



Washington State
Department of Transportation

GETTING TO



**WSDOT's Highway Safety Improvement Program
Implementation Plan 2024**

Table of Contents

Table of Contents	i	Breakaway Cable Terminals	53
Acknowledgements	ii	Cable Median Barriers	55
List of Acronyms	iii	Guardrail Infill and Retrofit	57
Exhibits	iv	High Visibility Edge Lines	59
Executive Summary	v	Field Assessments	61
Introduction	1	Active Transportation	62
Safety Investment Strategy	12	Decision-Making and Performance Improvement	66
Performance Trends	22	Conclusion	69
Safe System Approach	35	Appendix A: Emphasis Areas	70
Complete Streets	39	Appendix B: Fatal and Serious Injury Crashes Across Jurisdictions	77
Crash Analysis Location/Crash Analysis Corridor Intersection Analysis Location	42	Appendix C: Detailed Project List	84
Intersection Systemic Safety	45	Appendix D: WSDOT CMF Inventory	98
High Friction Surface Treatment	47	Appendix E: Local Road Safety Plan Growth Chart	99
Systemic Curve Treatment	49		
Rumble Strips	51		

Title VI Notice to Public

It is the Washington State Department of Transportation's (WSDOT's) policy to assure that no person shall, on the grounds of race, color, or national origin, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its programs and activities. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equity and Civil Rights (OECR). For additional information regarding Title VI complaint procedures and/or information regarding our non-discrimination obligations, please contact OECR's Title VI Coordinator at (360) 705-7090.

Americans with Disabilities Act (ADA) Information

This material can be made available in an alternate format by emailing the Office of Equity and Civil Rights at wsdotada@wsdot.wa.gov or by calling toll free, 855-362-4ADA(4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

Acknowledgements

WSDOT, together with all partner agencies and safety influencers, strives to reach zero fatal and serious injury crashes. This Highway Safety Improvement Program Implementation Plan was developed through the effort of multiple individuals and divisions across WSDOT.

The Transportation Safety and Systems Analysis division is thankful for the collaborative efforts, participation, and time producing and reviewing this document. Leaders in data analysis, assembling and reviewing the document for submission (in alphabetical order):

- **Sreenath Gangula**
- **Joe Irwin**
- **John Milton**
- **Dustin Motte**
- **Amy Shaffer**
- **Ida van Schalkwyk**

The Transportation Safety Systems Analysis division would also like to thank the following individuals and their divisions for providing working documents for inclusion in the implementation plan (in alphabetical order):

- **Anissa Allen, HQ Capital Program Development**
- **Barb Chamberlain, HQ Active Transportation Division**
- **Charlotte Claybrooke, HQ Active Transportation Division**
- **Matthew Enders, HQ Local Programs**
- **Dina Swires, HQ Transportation Operation**
- **Ida van Schalkwyk, HQ Development Division**

List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
CAR	Crash Analysis Report
CMF	Crash Modification Factor
CPDM	Capital Program Development and Management
FARS	Fatal Analysis Reporting System
FAST	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
HSEC	Highway Safety Executive Committee
HFST	High Friction Surface Treatments
HSIG	Highway Safety Issues Group
HSIP	Highway Safety Improvement Program
HSP	Highway System Plan
HSM	AASHTO Highway Safety Manual
I-2	WSDOT Investment Category: Improvement Program - Safety Sub-Program
JOPS	Joint Operations Policy Statement
LCE	Low-Cost Enhancement
LRSP	Local Road Safety Plan
MAP-21	Moving Ahead for Progress in the 21st Century Act
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
NHTSA	National Highway Traffic Safety Administration
RCW	Revised Code of Washington
RTPO	Regional Transportation Planning Organization
SHSP	Strategic Highway Safety Plan
SPF	Safety Performance Function
VRU	Vulnerable Road User
WA	Washington state
WSDOT	Washington State Department of Transportation
WSP	Washington State Patrol
WTSC	Washington Traffic Safety Commission

Exhibits

- v **Exhibit 1.** Summary of Significant Progress for MAP-21 Safety Performance Measures
- 6 **Exhibit 2.** Societal Cost Compared to Program Spending
- 7 **Exhibit 3.** Safety Management Activities Supporting Target Zero
- 9 **Exhibit 4.** Summary of WSDOT's I-2 Investment Types, Emphasis Areas, and Strategies/Subcategories
- 10 **Exhibit 5.** Strategic Highway Safety Plan, Target Zero 2019 Emphasis Areas
- 11 **Exhibit 6.** Fatal and Serious Injuries Crashes; Societal Cost Across Emphasis Areas
- 12 **Exhibit 7.** Allocation of 2021-2022 HSIP Funding
- 12 **Exhibit 8.** HSIP Funding Split
- 13 **Exhibit 9.** Lane Departure Funding Split
- 14 **Exhibit 10.** WSDOT Local Safety Countermeasures
- 14 **Exhibit 11.** Planned FFY24 Local Safety Program Obligations
- 15 **Exhibit 12.** 2019-2027 I-2 Safety Strategies
- 16 **Exhibit 13.** I-2 Safety Program General Process Flow
- 17 **Exhibit 14.** I-2 Safety Program Crash Reduction Subcategories
- 17 **Exhibit 15.** Subcategories for Decision Making and Performance Improvement
- 18 **Exhibit 16.** I-2 Safety Subprogram Crash Prevention Category
- 19 **Exhibit 17.** Process flow for the WSDOT I-2 Safety Funding Subprogram Crash Reduction Category
- 20 **Exhibit 18.** Process flow for the WSDOT I-2 Safety Funding Program Crash Prevention Category
- 20 **Exhibit 19.** Distribution of I-2 Safety Funding to Target Zero Emphasis areas
- 21 **Exhibit 20.** Safety Subprogram Funding Distribution by Jurisdiction Type
- 21 **Exhibit 21.** Expected Safety Subprogram Funding Obligation by Emphasis Area
- 23 **Exhibit 22.** Washington State Performance across Required Safety Performance Metrics
- 24 **Exhibit 23.** MAP-21 Safety Performance Metric: Fatalities
- 24 **Exhibit 24.** MAP-21 Safety Performance Metric: Fatality rate per 100 million VMT
- 25 **Exhibit 25.** MAP-21 Safety Performance Metric: Serious Injuries
- 25 **Exhibit 26.** MAP-21 Safety Performance Metric: Serious injury rate per 100 million VMT
- 26 **Exhibit 27.** MAP-21 Safety Performance Metric: Non-motorist fatalities and serious injuries
- 26 **Exhibit 28.** Trends for fatalities and serious injuries
- 27 **Exhibit 29.** Emphasis areas for all public roadways in Washington state by percentage fatal and serious injury crashes
- 27 **Exhibit 30.** Distribution of fatal and serious injury crashes under WSDOT jurisdiction
- 37 **Exhibit 31.** Distribution of fatal and serious injury crashes across WSDOT jurisdiction
- 28 **Exhibit 32.** Emphasis areas under local jurisdiction in Washington state by percentage fatal and serious injury crashes
- 28 **Exhibit 33.** Emphasis areas under WSDOT jurisdiction by percentage fatal and serious injury crashes
- 28 **Exhibit 34.** Emphasis areas for city streets, excluding state routes within cities with 30,000 or larger population
- 29 **Exhibit 35.** Emphasis areas for state routes within cities with a population of 30,000 or greater (local jurisdiction)
- 29 **Exhibit 36.** Emphasis areas for city jurisdiction (city streets and state routes within cities with 30,000 or larger population)
- 29 **Exhibit 37.** Emphasis areas for county roads jurisdiction (city streets and state routes within cities with 30,000 or larger population)
- 32 **Exhibit 38.** Change in Fatal and Serious Injury Crashes
- 32 **Exhibit 39.** Target Zero Emphasis Areas as Percentage of Fatal and Serious Injury Crashes
- 34 **Exhibit 40.** Summary of WSDOT's I-2 Subprogram Strategies, Emphasis Areas and Subcategories
- 36 **Exhibit 41.** WSDOT Safe System Approach Elements & Principles
- 37 **Exhibit 42.** Safe System Alignment
- 54 **Exhibit 43.** State & Federal Breakaway Cable Terminal Policies
- 58 **Exhibit 44.** Estimated Cost for Replacing Weathering Steel Guardrail
- 60 **Exhibit 45.** All Injury Crashes in Western Washington
- 60 **Exhibit 46.** Marginal Labor, Equipment, Materials and Operations (LEMO) Costs
- 64 **Exhibit 47.** Criteria for Evaluating Locations for Pedestrian and Bicyclist Infrastructure
- 97 **Exhibit 48.** Estimated Funding and Benefits by Emphasis Area
- 97 **Exhibit 49.** Funding Obligations and Predicted Benefits by Investment Subcategory

Executive Summary

The Washington State Department of Transportation has set safety as one of the top priorities in carrying out its transportation mission. Safety is also a transportation system policy goal for WSDOT ([RCW 47.04.280\(1\)\(b\)](#)). The goal in Washington state is to achieve zero fatal and serious injury crashes by 2030. Under the [Highway Safety Improvement Program \(HSIP\) \(23 U.S.C. §148\)](#) WSDOT is required to set five safety performance targets. These are:

- Number of fatalities
- Rate of fatalities per 100 million vehicle miles traveled
- Number of serious injuries
- Rate of serious injuries per 100 million vehicle miles traveled
- Number of fatalities and serious injuries among people walking and biking (nonmotorized) in motor vehicle crashes

To set targets for 2024, WSDOT, together with the Washington Traffic Safety Commission

(WTSC) and Metropolitan Planning Organizations (MPO) used the “Target Zero method.” This method reviews safety performance measures during the previous five-year period to determine the current annual rolling average performance and then plots a trend line to zero fatal and serious injury crashes in 2030.

The resulting 2022 targets and 2023 outcomes are summarized in **Exhibit 1**. Based on the FHWA determination that WSDOT failed to make significant progress, the agency is required to develop this HSIP Implementation Plan.

[FHWA requires](#) that states failing to make significant progress must:

1. Submit an annual HSIP Implementation Plan. The implementation plan describes the actions WSDOT will take to make significant progress toward meeting safety targets in order to address its failure to meet targets.
2. Obligate federal HSIP funds based on previous year's allocations.

Exhibit 1. Summary of Significant Progress for MAP-21 Safety Performance Measures
2019 through 2023

Performance Measure	Target: 2019-2023 rolling average	Outcome: 2019-2023 rolling average	Baseline: 2017-2021 rolling average	Target/ Baseline Met?	Significant Progress?
Number of fatalities	447.5	667.8	577.6	No/No	No
Rate of Fatalities per 100 million VMT on all public roads	0.757	1.145	0.976	No/No	
Number of serious injuries	1,876.5	2823.6	2412.0	No/No	
Rate of serious injuries per 100 million VMT on all public roads	3.178	4.841	4.079	No/No	
Number of non-motorized fatalities and serious injuries	462.0	657.0	599.8	No/No	

WSDOT safety subcategories

To reduce the potential for fatal and serious injury crashes across each of the emphasis areas, WSDOT has set up subcategories for targeted investment. The sidebar on the right summarizes the current and proposed subcategories for the WSDOT subprogram.

Based on the vulnerable road user assessment, WSDOT is combining its Washington-specific Diversity, Equity, Inclusion method with its Vulnerable Road User analysis to develop a ranked list of locations for further consideration by the agency's regions. This list will inform VRU project selection within the safety subprogram.

WSDOT's Local Programs is incorporating VRU Assessment ratings into its project prioritization processes. This is being done for the City Safety Program awards and will be done next year with the County Safety Program awards as well. WSDOT Local Programs is also sharing the VRU Assessment information with local agencies for their consideration and use in their Local Road Safety Plan updates.

Speed Management will be a focus area within WSDOT's road safety approach. This includes changes to the subcategories: target speed setting, speed safety cameras, and speed management methods.

*A key principle of the safe system approach is **Speed Management**. WSDOT will focus on this subcategory, aiming to lower speeds and reduce crash forces*

I-2 Safety Program Subcategories

- Rumble Strips
- Lane Departure-System Curve Treatments
- Breakaway Cable Terminal Replacement
- Guardrail Infill and Retrofit
- High Friction Surface Treatment Program – Ramps
- I-2 Subprogram Field Assessments
- Active Transportation
- Safety Decision-Making and Performance Improvement
- Edge Line Visibility Pilot
- Redirectional Landforms (considered complete)
- Speed Management



Contractor crews make progress on the State Route 19/State Route 104 roundabout in Jefferson County in June 2024.

Introduction

The Washington State Department of Transportation is continuing to integrate the Safe System Approach within its project development process. This approach will be essential in addressing the recent rise in crash trends.

WSDOT anticipates delivering the strategic highway safety plan (SHSP) called "[Target Zero](#)" in the final quarter of 2024. The goal of Target Zero is to achieve zero fatalities and serious injuries for all roadways in Washington state by 2030. Washington was the first state in the United States to set a goal of zero fatal crashes and continues to actively pursue this goal. Reducing exposure, likelihood, and severity of fatal and serious injury crashes makes it more likely that our families, friends, and the public will arrive home safely.

The Highway Safety Improvement Program (HSIP) is a core federal-aid program that aims to achieve a significant reduction in fatalities and serious injuries on all public roads. In February 2024, WSDOT held a safety town hall (with approximately 200 participants) to discuss key actions to address road safety progress.

Target Setting and Special Rules

Transportation Performance Management, under 23 U.S.C. 150(b), directs state DOTs to set five safety targets focused on fatal and serious injuries, and to report on progress towards these targets on an annual basis as part of required federal HSIP reporting.

