Highway Safety Improvement Program

Data Driven Decisions

Michigan
Highway Safety Improvement Program
2016 Annual Report

Prepared by: MI

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. 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."

Table of Contents

Executive Summary

The 2016 HSIP Annual Report for the Michigan Department of Transportation (MDOT) will be for the one year time period of FY 2015 which commenced on October 1, 2014 and ended on September 30, 2015. This report addresses safety improvements funded through MDOT on both trunkline and non-trunkline roadways.

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 MAP-21 Reporting Guidance dated February 13, 2013 and consists of four sections: program structure, progress in implementing HSIP projects, progress in achieving safety performance targets, and assessment of the effectiveness of the improvements.

Program Structure

Program Administration

How are Highway Safety Improvement Program funds allocated in a State?

Other-Central Office

Describe how local roads are addressed as part of Highway Safety Improvement Program.

For the local roadway network, HSIP funds ($15.1 M) are administered by the Local Agency Programs Safety Engineer located in the Central Office. Typically, only the construction phase is eligible for federal aid. Preliminary engineering costs were eligible for federal participation if it was for a project identified on the Transparency (5%) Report, by the Local Safety Initiative, in a Road Safety Audit (RSA) or in a traffic signal optimization project. Otherwise, preliminary engineering was not eligible for federal safety funds. Projects are federally funded at 80 or 90 percent up to an amount not to exceed $600 K Federal, with a 20 or 10 percent local match, respectively.

All Local Agencies within Metropolitan Planning Organizations (MPO) areas must coordinate with their MPO to ensure inclusion of their project in the area's TIP. Those agencies that are part of a rural task force are to notify their members that they applied for these funds. Rural task force approval is not necessary. Local Agency Programs (LAP) coordinates with MDOT Planning to ensure these projects are included in the STIP.

The planning and selection of projects for the local roadway system is very similar to that of the state trunkline. Local agencies were invited by a July 16, 2013 memorandum to submit proposed projects for consideration as part of an annual call-for projects (CFP).

The emphasis of the local FY 2015 CFP was to address those locations with correctable fatality and injury crashes to support the department's efforts of reducing fatalities and serious injuries. Per the CFP, the local agency was to provide a Time of Return (TOR) analysis showing how the proposed improvement would address fatalities and injuries. In the TOR, all crash types and severity levels correctable by the proposed improvement can be included. A maximum of five years of available crash data is to be used in the TOR analysis. For FY 2015 projects, 2008 to 2012 (or the current availability) crash data was used.

Eligible projects must meet current standards and warrants. Project types may include replacement, installation or elimination of guardrail, removal of fixed objects from clear zones, traffic and pedestrian signal optimization, installation and upgrades, access management,horizontal and vertical curve modifications, sight distance and drainage improvements, bridge railing replacement or retrofit, roadway intersection improvements to improve safety, mid-block pedestrian crossings, improvements to school zones, shoulder and centerline rumble strips, and improved permanent signing and pavement markings.

For the FY 2015 CFP, a greater emphasis is placed on the identification of correctable fatalities and serious injuries, both in the selection and prioritization of safety projects. In addition, in FY 2015, a small portion of the local safety funds were allocated to five subprograms: Centerline and Shoulder Rumble Strips ($200 K), Guardrail Upgrades and Clear Zone Improvements ($1.5 M), Traffic Signal Optimization – all red phasing ($150 K), Road Safety Audits ($50 K) and Non-motorized Facility/Pedestrian Improvements ($100 K). Local agencies were informed that this money is reserved for the listed strategic improvements, and encouraged to submit conforming projects.

Identify which internal partners are involved with Highway Safety Improvement Program planning.

Design
Planning
Maintenance
Operations

Briefly describe coordination with internal partners.

MDOT's Safety Programs Unit provides support and coordination to internal partners within the Department. Each of the seven Regions is comprised of a Traffic Safety and Operations Engineer as well as Traffic and Safety Engineers located in the Transportation Service Center (TSC) offices. Employees within the Safety Programs Unit distribute the High Crash List, Transparency (5%) Report, and Pavement Friction Analysis to the Region and TSC staff for their use in project selection.Road Safety Audits and 3R/4R Safety Reviews are conducted with various internal partners located with the Central, Region, and TSC offices. In addition, the Safety Programs Unit supports the Regions and TSC's with special data requests in the development of their safety program.

HSIP funding partnering is also coordinated between the Traffic and Safety Unit and Local Agency Programs.

Identify which external partners are involved with Highway Safety Improvement Program planning.

Metropolitan Planning Organizations
Local Government Association
Other-County Road Association of Michigan

Identify any program administration practices used to implement the HSIP that have changed since the last reporting period.

Other-No changes since the last reporting period

Describe any other aspects of Highway Safety Improvement Program Administration on which you would like to elaborate.

For the State Trunkline Program, safety funds are administered by the Safety Template Program Manager in Traffic and Safety (Central Office). For FY 2015, $19M in safety funding was available, of which $15.6M was allocated to the seven MDOT Regions as funding targets. The allocations were based on the percentage of fatalities and serious injuries, lane miles and Vehicle Miles Traveled in each Region. The goal is that all Regions receive a minimum of 5 percent of the Safety Target.

Beyond the allocated $15.6 M, an additional $2M of the safety funds was reserved by the Traffic and Safety area to apply to projects in any Region at their discretion. The Regions were permitted to submit candidate projects with total costs exceeding their funding targets; the central office review team then selected the projects to be funded in each Region, taking

into account priorities expressed by the Regional staffs, and use their discretionary funds to apply to worthy projects that exceeded a particular Region's funding target. All project phases; preliminary engineering, construction engineering, right of way and construction are eligible for safety funding.

In addition to the $17.6 M of project funding described above, in which project selection was by central office staff, each Region was given $200K for low-cost safety improvement to be chosen at the discretion of the Region staff. The Regions use this pot of money for a variety of minor roadside safety improvements which can be performed in a timely manner by state forces or contract agencies. Individual Safety Work Authorizations (SWA) are the most cost effective method of funding these types of improvements and can be initiated quickly throughout the fiscal year in response to safety needs. Federal funds are used for those improvements meeting funding criteria.

Once the FY 2015 program was developed, it was reviewed and approved by the Project Screening Committee (PSC). The PSC consists of Region and central office program managers and Planning staff who help develop the MDOT's Five Year Plan for approval by the Transportation Commission. The PSC ensures coordination between Regions on various corridors and between the programs.

In FY 2015, the use of HSIP funding continued in the administration of the pavement marking program. Under 23 U.S.C. 148(e)(1)(c), HSIP funds may be obligated for any project to maintain minimum levels of retroreflectivity of traffic signs and pavement markings, without regard to whether that project is included in an applicable State SHSP. Prior to FY 2013 Surface Transportation Safety funding was used in the placement of pavement markings in the Annual Pavement Marking Program.

Program Methodology

Select the programs that are administered under the HSIP.

Other-Countermeasures to achieve Toward Zero Deaths

Program: **Other-Countermeasures to achieve Toward Zero Deaths**
Date of Program Methodology: **10/1/2001**

What data types were used in the program methodology?

Crashes	*Exposure*	*Roadway*
Fatal and serious injury crashes only		Median width Horizontal curvature Functional classification Roadside features

What project identification methodology was used for this program?
Expected crash frequency with EB adjustment
Relative severity index
Excess expected crash frequency using SPFs

Are local roads (non-state owned and operated) included or addressed in this program?
Yes
If yes, are local road projects identified using the same methodology as state roads?
Yes

How are highway safety improvement projects advanced for implementation?
selection committee

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

Ranking based on B/C	2
Available funding	1

What proportion of highway safety improvement program funds address systemic improvements?

25%

Highway safety improvement program funds are used to address which of the following systemic improvements?

Cable Median Barriers
Rumble Strips
Traffic Control Device Rehabilitation
Pavement/Shoulder Widening
Install/Improve Signing
Install/Improve Pavement Marking and/or Delineation
Upgrade Guard Rails
Clear Zone Improvements

Safety Edge
Add/Upgrade/Modify/Remove Traffic Signal

What process is used to identify potential countermeasures?

Engineering Study
Road Safety Assessment
Other-High Crash List
Other-Transparency Report
Other-Fatality and Serious Injury Region-wide Maps
Other-3R/4R Safety Reviews
Other-Pavement Friction Analysis
Other-Customer Concerns
Other-Local Safety Initiative

Identify any program methodology practices used to implement the HSIP that have changed since the last reporting period.

Other-No changes since the last reporting period

Describe any other aspects of the Highway Safety Improvement Program methodology on which you would like to elaborate.

The annual process for submitting safety projects starts with a Call for Projects (CFP) issued to the seven MDOT Regions from the Safety Template Program Manager.The FY 2015 Safety Call request was made to the Regions on December 13, 2010. In response to the CFP, the Regions identify locations where safety improvements (i.e. add a center left turn lane, right turn lane, geometric improvements to accommodate signalization, median protection, etc.) could be made. These locations are to be identified through the current Transparency Report, Fatality and Serious Injury Regionwide Maps, High Crash List, 3R/4R Safety Reviews, customer concerns, and Pavement Friction Analyses. Upon location identification an engineering study is conducted by the Region to determine the appropriate safety improvement. The emphasis of the Safety Call was to address those locations with correctable fatality and serious injury crashes to support the department's efforts of reducing fatalities and serious injuries and support the vision of Toward Zero Deaths (TZD). All safety projects and proposed candidates must address a focus area of the Michigan Strategic Highway Safety Plan (SHSP). Submitted concepts must meet a maximum Time-of-Return (TOR) to qualify for safety funding. The TOR is a cost benefit analysis of proposed safety improvement which considers all crash types and severity levels that are correctable

by the proposed improvement. A minimum of the latest three years of available crash data is to be used in the TOR analysis. For FY 2015 project, in which 2008 to 2010 (or most current data available)crash data was used, three TOR criteriawere established:

- Stand alone safety improvement - TOR of 7 years or less
- Stand alone safety improvement for location on the current Transparency Report – TOR of 10 years or less.
- Safety improvement in conjunction with a Construction project - TOR of 10 years or less.

Each Region's submittal was reviewed by the Central office review teamto ensure all criteria were met. The Regions were permitted to submit candidate projects with total costs exceeding their funding targets. The review team, taking into account priorities expressed by the Regions, used the TOR values as a means to develop project rankings (lowest to highest TOR value) within each Region and the TOR values for projects beyond funding targets to allocate the $2 M funds statewide.

For FY 2015, funding was included in programmed preliminary engineering for outer year safety projects to conduct a road safety audit (RSA). For guidance, a RSA should be conducted for all proposals exceeding $750,000 in programmed construction costs. Each Region was required to conduct at least one RSA for a FY 2014 or FY 2015 improvement projects.The RSA should be done prior to 30 percent completion of the plans.The purpose of the audit is to ensure the appropriate safety fixes are incorporated into the overall design based on crash patterns within the project limits.

Continuing in FY 2015each Region was required to allocate up to a certain percent of their funding target for low cost safety improvements. This amount is in addition to the Safety Work Authorizations (SWA funding). The focus is to be on systemwide safety improvements done by work authorization or through the letting process. A TOR justification is not be required if the proposed improvement is selected from the list of approved and proven safety systemwide fixes (Eligibility Guidelines for Low Cost Safety Improvement Projects-see attachment). For FY 2014 through FY 2017, the percentage is 10 percent. For FY 2018 through 2020 this percentage was increased to 25 percent. New for FY 2020 is the allocation of $1 million toward additional low cost safety improvements for regions meeting or exceeding their target amount in project proposals. To accommodate this change, the $2 million of discretionary funding as describedabove has been reduced from $2 million to $1 million. For FY 2021 and FY 2022 the percentage submitted shall be a minimum of 25 percent up to a maximum of 50 percent.

In an effort to incorporate the Highway Safety Manual (HSM) into MDOT's business process all safety projects submitted for FY 2019 to present, except for freeway improvements, shall have the HSM predictive analysis performed on them. A comparison of future conditions with and without the proposed improvement shall be provided. Starting for FY 2020 and continuing for FY 2021 and 2022, all submitted concepts must address two or more fatal and/or serious injury crashes.

Progress in Implementing Projects

Funds Programmed

Reporting period for Highway Safety Improvement Program funding.

State Fiscal Year

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

Funding Category	Programmed*		Obligated	
HSIP (Section 148)	$56,216,814.00	98 %	$52,759,948.00	99 %
Other Federal-aid Funds (i.e. STP, NHPP)	$403,274.00	1 %	$398,694.00	1 %
State and Local Funds	$613,557.00	1 %	$298,044.00	1 %
Totals	$57,233,645.00	100%	$53,456,686.00	100%

How much funding is programmed to local (non-state owned and operated) safety projects?
$14,608,601.00
How much funding is obligated to local safety projects?
$13,209,505.00

How much funding is programmed to non-infrastructure safety projects?
$1,016,831.00
How much funding is obligated to non-infrastructure safety projects?
$696,738.00

How much funding was transferred in to the HSIP from other core program areas during the reporting

period?
$0.00
How much funding was transferred out of the HSIP to other core program areas during the reporting period?
$0.00

Discuss impediments to obligating Highway Safety Improvement Program funds and plans to overcome this in the future.

None to discuss.

Describe any other aspects of the general Highway Safety Improvement Program implementation progress on which you would like to elaborate.

During the reporting period 1.81 percent of the programmed and 1.32 percent of the obligated funds for the state trunkline system were directed to non-infrastructure safety items such as road safety audits, SHSP activities, outreach, educational efforts, and data collection. On the local side no HSIP funds were directed toward tribal safety projects. Overall, 26 percent of the programmed and 25 percent of the obligated funds were directed to local safety projects.

