit postings.

Applicability of Special Rules

Does the HRRR special rule apply to the State for this reporting period?

No

Provide the number of older driver and pedestrian fatalities and serious injuries 65 years of age and older for the past seven years.

PERFORMANCE MEASURES	2013	2014	2015	2016	2017	2018	2019
Number of Older Driver and Pedestrian Fatalities	72	59	65	75	48	78	75
Number of Older Driver and Pedestrian Serious Injuries	272	271	281	297	266	275	296

2019 is still not finalized in FARS nor in the statewide system for serious injury crashes.

Evaluation

Program Effectiveness

How does the State measure effectiveness of the HSIP?

- Benefit/Cost Ratio
- Change in fatalities and serious injuries
- Economic Effectiveness (cost per crash reduced)

Based on the measures of effectiveness selected previously, describe the results of the State's program level evaluations.

State's program level evaluations.

- MassDOT's most recent year of completed crash data is 2018, therefore, this evaluation reflects projects which were completed in 2015. MassDOT performed crash-based before/after evaluations of 10 HSIP projects completed in 2015 (additional projects, which included large scale signage improvements, were not able to be evaluated). The 10 projects represented \$43.99 million in HSIP funding, with 8 projects falling under MassDOT's Intersection emphasis area (\$36.35 million) and 2 projects falling under the roadway departure emphasis area (\$7.63 million).
- MassDOT estimates the 8 intersection projects will reduce societal crash costs by \$58.98 million over their service lives, producing a benefit-cost ratio of 1.62. This reduction in crash costs is a result of a reduction of 11 KABC and 0.9 KA crashes per year for a total of 223 KABC and 18 KA crashes. At a total cost of \$36.35 million, MassDOT is spending \$2 million per KA crash prevented under the Intersection emphasis area.
- MassDOT estimates the 2 roadway departure projects will reduce societal crash costs by \$13.11 million over their service lives, producing a benefit-cost ratio of 1.72. This reduction in crash costs is a result of a reduction of 3.8 KABC and 0.3 KA crashes per year for a total of 42 KABC and 3.5 KA crashes. At a total cost of \$7.62 million, MassDOT is spending \$2.18 million per KA crash prevented under the Roadway Departure emphasis area.

What other indicators of success does the State use to demonstrate effectiveness and success of the Highway Safety Improvement Program?

- # RSAs completed
- HSIP Obligations
- Increased awareness of safety and data-driven process
- More systemic programs

Effectiveness of Groupings or Similar Types of Improvements

Present and describe trends in SHSP emphasis area performance measures.