The WSDOT safety targets are: number of fatalities, fatality rate (per 100 MVMT), number of serious injuries, serious injury rate (per 100 MVMT), and number of non-motorized fatal and serious injuries. The first three targets are identical to those used by the Washington Traffic Safety Commission (WTSC) federal Highway

Key Takeaways

- WSDOT is required to set five targets as part of the Highway Safety Improvement Program.
- WSDOT did not make significant progress towards Target Zero goals in 2023.

Safety Program reporting and are required by federal law to mirror WTSC targets. These targets are developed in coordination with WTSC and Washington's Metropolitan Planning Organizations. The targets apply to all roads in Washington regardless of ownership.

WSDOT did not meet or make significant progress in 2023 in the areas of fatalities, serious injuries, fatality rate, serious injury rate, and non-motorized fatalities and serious injuries. Thus, WSDOT is required to develop HSIP implementation plan that under 23 U.S.C. §148 must:

- Identify roadway features that constitute a hazard to road users
- Identify highway safety improvement projects on the basis of crash experience, crash potential, or other data-supported means
- Describe how HSIP funds will be allocated, including projects, activities, and strategies to be implemented
- Describe how the proposed projects, activities, and strategies funded under the HSIP will allow Washington state to make progress toward achieving safety performance targets
- Describe the actions Washington state will undertake to achieve the performance targets

Legal Requirements

Federal and State laws have significant impact on how WSDOT develops and manages the highway safety program.

Federal Laws

The [23 U.S.C. §150: National Goals and Performance Management Measures](#) HSIP is a Federal Aid program administered through the Federal Highway Administration (FHWA). The purpose of the program is to reduce fatalities and serious injuries on all public roads regardless of ownership. The HSIP requires a data-driven strategic approach to reducing fatalities and serious injuries. HSIP is legislated under [Section 148 of Title 23 and regulated under 23 CFR Part 924](#).

The main components of HSIP are:

- The [Strategic Highway Safety Plan](#) is a statewide coordinated safety plan. In our state, it is called Target Zero.
- The [State HSIP](#) or program of highway safety improvement projects.
- Railway-Highway Crossing Program (RHCP) provides funds for elimination of hazards at railway-highway crossings under [23 U.S.C. §130](#)
- [High Risk Rural Roads](#) due to an increased fatality rate on Washington's rural roads.
- Vulnerable Road User Assessment is an assessment of the safety performance of a state with respect to vulnerable road users (pedestrians and bicyclists) and the plan of the state to improve the safety of vulnerable road users as described under [23 U.S.C. 148\(l\). \(23 U.S.C. 148\(a\)\(16\)\)](#).

State Laws

[RCW 47.04.280: Transportation System Policy Goals](#) establishes six transportation goals for Washington including a goal for Safety: "To provide for and improve the safety and security of transportation customers and the transportation system."

- [RCW 47.05: Priority Programming for Highway Development Target Zero](#) requires projects to be selected according to factual need and evaluation of cost and benefit.
- [RCW 43.59 Traffic Safety Commission](#) establishes the Washington Traffic Safety Commission and designates this body to serve as the Governor's Highway Safety Representative as required by the federal Highway Safety Act of 1966 (Public Law 89-564; 80 Stat. 731).

Target Zero

[Target Zero, the Washington State Strategic Highway Safety Plan \(SHSP\)](#), forms the basis for how Washington state measures safety performance and sets priorities and emphasis areas for safety performance investments. It is a formal statewide planning document signed by the Governor and approved by the FHWA Division Administrator.

Target Zero is being updated and developed around the Safe System Approach, and will include socioeconomic, demographic and cultural aspects and how each influence road safety outcomes. The revised document will be delivered in late 2024. This implementation plan is developed under the 2019 update, but also recognizes transitional elements in the 2024 update.

Target Zero

- Sets statewide priorities for all traffic safety partners through a collaborative effort.
- Provides a resource for potential strategies to address each of the priority areas.
- Monitors outcomes at a statewide level for each of the priority levels.

Safety Leadership

Washington State

The Washington Traffic Safety Commission is Washington's designated highway safety office (SHSO) and leads statewide efforts to save lives and prevent serious injuries on our roadways. The commission is led by the Governor of Washington state. Commissioners include the chief executive officers from state agencies and other organizations with responsibility for reducing the crash potential or the frequency and severity of crashes. Members include:

- Governor of the State of Washington, Commission Chair
- Secretary of Transportation, WSDOT
- Chief, Washington State Patrol
- Director, Washington State Department of Licensing
- Secretary of Health, Washington Department of Health
- Director, Health Care Authority
- Superintendent of Public Instruction
- Commissioner, Washington State Association of Counties
- Association of Washington Cities representative
- Judicial representative

Collaboration

- Safety-minded leaders conduct outreach and partner with various agencies and groups throughout Washington to collaboratively develop the best paths forward in ongoing efforts to save lives and prevent serious injuries on roads statewide.

The Commission works to develop plans, programs, and events that support reducing fatal and serious injury crash potential on Washington's roadways with the following organizations:

- Washington state tribes
- Tribal, Municipal, and Rural Transportation Planning Organizations
- Washington State Legislature
- Freight Mobility Strategic Investment Board
- Local law enforcement
- Community, local and regional agencies and organizations
- Private and non-profit organizations
- Federal Highway Administration
- National Highway Traffic Safety Administration
- Federal Motor Carrier Safety Administration
- Federal Railroad Administration
- Bureau of Indian Affairs
- WTSC employees

The WTSC also convenes and coordinates with:

- Cooper Jones Active Transportation Safety Council
- Washington Impaired Driving Advisory Council
- Tribal Traffic Safety Advisory Board
- Traffic Records Committee

Washington State Department of Transportation

In 2024, WSDOT is creating a highway safety office. The highway safety office is being developed to provide a centralized leadership for road safety. While WSDOT continues to recognize the value of its collaborative approach by the Highway Safety Executive Committee (HSEC), the agency believes that to sustain the effort requires an office dedicated to leading the safety program is required.

The Secretary of Transportation represents WSDOT on the WTSC. The Secretary is supported by the HSEC. The HSEC and HSIG are chaired by the State Safety Engineer and Deputy State Safety Engineer, respectively. The HSEC consists of directors from various divisions within WSDOT.

The HSEC develops safety policies for implementing the WSDOT Capital Program Safety Subprogram (I-2) and project development processes to meet Target Zero, coordinates transportation system safety within and between modes, and delivers the Washington Transportation Plan and Highway System Plan. The HSEC also has a role in policy development throughout safety related aspects of all programmatic areas.

HSEC responsibilities include:

- Providing executive support for Target Zero.
- Approving project budgets and expenditures of funds.
- Approving project scopes, objectives, and strategy.
- Resolving organizational, policy and procedural issues.
- Supporting an environment of collaboration and cooperation.
- Approving and supporting resource commitments to projects.

The HSEC membership will change in 2024 and a new charter will be developed by July of 2024. The HSEC is supported by the Highway Safety Issues Group (HSIG). HSIG is an interdisciplinary

team of transportation professionals with an interest in and responsibility for reducing fatal and serious injury crash potential on Washington's roadways. HSIG serves as a forum—which includes WSDOT region representation—to discuss safety performance, implementation of the safety subprogram, and provide technical support to HSEC for solving technical safety issues.

HSIG responsibilities include:

- Identifying highway safety issues.
- Developing proposed highway safety policies for HSEC consideration.
- Developing solutions within HSIG authority and proposing solutions for HSEC consideration.
- Developing and providing recommended policies to the HSEC for consideration if outside HSIG authority.
- Developing proposed project scope and requirements.
- Providing technical and engineering support to HSEC.

Through HSEC and HSIG, WSDOT has developed the following documents to guide safety activities and performance on Washington's Roadways:

- [FHWA Stewardship Agreement](#) - WSDOT's agreement with FHWA for addressing safety issues on federal aid projects and safety programs.
- Safety Scoping Process Flow Chart - a chart illustrating the workflow of tasks required to understand scoping across divisions and regions.
- [Target Zero](#) - Washington state's Strategic Highway Safety Plan developed by the Washington Traffic Safety Commission.
- [Washington Transportation Plan](#) - Washington State Transportation Commission's recommended strategic transportation plan includes a highway safety element.

- [Safe System Policy](#) - Executive Order E 1085.01 establishes the Highway Safety Executive Committee and directs WSDOT employees to implement policies and procedures that advance the Safe System Approach to road safety.
- [Safety Analysis Guide](#) - Provides guidance regarding expectations for safety analysis across WSDOT programs and outside typical program areas.

Other guidance that supports WSDOT's Target Zero responsibilities include:

- The [WSDOT Design Manual](#) provides specific policies and guidance, criteria, procedures, and safety analysis documentation requirements.
- [Traffic Manual](#)
- I-2 Scoping Instructions
- [Active Transportation Plan](#)

Stakeholder Outreach

WSDOT works very closely with its safety partners, and has achieved a high level of cooperation and coordination at the federal, state and local levels. WTSC and MPOs/RTPOs meet frequently to discuss all areas of the safety program, including target setting and progress toward achieving the goal of zero fatal and serious injury crashes by 2030. WSDOT and WTSC meet quarterly with the FHWA, NHTSA, FMCSA and the WSP to discuss ongoing safety-related activities.

WSDOT and its partners are updating the state's SHSP with a completion date of later this year. As part of the HSIP target setting process, WSDOT meets with MPO Technical, Coordinating and Executive Committees, as well as with MPO and RTPO boards as requested.

In his 2024 State of Transportation address to the Washington State Legislature, Washington State Secretary of Transportation Roger Millar continued to emphasize the need for additional funding to the WSDOT Safety Program by highlighting the societal cost of crashes in comparison to funding WSDOT receives in its capital program (refer to **Exhibit 2 on page 6**).

The Washington State *Active Transportation Plan 2020 and Beyond* is complete. The Active Transportation Division and other offices with safety responsibilities will continue to work on an action plan for safety, prioritizing measures to address the ongoing trend of disproportionate serious/fatal crashes involving pedestrians and bicyclists. This work will be ongoing through 2025.

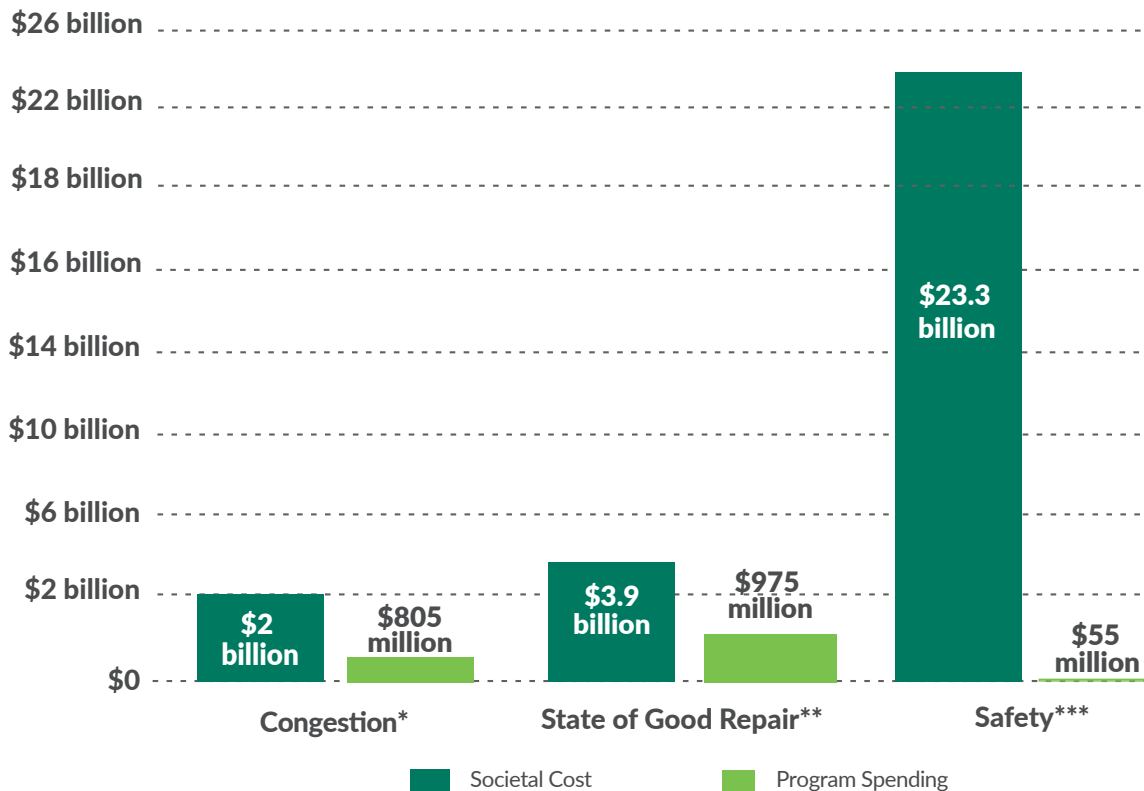
Decision Framework

To focus efforts on eliminating fatal and serious injuries on the state's roadways, the HSIP uses the emphasis areas within the SHSP, Target Zero, to develop subcategories. The subcategories use a 10-year horizon for planning purposes.

Using the subcategories and 10-year plan, ranked lists are developed within each of the subcategories; the methods and processes are described in the Safety Subcategories Methods Section.