General Listing of Projects

List each highway safety improvement project obligated during the reporting period.

Project	Improvement Category	Output	HSIP Cost	Total Cost	Funding Category	Functional Classification	AADT	Speed	Roadway Ownership	Relationship to SHSP	
										Emphasis Area	Strategy
See attached project list											

Project	Improvement Category	Output	HSIP Cost	Total Cost	Funding Category	Functional Classification	AADT	Speed	Roadway Ownership	Relationship to SHSP	
										Emphasis Area	Strategy
Old Indiantown Road	Alignment Vertical alignment or elevation change	0.38 Miles	79920	99900	HSIP (Section 148)	Rural Local Road or Street	200	55	County Highway Agency	Roadway Departure	Reduce Fs and As
Wyatt Road @ Grove Road	Intersection geometry Auxiliary lanes - add left-turn lane	0.51 Miles	346400	433000	HSIP (Section 148)	Rural Minor Collector	500	55	County Highway Agency	Pedestrians	Reduce Fs and As
Bellaire Road	Roadway Superelevation / cross slope	0.9 Miles	312000	390000	HSIP (Section 148)	Rural Major Collector	184	55	County Highway Agency	Lane Departure	Reduce Fs and As
Garfield Road	Roadway Rumble strips - center	0.25 Miles	386650	407000	HSIP (Sectio	Rural Minor	4551	50	County Highway	Lane Departure	Reduce Fs

					n 148)	Arterial			Agency		and As
CR 426 and CR 412	Roadway delineation Longitudinal pavement markings - remarking	5.7 Miles	113520	141900	HSIP (Section 148)	Rural Major Collector	950	55	County Highway Agency	Pavement markings	Reduce Fs and As
Mitchell Road @ Division Road	Intersection traffic control Modify traffic signal timing - left-turn phasing (permissive to protected/permissive)	1 Numbers	96000	120000	HSIP (Section 148)	Urban Minor Arterial	6785	45	County Highway Agency	Intersections	Reduce Fs and As
Stanley Road @ Linden Road	Intersection traffic control Intersection flashers - add advance intersection warning sign-mounted	1 Numbers	24000	30000	HSIP (Section 148)	Urban Minor Arterial	4207	55	County Highway Agency	Intersections	Reduce Fs and As
Hill Road @ Elms Road	Intersection traffic control Modify control - traffic signal to roundabout	1 Numbers	504000	560000	HSIP (Section 148)	Urban Minor Arterial	4516	55	County Highway Agency	Intersections	Reduce Fs and As
Seymour Road	Roadway signs and traffic control Roadway signs (including post) - new or updated	0.61 Miles	36332	45415	HSIP (Section 148)	Rural Major Collector	3855	55	County Highway Agency	Lane Departure	Reduce Fs and As
Curve Signing Countywide	Alignment Horizontal curve realignment	0 Miles	75200	94000	HSIP (Section 148)	Countywide	2000	55	County Highway Agency	Lane Departure	Reduce Fs and As
Keefer Highway	Roadside Removal of roadside objects (trees, poles, etc.)	1.81 Miles	531000	590000	HSIP (Section 148)	Rural Major Collector	1213	55	County Highway Agency	Roadway Departure	Reduce Fs and As
Grand River Avenue	Roadside Removal of roadside objects (trees, poles, etc.)	3.03 Miles	284000	355000	HSIP (Section 148)	Rural Major Collector	4249	55	County Highway Agency	Roadway Departure	Reduce Fs and As
Guardrail Upgrades	Roadside Barrier- metal	5 Numbe	150408	188010	HSIP (Sectio	Rural Major	1372	55	County Highway	Roadway Departure	Reduce Fs

@ 5 locations		rs			n 148)	Collector			Agency		and As
East Main Street	Roadway Roadway narrowing (road diet, roadway reconfiguration)	2.12 Miles	600000	670000	HSIP (Section 148)	Urban Minor Arterial	5979	25	County Highway Agency	Lane Departure	Reduce Fs and As
8th Street @ U Avenue	Intersection geometry Auxiliary lanes - add left-turn lane	1 Numbers	170400	213000	HSIP (Section 148)	Rural Major Collector	2149	55	County Highway Agency	Intersections	Reduce Fs and As
Fish Lake Road	Roadway Rumble strips - center	5.18 Miles	584386.8	615144	HSIP (Section 148)	Rural Major Collector	3500	55	County Highway Agency	Lane Departure	Reduce Fs and As
Washburn Road @ Columbiaville Road	Alignment Vertical alignment or elevation change	1 Numbers	283732.55	333803	HSIP (Section 148)	Rural Major Collector	3000	55	County Highway Agency	Intersections	Reduce Fs and As
Oregon Road	Roadway Rumble strips - center	0.74 Miles	457401.6	571752	HSIP (Section 148)	Rural Local Road or Street	2890	55	County Highway Agency	Lane Departure	Reduce Fs and As
Bronson Lake Road	Roadside Barrier- metal	2.14 Miles	144029.6	180037	HSIP (Section 148)	Rural Major Collector	2800	35	County Highway Agency	Lane Departure	Reduce Fs and As
Bowers Road @ Myers Road	Intersection geometry Auxiliary lanes - add left-turn lane	1 Numbers	238748	298435	HSIP (Section 148)	Urban Minor Arterial	7100	55	County Highway Agency	Intersections	Reduce Fs and As
Smith Road @ Lewis Avenue	Intersection traffic control Modify traffic signal - modernization/replacement	1 Numbers	82170	83000	HSIP (Section 148)	Urban Minor Arterial	1026	45	County Highway Agency	Intersections	Reduce Fs and As
South Otter Creek at 3 RR Tracks	Shoulder treatments Widen shoulder - paved or other	0.09 Miles	44000	55000	HSIP (Section 148)	Urban Major Collector	2196	50	County Highway Agency	Roadway Departure	Reduce Fs and As

Federal Road @ Almy Road	Intersection geometry Auxiliary lanes - add left-turn lane	1 Numbers	283232	354040	HSIP (Section 148)	Rural Major Collector	5816	55	County Highway Agency	Intersections	Reduce Fs and As
Various Roads	Roadway signs and traffic control Sign sheeting - upgrade or replacement	123 Numbers	55890	62100	HSIP (Section 148)	Various Roads	3500	55	County Highway Agency	Signage	Reduce Fs and As
Federal Road	Roadside Barrier- metal	4.63 Miles	146568	183210	HSIP (Section 148)	Rural Major Collector	6200	55	County Highway Agency	Roadway Departure	Reduce Fs and As
Grand River Avenue @ Beck Road	Intersection geometry Auxiliary lanes - add left-turn lane	1 Numbers	432160	540200	HSIP (Section 148)	Urban Minor Arterial	14640	50	City of Municipal Highway Agency	Intersections	Reduce Fs and As
Giddings Road @ Walton Road	Intersection traffic control Modify traffic signal - modernization/replacement	1 Numbers	213667.2	267084	HSIP (Section 148)	Urban Major Collector	8900	35	City of Municipal Highway Agency	Intersections	Reduce Fs and As
Adams Road @ Walton Blvd	Intersection traffic control Modify traffic signal - modernization/replacement	1 Numbers	244895.2	306119	HSIP (Section 148)	Urban Principal Arterial - Other	44110	45	County Highway Agency	Intersections	Reduce Fs and As
Maple Road @ Wyndham Blvd/Apple Blossom Trail	Intersection geometry Auxiliary lanes - add left-turn lane	1 Numbers	328000	410000	HSIP (Section 148)	Urban Principal Arterial - Other	21982	45	County Highway Agency	Intersections	Reduce Fs and As
Dickerson Road	Roadway Roadway widening - travel lanes	0.9 Miles	364525.2	405028	HSIP (Section 148)	Urban Minor Arterial	4082	45	County Highway Agency	Lane Departure	Reduce Fs and As
16th Street	Intersection geometry	0.22	450000	550000	HSIP	Urban	1647	35	City of	Intersecti	Reduc

and Waverly Road	Auxiliary lanes - add left-turn lane	Miles			(Section 148)	Minor Arterial	3		Municipal Highway Agency	ons	e Fs and As
Keno Road	Roadside Barrier - other	0.72 Miles	26994.6	29994	HSIP (Section 148)	Rural Major Collector	848	55	County Highway Agency	Snow fence	Reduce Fs and As
Marine City Highway	Roadside Barrier- metal	0.83 Miles	69743.2	87179	HSIP (Section 148)	Rural Minor Arterial	6827	55	County Highway Agency	Roadway Departure	Reduce Fs and As
Ormes Road @ Bray Road	Lighting Intersection lighting	1 Numbers	70550.4	88188	HSIP (Section 148)	Rural Major Collector	3030	55	County Highway Agency	Intersections	Reduce Fs and As
Ann Arbor - Saline Road	Pedestrians and bicyclists Install new crosswalk	2 Numbers	69500	62550	HSIP (Section 148)	Urban Principal Arterial - Other	25000	45	City of Municipal Highway Agency	Pedestrians	Reduce Fs and As
Huron River Drive	Roadway Roadway narrowing (road diet, roadway reconfiguration)	0.85 Miles	439510.5	488345	HSIP (Section 148)	Urban Minor Arterial	14500	45	County Highway Agency	Lane Departure	Reduce Fs and As
Hewitt Road	Roadway Roadway narrowing (road diet, roadway reconfiguration)	1.17 Miles	553046.4	614496	HSIP (Section 148)	Urban Minor Arterial	17000	45	County Highway Agency	Lane Departure	Reduce Fs and As
Whittaker Road @ Merritt Road	Intersection traffic control Modify control - all-way stop to roundabout	0.38 Miles	600000	1210377	HSIP (Section 148)	Urban Minor Arterial	9700	55	County Highway Agency	Intersections	Reduce Fs and As
Schaefer Highway	Intersection geometry Intersection geometrics - miscellaneous/other/unspecified	4 Miles	495000	550000	HSIP (Section 148)	Urban Principal Arterial - Other	13600	30	City of Municipal Highway Agency	Intersections	Reduce Fs and As

Joy Road	Intersection geometry Intersection geometrics - miscellaneous/other/unspecified	4.8 Miles	559800	622000	HSIP (Section 148)	Urban Minor Arterial	13400	30	City of Municipal Highway Agency	Intersections	Reduce Fs and As
McGraw Street	Intersection geometry Intersection geometrics - miscellaneous/other/unspecified	1.7 Miles	450000	500000	HSIP (Section 148)	Urban Minor Arterial	10300	30	City of Municipal Highway Agency	Intersections	Reduce Fs and As
McNichols Road	Intersection geometry Intersection geometrics - miscellaneous/other/unspecified	3.2 Miles	495000	550000	HSIP (Section 148)	Urban Principal Arterial - Other	12900	30	City of Municipal Highway Agency	Intersections	Reduce Fs and As
Grosse Pointe Blvd @ St Paul School/Grosse Pointe Academy	Intersection traffic control Modify traffic signal - modify signal mounting (spanwire to mast arm)	0.02 Miles	90087.2	112609	HSIP (Section 148)	Urban Major Collector	7000	30	City of Municipal Highway Agency	Intersections	Reduce Fs and As
16 Road	Roadside Barrier- metal	8.86 Miles	540000	600000	HSIP (Section 148)	Rural Minor Arterial	1650	55	County Highway Agency	Roadway Departure	Reduce Fs and As
16th Street	Shoulder treatments Widen shoulder - paved or other	0.27 Miles	165150	183500	HSIP (Section 148)	Rural Local Road or Street	225	55	County Highway Agency	Roadway Departure	Reduce Fs and As
16th Street @ 120th Avenue	Roadside Removal of roadside objects (trees, poles, etc.)	1 Numbers	263745	293050	HSIP (Section 148)	Rural Minor Collector	320	55	County Highway Agency	Intersections	Reduce Fs and As
Kipp Road	Intersection traffic control Modify traffic signal - modify signal mounting	3 Numbers	184160	230200	HSIP (Section 148)	Urban Minor Arterial	10763	45	City of Municipal	Intersections	Reduce Fs and As

	(spanwire to mast arm)								Highway Agency		
Leonard Street	Intersection traffic control Modify traffic signal - modify signal mounting (spanwire to mast arm)	1 Numbers	80000	100000	HSIP (Section 148)	Urban Principal Arterial - Other	22387	30	City of Municipal Highway Agency	Intersections	Reduce Fs and As
Sprinkle Road	Roadway Rumble strips - edge or shoulder	1.04 Miles	652359.51	658949	HSIP (Section 148)	Urban Principal Arterial - Other	25849	55	County Highway Agency	Roadway Departure	Reduce Fs and As
Nadeau Road	Shoulder treatments Widen shoulder - paved or other	0.85 Miles	274500	305000	HSIP (Section 148)	Urban Minor Arterial	7958	45	County Highway Agency	Roadway Departure	Reduce Fs and As
CR 388 @ CR 687	Intersection geometry Auxiliary lanes - add right-turn lane	1 Numbers	468307.13	473037.5	HSIP (Section 148)	Rural Major Collector	5374	55	County Highway Agency	Intersections	Reduce Fs and As