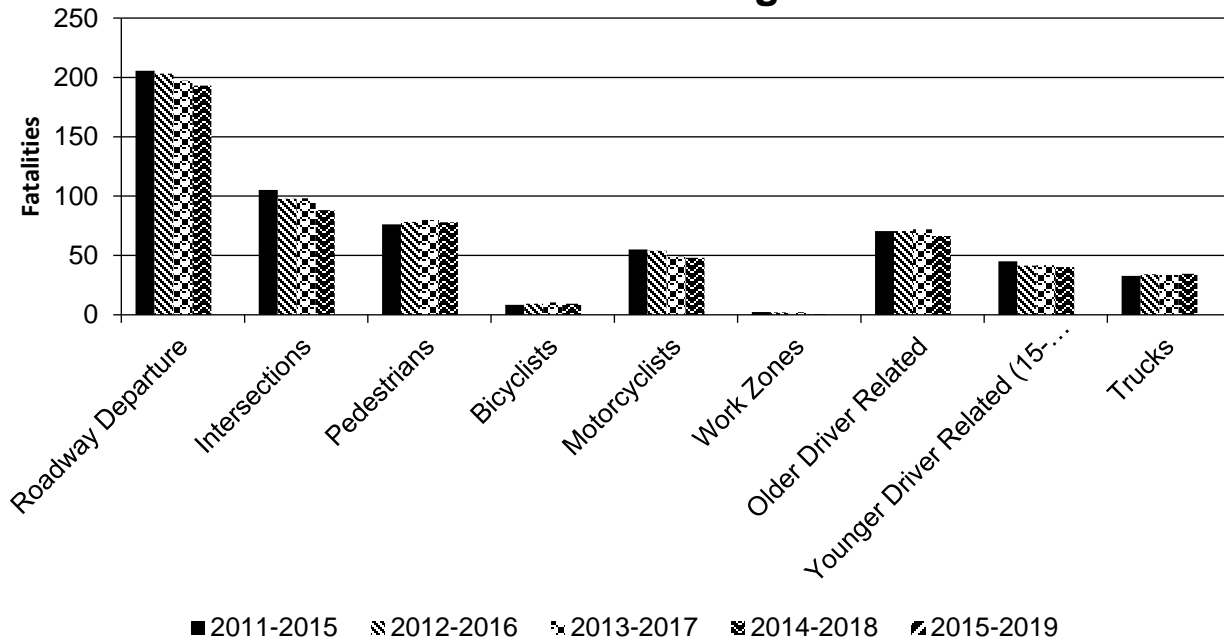
Year 2018

SHSP Emphasis Area	Targeted Crash Type	Number of Fatalities (5-yr avg)	Number of Serious Injuries (5-yr avg)	Fatality Rate (per HMVMT) (5-yr avg)	Serious Injury Rate (per HMVMT) (5-yr avg)
Roadway Departure		193	645.6	0.33	1.09

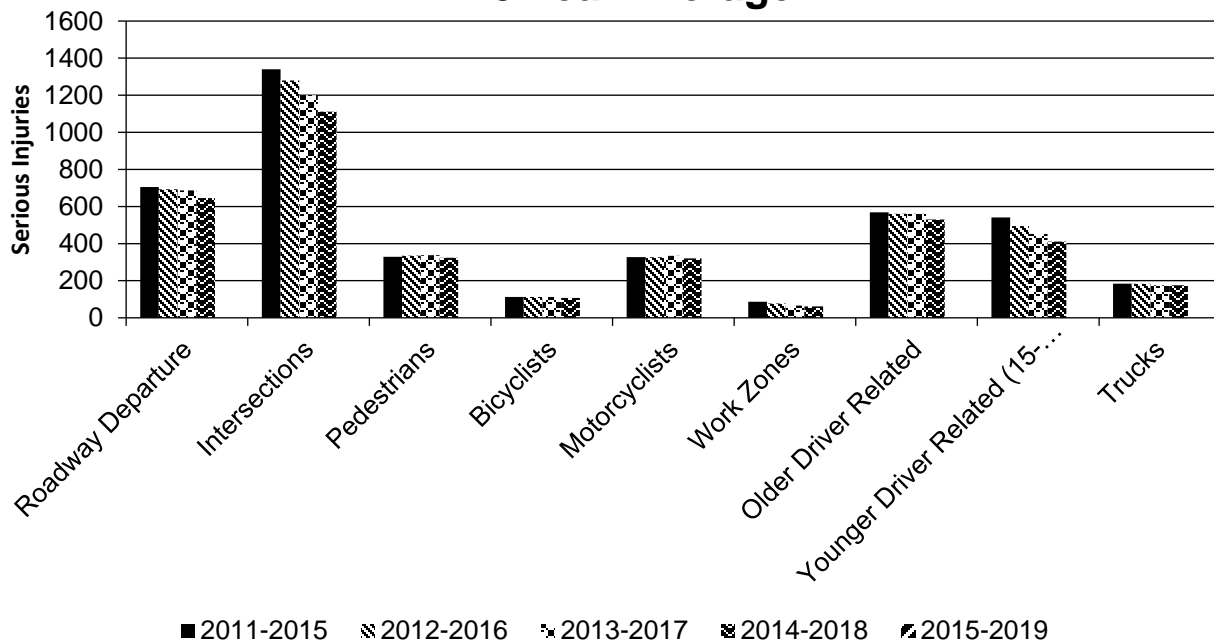
2020 Massachusetts Highway Safety Improvement Program