Each emphasis area has associated strategies for fatality and serious injury reduction and will focus on incorporating the Safe System principles. The SHSP also recognizes the need for leadership in achieving safety goals and the appropriate safety culture within an organization. **Exhibit 3 on page 7** shows the connections between the various safety management activities which support Target Zero. WSDOT is currently reviewing the entire highway safety program to better align with the Safe System Approach, and equity-based principles. A review of the status of each subcategory will occur.

Exhibit 2. Societal Cost Compared to Program Spending For Congestion, State of Good Repair and Safety



Notes and data sources: data from the 2022 State of Transportation Report: <https://wsdot.wa.gov/about/secretary-transportation/state-transportation>
 *Congestion cost source: Texas Transportation Institute’s 2015 Urban Mobility Scorecard; based on a value of travel delay and excess fuel consumption for the area from Everett to Tacoma.
 **State of Good Repair cost source: ASCE 2017 Infrastructure Report Card; estimated at \$656 for every Washington driver.
 ***Safety cost source: Societal costs of crashes calculated using methods described in Crash Cost for Highway Safety Analysis (FHWA-SA-17-071), Chapter 6, Federal Highway Administration, Office of Safety 2018. Economic cost components include 2023 values for: medical care, emergency services, market productivity, household productivity, legal costs, insurance administrative costs, workplace costs, property damage and congestion (in 2023 dollars).

Complete Streets Implementation at WSDOT

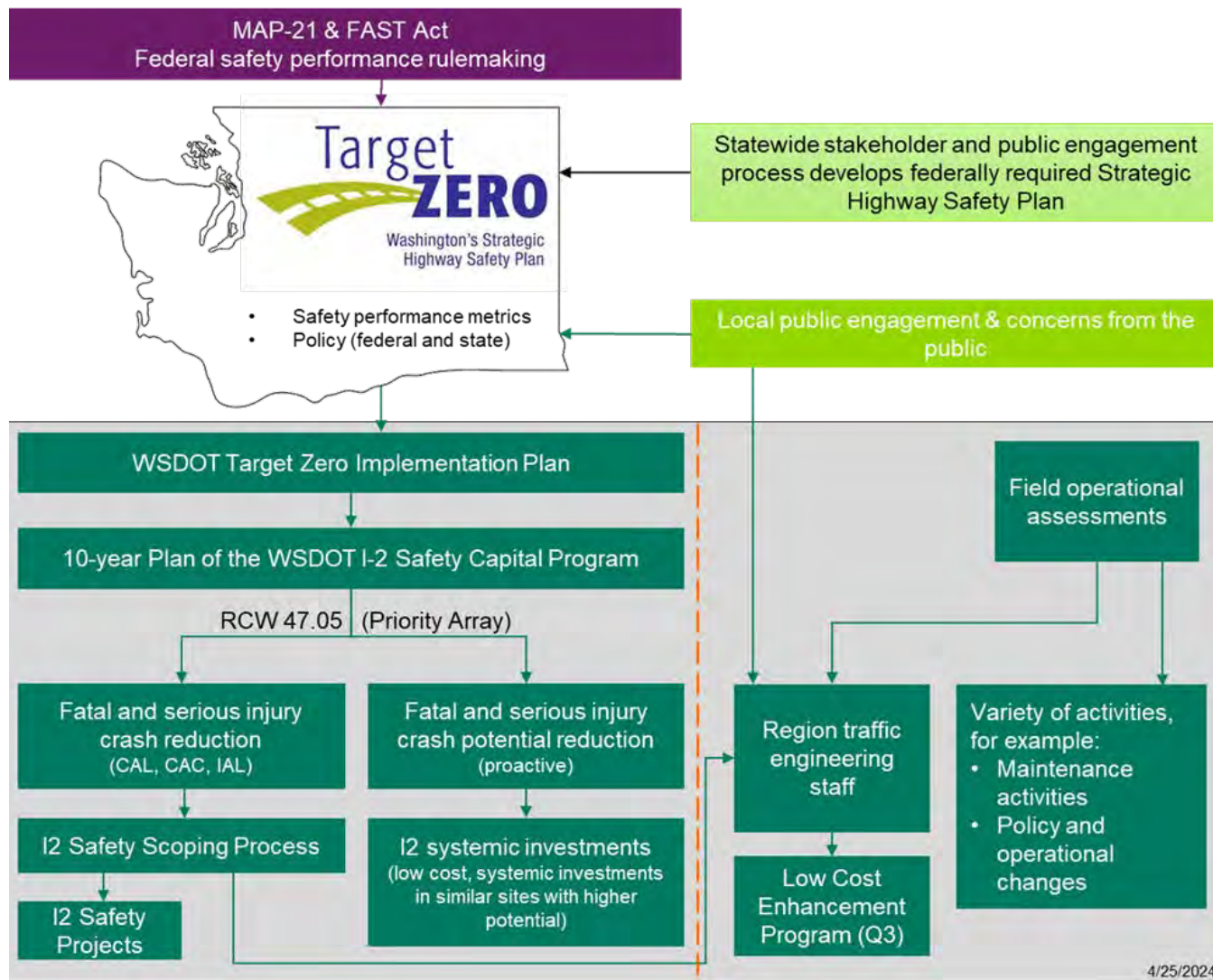
In the 2022 Move Ahead Washington transportation investment package (ESSB 5974), the legislature expressed an intent to improve the safety, mobility, and accessibility of state highways. They directed WSDOT to incorporate the principles of complete streets with facilities that provide street access with all users in mind, including pedestrians, bicyclists, and public transportation users.

This directive applies on all projects with an estimated cost of \$500,000 or more, where the design phase of the project begins on or after July 1, 2022, that are to be constructed on state highways routed over city streets. Since this date, WSDOT has been implementing Complete Streets Considerations as part of project development.

As part of the work for the Washington State Active Transportation Plan, state routes within the boundaries of population centers (defined as incorporated cities and towns and census designated places) were assessed for level of traffic stress. Level of traffic stress (LTS) provides a quantitative measure of roadway characteristics including posted speed, number of lanes, and traffic volumes; higher LTS corresponds to locations with higher crash potential.

In 2023, 6.8% of active transportation user-involved crashes occurred on state facilities within population centers (excluding ramps and limited access freeways, and including ramp terminals), making these facilities an ideal focus for further investment that improves active transportation facilities and access to transit. Most of these facilities also have higher levels of traffic stress.

Exhibit 3. Safety Management Activities Supporting Target Zero



Safety Priorities

Target Zero 2019 evaluated data for 2015–2017 to identify statewide priority areas related to fatalities and serious injuries. The team categorized priorities as either level one or level two based on the percentage of fatalities and serious injuries associated with each factor.

- Priority level 1** includes the contributing factors and crash types associated with the largest number of fatalities and serious injuries and constitute at least 25% of fatalities or serious injuries. This level also includes supporting systems and technologies that are essential for development and management of the I-2 and local safety programs.
- Priority level 2** factors include those factors and crash types that are less than 25% of fatalities or serious injuries.

Exhibit 4 on page 9 summarizes the Target Zero emphasis areas. The approaches used for these subcategories are outlined in the Implementation Section of this report.

Exhibit 5 on page 10 shows the Target Zero 2019 Emphasis Areas as presented in the Washington State Strategic Highway Safety Plan. The table provides the priority level, and number and percent of fatalities and serious injuries that occurred during the three-year period from 2015 to 2017. WSDOT's emphasis areas are consistent with the priorities of Target Zero.

Though not identified as safety subcategories, investments in the monitored areas of Target Zero may occur for vehicle-train crashes by the HQ Development Division, school active transportation by the HQ Active Transportation Division, and work zone safety by the HQ Transportation Operations Division and regions.

The emphasis areas identified in Target Zero provide the basis for subcategory development in the I-2 safety subprogram. Each of these emphasis areas represent broad categories of crash types. Subcategories focus on specific individual crash types and contributing factors. The expectation is that investments will reduce fatal and serious injury crash severity for individual or groups of crash types.

Appendix B on page 77 summarizes the statewide safety performance and safety

performance for state routes distinguishes between facilities under WSDOT jurisdiction and those under local jurisdiction. Note that state routes in cities with populations over 30,000 are under local jurisdiction and do not receive Safety Subprogram investments from WSDOT. Summaries for the latter do not include any limited access facilities or crashes related to ramp terminals or crossroads at interchanges within these city boundaries. Per RCW 47.24.020(13) these state routes are local jurisdiction.

The strategies used to address specific crash types or groups of crash types are commonly known as crash countermeasures. The countermeasures become the subcategories for investment. WSDOT uses the subcategories to develop a method for ranking, prioritizing, and implementing projects.



Exhibit 4. Summary of WSDOT's I-2 Investment Types, Emphasis Areas, and Strategies/Subcategories
 Target Zero emphasis areas; Washington state; 2015-2019

Type of Investment	Emphasis area	Strategies/Subcategories
Reactive Safety Investments	Intersection-related	Intersection Analysis Locations
	Lane departure	Crash Analysis Locations/Crash Analysis Corridors
Proactive Safety Investments	Intersection Systemic Safety	Compact roundabouts
	Lane departure	Rumble Strips
		High Friction Surface Treatment Program
		Systemic Curve Treatments
		Redirectional Landforms (Dormant)
		Breakaway Cable Terminal Replacement
		Guardrail Infill and Retrofit
		Field Assessments
		Edge Line Visibility Pilot
	Active Transportation	Pedestrians and Bicyclists
		Motorcyclists
	Safety Decision-making and Performance Improvement	MIRE FDE
		AASHTO HSM Predictive Method Tools
		AASHTO SafetyAnalyst IHSDM Crash Prediction Module
MPO/WTSC Planning/Target Setting		
Safe System	Speed Management	

Notes: The emphasis areas identified in Target Zero provide the direction for subcategory development in the I-2 safety program. Each of these emphasis areas represent broad categories of crash types. Subcategories focus on specific individual crash types and contributing factors. The expectation is that investments will reduce fatal and serious injury crash severity for individual or groups of crash types.

Appendix A on page 70 provides updated performance information and presents the top seven emphasis areas by jurisdiction across crash types and road users.

Exhibit 6 on page 11 shows the emphasis areas with associated fatal and serious injuries, fatal

and serious crashes, total crashes and total 2023 societal costs associated with each of the crash types and user groups. The chart shows that lane departure and intersection related crashes are the top crash types, and for user groups, crashes involving younger drivers, and crashes involving people walking and biking predominate.

Exhibit 5. Strategic Highway Safety Plan, Target Zero 2019 Emphasis Areas

Source: Target Zero 2019

Priority Level and Emphasis Area		Fatalities ¹		Serious Injuries ²	
		Number	%	Number	%
		1,650	100%	6,537	100%
High Risk Behavior					
1	Impairment	958	58.1%	1,215	18.6%
1	Distraction	502	30.4%	1,933	29.6%
1	Speeding	485	29.4%	1,579	24.2%
2	Unrestrained Occupants	312	18.9%	701	10.7%
Crash Type					
1	Lane Departure	796	48.2%	2,458	37.6%
1	Intersection Related	377	22.8%	2,256	34.5%
Road Users					
1	Young Drivers 16-25	512	31.0%	2,243	34.3%
2	Pedestrians and Bicyclists	329	19.9%	1,333	20.4%
2	Motorcyclists	236	14.3%	1,209	18.5%
2	Older Drivers 70+	223	13.5%	599	9.2%
2	Heavy Trucks	178	10.8%	442	6.8%
Decision and Performance Improvement					
1	Traffic Data Systems				
1	EMS and Trauma Care Systems				
1	Evaluation and Diagnostics				
1	Safe Systems				
1	Cooperative Automated Transportation, including Autonomous Vehicles				
Other Monitored Emphasis Areas					
	Drowsy Drivers	44	2.7%	236	3.6%
	Work Zones	18	1.1%	70	1.1%
	Vehicle-Train	12	0.7%	4	0.1%
	Wildlife	8	0.5%	53	0.8%
	School Buses	4	0.2%	17	0.3%

Notes: Percentages may not add to 100 due to crashes involving more than one factor.

1. Fatality data is from the preliminary 2019 Q4 release of the WA-FARS Analytical File, and the final 2018 WA-FARS, the best available data (final NHTSA FARS data is only available up to 2017).

2. Serious injury data is from the WSDOT Engineering Crash Datamart and represents reported crashes involving at least one motor vehicle and meeting the requirements of RCW 46.52.070, RCW 46.52.030 and WAC 446-85-010.

Source: 2019 Target Zero report, www.targetzero.com.

Exhibit 6. Fatal and Serious Injury Crashes and Societal Cost Across Emphasis Areas

Target Zero emphasis areas; Washington state; 2023

Emphasis Areas	Fatal and Serious Injuries ¹	Fatal and Serious Injury Crashes ²	Total Crashes	2023 Societal Crash Cost ³
Crash Types				
Lane departure	1,803	1,451	26,600	\$7,524,584,100
Run off the road	1,304	1127	24,424	\$6,028,340,000
Opposite direction	499	324	2,176	\$1,496,244,100
Intersection related	1,476	1295	43,081	\$8,582,294,100
User Groups⁴				
Crashes involving people walking and biking ⁵	839	807	3,198	\$3,804,384,300
Crashes involving people walking	663	632	2,066	\$2,876,714,500
Crashes involving people biking	177	176	1,133	\$931,701,200
Crashes involving motorcyclists	772	731	2,203	\$3,218,428,600
Crashes involving heavy trucks	261	220	6,549	\$1,255,761,500
Crashes involving younger drivers (ages 16 to 25)	1,438	1137	39,591	\$7,379,936,300
Crashes involving older drivers (ages 70 and over)	491	407	12,148	\$2,568,915,400
All crashes	4,505	3,816	113,113	\$23,151,024,900

Source: WSDOT Engineering Crash Data Mart, 2023 year end snapshot (June 2024).