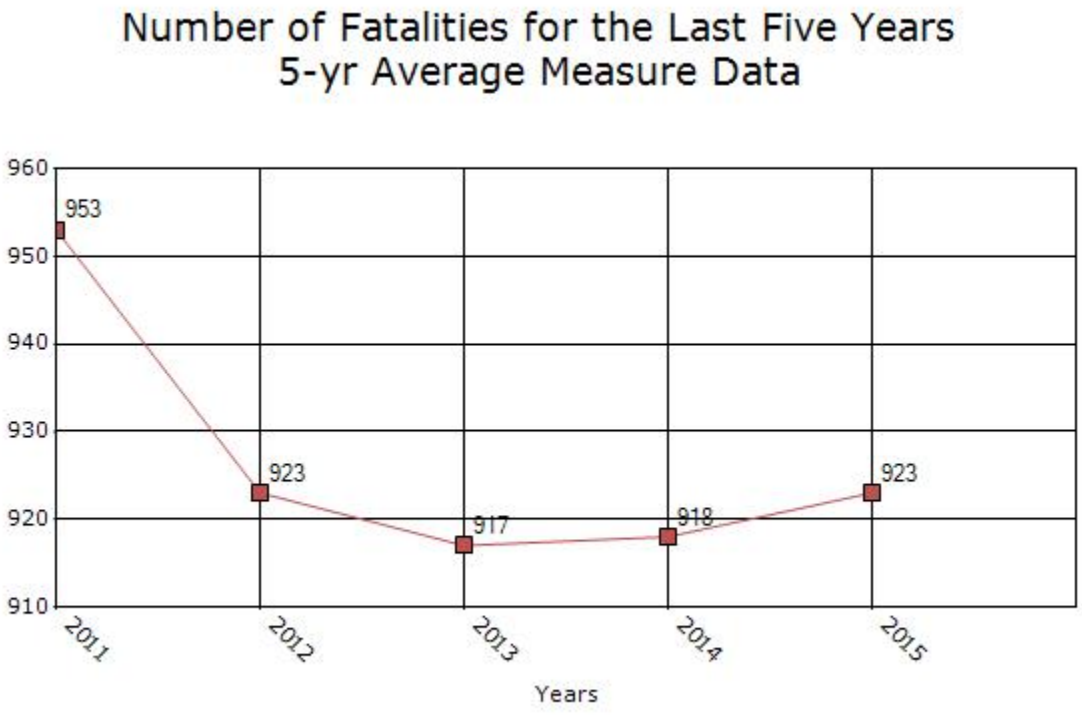
Progress in Achieving Safety Performance Targets

Overview of General Safety Trends

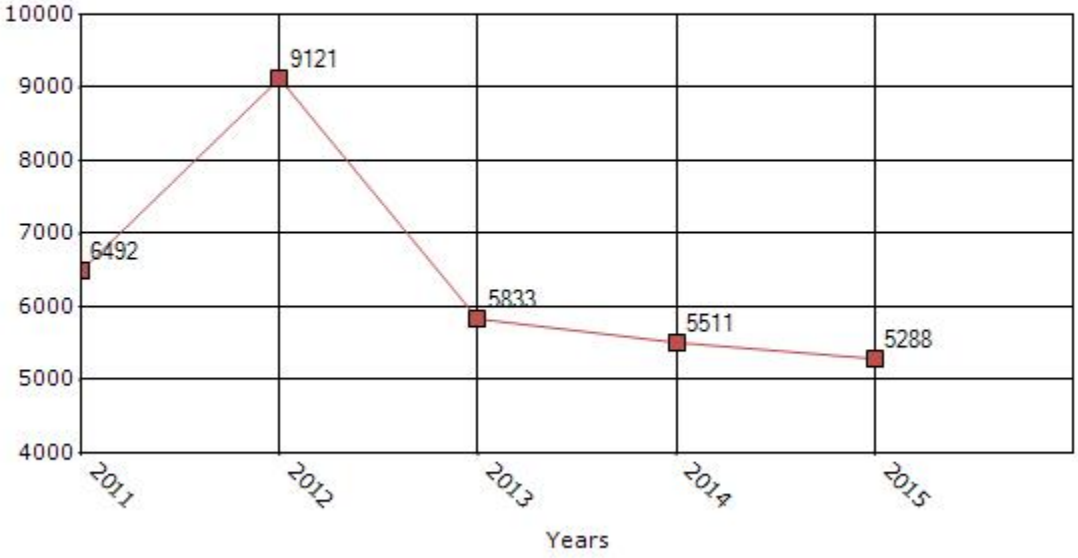
Present data showing the general highway safety trends in the state for the past five years.

Performance Measures*	2011	2012	2013	2014	2015
Number of fatalities	953	923	917	918	923
Number of serious injuries	6492	9121	5833	5511	5288
Fatality rate (per HMVMT)	0.96	0.95	0.96	0.95	0.96
Serious injury rate (per HMVMT)	6.56	6.33	6.1	5.73	5.5

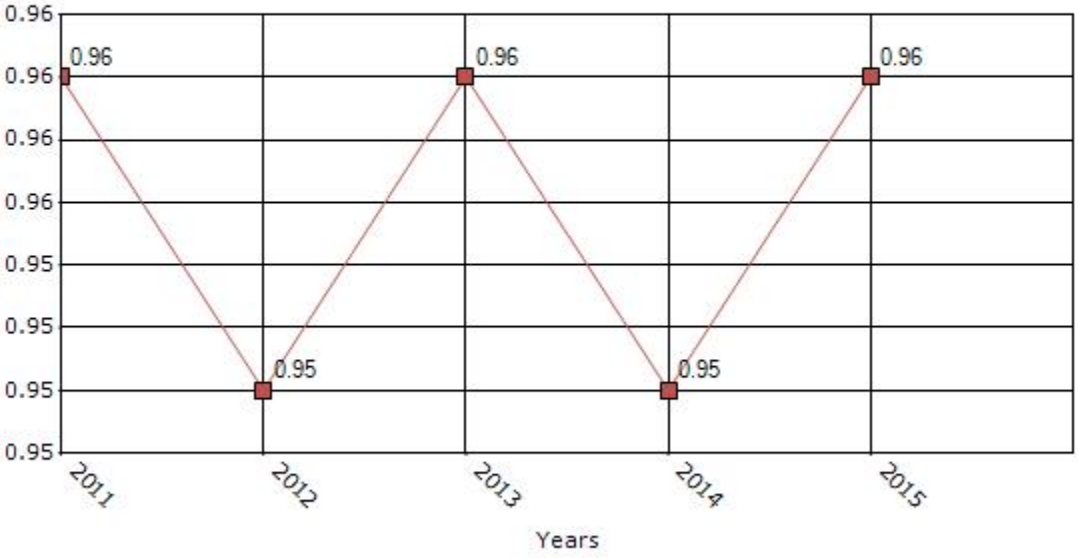
*Performance measure data is presented using a five-year rolling average.



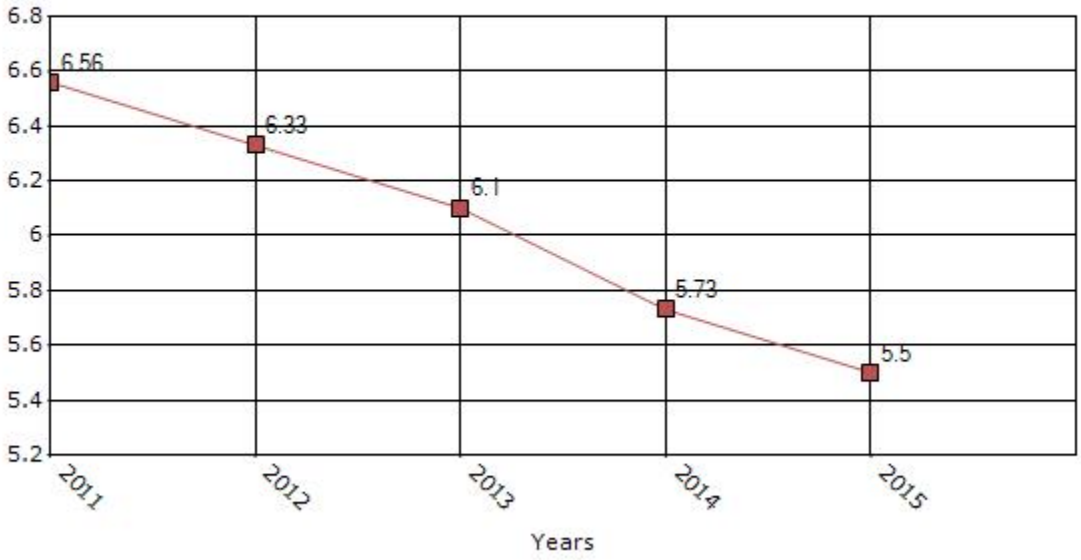
Number of Serious Injuries for the Last Five Years
5-yr Average Measure Data