SHSP Emphasis Area	Targeted Crash Type	Number of Fatalities (5-yr avg)	Number of Serious Injuries (5-yr avg)	Fatality Rate (per HMVMT) (5-yr avg)	Serious Injury Rate (per HMVMT) (5-yr avg)
Intersections		88.2	1,111.4	0.15	1.88
Pedestrians		78	323.8	0.13	0.54
Bicyclists		9.4	107	0.02	0.18
Motorcyclists		48	320	0.08	0.54
Work Zones		0.6	61.2	0	0.11
Older Driver Related		66.4	529.6	0.11	0.89
Younger Driver Related (15-20)		40.2	411	0.07	0.7
Trucks		34.6	175.6	0.06	0.3

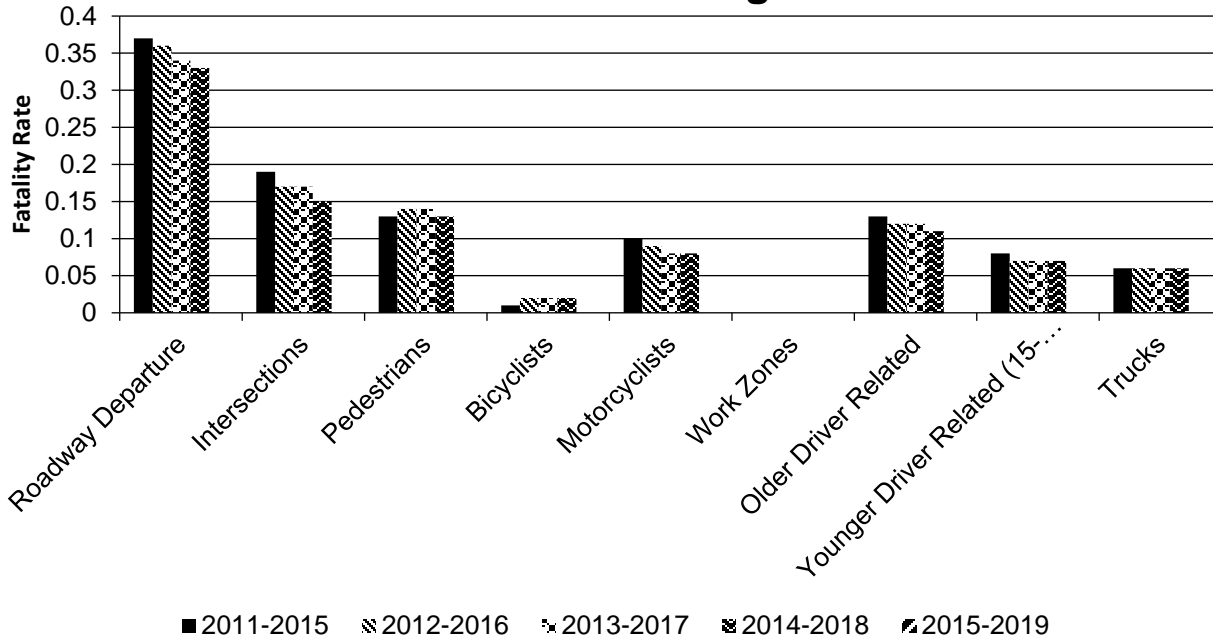
Number of Fatalities 5 Year Average



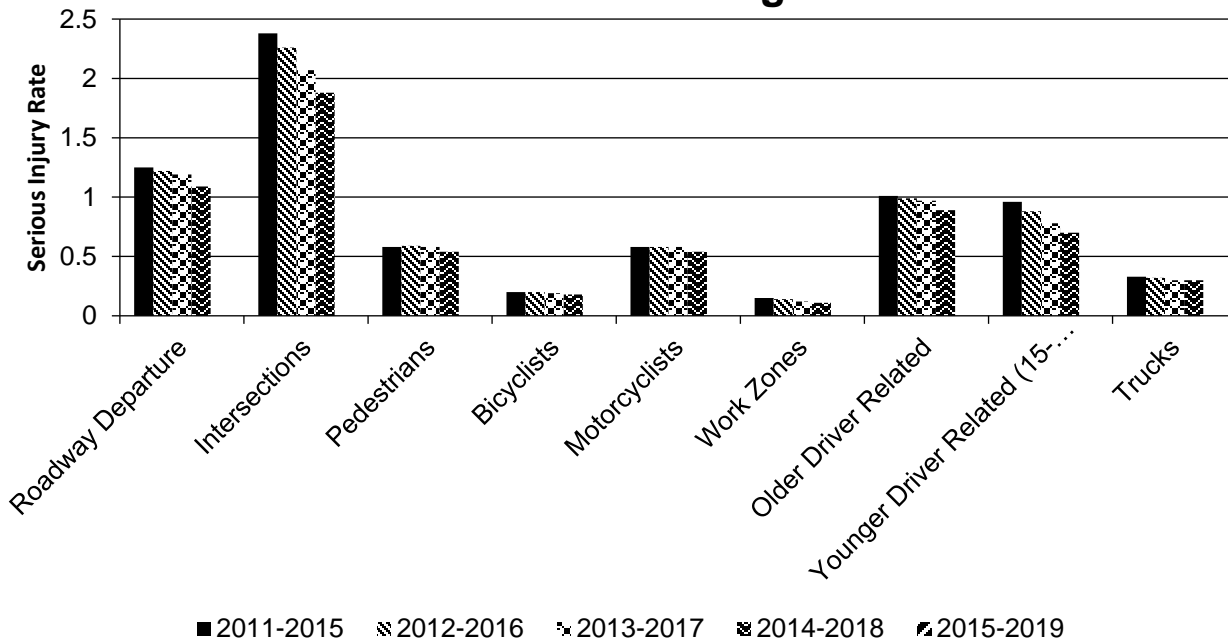
Number of Serious Injuries 5 Year Average



Fatality Rate (per HMVMT) 5 Year Average



Serious Injury Rate (per HMVMT) 5 Year Average



The VMTs used to calculate the rates are based on the statewide VMTS and not restricted to the VMTS of that emphasis area. (As an example, older drivers fatality rates are calculated by dividing the total number of older driver fatalities by the total statewide VMTS not just the VMTs of older drivers).. 2019 is not finalized for FARS nor for the serious injuries to get to this level of information

Has the State completed any countermeasure effectiveness evaluations during the reporting period?

No

There weren't any groups of projects to evaluate as a countermeasure.

Project Effectiveness

Provide the following information for previously implemented projects that the State evaluated this reporting period.