Notes:

1. Fatalities represent fatal crashes reported in the WSDOT Engineering Crash Data Mart. There are slight differences between the WSDOT Engineering Crash Data Mart and the NHTSA FARS data. For the purpose of this Implementation Plan the data presented are from the WSDOT Engineering Crash Data Mart (2023 year end snapshot).

2. The fatal crashes reported in the WSDOT Engineering Crash Data Mart. There are slight differences between the WSDOT Engineering Crash Data Mart and the NHTSA FARS data. For the purpose of this Implementation Plan the data presented are from the WSDOT Engineering Crash Data Mart unless otherwise noted.

3. The societal cost values were estimated using WSDOT specific crash costs derived using the methodology outlined in the FHWA Guide, Crash Costs for Highway Safety Analysis, 2018. Costs used are as follows:

- Fatal Crash (K) - \$4,308,200
- Serious Injury Crash (A) - \$4,308,200
- Evident Injury Crash (B) - \$304,200
- Possible Injury Crash (C) - \$180,600
- Property Damage Only Crash (O) - \$ 19,300

4. Totals represent crashes involving the specific user groups. It does not imply that these users are at fault in these crashes or that these users were involved in the first or second collision types.

5. The crashes involving people walking and people cycling will not individually add up to the total crashes involving people walking and biking because there were crashes where both people walking and biking are involved (not mutually exclusive).

Safety Investment Strategy

WSDOT’s funding for reducing fatal and serious injury crash potential is managed through a combination of its capital programs, operational program and its Program's Safety Subprogram (I-2). Processes within the WSDOT design manual guide how funding and project development will occur when the project is funded through different program areas, including the I-2 funding requirements.

Complete Streets are a requirement for projects in excess of \$500,000 within urbanized areas. Other funding programs and subprograms may also address crash potential if there is a positive benefit/cost opportunity within the boundaries of the project (e.g., a preservation project might include a guardrail improvement). A brief overview of WSDOT's safety investment strategy is provided below.

Integration of HSIP and Target Zero

Federal safety funds from the Highway Safety Improvement Program (HSIP) are split between state highways and local roads in a data-driven process following the Target Zero framework.

The funds are split according to the proportion of fatal and serious injury crashes that occurred on local roadways (cities and counties) versus roadways under WSDOT jurisdiction. Allocation of funding is based on the most recent five-year period.

Available Funds and Allocation Goals

For the FFY 2025 reporting period, it is anticipated that the State of Washington will receive approximately \$53.2 million for the HSIP program. Of this, approximately \$16.0 million will be allocated to state roadways and \$37.2 million to local roadways. **Exhibit 7** shows the federal funding allocation for federal fiscal years 2021 through 2024. **Exhibit 8** shows the percentage distribution with 70% to local roads, and 30% to state highways.

Exhibit 7. Allocation of HSIP funding

Federal Fiscal Years 2021 through 2024

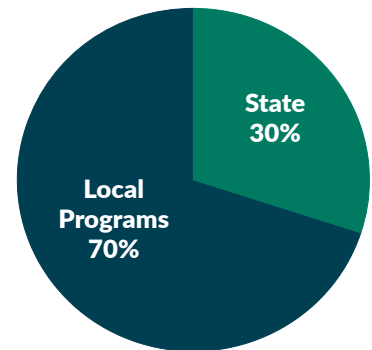
	Total	State	Local Programs
FFY 2021	\$40,194,531	\$13,406,425	\$26,788,106
FFY 2022	\$49,811,957	\$14,943,587	\$34,868,370
FFY 2023	\$51,109,000	\$15,333,000	\$35,776,000
FFY 2024	\$52,119,500	\$15,232,683	\$36,886,817

Key Takeaways

- HSIP funds are allocated to local roadways and state roadways based on the proportion of fatal and serious injury crashes for Target Zero priority level 1 infrastructure emphasis areas.
- Current split is 70% to local roadways to 30% state roadways.

Exhibit 8. HSIP Funding Split

Federal Fiscal Year 2024



Local Roadways

The state Legislature established \$20 million to help fund local roadways over a 16-year period. This funding will allow expansion of Target Zero safety efforts for the lane departure emphasis area. **Exhibit 9** shows the Lane Departure fund distribution.

The funding for local roadways is divided into two programs, the County Safety Program and the City Safety Program. All safety projects must address fatal or serious injury crashes per HSIP funding requirements.

WSDOT Local Programs is working with local agencies on developing realistic schedules for their applications for safety projects. WSDOT Local Programs has also been providing 100% funding for local safety projects to reduce delays related to other funding sources and has also provided some cost increases for projects seeing high inflation rates for construction to keep projects moving forward. In addition, if project applications are not headed to design within two years, those projects are being deferred to the next funding cycle for cities and counties so that only projects with near term starts are being awarded.

County Safety Program

The County Safety Program methodology has remained consistent since 2010, requiring counties to apply only for systemic safety projects. Systemic safety involves a data-driven, prioritized approach to address crash potential (typically lower-cost and widespread improvements). With the widely

dispersed nature of fatal and serious injury crashes across 39,200 centerline miles, WSDOT and counties have agreed a systemic approach is the best way to advance Target Zero.

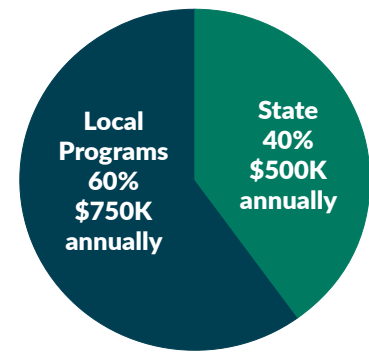
Since 2014, WSDOT has required counties to submit a Local Road Safety Plan (LRSP) as part of their application to be eligible for HSIP funds. This plan describes the data-driven prioritization process for the county, including identification of common roadway characteristics associated with fatal and serious injury crashes.

The County Safety Program has a call for projects every two years. Once counties submit their funding applications and Local Road Safety Plans, WSDOT Local Programs staff identify projects for funding based on fatal and serious injury crash history, common roadway characteristics associated with fatal and serious injury crashes, cost effectiveness of the countermeasures proposed, and agency delivery record based upon prior project selections. Funding for selected projects is then awarded to the counties for delivery.

City Safety Program

The City Safety Program methodology has remained consistent since 2012 and addresses safety on 17,639 centerline miles of city roadways. That methodology requires cities to apply for spot location projects or systemic safety projects. Since 2012, about half of the City Safety Program funds have been awarded to spot location projects and about

Exhibit 9. Lane Departure Funding Split



half to systemic safety projects. Starting in 2020, all cities were required to submit a LRSP as part of their application to be eligible for HSIP funds.

The City Safety Program has a call for projects every two years. Once cities submit their funding applications and LRSPs, WSDOT Local Programs staff identify projects for funding. For systemic safety projects, funding is based on fatal and serious injury crash history, common roadway characteristics associated with fatal and serious injury crashes, cost effectiveness of the countermeasures proposed, and agency delivery record based upon prior project selections.

For spot location projects, funding is based on the benefit/cost ratio of the project (expected safety benefits are based on Crash Modification Factors and crash history and are compared to total project cost). All benefit/cost ratios are calculated by WSDOT for statewide consistency. Agency eligibility is also affected by the delivery record of that agency based upon prior project selections. Funding for selected projects is then awarded to the cities for delivery.

WSDOT Local Safety Grant Program: Strategies and Implementation

Local agency strategies follow the guidance found in Target Zero. Refer to **Exhibit 10** for recent Target Zero emphasis areas and primary strategies addressed by cities and counties. Refer to **Exhibit 11** for safety fund distribution in FFY 2025. The changes most likely to reduce potential crashes by contributing factors and crash types on local roads in FFY 2025 are:

- The requirement for all agencies to develop a LRSP when applying for safety projects. **Appendix E on page 99** demonstrates the growth of development of Local Road Safety Plans within the state over the past decade.
- The roundabouts-first approach to major intersection improvements (rather than traffic signals). This policy is about making a culture change to utilize this safety improvement as part of the engineering toolbox for local agency public works departments. This requirement led to roundabouts being the highest-funded single countermeasure in three of the past four years.
- Allowing tribes to be direct recipients of local HSIP funds (starting in 2023) to provide the potential for reaching some of the locations that have not previously been addressed through this program.

Exhibit 10. WSDOT Local Safety Countermeasures for 2014-2024

City	County
Intersections (48%)	Lane Departure (64%)
Signal Operations/Visibility	Guardrail
Roundabouts	Signing
New Traffic Signals	High Friction Surface Treatments
Illumination	Shoulders
Signing	Slope Flattening
Pedestrians & Bicycles (39%)	Clear Zone Improvements
Rapid Flashing Beacons	Bridge Rail
Road Diets	Widening
Pedestrian Hybrid Beacons	Pavement Markings
Refuge Islands	Intersections (32%)
High Visibility Crosswalks	Roundabouts
Bike Lanes/Cycle Tracks	Signing
Leading Pedestrian Intervals	New Traffic Signals
Lane Departure (11%)	Signal Operations/Visibility
Guardrail	Sight Distance
Signing	Pedestrians & Bicycles (2%)
High Friction Surface Treatments	Refuge Islands
Speeding (1%)	Data Improvement (1%)
Speed Feedback Signs	Data Collection
Data Improvement (1%)	Speeding (1%)
Data Collection	Speed Feedback Signs

Exhibit 11. Planned FFY 2025 Local Safety Project Obligations

City	County
Pedestrians & Bicycles (21%)	Lane Departure (36%)
Rapid Flashing Beacons	Guardrail
Pedestrian Hybrid Beacons	Slope Flattening
Bike Lanes/Cycle Tracks	Shoulders
Sidewalks	Signing
Road Diets	Rumble Strips
Intersections (18%)	Realignment
Signal Operations/Visibility	Intersections (21%)
Roundabouts	Roundabouts
Left Turn Lanes	Sight Distance
Illumination	Signing
Lane Departure (2%)	Pedestrians & Bicycles (2%)
Guardrail	Median Curbs
	Sidewalks

Exhibit 12. 2019-2027 I-2 Safety Strategies

Subcategory: Crash Reduction (ID)
CAL/CAC
IAL
Subcategory: Crash Prevention (IE)
Intersections – 15%
Intersection Systemic Safety (angle/high speed) (Compact Roundabouts)
Lane Departure (run-off-the-road + opposite direction) – 15%
Rumble Strips
High Friction Surface Treatments
Horizontal Curves
Roadside Safety Hardware – 15%
Redirectional landforms (dormant)
BCT - Interstate
BCT - Non Interstate
Guardrail infill
Corridors – 5%
Field Assessment
High Visibility Markings
Vulnerable Users – 15%
Pedestrian and Bike (active transportation)
Motorcycle
Decision Making & Performance Improvement – 5%
MIRE FDE
AASHTO Highway Safety Manual Predictive Method Tools
AASHTOWare SafetyAnalyst™
ISHDM Crash Prediction Module
MPO/WTSC Planning/Target Setting

State Highways Under WSDOT Jurisdiction

WSDOT's use of 10-Year Implementation Plan

The agency uses a 10-year planning horizon for the safety subprogram, as it is difficult to assess safety performance effectively beyond the 10-year time frame. This plan is intended to implement Target Zero, and to incorporate safety components of the Active Transportation Plan. In the next update of the Strategic Highway Safety Plan, the public transportation plan will become increasingly important, particularly in the context of vulnerable road users. Having gained a perspective of the multiple correlated safety components within other plans in the agency, WSDOT has a starting point for needs assessment.

WSDOT reviews, assesses, and ranks the respective subcategories within investment categories from the priorities and strategies within Target Zero. The subcategory ranking helps WSDOT determine relative priority and potential budget levels in the Safety subprogram shown in **Exhibit 12**. The percentages shown indicate the respective target amount for a given year's funding.

It is important to note that WSDOT typically programs projects over a six-year period, or three consecutive two-year biennial cycles. Because projects are previously programmed, implementation of projects within a new subcategory is not immediate so funding for projects is not immediate. Projects require significant time for scoping, alternatives analysis,

environmental considerations, public outreach and funding in coordination with legislative actions and capital program needs. In general, from ranking to implementation of a typical project is six years or more. Therefore, implementing new subcategories will typically span more than one biennium.

Priority Programming for Highway Development

In [RCW 47.05](#), the Washington State Legislature recognized the complexity and diversity of transportation needs were becoming increasingly challenging. The legislature also recognized the needs of the transportation system outweighed the ability to fund every location. The RCW requires projects be selected based on a policy of priority programming where objectives are defined within available resources, and the selection of projects be based on factual need and evaluation of the life-cycle costs and benefits.

WSDOT reviews and selects various strategies for further development into a program of potential safety-related investments that include both fatal and serious injury crash prevention and crash reduction elements. These are strategies that reduce the potential for crashes on the state highway system.

This step of the process uses several different screening methods to identify a set of locations within all highways that would appear to have potential for fatal and serious injury crash reduction when addressed with a given engineering countermeasure.

Target Zero requires WSDOT to use a values-based, data-driven approach to evaluating, analyzing, and diagnosing crashes and their contributing factors (5th E of Safety Management) to determine how best to modify the road system to reduce fatal and serious injury crashes to the greatest extent possible within available resources.