Rate of Fatalities for the Last Five Years
5-yr Average Measure Data



Rate of Serious Injuries for the Last Five Years
5-yr Average Measure Data

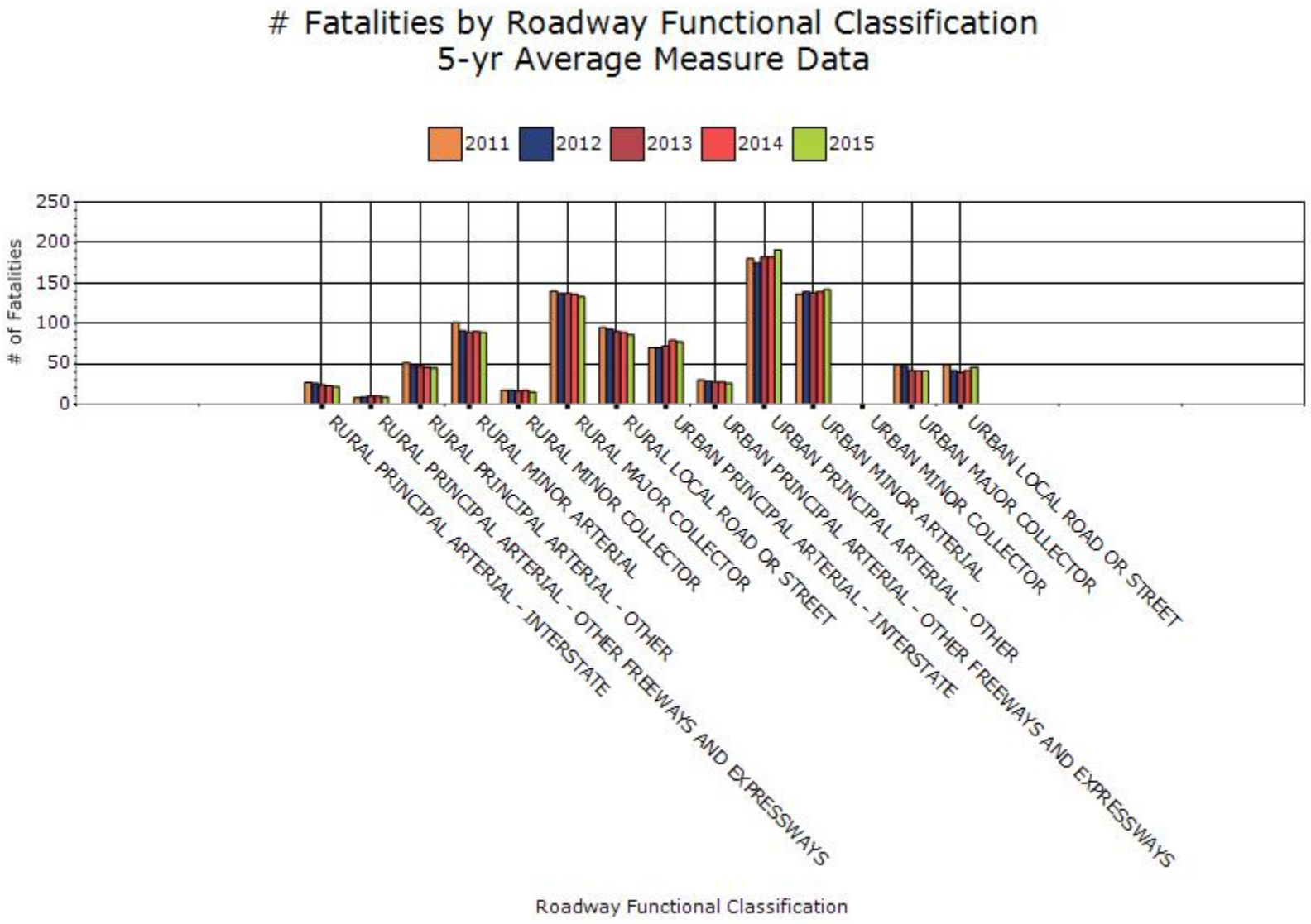


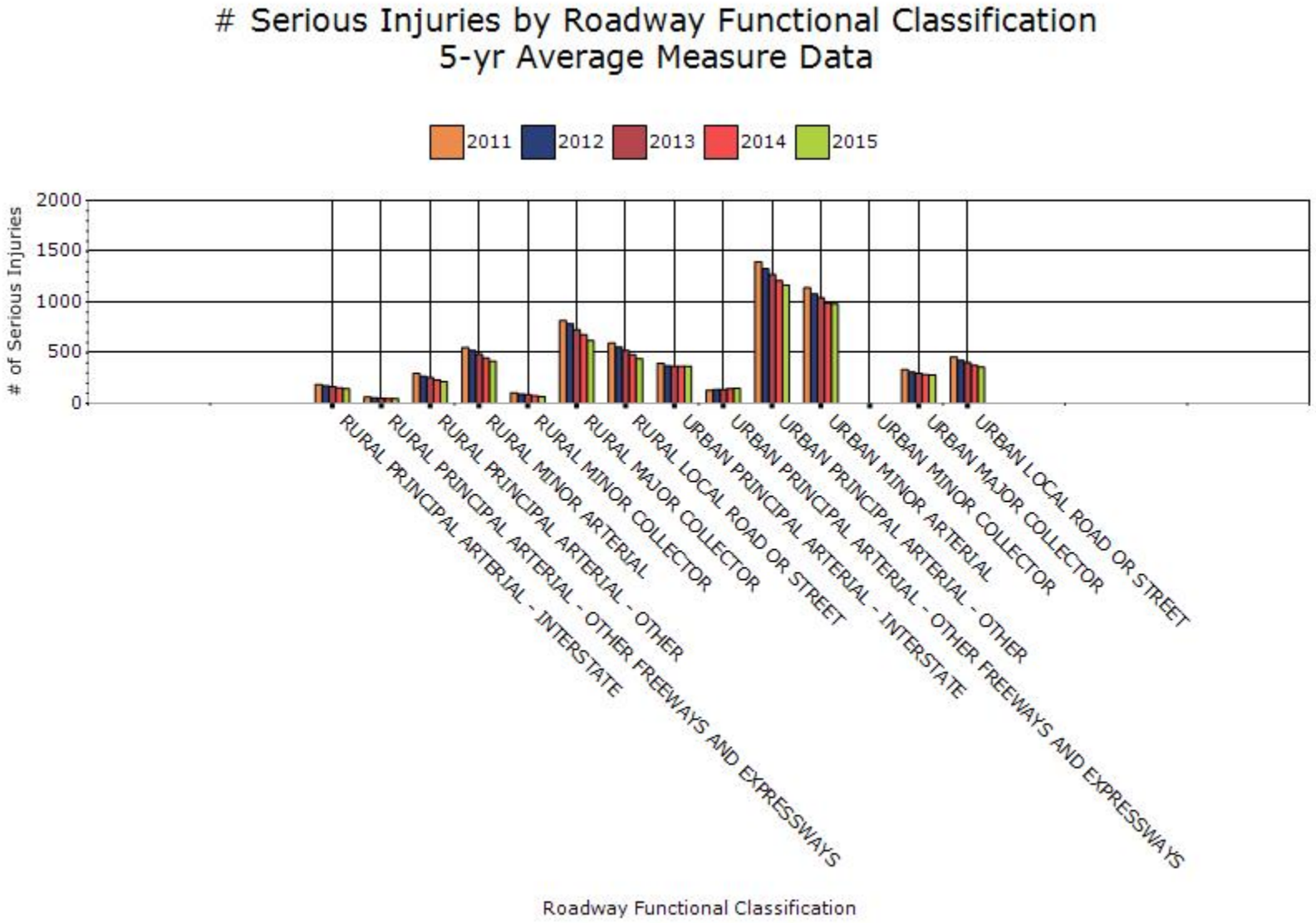
To the maximum extent possible, present performance measure* data by functional classification and ownership.

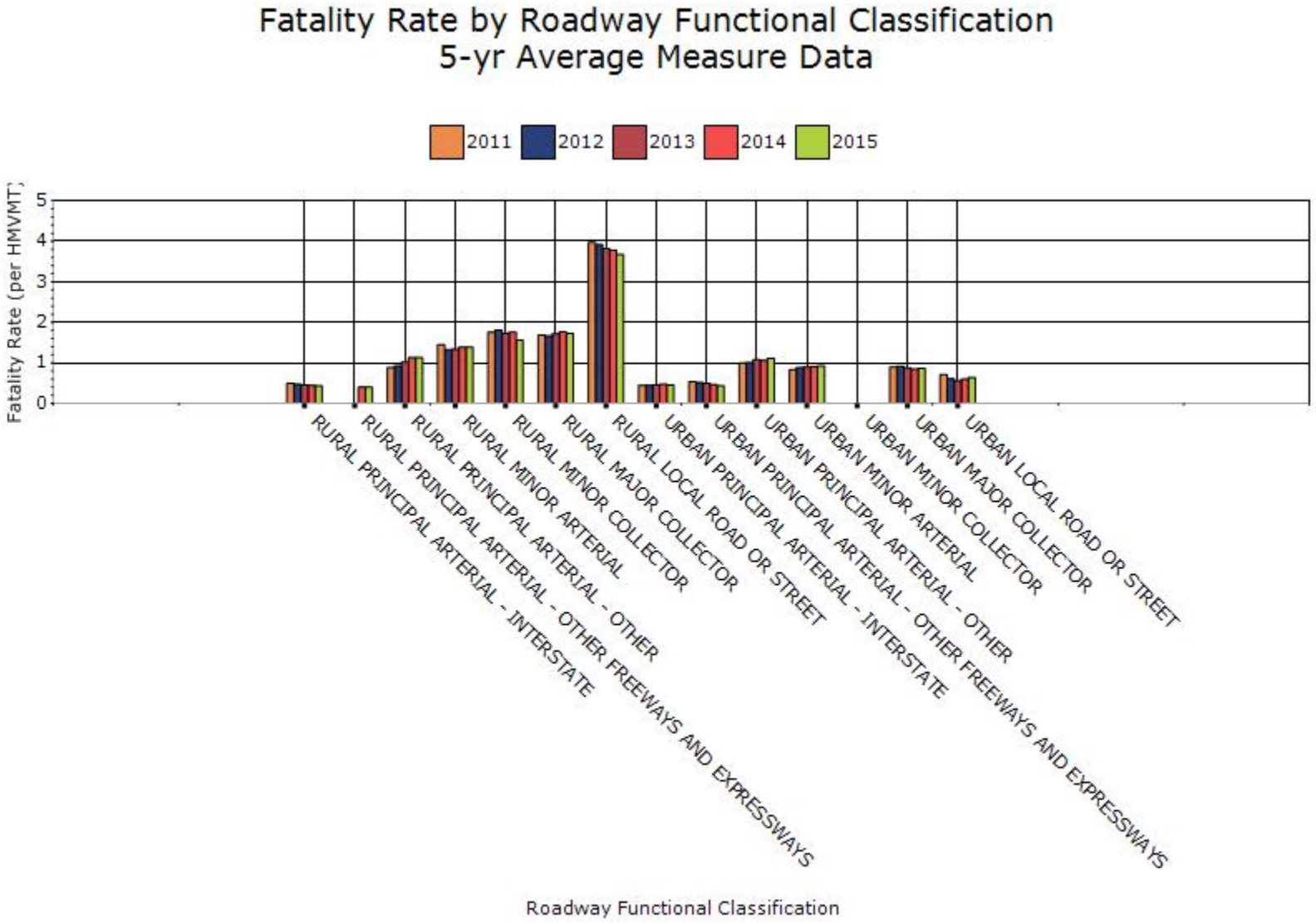
Year - 2015

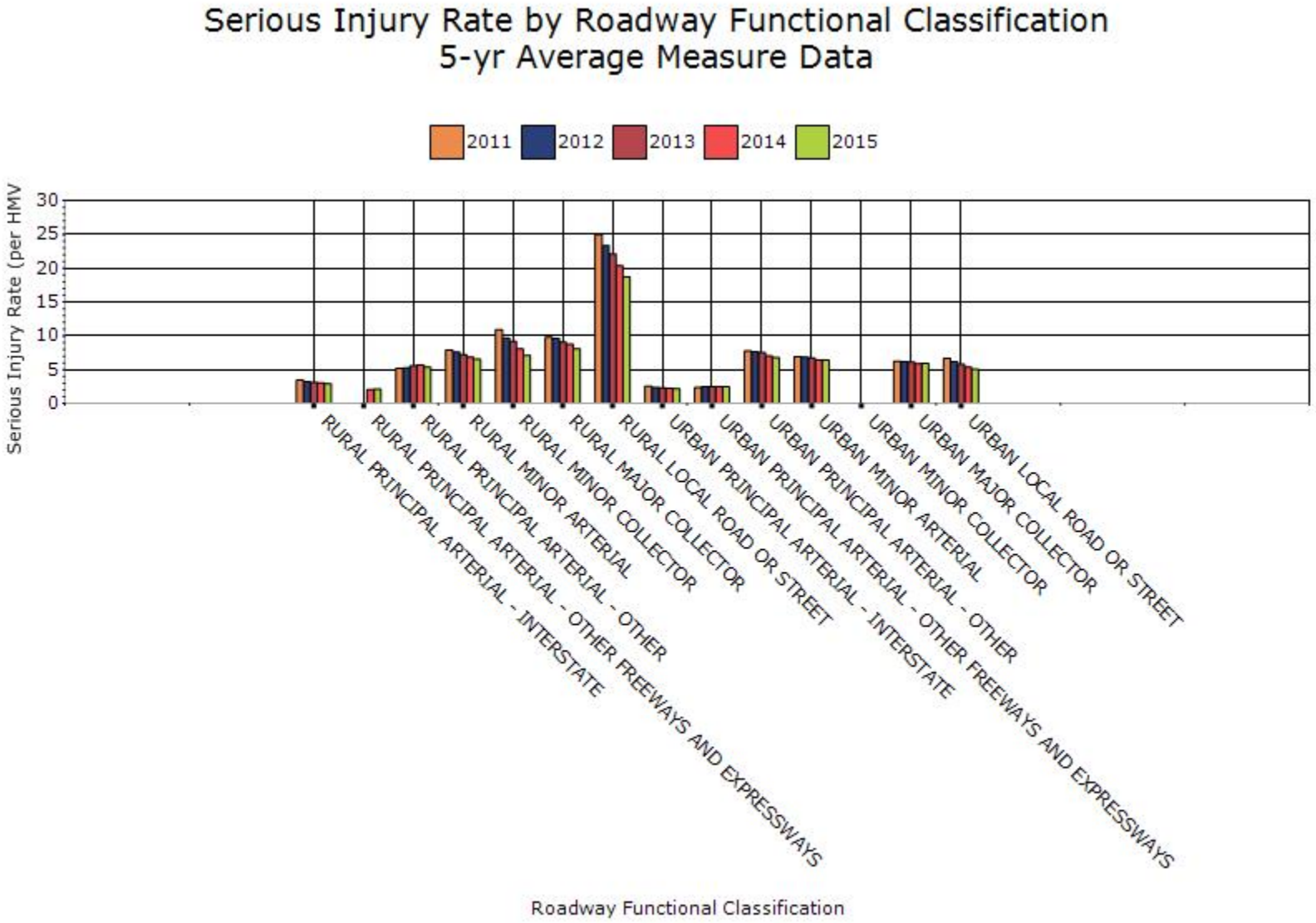
Function Classification	Number of fatalities	Number of serious injuries	Fatality rate (per HMVMT)	Serious injury rate (per HMVMT)
RURAL PRINCIPAL ARTERIAL - INTERSTATE	22	144	0.44	2.91
RURAL PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS	9	49	0.4	2.13
RURAL PRINCIPAL ARTERIAL - OTHER	45	215	1.13	5.35
RURAL MINOR ARTERIAL	89	418	1.39	6.54
RURAL MINOR COLLECTOR	15	68	1.56	7.12
RURAL MAJOR COLLECTOR	133	621	1.73	8.08
RURAL LOCAL ROAD OR STREET	86	441	3.67	18.73
URBAN PRINCIPAL ARTERIAL - INTERSTATE	77	367	0.46	2.2

URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS	26	150	0.44	2.47
URBAN PRINCIPAL ARTERIAL - OTHER	191	1166	1.11	6.81
URBAN MINOR ARTERIAL	142	981	0.93	6.4
URBAN MINOR COLLECTOR		1		
URBAN MAJOR COLLECTOR	41	282	0.87	5.91
URBAN LOCAL ROAD OR STREET	46	358	0.64	5.06


Fatalities by Roadway Functional Classification
5-yr Average Measure Data
2011
2012
2013
2014
2015
# of Fatalities
250
200
150
100
50
0
RURAL PRINCIPAL ARTERIAL - INTERSTATE
RURAL PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
RURAL PRINCIPAL ARTERIAL - OTHER
RURAL MINOR ARTERIAL
RURAL MINOR COLLECTOR
RURAL MAJOR COLLECTOR
RURAL LOCAL ROAD OR STREET
URBAN PRINCIPAL ARTERIAL - INTERSTATE
URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
URBAN PRINCIPAL ARTERIAL - OTHER
URBAN MINOR ARTERIAL
URBAN MINOR COLLECTOR
URBAN MAJOR COLLECTOR
URBAN LOCAL ROAD OR STREET
Roadway Functional Classification