- MassDOT used the Empirical Bayes (EB) before-after method where possible to evaluate the projects. When EB was not possible (i.e. no SPF was available for the site), MassDOT used a naïve approach which accounted for changes in traffic volume using crash rate. MassDOT used a service life of 20 years for all except one project, which consisted of high-friction surface treatment. For that project, MassDOT assumed a 10 year service life. MassDOT used the evaluations to estimate annual property damage only (PDO), fatal and injury (KABC) and fatal and serious injury (KA) crash reductions.
- To calculate monetary benefits, MassDOT used crash costs from FHWA's *Crash Costs for Highway Safety Analysis*. MassDOT converted the national costs to Massachusetts-specific costs then grew them from 2016 to 2019 following the guidance describe in the report. MassDOT also converted project costs from project year to 2019 costs. MassDOT also converted estimated annual benefits to a lump sum in 2019 using the Uniform-Series Present Net Worth factor assuming an annual discount rate of 7 percent. MassDOT also used average crash costs for each facility type based on the average severity distribution of crashes at those facility types between 2013 and 2017.
- In total, MassDOT estimates these HSIP projects will produce \$72.08 million in societal crash cost benefits throughout their service lives. At a total cost of \$43.99 million, these projects have a total benefit-cost ratio of 1.6. This corresponds with the prevention of 265 KABC and 21 KA crashes throughout the service lives of the project, at a cost of \$166,000 to reduce one KABC crash and \$2.1 million to reduce on KA crash.