Exhibit 13 shows the general process flow in subcategory development.

Using this process, WSDOT developed targets for each category. **Exhibit 14 on page 17** lists the reduction categories identified. Federal HSIP funds can also be used to support data and decision-making tools, and WSDOT has added an emphasis area for decision-making and performance improvement. **Exhibit 15** lists the subcategories for this emphasis area. **Exhibit 16 on page 18** provides the prevention subcategories for the 2023-2025 biennium.

WSDOT I-2 Safety Subprogram

Safety projects within WSDOT's scope of responsibility are programmed through the WSDOT Safety Subprogram (I-2) using a ranking and prioritization process.

Countermeasures

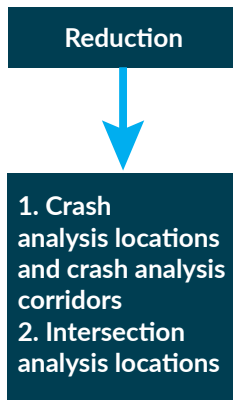
WSDOT's approach to investments in highway safety is values and data-driven, as well as science based. The approach focuses on proven infrastructure countermeasures expected to reduce the potential for crashes, including pilot projects, new technology, and test application to understand performance. These countermeasures have several common characteristics:

- Target fatal and serious injury crashes.
- Have been evaluated and shown to have a proven benefit in net overall reduction in the societal cost of fatal and serious injury crashes.
- Are the result of a statewide approach that requires analysis of benefit-cost.
- Crash reduction countermeasures focus on fatal and serious injury crash reduction. Countermeasures are selected based on historic crash performance compared to similar facilities, crash type, and contributing factor analysis.
- Crash prevention (systemic) countermeasures focus on fatal and serious injury crash prevention, contributing factors, or crash types.

Exhibit 13. I-2 Safety Program General Process Flow



**Exhibit 14. I-2 Safety Program
Crash Reduction Category
Subcategories**



**Exhibit 15. Subcategories for
Decision Making and Performance
Improvement**



Crash Reduction

Reduction countermeasures are selected based on the historic safety performance of segments and intersections. The process selection steps:

- Screen the statewide network using respective methods of each subcategory
- Assessment of a subset of sites selected during the screening for infrastructure investment based off cost-effectiveness
- Identify potential countermeasures to reduce crash outcome(s)
- Complete a crash analysis report (CAR). WSDOT regional staff analyze locations and complete a CAR, which is used in the priority programming process to develop a benefit/cost ratio.

The potential projects are considered for funding based on a rigorous review of:

- Program project as appropriate
- Effectiveness of countermeasure(s) in addressing factors contributing to crash types typical of the location
- Location context
- The cost effectiveness of the proposed investment using the anticipated societal crash reduction benefits

The network screening is based on the excess fatal and serious injury crashes and is performed

using the AASHTOWare SafetyAnalyst™ software.

Region staff conduct the assessment of sites identified during network screening. If they find that contributing factors at a site include risky behaviors, they notify Washington State Patrol and the local Target Zero Teams. These organizations are responsible for enforcement and educational countermeasures focused on risky behavior.

The reduction flow chart in **Exhibit 17 on page 19** illustrates the general process for screening and developing a ranked list of potential locations for investment.

Crash Prevention

Crash prevention subcategories are associated with the emphasis areas in Target Zero. Under the current plan, the subcategories are:

- Lane departure crashes include two subcategories: run off the road crashes and opposite direction crashes
- Intersection related crashes focusing on compact roundabouts, reduced left-turn conflict intersections (RCUT or JCUT).
- Speed management focusing on reducing crash forces
- User types: people that walk and bike; motorcyclists; heavy truck drivers; older drivers (65+); and younger drivers (16-25); This category includes two I-2 subcategories: motorcyclists and pedestrians and bicyclists.

Discussion papers are developed for each subcategory and approved by the Highway Safety Executive Committee. The proactive measures generally represent low cost per mile or per location investments with high returns on investment.

In recent years WSDOT has found that the cost of some of these countermeasures can vary greatly. In those cases, a benefit-cost analysis is still performed to confirm that the investment will, as a corridor or group of locations, still meet the minimum benefit-cost thresholds. The section on Implementation provides additional information about each subcategory.

Each prevention subcategory has a different method for ranking a location for potential project consideration. The subcategory benefit/cost may either be for a location or as a system benefit/cost.

A systemic approach recognizes that crashes are scattered across the system, and may occur at different locations because of different factors, such as weather, driver behavior or errors. In other

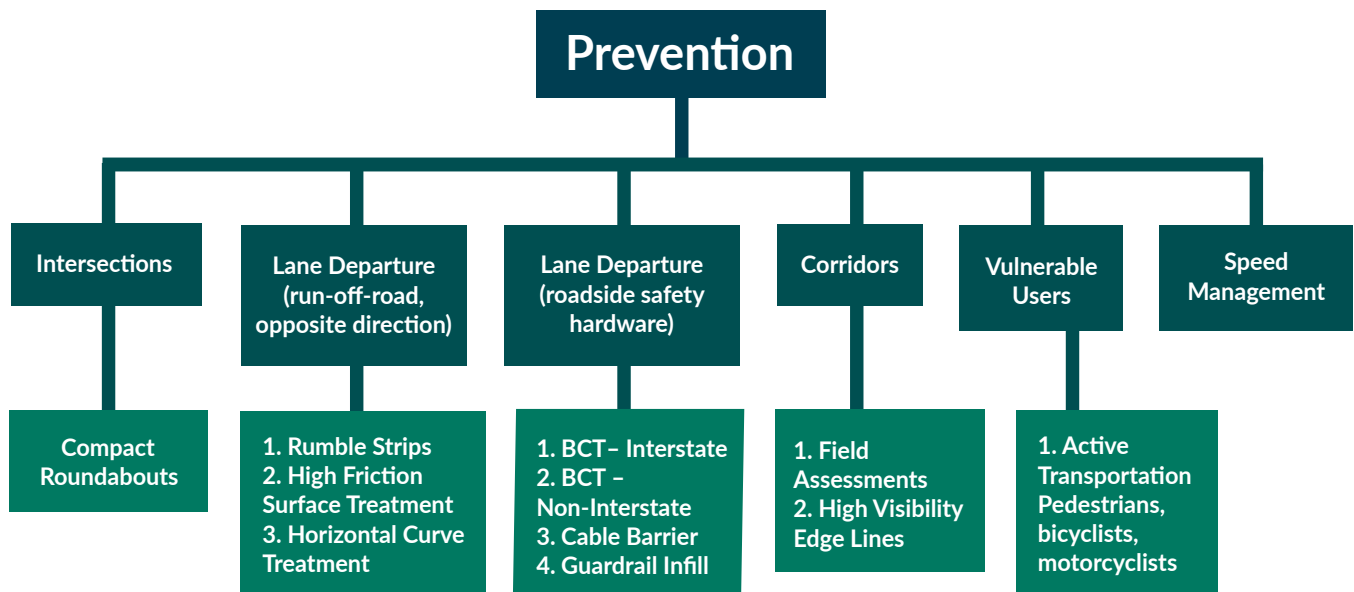
words, selection is based on an evaluation of the countermeasures relevant to the subcategory. **Exhibit 18 on page 20** illustrates this process.

The I-2 safety subprogram funding is distributed between the reduction and prevention categories based on the Target Zero emphasis areas. WSDOT targets 70% of the I-2 funding toward preventive systemic subcategories and 30% toward reduction. **Exhibit 19 on page 20** summarizes the distribution of funding. There are significant year-to-year variances. In this year's allocation, the focus will be on intersections and the installation of roundabouts.

Corridor Subcategories

In addition to the I-2 Safety subprogram, other funding subprograms may develop projects that might influence fatal and serious injury crash potential. For instance, maintenance and operational program modifications to the roadway or roadside contribute to change. When a safety activity is triggered, safety subject matter experts are consulted.

Exhibit 16. Safety Program Crash Prevention Category Subcategories



The crash prevention category also includes two subcategories that address corridors and are commonly associated with preservation and maintenance activities, respectively.

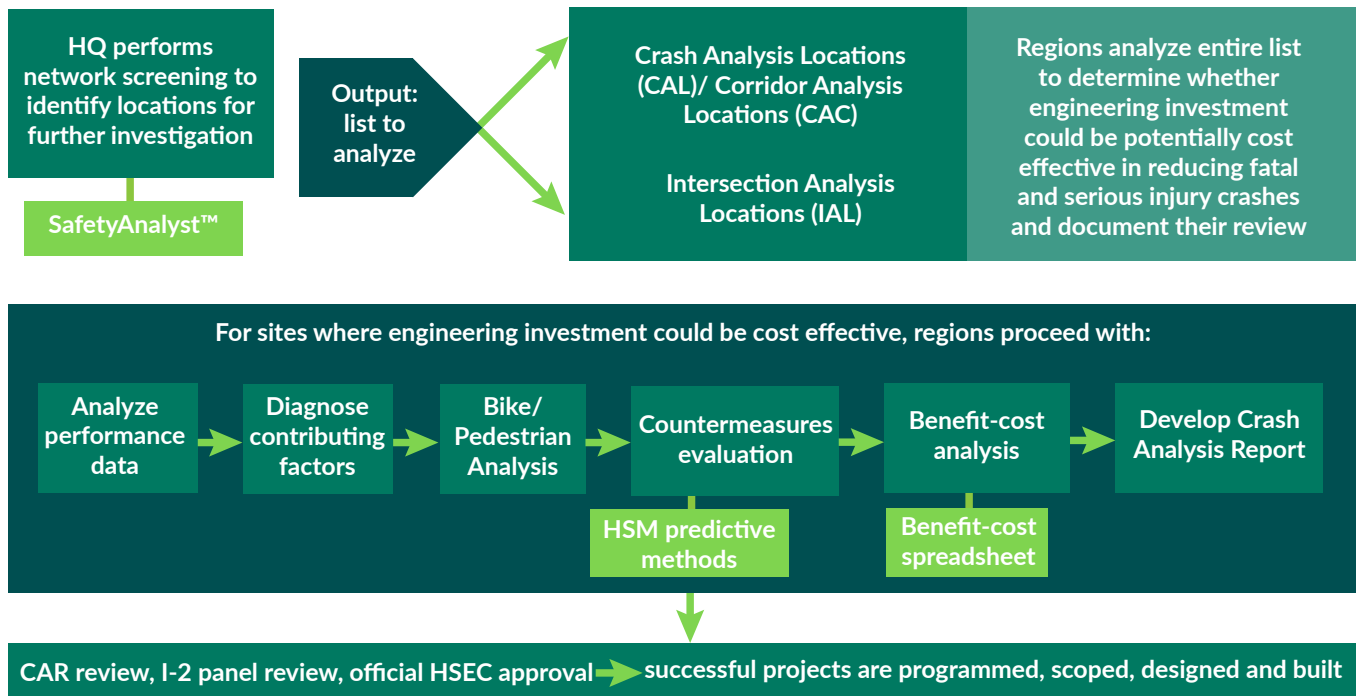
- Field assessments conducted by regional Transportation Operations staff.
- High Visibility Marking Pilot projects managed through Transportation Operations.

While these subcategories are listed as corridor approaches, treatments in other subcategories, such as rumble strips, are also deployed at the corridor level as part of considerations during pavement preservation. These investments are, however, addressed under other funding subprograms.

WSDOT is considering funding of Safety Audits and will explore funding through this subcategory. Current funding for Field Assessments is being transitioned away from HSIP funds.



Exhibit 17. Process flow for the WSDOT I-2 Safety Subprogram Crash Reduction Category



Decision-making and performance improvement

Target Zero also includes an emphasis area for decision-making and performance improvement. Activities may include examining safety roles and responsibilities related to safety within WSDOT, improving the availability, access, and/or quality of data needed to support analysis and performance management, and/or tools to improve the consistency and quality of safety management and project development and delivery.

Work conducted in support of decision-making and performance improvement is funded through the agency operating budget provided for agency staff and programs.

With the Safe System approach, WSDOT is considering a speed management subcategory for future programming, and may use this subcategory to improve its equity-based assessment capabilities as it relates to safety.