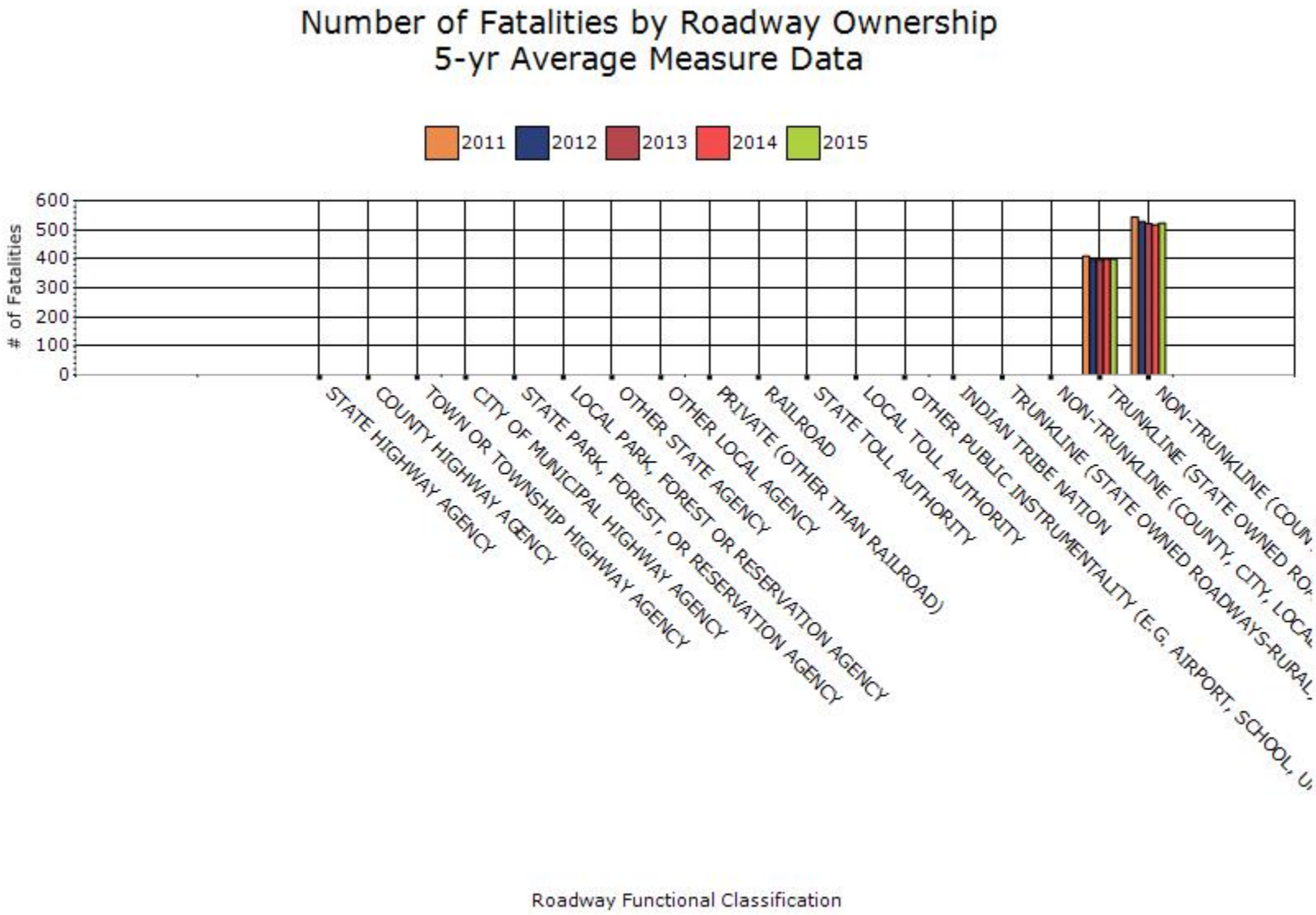

Serious Injuries by Roadway Functional Classification
5-yr Average Measure Data
2011
2012
2013
2014
2015
# of Serious Injuries
2000
1500
1000
500
0
RURAL PRINCIPAL ARTERIAL - INTERSTATE
RURAL PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
RURAL PRINCIPAL ARTERIAL - OTHER
RURAL MINOR ARTERIAL
RURAL MINOR COLLECTOR
RURAL MAJOR COLLECTOR
RURAL LOCAL ROAD OR STREET
URBAN PRINCIPAL ARTERIAL - INTERSTATE
URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
URBAN PRINCIPAL ARTERIAL - OTHER
URBAN MINOR ARTERIAL
URBAN MINOR COLLECTOR
URBAN MAJOR COLLECTOR
URBAN LOCAL ROAD OR STREET
Roadway Functional Classification

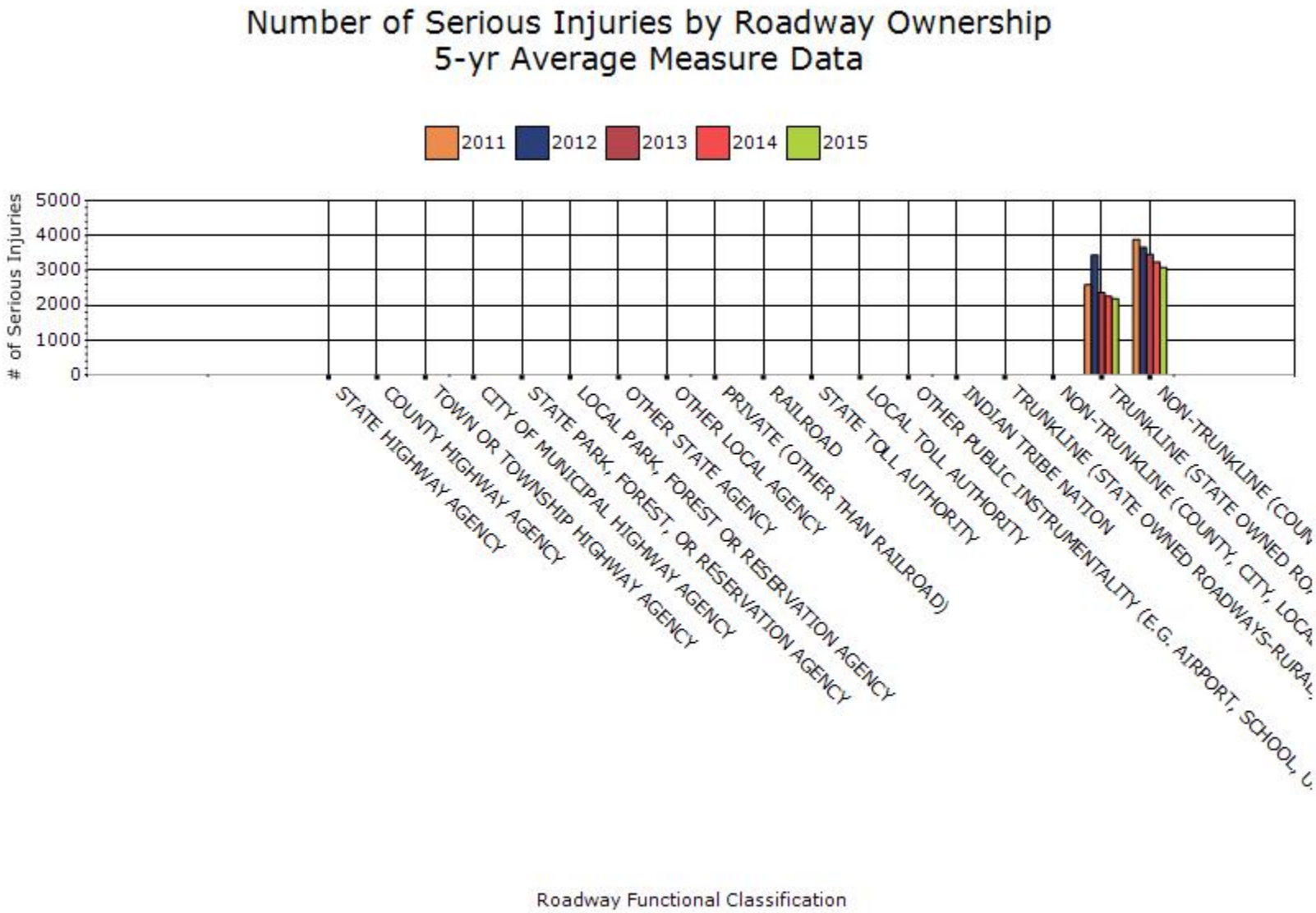

Fatality Rate by Roadway Functional Classification
5-yr Average Measure Data
2011
2012
2013
2014
2015
Fatality Rate (per HMVMT)
0
1
2
3
4
5
RURAL PRINCIPAL ARTERIAL - INTERSTATE
RURAL PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
RURAL PRINCIPAL ARTERIAL - OTHER
RURAL MINOR ARTERIAL
RURAL MINOR COLLECTOR
RURAL MAJOR COLLECTOR
RURAL LOCAL ROAD OR STREET
URBAN PRINCIPAL ARTERIAL - INTERSTATE
URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
URBAN PRINCIPAL ARTERIAL - OTHER
URBAN MINOR ARTERIAL
URBAN MINOR COLLECTOR
URBAN MAJOR COLLECTOR
URBAN LOCAL ROAD OR STREET
Roadway Functional Classification

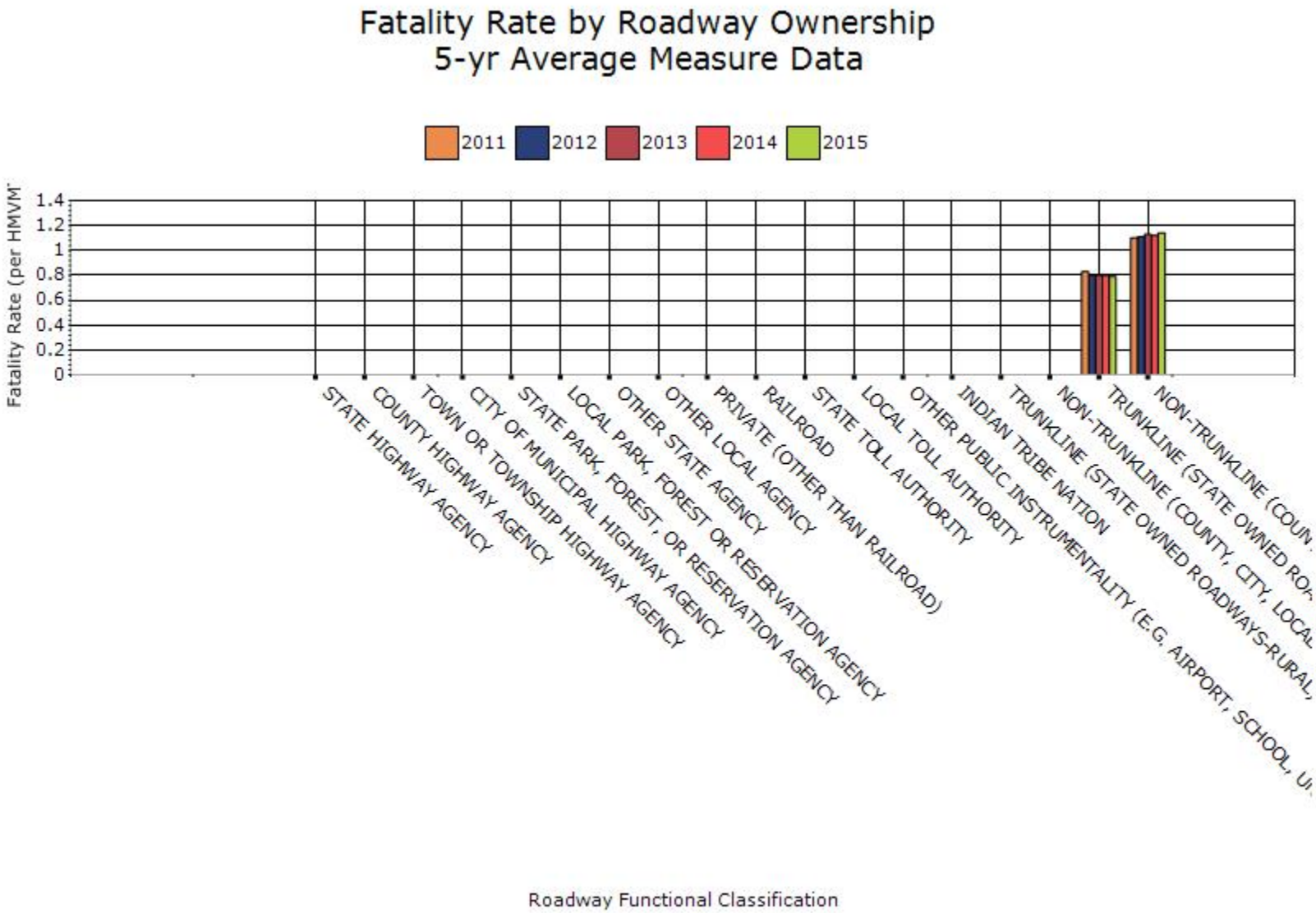

Serious Injury Rate by Roadway Functional Classification
5-yr Average Measure Data
2011
2012
2013
2014
2015
Serious Injury Rate (per HMV
30
25
20
15
10
5
0
RURAL PRINCIPAL ARTERIAL - INTERSTATE
RURAL PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
RURAL PRINCIPAL ARTERIAL - OTHER
RURAL MINOR ARTERIAL
RURAL MINOR COLLECTOR
RURAL MAJOR COLLECTOR
RURAL LOCAL ROAD OR STREET
URBAN PRINCIPAL ARTERIAL - INTERSTATE
URBAN PRINCIPAL ARTERIAL - OTHER FREEWAYS AND EXPRESSWAYS
URBAN PRINCIPAL ARTERIAL - OTHER
URBAN MINOR ARTERIAL
URBAN MINOR COLLECTOR
URBAN MAJOR COLLECTOR
URBAN LOCAL ROAD OR STREET
Roadway Functional Classification