Compliance Assessment

What date was the State’s current SHSP approved by the Governor or designated State representative?

12/31/2018

What are the years being covered by the current SHSP?

From: 2012 To: 2016

When does the State anticipate completing it’s next SHSP update?

2023

Provide the current status (percent complete) of MIRE fundamental data elements collection efforts using the table below.

*Based on Functional Classification (MIRE 1.0 Element Number) [MIRE 2.0 Element Number]

ROAD TYPE	*MIRE NAME (MIRE NO.)	NON LOCAL PAVED ROADS - SEGMENT		NON LOCAL PAVED ROADS - INTERSECTION		NON LOCAL PAVED ROADS - RAMPS		LOCAL PAVED ROADS		UNPAVED ROADS	
		STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE
ROADWAY SEGMENT	Segment Identifier (12) [12]	0.9997928276947 94	0.9996637906760 75					0.03066037735849 06	0.0004441492849196 51	0.8971193415637 86	0.0002431802251562 79
	Route Number (8) [8]	1	1								
	Route/Street Name (9) [9]	0.9977003874122 11	0.9997730587063 51								
	Federal Aid/Route Type (21) [21]	0.9949657129834 88	0.9994368493824 26								
	Rural/Urban Designation (20) [20]	1	1					1	1		
	Surface Type (23) [24]	1	1					1	1		
	Begin Point Segment Descriptor (10) [10]	1	1					1	1	1	1
	End Point Segment Descriptor (11) [11]	1	1					1	1	1	1
	Segment Length (13) [13]	1	1								
Direction of Inventory (18) [18]	0.9989330626281 88	0.9997730587063 51									

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ROAD TYPE	*MIRE NAME (MIRE NO.)	NON LOCAL PAVED ROADS - SEGMENT		NON LOCAL PAVED ROADS - INTERSECTION		NON LOCAL PAVED ROADS - RAMPS		LOCAL PAVED ROADS		UNPAVED ROADS	
		STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE
	Functional Class (19) [19]	1	1					100	100	100	100
	Median Type (54) [55]	0.9989330626281 88	0.9997310325408 6								
	Access Control (22) [23]	0.9999585655389 59	1								
	One/Two Way Operations (91) [93]	0.9999896413847 4	0.9999831895338 04								
	Number of Through Lanes (31) [32]	0.9999896413847 4	0.9999831895338 04					0.97720125786163 5	0.987830309593202		
	Average Annual Daily Traffic (79) [81]	0.9679504443845 95	0.9836518216241 43					0.80267295597484 3	0.963461318827277		
	AADT Year (80) [82]	0.9679504443845 95	0.9836518216241 43								
	Type of Governmental Ownership (4) [4]	1	1					1	1	1	1
INTERSECTION	Unique Junction Identifier (120) [110]			1	1						
	Location Identifier for Road 1 Crossing Point (122) [112]			1	1						
	Location Identifier for Road 2 Crossing Point (123) [113]			1	1						
	Intersection/Juncti on Geometry (126) [116]			1	1						
	Intersection/Juncti on Traffic Control (131) [131]			0.5417231715034 81	0.7231166384678 44						
	AADT for Each Intersecting Road (79) [81]			0.968	0.984						