Exhibit 18. Process flow for the WSDOT I-2 Safety Subprogram Crash Prevention Category

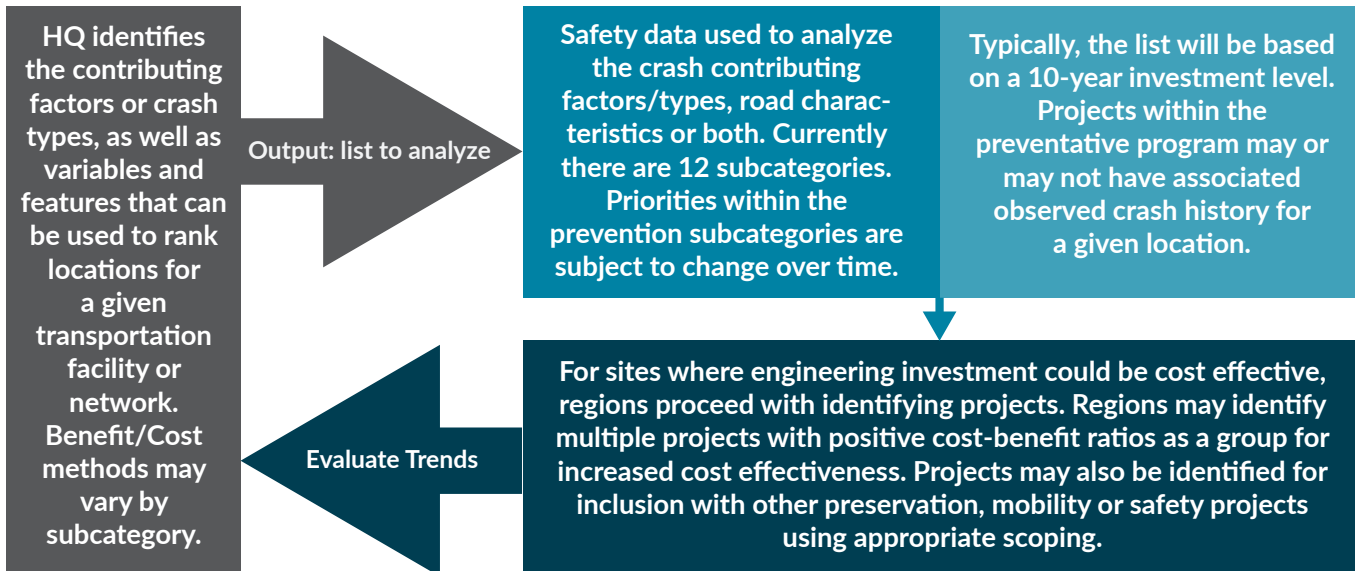
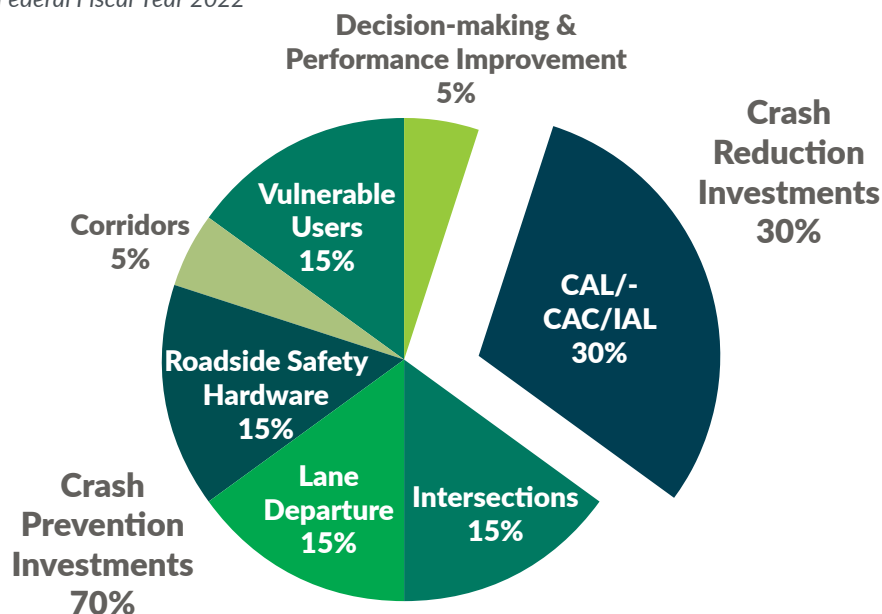


Exhibit 19. Distribution targets of I-2 Safety Funding to Target Zero Emphasis areas
Federal Fiscal Year 2022



Projects

Priority programming for state and local roads results in a prioritized list of potential projects within the Capital Program Division. Adjustments may occur to align with other programmed work (e.g., pavement or mobility improvements) and workforce capacity. For federal fiscal year 2025, \$15.9 million (30%) is expected to be allocated to roadways under WSDOT jurisdiction, \$37.2 million (70%) of available funding is expected to be obligated on local roadways under city and county jurisdiction. Refer to **Exhibit 20**.

For federal fiscal year 2025, \$164.3 million (78%) of available funding is expected to be obligated for intersection investments, \$37.6 million (18%) for lane departure investments, and \$7.9 million (4%) is expected for pedestrian and bicyclist investments. Refer to **Exhibit 21**.

The list of programmed projects identified for the FFY 2025 is provided in **Appendix C: Detailed Project List on page 84**. Benefit - Cost effectiveness of programmed projects in Prevention/Reduction categories is demonstrated in **Exhibits 48 and 49 on page 97**.

Exhibit 20. Safety Subprogram Funding Distribution by Jurisdiction Type

Anticipated obligations for Federal Fiscal Year 2025

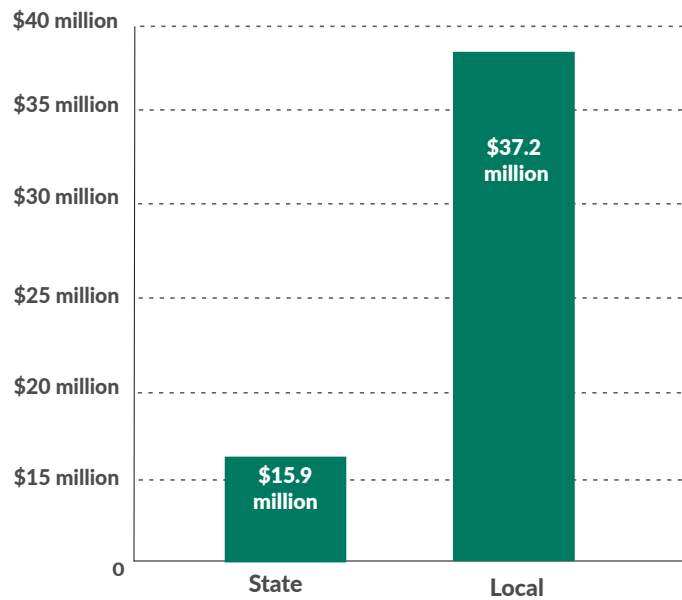
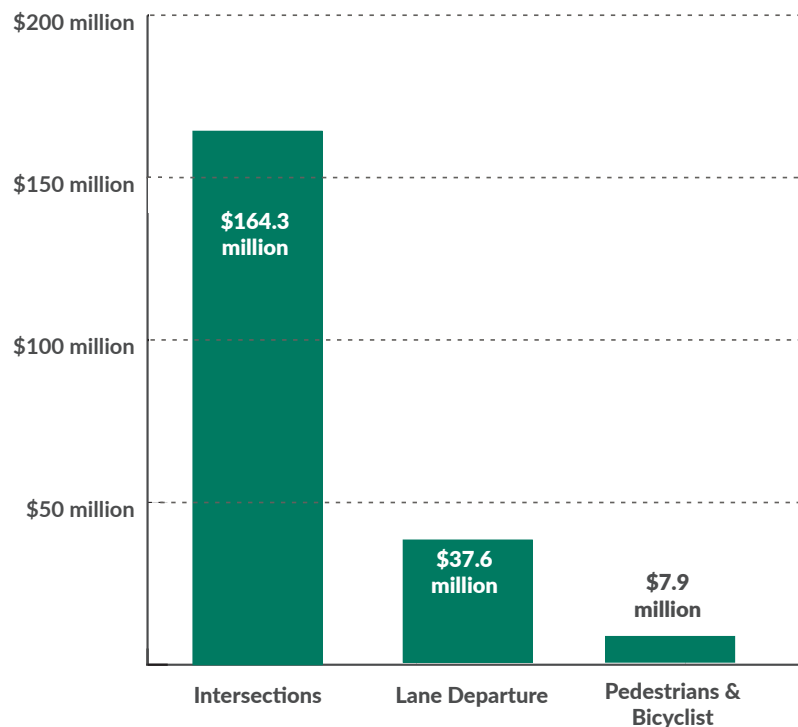


Exhibit 21. Expected Safety Subprogram Funding Obligations by Emphasis Area

Anticipated obligations for Federal Fiscal Year 2025



Performance Trends

Project Review points

Review effectiveness of previously implemented projects, countermeasures, and programs to determine needs for further considerations elaborating on:

- What countermeasures were implemented?
- Where were those countermeasures implemented?
- What crash types or severities were those countermeasures addressing?
- Were those crash types and pertinent countermeasures identified as a priority in the SHSP?
- Were those countermeasures effective in reducing fatal and serious injury crashes?

Washington State Performance Trends

The 2019 Target Zero Plan is the seventh version of this safety road map and it is now more important than ever given the increasing crash trends.

Data from 2014–2023 show Washington’s traffic fatalities and serious injuries are increasing.

Safety performance management through analysis, evaluation, and diagnosis is critical for understanding and reducing fatal and serious injury crashes. Washington is required by FHWA to set performance targets for the following metrics:

- Number of fatalities - The total number of persons dying in a motor vehicle crash during a calendar year
- Rate of fatalities per 100 million vehicle miles travelled (VMT) - the ratio of total number of fatalities to the number of vehicle miles travelled (VMT expressed in 100 million VMT) in a calendar year
- Number of serious injuries - The total number of persons suffering a serious injury in a motor vehicle crash during a calendar year
- Rate of serious injuries per 100 million VMT - The ratio of total number of serious injuries to the number of VMT (VMT expressed in 100 million VMT) in a calendar year
- Number of non-motorized fatalities and number of non-motorized serious injuries combined - The combined total number of fatalities and serious injuries among pedestrians and bicyclists during a calendar year

WSDOT and WTSC elected to report consistent targets for the first three metrics as part of the Highway Safety Plan.

WSDOT sets targets and monitors performance for highway safety by a yearly assessment of safety data. Safety performance is reported in WSDOT’s Gray Notebook, the agency’s quarterly accountability report and, in accordance with the Safe System Executive Order, on a formal basis to the Washington State Secretary of Transportation.

WSDOT's Approach to Target Setting

WSDOT and WTSC work together to determine how best to set highway safety targets for Washington state.

WSDOT uses aspirational targets such as the Target Zero method. Targets were set using the last five-year rolling average (baseline) and projecting to zero fatal and serious injury crashes in 2030.

Exhibit 22 summarizes the trend for the targets, including the number of highway fatalities and serious injuries, the rate of occurrence per 100 million vehicle miles traveled (VMT), and the number of fatal and serious injuries among people walking or biking (non-motorist). **Exhibits 23 through 27** show the five safety performance metrics. **Exhibit 28** lists trends for fatalities and serious injuries for older active transportation users and drivers.

Exhibit 22. Washington State Performance Across Five Required Safety Performance Metrics

Rolling five-year averages; 2014 through 2023

Performance Measure	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Number of Fatalities	450.0	468.2	484.6	509.6	530.2	545.4	550.0	577.6	613.6	667.8
Rate of Fatalities	0.787	0.811	0.827	0.856	0.876	0.889	0.919	0.976	1.047	1.145
Number of Serious Injuries	2,146.8	2,071.0	2,087.4	2,091.4	2,155.4	2,205.0	2,271.2	2,412.0	2,588.2	2,823.6
Rate of Serious Injuries	3.754	3.591	3.570	3.516	3.563	3.593	3.797	4.079	4.416	4.841
Number of Non-Motorized Fatalities and Serious Injuries	481.8	486.2	510.4	517.6	564.2	579.2	584.4	599.8	625.0	657.0

Note. Values represent five-year rolling averages ending in the year shown in the header. For example, the 2023 rolling average (2019 through 2023) fatality count is 667.8.



Serious injury crashes like this incident on I-5 near Fife are becoming more commonplace.

Historical performance

Since 2013, the safety performance across the current Target Zero Emphasis areas declined as fatal and serious injury crashes increased.

Safety legislation and proactive countermeasures installed by WSDOT and behavioral programs managed by WTSC contributed to the reductions. Post 2013, fatal and serious injury crashes across the emphasis areas increased to present day highs/near high totals. It is believed that travel and economic growth, coupled with numerous congestion relief projects led to a subsequent increase in crashes. With cannabis laws, and subsequently COVID-19, the number of fatalities and serious injuries have increased. After COVID-19, behaviors such as DUI, speeding, and distracted driving increased, and restraint usage decreased leading to a rapid increase in the number of fatal and serious injury crashes on Washington's public roads. With roads seeing fewer vehicles, speeds increased in many locations across the system.

WSDOT is using data from the WSDOT Engineering Data Mart, resulting in some minor differences in the total counts of fatalities and fatal crashes compared to the WTSC Coded Fatality Files data.

Using the WSDOT data, the agency can integrate the crash data more easily with roadway and other internal datasets that heavily rely on WSDOT specific mainframe location identifiers and their geospatial characteristics.