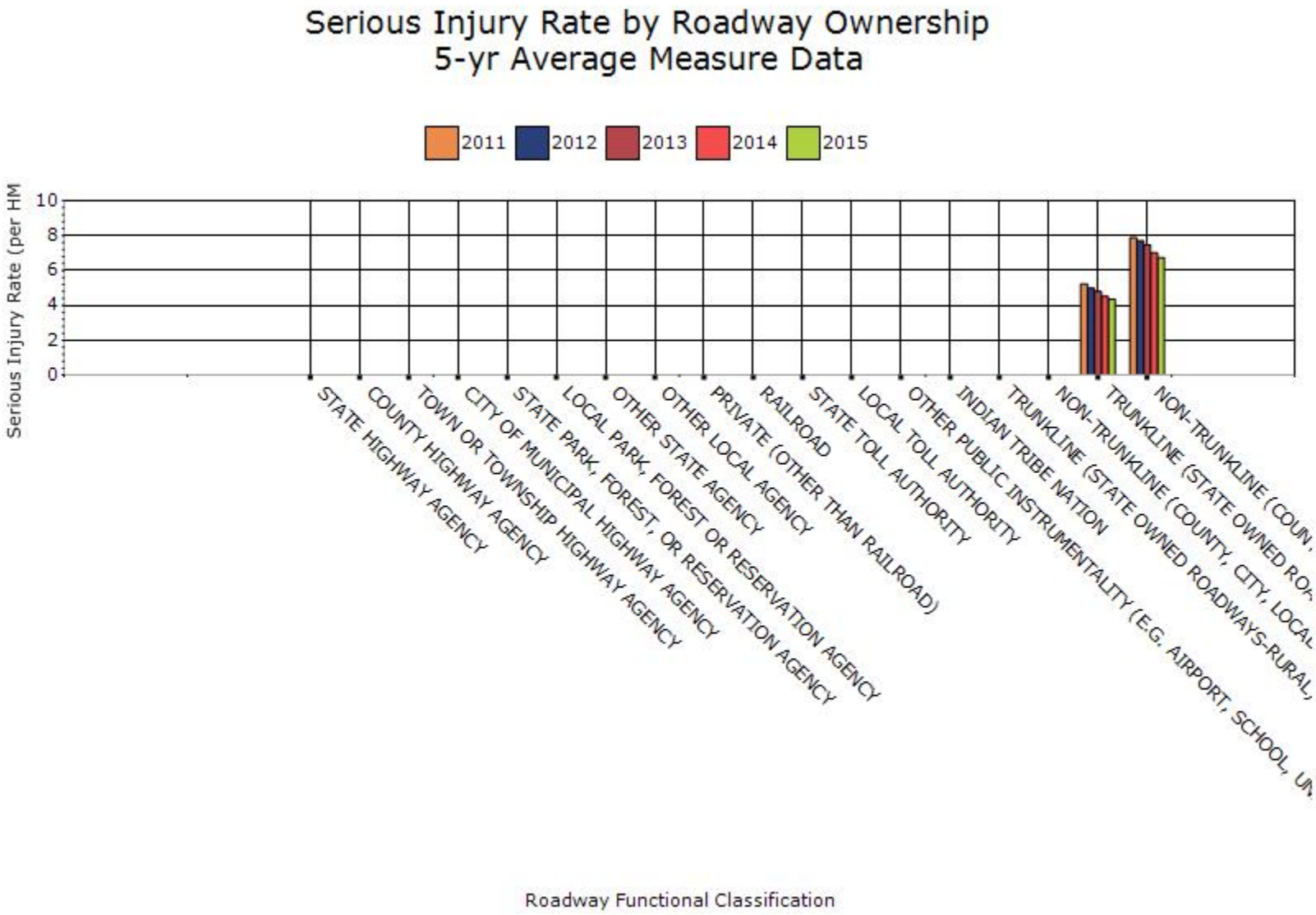
Year - 2015

Roadway Ownership	Number of fatalities	Number of serious injuries	Fatality rate (per HMVMT)	Serious injury rate (per HMVMT)
TRUNKLINE (STATE OWNED ROADWAYS)	400	2186	0.79	4.34
NON-TRUNKLINE (COUNTY, CITY, LOCAL OWNED ROADWAYS)	523	3085	1.14	6.74


Number of Fatalities by Roadway Ownership
5-yr Average Measure Data
2011
2012
2013
2014
2015
# of Fatalities
600
500
400
300
200
100
0
STATE HIGHWAY AGENCY
COUNTY HIGHWAY AGENCY
TOWN OR TOWNSHIP HIGHWAY AGENCY
CITY OF MUNICIPAL HIGHWAY AGENCY
STATE PARK, FOREST, OR RESERVATION AGENCY
LOCAL PARK, FOREST, OR RESERVATION AGENCY
OTHER STATE AGENCY
OTHER LOCAL AGENCY
PRIVATE (OTHER THAN RAILROAD)
RAILROAD
STATE TOLL AUTHORITY
LOCAL TOLL AUTHORITY
OTHER PUBLIC INSTRUMENTALITY (E.G. AIRPORT, SCHOOL, U
INDIAN TRIBE NATION
TRUNKLINE (STATE OWNED ROADWAYS-RURAL
NON-TRUNKLINE (COUNTY, CITY, LOCA
TRUNKLINE (STATE OWNED RO
NON-TRUNKLINE (COUN
Roadway Functional Classification


Number of Serious Injuries by Roadway Ownership
5-yr Average Measure Data
2011
2012
2013
2014
2015
# of Serious Injuries
5000
4000
3000
2000
1000
0
STATE HIGHWAY AGENCY
COUNTY HIGHWAY AGENCY
TOWN OR TOWNSHIP HIGHWAY AGENCY
CITY OF MUNICIPAL HIGHWAY AGENCY
STATE PARK, FOREST, OR RESERVATION AGENCY
LOCAL PARK, FOREST OR RESERVATION AGENCY
OTHER STATE AGENCY
OTHER LOCAL AGENCY
PRIVATE (OTHER THAN RAILROAD)
RAILROAD
STATE TOLL AUTHORITY
LOCAL TOLL AUTHORITY
OTHER PUBLIC INSTRUMENTALITY (E.G. AIRPORT, SCHOOL,
INDIAN TRIBE NATION
TRUNKLINE (STATE OWNED ROADWAYS-RURAL
NON-TRUNKLINE (COUNTY, CITY, LOCA
TRUNKLINE (STATE OWNED RO
NON-TRUNKLINE (COUN
Roadway Functional Classification


Fatality Rate by Roadway Ownership
5-yr Average Measure Data
2011
2012
2013
2014
2015
Fatality Rate (per HMVM
1.4
1.2
1
0.8
0.6
0.4
0.2
0
STATE HIGHWAY AGENCY
COUNTY HIGHWAY AGENCY
TOWN OR TOWNSHIP HIGHWAY AGENCY
CITY OF MUNICIPAL HIGHWAY AGENCY
STATE PARK, FOREST, OR RESERVATION AGENCY
LOCAL PARK, FOREST OR RESERVATION AGENCY
OTHER STATE AGENCY
OTHER LOCAL AGENCY
PRIVATE (OTHER THAN RAILROAD)
RAILROAD
STATE TOLL AUTHORITY
LOCAL TOLL AUTHORITY
OTHER PUBLIC INSTRUMENTALITY (E.G. AIRPORT, SCHOOL, U
INDIAN TRIBE NATION
TRUNKLINE (STATE OWNED ROADWAYS-RURAL,
NON-TRUNKLINE (COUNTY, CITY, LOCA
TRUNKLINE (STATE OWNED RO
NON-TRUNKLINE (COUN
Roadway Functional Classification


Serious Injury Rate by Roadway Ownership
5-yr Average Measure Data
2011
2012
2013
2014
2015
Serious Injury Rate (per HM
10
8
6
4
2
0
STATE HIGHWAY AGENCY
COUNTY HIGHWAY AGENCY
TOWN OR TOWNSHIP HIGHWAY AGENCY
CITY OF MUNICIPAL HIGHWAY AGENCY
STATE PARK, FOREST, OR RESERVATION AGENCY
LOCAL PARK, FOREST OR RESERVATION AGENCY
OTHER STATE AGENCY
OTHER LOCAL AGENCY
PRIVATE (OTHER THAN RAILROAD)
RAILROAD
STATE TOLL AUTHORITY
LOCAL TOLL AUTHORITY
OTHER PUBLIC INSTRUMENTALITY (E.G. AIRPORT, SCHOOL, UN
INDIAN TRIBE NATION
TRUNKLINE (STATE OWNED ROADWAYS-RURAL,
NON-TRUNKLINE (STATE OWNED ROADWAYS-RURAL,
TRUNKLINE (COUNTY, CITY, LOCAL
NON-TRUNKLINE (COUN
Roadway Functional Classification

Describe any other aspects of the general highway safety trends on which you would like to elaborate.

In review of the 5-Year Rolling Average for statewide, state trunkline and local roadways both fatalities and serious injuries have decreased at minimum 3% percent from 2007-2011 to 2011-2015. The greatest reductions were for serious injuries have decreased 19% percent over the 5 year rolling average. In regard to rates while the fatality and serious injury rates are lower on state trunkline the percent decrease over the analysis time period is consistent between the two roadway networks. For both statewide and state trunkline the fatality rate has been below 1.0 fatality per 100 million vehicle miles traveled since 2007-2011. The local roadways fatality rate has been below 1.15 during the entire analysis time period.

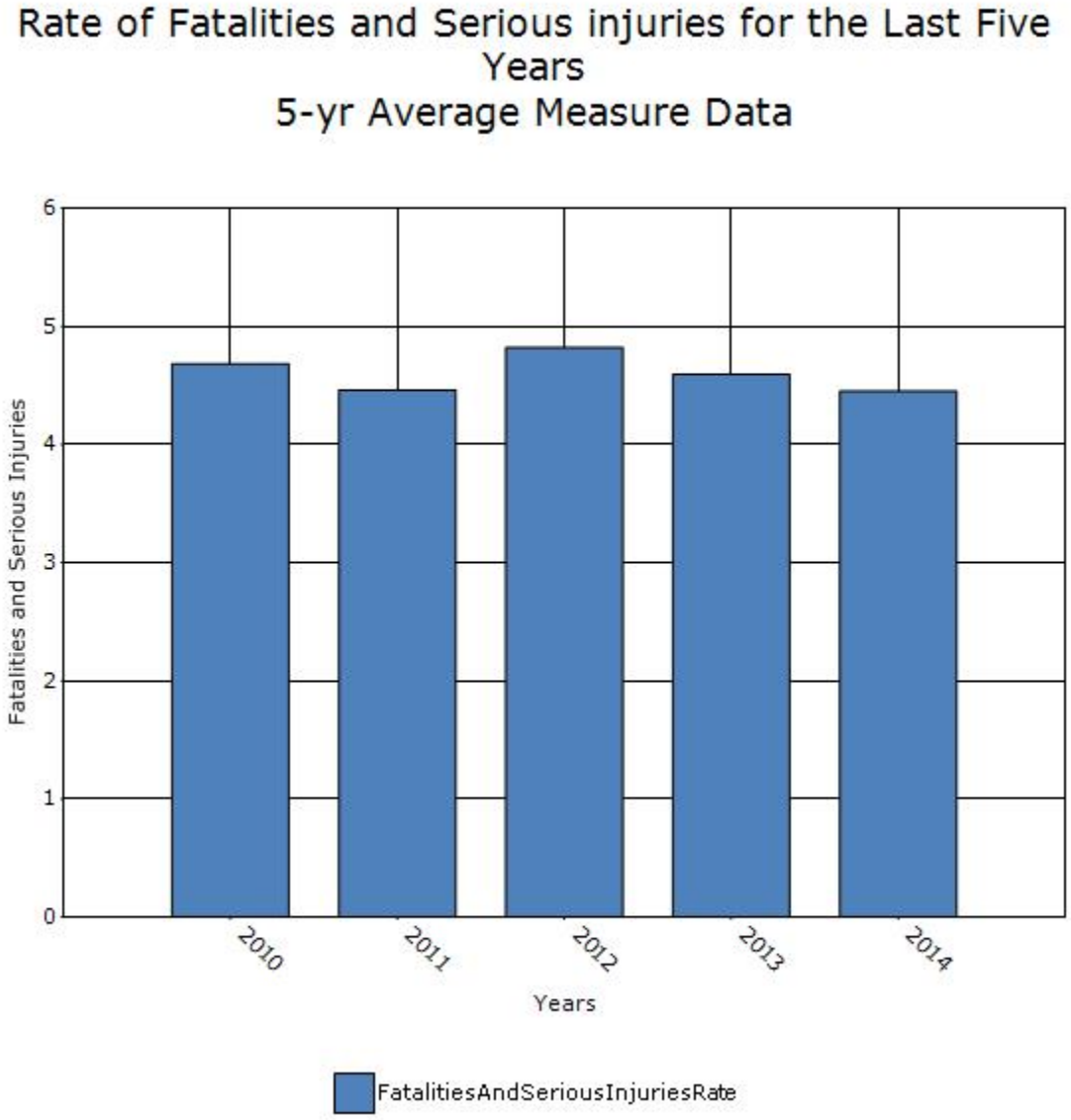
Application of Special Rules

Present the rate of traffic fatalities and serious injuries per capita for drivers and pedestrians over the age of 65.

Older Driver Performance Measures	**2010**	**2011**	**2012**	**2013**	**2014**
Fatality rate (per capita)	1.06	1.04	0.98	0.97	0.95
Serious injury rate (per capita)	3.616	3.422	3.236	3.018	2.898
Fatality and serious injury rate (per capita)	4.684	4.462	4.822	4.594	4.45

*Performance measure data is presented using a five-year rolling average.

Using the 5-Year Rolling Average of fatalities and serious injuries for drivers and pedestrians 65 years of age and older and the number of people 65 Years of age and older (Per 1,000 Total Population), as provided by FHWA, the rate has decreased from 4.82 for 2008-2012 to 4.45 for 20010-2014. With this decrease the special rule does not apply. See attachment for calculations.



Does the older driver special rule apply to your state?