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ROAD TYPE	*MIRE NAME (MIRE NO.)	NON LOCAL PAVED ROADS - SEGMENT		NON LOCAL PAVED ROADS - INTERSECTION		NON LOCAL PAVED ROADS - RAMPS		LOCAL PAVED ROADS		UNPAVED ROADS	
		STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE	STATE	NON-STATE
	AADT Year (80) [82]			0.968	0.984						
	Unique Approach Identifier (139) [129]			1	1						
INTERCHANGE/RAMP	Unique Interchange Identifier (178) [168]										
	Location Identifier for Roadway at Beginning of Ramp Terminal (197) [187]										
	Location Identifier for Roadway at Ending Ramp Terminal (201) [191]										
	Ramp Length (187) [177]					1	1				
	Roadway Type at Beginning of Ramp Terminal (195) [185]										
	Roadway Type at End Ramp Terminal (199) [189]										
	Interchange Type (182) [172]										
	Ramp AADT (191) [181]					0.9780451956641 56	0.960317460317 46				
	Year of Ramp AADT (192) [182]					0.9780451956641 56	0.960317460317 46				
	Functional Class (19) [19]					1	1				
Type of Governmental Ownership (4) [4]					1	1					
Totals (Average Percent Complete):		1.00	1.00	0.93	0.96	0.45	0.45	11.87	11.88	20.78	20.60

*Based on Functional Classification (MIRE 1.0 Element Number) [MIRE 2.0 Element Number]

Describe actions the State will take moving forward to meet the requirement to have complete access to the MIRE fundamental data elements on all public roads by September 30, 2026.

MassDOT is in relatively good shape. Our largest deficiencies are with the intersections. To overcome that, we assembled an intersection collection tool (using HSIP funds) and two procured two contracts with University of Massachusetts students (using HSIP funds) to collect the intersection MIRE FDE. There are approximately 70,000 intersections to be collected and, based on recent performance measures, each intersections takes approximately 8 minutes. We are 70% complete with the intersection collection and anticipate completion in less than one year. While AADTs are available on nearly 96% of all roadways (State owned and non-state owned), we are looking into a process in place to have some quality control. A committee has been established to perform this review which impacts HPMS, Safety and other.

Optional Attachments

Program Structure:

hwy_HSIP_Criteria_07-2020.pdf

dot-hwy_safety_analysis_guide080220.pdf

Project Implementation:

Safety Performance:

Evaluation:

Compliance Assessment:

Glossary

5 year rolling average: means the average of five individuals, consecutive annual points of data (e.g. annual fatality rate).

Emphasis area: means a highway safety priority in a State's SHSP, identified through a data-driven, collaborative process.

Highway safety improvement project: means strategies, activities and projects on a public road that are consistent with a State strategic highway safety plan and corrects or improves a hazardous road location or feature or addresses a highway safety problem.

HMVMT: means hundred million vehicle miles traveled.

Non-infrastructure projects: are projects that do not result in construction. Examples of non-infrastructure projects include road safety audits, transportation safety planning activities, improvements in the collection and analysis of data, education and outreach, and enforcement activities.

Older driver special rule: applies if traffic fatalities and serious injuries per capita for drivers and pedestrians over the age of 65 in a State increases during the most recent 2-year period for which data are available, as defined in the Older Driver and Pedestrian Special Rule Interim Guidance dated February 13, 2013.

Performance measure: means indicators that enable decision-makers and other stakeholders to monitor changes in system condition and performance against established visions, goals, and objectives.

Programmed funds: mean those funds that have been programmed in the Statewide Transportation Improvement Program (STIP) to be expended on highway safety improvement projects.

Roadway Functional Classification: means the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide.

Strategic Highway Safety Plan (SHSP): means a comprehensive, multi-disciplinary plan, based on safety data developed by a State Department of Transportation in accordance with 23 U.S.C. 148.

Systematic: refers to an approach where an agency deploys countermeasures at all locations across a system.

Systemic safety improvement: means an improvement that is widely implemented based on high risk roadway features that are correlated with specific severe crash types.

Transfer: means, in accordance with provisions of 23 U.S.C. 126, a State may transfer from an apportionment under section 104(b) not to exceed 50 percent of the amount apportioned for the fiscal year to any other apportionment of the State under that section.