Exhibit 23. Fatalities

2006 through 2030

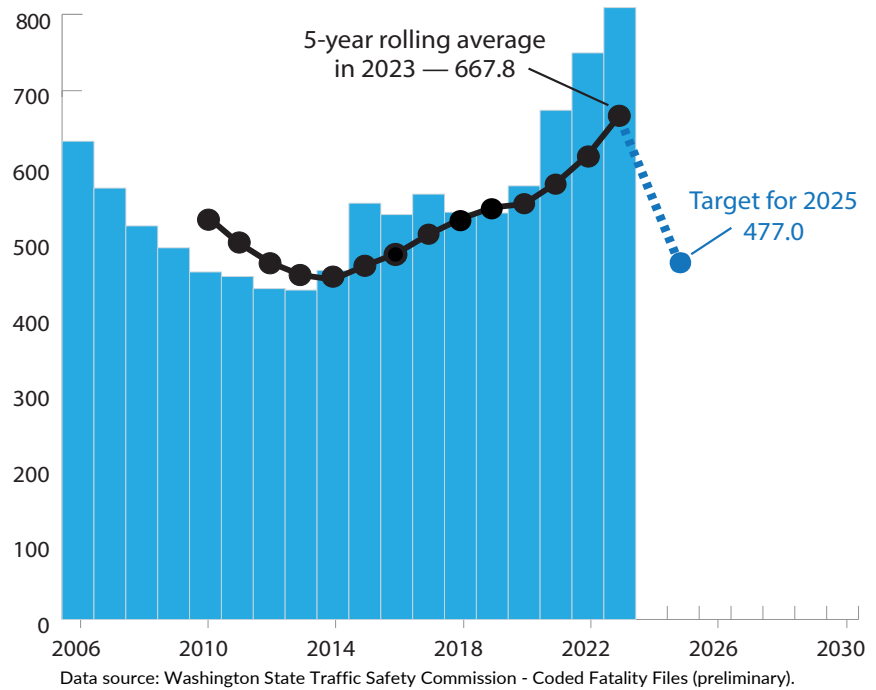
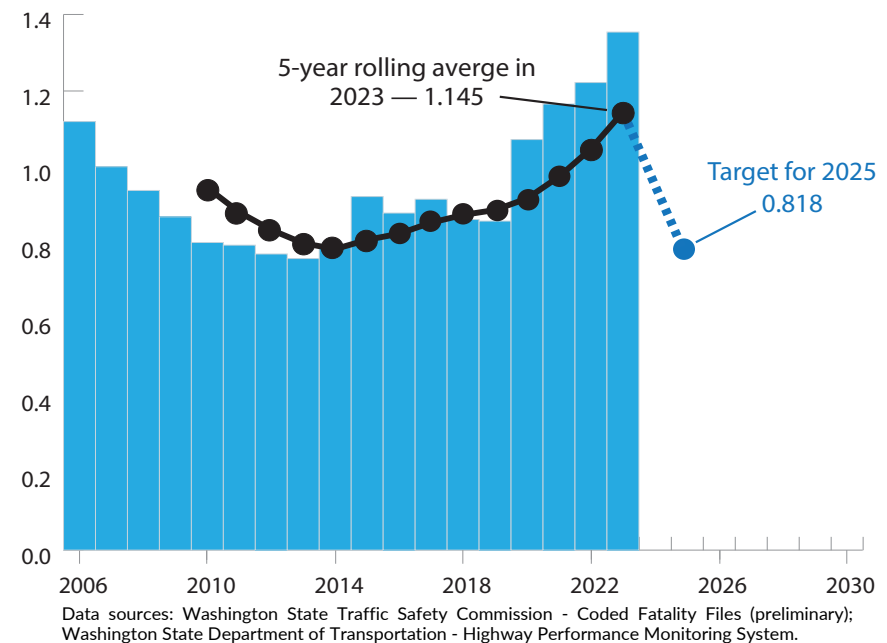


Exhibit 24. Fatality rate

2006 through 2030



Notes: Fatality data for 2023 is finalized as of January 2025, serious injury count for 2023 is as of June 2024. All data for 2023 is preliminary as of June 2024. Under 23 U.S. Code § 148 and 23 U.S. Code § 407, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not 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.

For the most part, discussion of performance is around fatal and serious injury crashes rather than individual fatalities and serious injuries.

Data from the most recent three years (2021–2023) show Washington’s traffic fatal and serious injury crashes are increasing. Refer to **Exhibit 22 on page 23**.

Exhibit 34 on page 28 shows the percentage change between the 2019 and 2023 Target Zero plan emphasis areas. Lane departures, run-off-the-road, intersections, young drivers, and older drivers involved fatal and serious injury crashes have increased by the highest percentages.

Exhibit 35 on page 29 portrays the emphasis area as a portion of the total fatal and serious injury crashes for 2019-2023. The data show lane departure, run-off-the-road, intersections, and young drivers involved make up the highest percentage of the total fatal and serious injuries.

Exhibit 25. Serious Injury

2006 through 2030

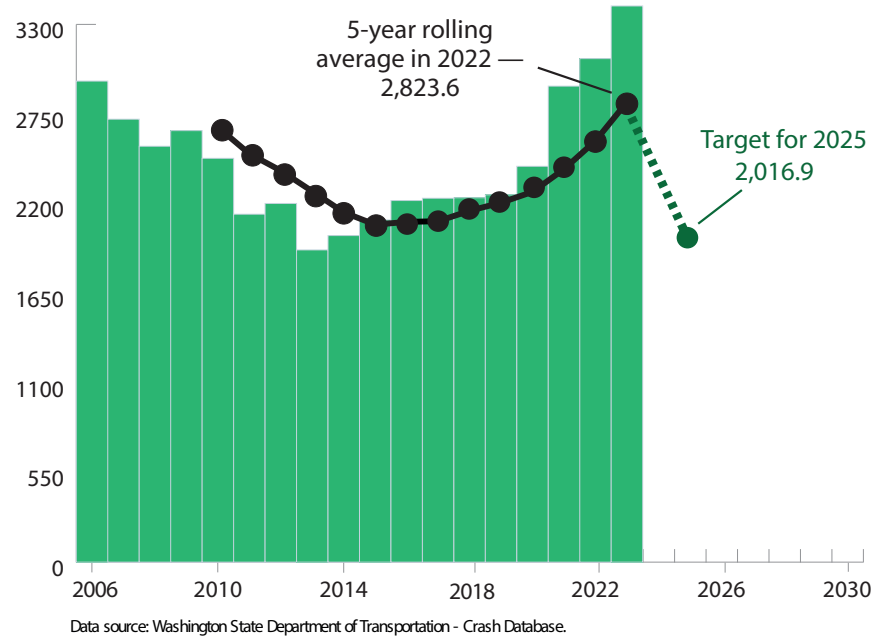
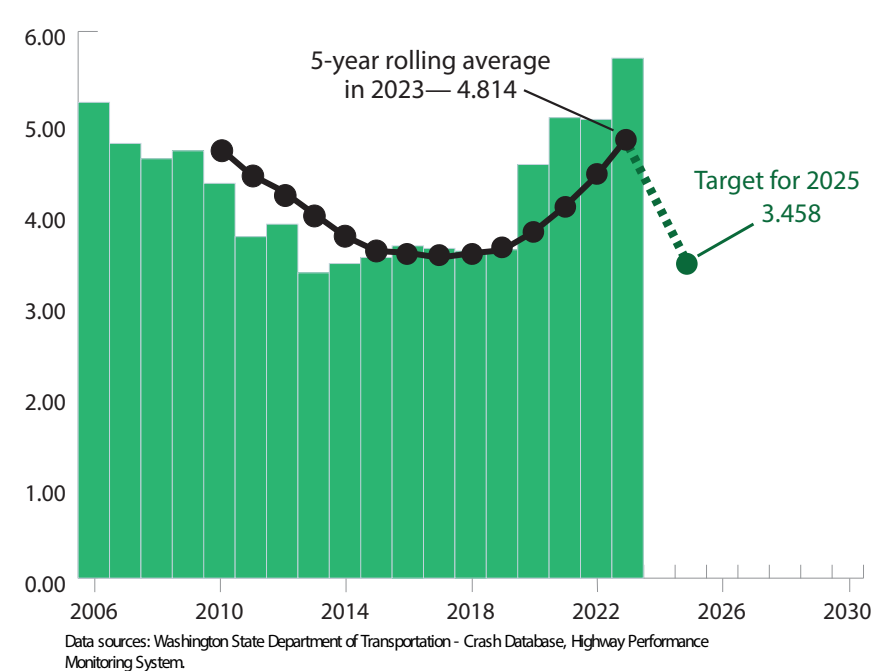


Exhibit 26. Serious Injury Rate

2006 through 2030



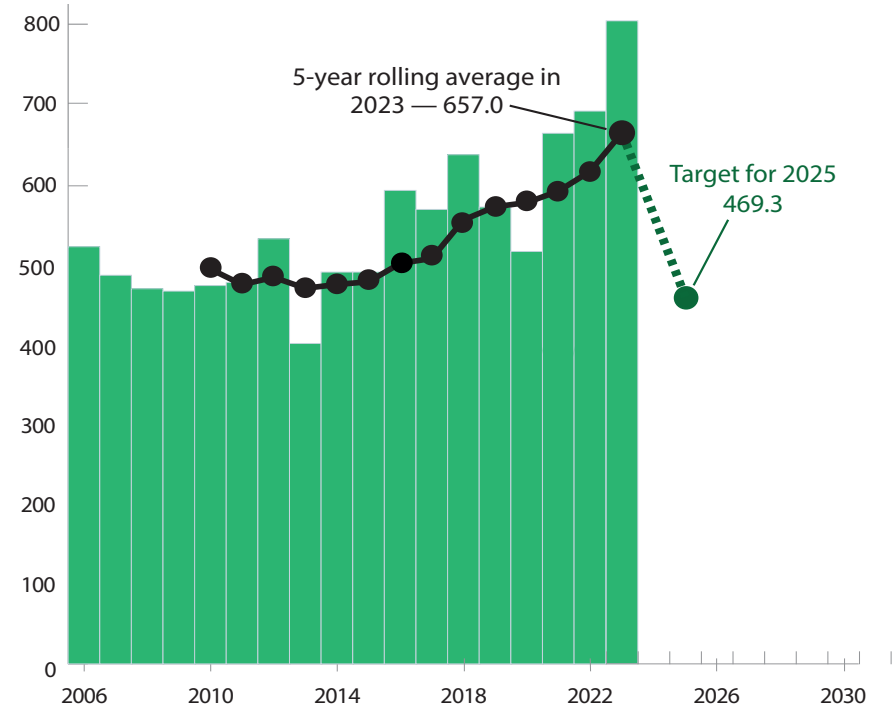
Other notable trends

- For 2023, the combined pedestrian and cyclist involved crashes remains high and account for 21.1% of total fatal and serious injury crashes.

Washington State traffic-related fatalities in 2023 reached a high not seen since the 1990s. VMT and both fatal and serious injury crashes increased in 2023. The following section presents the distribution of fatal and serious injury crashes across jurisdictions.

Exhibit 27. Non-motorist Fatalities and Serious Injuries

2006 through 2030



Data sources: Washington State Traffic Safety Commission - Fatality Analysis Reporting System; Washington State Department of Transportation - Crash Database, Highway Performance Monitoring System.

Fatal and serious injury crashes across all public roadways in Washington State

There were 18,678 fatal and serious injury crashes in Washington state between 2019 and 2023. Refer to **Appendix B on page 77**.

The five-year average annual societal cost for crashes in

Washington between 2019 and 2023 was \$24.8 billion, of which \$16.4 billion annually represented fatal and serious injury crashes. **Exhibit 29** presents the largest portions of fatal and serious injury crashes

for all public roadways across the Target Zero emphasis areas. Note in subsequent subsections how these percentages are different across the emphasis areas when considering specific jurisdictions.

Exhibit 28. Trends for fatalities and serious injuries, including older active transportation users

The rate of occurrence per 100 million vehicle miles traveled (VMT)

Types of road user involved	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
65 plus Pedestrian Fatalities	21	23	24	28	18	28	27	34	28	43
65 plus Pedestrian Serious Injuries	38	36	45	51	54	54	44	53	48	72
65 plus Bicyclist Fatalities	1	2	2	3	5	3	4	3	4	3
65 plus Bicyclist Serious Injuries	5	3	9	5	14	8	4	5	7	8
Motor vehicle driver 65 plus fatalities	88	115	117	109	101	121	98	124	144	146
65 plus Motor Vehicle Driver Serious Injuries	122	132	144	135	136	156	173	186	211	225

Exhibit 29. Emphasis areas for all public roadways in Washington State by total and percentage fatal and serious injury crashes

Top Emphasis Areas	Total Fatal and Serious Injury Crashes	% Fatal and Serious Injury Crashes
Lane departure	7,297	39.1%
Intersection related	6,007	32.2%
Involving people walking or biking	3,982	22.3%
Involving motorcyclists	3,499	18.7%
Involving heavy trucks	1,282	6.9%

Data source: WSDOT data 2019-2023

Note. Statewide centerline miles from the 2019 Miles and Daily Vehicle Miles Travelled (DVMT) Information web page at <https://wsdot.wa.gov/mapsdata/travel/hpms/annualmileage.htm>.

Fatal and serious injury crashes across jurisdictions

The distribution of fatal and serious injury crashes along with the societal cost of these crashes across jurisdictions provide valuable insight as to the safety performance of the different parts of the system and identify jurisdiction specific priorities for the Target Zero emphasis areas. This is valuable input into decisions regarding the relative investment levels likely to support effective overall reductions in fatal and serious injury crashes.

Between 2019 and 2023, 62.1% of the fatal and serious injury crashes occurred under local

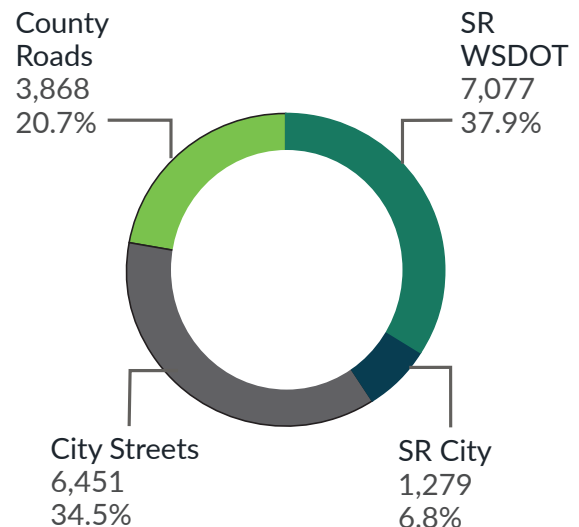
jurisdiction on public roadways in Washington state. These roadways include city streets, county roads, and state routes within cities with a population over 30,000. Refer to **Exhibit 30**.