No

Assessment of the Effectiveness of the Improvements (Program Evaluation)

What indicators of success can you use to demonstrate effectiveness and success in the Highway Safety Improvement Program?

Other-Decrease of fatal and serious injuries on a 5-year rolling average

What significant programmatic changes have occurred since the last reporting period?

None

Briefly describe significant program changes that have occurred since the last reporting period.

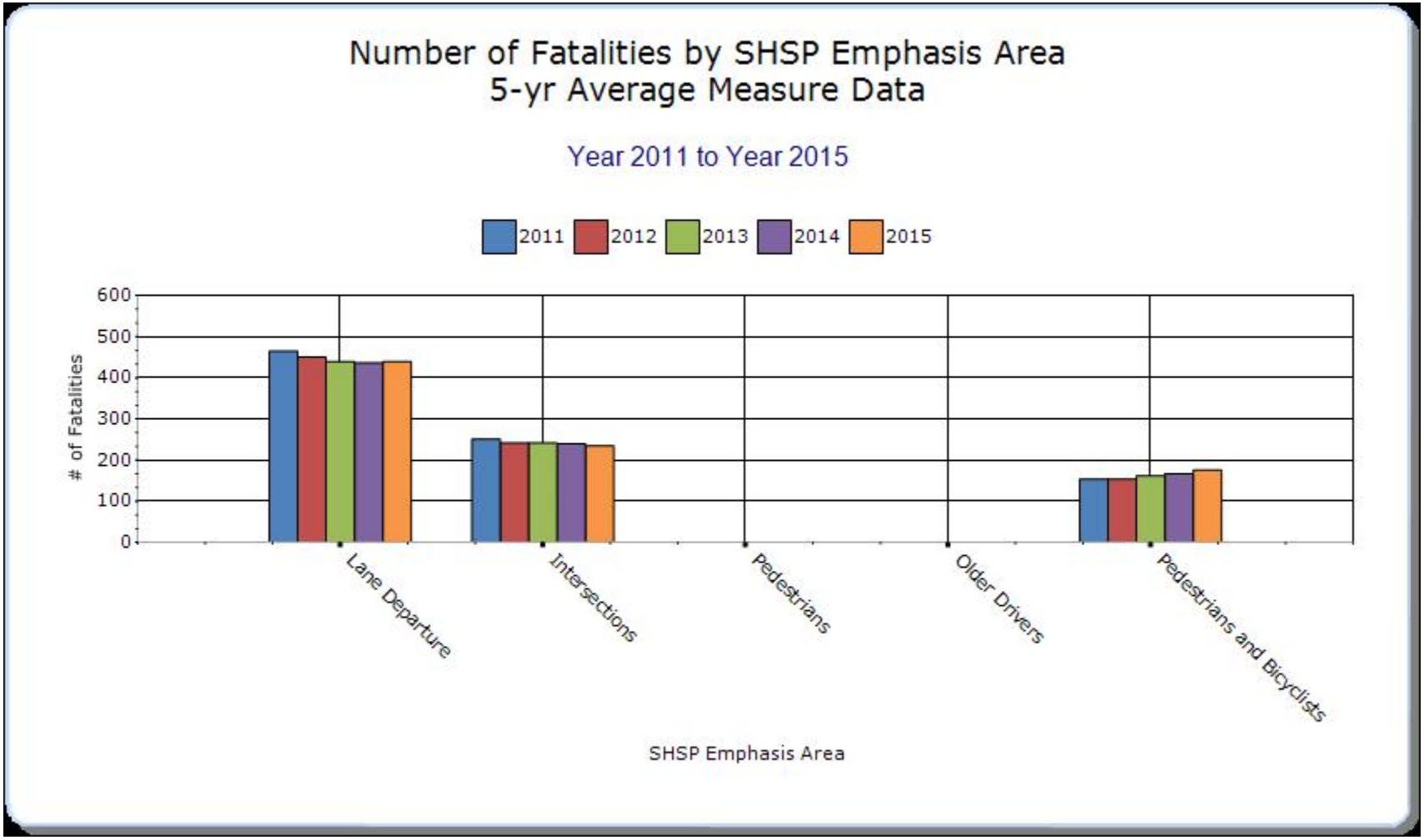
No significant changes have occurred since the last reporting period.

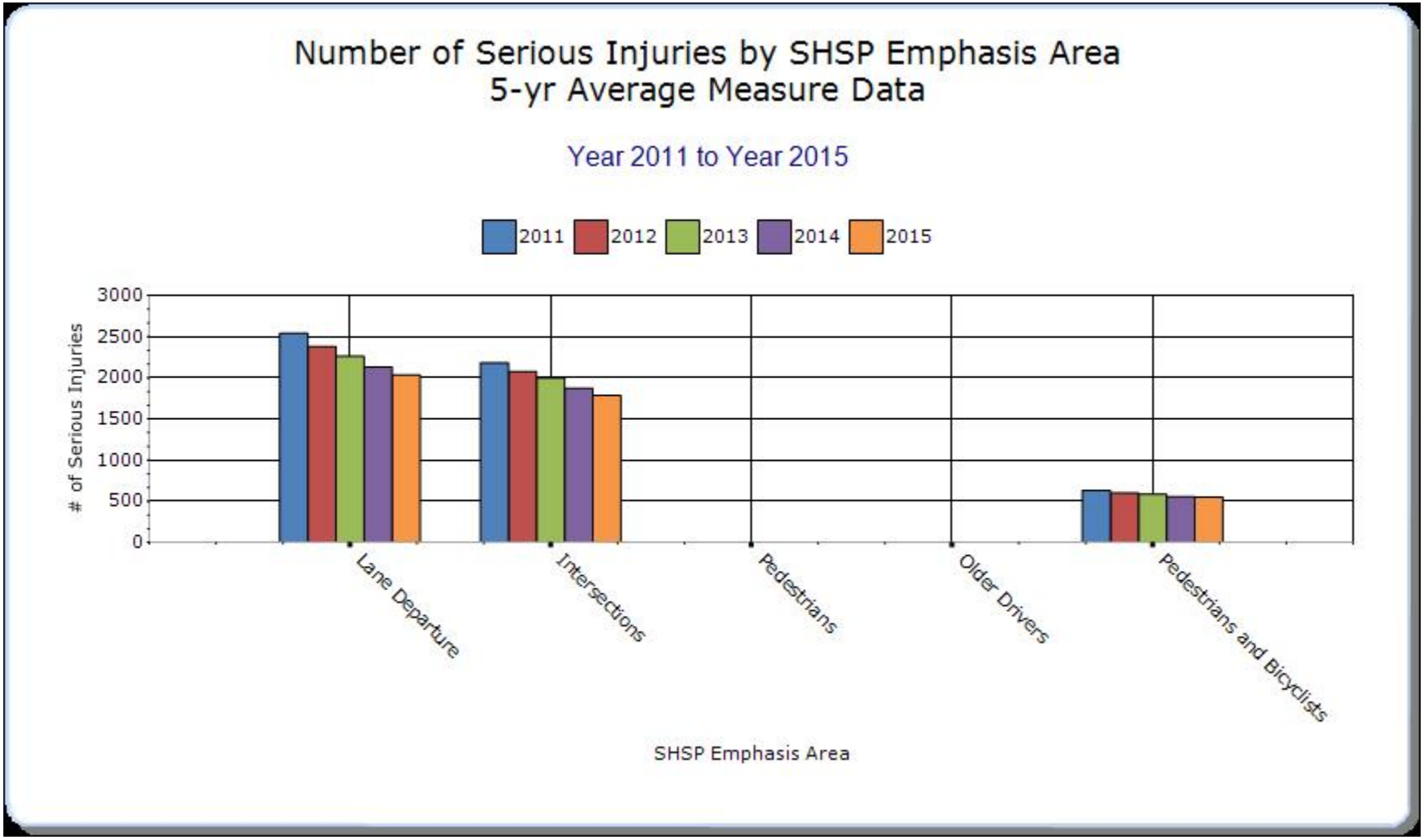
SHSP Emphasis Areas

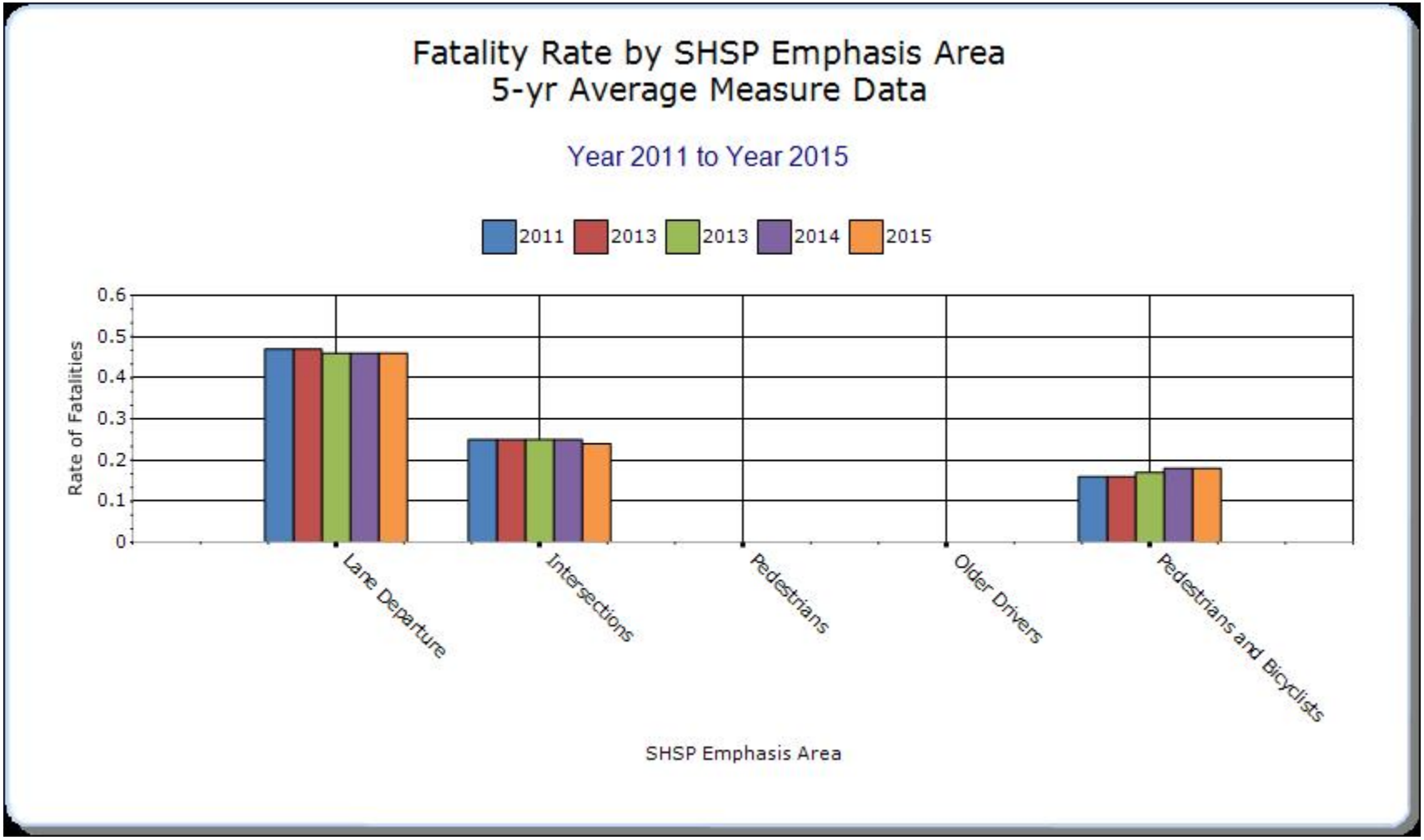
For each SHSP emphasis area that relates to the HSIP, present trends in emphasis area performance measures.

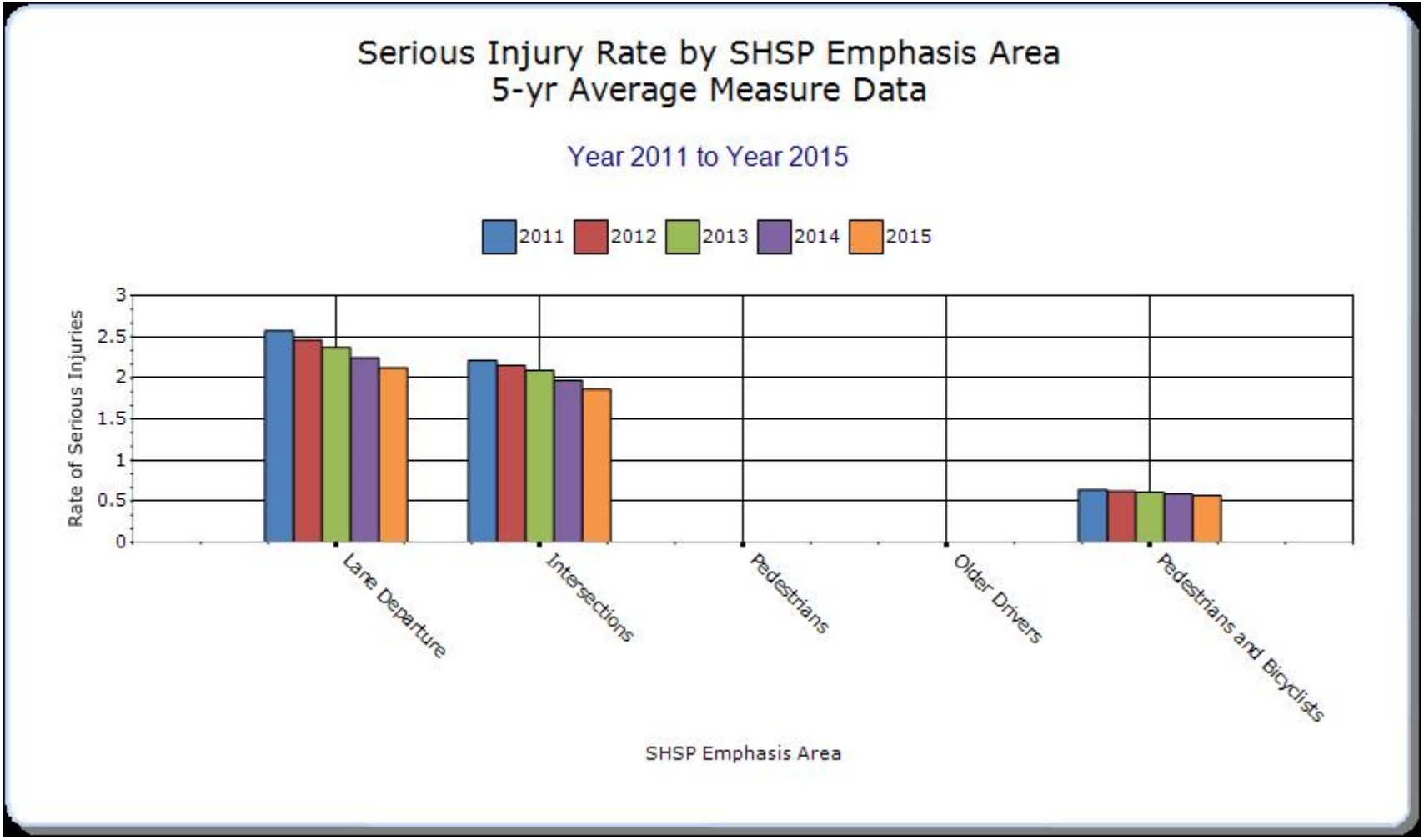
Year - 2015

HSIP-related SHSP Emphasis Areas	Target Crash Type	Number of fatalities	Number of serious injuries	Fatality rate (per HMVMT)	Serious injury rate (per HMVMT)	Other-1	Other-2	Other-3
Lane Departure		439	2033	0.46	2.12			
Intersections		235	1784	0.24	1.86			
Pedestrians and Bicyclists		176	551	0.18	0.57			


Number of Fatalities by SHSP Emphasis Area
5-yr Average Measure Data
Year 2011 to Year 2015
2011
2012
2013
2014
2015
600
500
400
300
200
100
0
# of Fatalities
Lane Departure
Intersections
Pedestrians
Older Drivers
Pedestrians and Bicyclists
SHSP Emphasis Area


Number of Serious Injuries by SHSP Emphasis Area
5-yr Average Measure Data
Year 2011 to Year 2015
2011
2012
2013
2014
2015
# of Serious Injuries
3000
2500
2000
1500
1000
500
0
Lane Departure
Intersections
Pedestrians
Older Drivers
Pedestrians and Bicyclists
SHSP Emphasis Area


Fatality Rate by SHSP Emphasis Area
5-yr Average Measure Data
Year 2011 to Year 2015
2011
2013
2013
2014
2015
Rate of Fatalities
0.6
0.5
0.4
0.3
0.2
0.1
0
Lane Departure
Intersections
Pedestrians
Older Drivers
Pedestrians and Bicyclists
SHSP Emphasis Area



Groups of similar project types

Present the overall effectiveness of groups of similar types of projects.

HSIP Sub-program Types	Target Crash Type	Number of fatalities	Number of serious injuries	Fatality rate (per HMVMT)	Serious injury rate (per HMVMT)	Other-1	Other-2	Other-3
SKIP	Multiple improvements may be applied to a single section of roadway							

Systemic Treatments

Present the overall effectiveness of systemic treatments.

Systemic improvement	Target Crash Type	Number of fatalities	Number of serious injuries	Fatality rate (per HMVMT)	Serious injury rate (per HMVMT)	Other-1	Other-2	Other-3
SKIP	Multiple systemic improvements may be applied to a single section of roadway							

Describe any other aspects of the overall Highway Safety Improvement Program effectiveness on which you would like to elaborate.

MDOT's implementation of the Systemic Approach to Safety has impacted the citizens throughout Michigan by helping improving the safety on the state trunkline network. By continuing this efforts through construction projects this proactive approach to safety will assist in the State of Michigan's efforts of saving lives and minimizing injuries moving toward the ultimate goal of Zero Deaths.

As reported in previous HSIP Reports the department undertook two system wide initiatives in FY 2008: freeway median barrier and non-freeway rumble strips. Both initiatives address lane departure, which is part of one of the 12 focus areas in the SHSP. Lane departure related crashes accounted for at least 455 fatalities statewide in 2015 (47 percent of all fatalities). A primary objective for this focus area is to identify cost effective strategies that help reduce unintentional lane departures, as well as alert the driver should a lane departure occur. The secondary objective is to assist the driver in returning to the travel lane safely and minimize departure consequences by creating roadside clear zones.

Rumble strips are a proven and cost-effective countermeasure to lane departure crashes brought on by driver drowsiness, distraction, and/or inattention. Since the late 1990s, MDOT has been systematically installing rumble strips on freeway shoulders. In 2007, MDOT pursued expanding rumble strips onto the rural, non-freeway system, as part of a three-year funding effort. MDOT's innovation was to make this a network-wide implementation. Rumble strip milling was incorporated in the annual pavement marking program and coordinated with MDOT's pavement engineers. To implement this effort, $3 M a year of additional funding was added to the pavement marking program for 2008 through 2010. The result is approximately 5,400 miles of centerline rumbles and 2,700 lane miles of shoulder rumbles.

To determine the overall effectiveness of the effort Wayne State University completed the 'Evaluation of Non-Freeway Rumble Strip-Phase II' for the department. The goal was to determine a cost/benefit ratio, estimated crash reduction factors, public acceptance and an implementation guide for local agencies. The safety performance analysis indicated statistically significant reductions in the range of 50 percent in all types of target crashes after centerline rumble strips were installed. Researchers identified 2,488 target crashes in the three years before installation of centerline rumble strips and 1,306 in the three years after installation. They noted a 43 percent to 55 percent reduction in head-on, sideswipe opposite and single-vehicle run-off-the-road crashes. Overall fatal and injury crashes were cut in half, with a 51 percent reduction in fatal crashes and a 47 percent reduction in injury crashes.

The economic analysis produced equally significant results. Researchers estimated a cost benefit of nearly $80 million over three years as a result of the crash reductions from centerline rumble strip installation. They estimated that centerline rumble strips on two-lane rural highways will produce benefit- to-cost ratios between 58:1 and 18:1, depending on how the cost is spread out over time. Researchers performed a sensitivity analysis that produced a range of benefit-cost ratio data for state and local agency use. The online road user survey drew responses from 380 drivers, ranging in age from under 20 to over 60. Of these

respondents, 79 percent strongly agreed or agreed that centerline rumble strips are an effective safety measure, and the majority would recommend installing rumble strips on additional state roadways.

Rumble strips are proving to be a cost-effective countermeasure to lane-departure crashes on Michigan's state highways. MDOT is reaching out to local agencies to increase their understanding of the benefits of rumble strips and to encourage interest in installing them on county, city and township roads either systemwide or at specific sites. To support this effort, MDOT has developed concise, user-friendly design and installation guidelines for use by local agencies.

Freeway median barriers minimize departure consequences. MDOT staff evaluated the state trunkline to project how many lives might be saved in Michigan through the installation of median barrier on candidate roadways. The crash analysis examined all freeway corridors without median protection which experienced four or more crossover type crashes during 2002 through 2006. Using a 90 percent reduction factor to estimate the benefit of median protection a total of 340 miles was identified. These corridors, with medians widths not requiring protection per MDOT's standards, experienced 66 fatalities and 257 serious injuries. Cable median barrier projects were done in conjunction with road/bridge projects when possible, or as corridor projects. To implement this effort, $14 M a year of additional funding was added to the safety template for 2008 through 2010. Since this initial funding effort cable barrier projects have been supported in the annual Safety Call for Projects.

The goal of 'Study of High Tension Cable Barrier on Michigan Roadways' research project was to determine the effectiveness of MDOT's high tension cable barrier installations in reducing the frequency of cross-median crashes and resultant injuries and fatalities. The results of the research show that cable median barriers have been highly effective at reducing crossover crashes in Michigan. After the barriers were installed, crossover crash rates on those highway segments fell by 87 percent, and the barriers successfully contained 97 percent of the vehicles that hit them. Cable barriers have improved overall safety at the locations where they have been installed. The most serious crash types—fatal and severe injury crashes—decreased by 33 percent after cable median barriers were installed, according to rigorous statistical analysis. Since their installation, cable barriers are estimated to have saved 20 lives and prevented over 100 serious injuries in Michigan. As expected, low-severity crashes increased following the cable barrier installation; crashes involving only property damage or minor injuries increased by 155 percent. Researchers' analysis showed that placing the cable barrier farther from the roadway (toward the center of the median) would result in fewer low-severity crashes, but this can be impractical because of soil conditions, slope grade, drainage characteristics, or increased installation and maintenance costs.

Overall, cable median barriers were slightly more prone to penetration by a vehicle than thrie-beam guardrail or concrete barrier, but they were the most effective in preventing redirection back into the travel lanes. Other findings include:

- **Motorcycles:** Cable barriers did not significantly impact motorcycle crash trends.
- **Winter roadway conditions:** Crash frequency increased in times of adverse weather and road conditions, but the cable barriers continued to contain vehicles as intended.
- **Rollovers:** Median rollover crash rates decreased by 50 percent after cable barriers were installed.

Before-and-after studies conducted by Opus International Consultants, Inc. identified reductions in injury crashes for all classes of roundabout conversions. The analysis estimated injury crash reductions that range from a low of 20 percent for signalized intersections converted to three-lane roundabouts to a high of 70 percent for signalized intersections converted to one- and two-lane roundabouts. One or two-way stop controlled intersections converted to roundabouts displayed a 40 percent reduction in injury crashes while all-way stop controlled intersections converted to a roundabout had a 36 percent reduction. While researchers identified an overall increase in crashes for most types of roundabout conversions, the reduction in injury crashes provides a net crash cost benefit for most conversion types. Researchers calculated a return on investment of less than two years for all three types of roundabouts, attributing this relatively quick return to the large reduction in crashes and the benefits associated with reductions in user delay. The total estimated benefit due to the reduction in crash severity and user delay is expected to range from $600,000 to $2,200,000 per year. Today there are 27 roundabouts on state trunkline therefore the annual total benefit expected is $30.2 million.

The Texas Transportation Institute (TTI) found that in Michigan, 6 inch wide edge line markings produced reductions for all crash types, including a 24.6 percent reduction in fatal and injury crashes, a 39.5 percent reduction for crashes at night and a 33.2 percent reduction in wet crashes at night on rural two-lane trunklines. TTI's review showed a benefit-cost ratio for wide edge lines to be $33 to $55 for each $1 spent. With an estimated increased cost of $840,000 per year the safety benefit is $27.8 to $46.2 million per year. In addition, the research showed a reduction of total crashes of approximately 19 to 27 percent and single vehicle wet crashes by 66 to 74 percent.

MDOT has fully embraced implementation of TZD as a safety program in and of itself and has developed several related action plans. MDOTs North Region analyzed recently implemented safety projects and compared that to crash trends for the region. In an effort to more closely align the problem with the goal, they developed a Region TZD Implementation Plan that heavily emphasizes strategies focused on reducing lane departure and stop-controlled intersection fatal and serious injury crashes. Each of the 7 Regions are now developing TZD implementation plans. The Traffic & Safety Section created and is actively tracking a TZD Strategic Plan for the purpose of increasing "awareness of MDOT's TZD efforts within the State of Michigan by 1) identifying effective strategies to distribute the TZD logo and create logo recognition, and 2)

gaining TZD partnerships. This Strategic Plan is designed to capture a widespread audience including: MDOT Employees and State agencies/employees, Local Agencies (County, City, Village, Township, etc.), private organizations, and the general public."

Communication is a key aspect of implementing TZD and in addition to the action plans, MDOT has developed a number of tools and resources. A sample of the TZD-focused resources include a website, rest area posters, internal and external newsletter articles, crash statistics postcard, safety fact sheet with actionable items for pedestrians, bicyclists, motorcyclists and drivers and a safety programs brochure. MDOT also communicates the year-to-date fatalities across a number of different media including a weekly email listserv, messaging on our digital messaging signs and social media outlets. This effort has let to numerous related news stories by media outlets across the state.

Project Evaluation

Provide project evaluation data for completed projects (optional).

Location	Functional Class	Improvement Category	Improvement Type	Bef-Fatal	Bef-Serious Injury	Bef-All Injuries	Bef-PDO	Bef-Total	Aft-Fatal	Aft-Serious Injury	Aft-All Injuries	Aft-PDO	Aft-Total	Evaluation Results (Benefit/ Cost Ratio)
None to include														

Optional Attachments

Sections	Files Attached
Progress in Implementing Projects: General Listing of Projects	MI 2015 Trunkline Project List.pdf
Progress in Achieving Safety Performance Targets: Application of Special Rules	65+ Special Rule Calulations.pdf
Assessment of the Effectiveness of the Improvements (Program Evaluation): SHSP Emphasis Areas	Progress in Achieving Safety Performance Targets.pdf

Glossary

5 year rolling average means the average of five individual, 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.