The pie chart in **Exhibit 31** demonstrates the distribution of fatal and serious injury crashes from 2019 through 2023 across Washington: 7,077 (37.9%) crashes occurred on state routes under WSDOT jurisdiction, 6,451 (34.5%) crashes occurred on city streets, 3,868 (20.7%) crashes occurred on county roads, and 1,279 (6.8%) crashes occurred on state routes within cities with a population of over 30,000.

Exhibit 30. Distribution of fatal and serious injury crashes across jurisdiction
(Source: WSDOT Data 2019-2023)



Exhibit 31. Distribution of fatal and serious injury crashes across WSDOT jurisdiction
(Source: WSDOT Data 2019-2023)



Local jurisdiction

Local jurisdiction fatal and serious injury crashes represent 62.1% of statewide fatal and serious

injury crashes. **Exhibit 32** presents the top emphasis areas for fatal and serious injury crashes in Washington state under local jurisdictions.

Exhibit 32. Emphasis areas under local jurisdiction in Washington state by total and percentage fatal and serious injury crashes

Top Emphasis Areas	Total Fatal and Serious Injury Crashes	% Fatal and Serious Injury Crashes
Intersection related	4,478	38.6%
Lane departure	4,131	35.6%
Involving people walking or biking	3,171	27.3%
Involving motorcyclists	2,116	18.2%
Involving heavy trucks	463	4.0%

Data source: WSDOT data 2019-2023

WSDOT jurisdiction

Between 2019 and 2023, 37.9% of the fatal and serious injury crashes in the state occurred on roadways under WSDOT jurisdiction. **Exhibit 33** presents the top emphasis areas for fatal

and serious injury crashes for roadways under WSDOT jurisdiction. For state routes under WSDOT jurisdiction, there were over twice as many fatal and serious injury crashes in the lane departure emphasis area than the intersection related area.

Exhibit 33. Emphasis areas under WSDOT jurisdiction in Washington state by percentage fatal and serious injury crashes

Top Emphasis Areas	Total Fatal and Serious Injury Crashes	% Fatal and Serious Injury Crashes
Lane departure	3,165	44.7%
Intersection related	1,527	21.6%
Involving motorcyclists	1,382	19.5%
Involving heavy trucks	819	11.6%
Involving people walking or biking	810	11.4%

Data source: WSDOT data 2019-2023

City streets (excluding state routes within cities with a population over 30,000)

Between 2019 and 2023, 34.5% of the fatal and serious injury crashes in the state occurred on city streets (excluding state routes within cities with a population over 30,000). 44.9% of the crashes on city streets are intersection related

fatal and serious injury crashes and 35.9% of the fatal and serious injury crashes involves people walking or biking. **Exhibit 34** presents the top emphasis areas for fatal and serious injury crashes for city streets in Washington state.

Exhibit 34. Emphasis areas for city streets, excluding state routes within cities with a population over 30,000, in Washington state by percentage fatal and serious injury crashes

Top Emphasis Areas	Total Fatal and Serious Injury Crashes	% Fatal and Serious Injury Crashes
Intersection related	2,955	45.8%
Involving people walking or biking	2,294	35.6%
Lane departure	1,736	26.9%
Involving motorcyclists	1,109	17.2%
Involving heavy trucks	225	3.5%

Data source: WSDOT data 2019-2023

Note. Statewide centerline miles from the 2022 Miles and Daily Vehicle Miles Travelled (DVMT) Information web page at <https://wsdot.wa.gov/mapsdata/travel/hpms/annualmileage.htm>.

State Routes within cities with a population over 30,000 (local jurisdiction)

Between 2019 and 2023, 6.8% of the fatal and serious injury crashes in the state occurred on state routes within cities with a population over 30,000, i.e. local jurisdiction. There were 4.75 fatal and serious injury crashes per mile on state routes under city jurisdiction. This is much higher

than any other parts of the system. The main contributors to this high density are intersection related crashes and crashes involving people walking and biking. **Exhibit 35** presents the top emphasis areas for fatal and serious injury crashes for state routes under local jurisdiction.

Exhibit 35. Emphasis areas for state routes within cities with a population over 30,000 (local jurisdiction) in Washington state by total and percentage fatal and serious injury crashes

Top Emphasis Areas	Total Fatal and Serious Injury Crashes	% Fatal and Serious Injury Crashes
Intersection related	642	50.2%
Involving people walking or biking	465	36.4%
Involving motorcyclists	229	17.9%
Lane departure	211	16.5%
Involving heavy trucks	69	5.4%

Data source: WSDOT data 2019-2023

City jurisdiction (city streets and state routes within cities with a population over 30,000)

Between 2019 and 2023, 41.4% of the fatal and serious injury crashes in the state occurred on city streets and state routes within cities with a population over 30,000, under city jurisdiction.

Exhibit 36 presents the top emphasis areas for fatal and serious injury crashes for roads under city jurisdiction.

Exhibit 36. Emphasis areas for city jurisdiction (city streets and state routes within cities with a population over 30,000) in Washington state by total and percentage fatal and serious injury crashes

Top Emphasis Areas	Total Fatal and Serious Injury Crashes	% Fatal and Serious Injury Crashes
Intersection related	3,579	46.5%
Involving people walking or biking	2,759	35.7%
Lane departure	1,947	25.2%
Involving motorcyclists	1,338	17.3%
Involving heavy trucks	294	3.8%

Data source: WSDOT data 2019-2023

County roads

Between 2019 and 2023, 20.7% of the fatal and serious injury crashes in the state occurred on county roads.

Of the total fatal and serious injury crashes on county roads, 56.8% were lane departure crashes. **Exhibit 37** presents the emphasis areas for fatal and serious injury crashes for county roads.

Exhibit 37. Emphasis areas for county roads jurisdiction (city streets and state routes within cities with a population over 30,000) in Washington state by percentage fatal and serious injury crashes

Top Emphasis Areas	Total Fatal and Serious Injury Crashes	% Fatal and Serious Injury Crashes
Lane departure	2,184	56.5%
Intersection related	881	22.8%
Involving motorcyclists	778	20.1%
Involving people walking or biking	412	10.7%
Involving heavy trucks	169	4.4%

Data source: WSDOT data 2019-2023

WSDOT I-2 subprogram implementation

The previous section discussed how Target Zero priority levels are examined to identify emphasis areas and how WSDOT develops safety subcategories for the emphasis areas within its scope of responsibility.

One or more potential strategies (countermeasures) are identified for each subcategory. The next section provides information about each strategy, the anticipated benefits, how potential projects will be prioritized for implementation, and the anticipated costs and benefits.

Local Road Safety Strategy

WSDOT's local road safety process is implemented based on each local agency's fatal and serious injury crash history, its Local Road Safety Plan (LRSP), and countermeasure selection. Because of the varying nature and context of each location, whether it be within a county or city, a wide array of crash countermeasures are used that are specific to that location's characteristics. These characteristics are identified and evaluated within each LRSP. The LRSPs provide detail on each local agency's need.

The most common countermeasures implemented by counties relate to lane departure crashes, such as guardrail, HFST, and signing improvements. Common county intersection safety countermeasures are signal visibility and operations upgrades, roundabouts, and signage upgrades.

Cities implementation focus is related to pedestrian safety countermeasures, including road diets, rectangular rapid flashing beacons and pedestrian hybrid beacons. Summary and comparison data for developing Local Road Safety Plans are made available to local agencies through the Local Programs Division of WSDOT.

Detailed crash data are also provided to agencies through WSDOT's Crash Data and Reporting office. Other data resources include the Washington Traffic Safety Commission's dashboards and the [WSDOT Crash Data Portal](#). Community-specific data help local and regional agencies prioritize their traffic safety projects and programs, and also assists in developing localized Target Zero efforts. A data-driven approach to understanding crashes, crash types and problem identification and prioritization can provide local-level justification for allocating funds and resources.



WSDOT's Safety Strategies

The I-2 safety subprogram funding is distributed between the reduction and prevention categories based on the Target Zero emphasis areas.

Crash Reduction Safety Emphasis Areas:

- Crash Analysis Location/Crash Analysis Corridor
- Intersection Analysis Location

State Crash Prevention Safety Emphasis Areas:

Lane Departure

The lane departure emphasis area consists of run-off-the-road crashes and opposite direction crashes. Opposite direction crashes do not include any wrong way crashes. The most common crash types among lane departure crashes are fixed object crashes and head-on crashes. Emphasis area and crash type information are primary inputs to subcategory development.

Several countermeasures are considered to address these crash types, depending on the context, and contributing factors of these crashes. For example:

- Rumble Strips
- High Friction Surface Treatment Program
- Lane Departure-System Curve Treatments
- Breakaway Cable Terminal Replacement
- Cable Median Barrier (Paused)
- Guardrail Infill and Retrofit
- I-2 Subprogram Field Assessments
- Edge Line Visibility Pilot

Intersection Related

Analysis of intersection related fatal and serious injury crashes shows that vehicles entering an intersection at an angle are the most common type of crash. Some of the most

effective countermeasures to target this type of crash are roundabouts if the context and site-specific conditions are appropriate for such an installation. If the site is not appropriate for these, other countermeasures can be considered, particularly those dealing with temporary reductions in operating speed and increasing driver awareness of expectations related to conflicts at the intersection. Information about roundabouts is provided in the section on Intersection Systemic Safety on **page 45**. In 2024, WSDOT will emphasize and install roundabouts.

Other Proactive Safety Investments

Other subcategories have been established: *Active Transportation* and *Safety Decision-making and Performance Improvement*. Another subcategory, *Speed Management*, is under development. The *Active Transportation* subcategory was created to recognize and address the increase in people walking, biking, and using other forms of active transportation (mobility assisting devices) and to consider equity-related aspects. The work and methods planned for this reporting period are described in the section on Active Transportation on **page 62** as this method will be used to develop a short rank list for consideration in the 2024 funding cycle.

The *Safety Decision-Making and Performance Improvement* subcategory focuses on improving efficiency through better understanding of the resources used in highway target setting and safety management. Speed Management to achieve the principles of the Safe System has been a focus in 2023. Additional information on this subcategory is provided on **page 35**.

WSDOT completed a [Vulnerable Road User \(VRU\) Safety Assessment](#). This assessment is required by FHWA and will be an appendix to the updated Strategic Highway Safety Plan in 2024. WSDOT found strong correlation between a Washington-specific equity score and crashes at about 82%. This correlation indicates lower income and overburdened communities are more reliant on active transportation modes and subject to fatal and serious injury crashes.

Exhibit 38. Percent change in number of Fatal and Serious Injury Crashes

Washington state; 2018-2020 to 2021-2023; Percentages rounded up

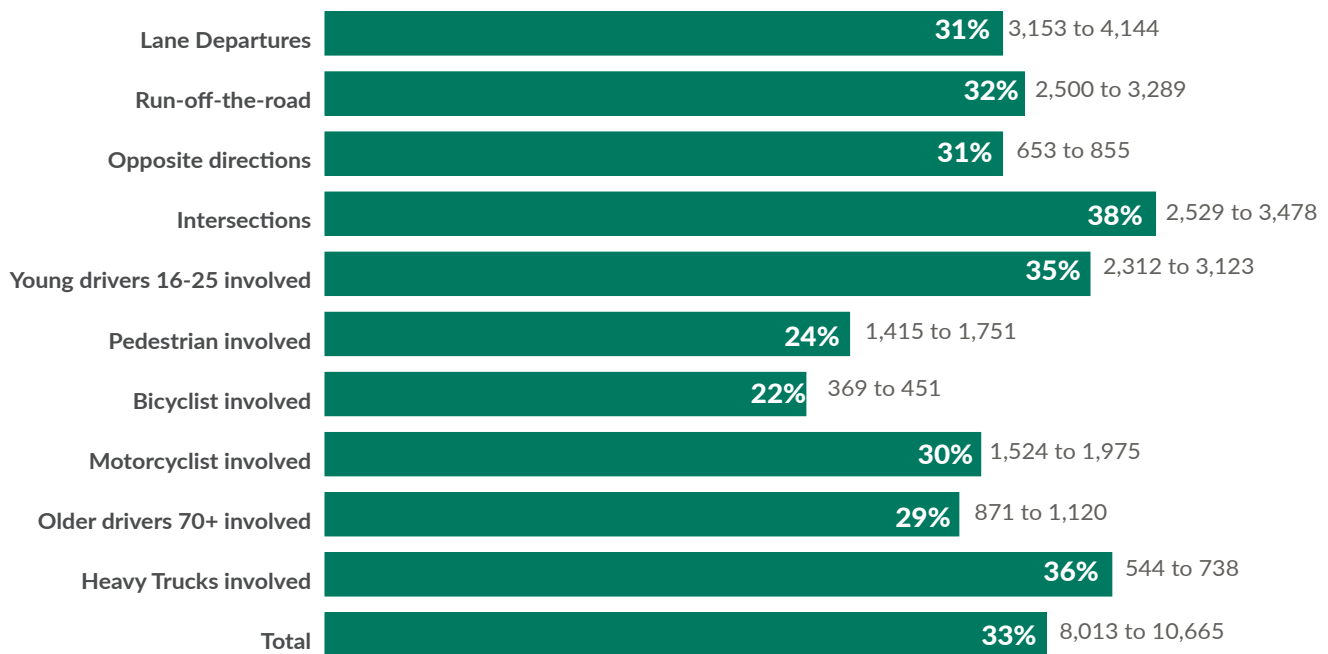
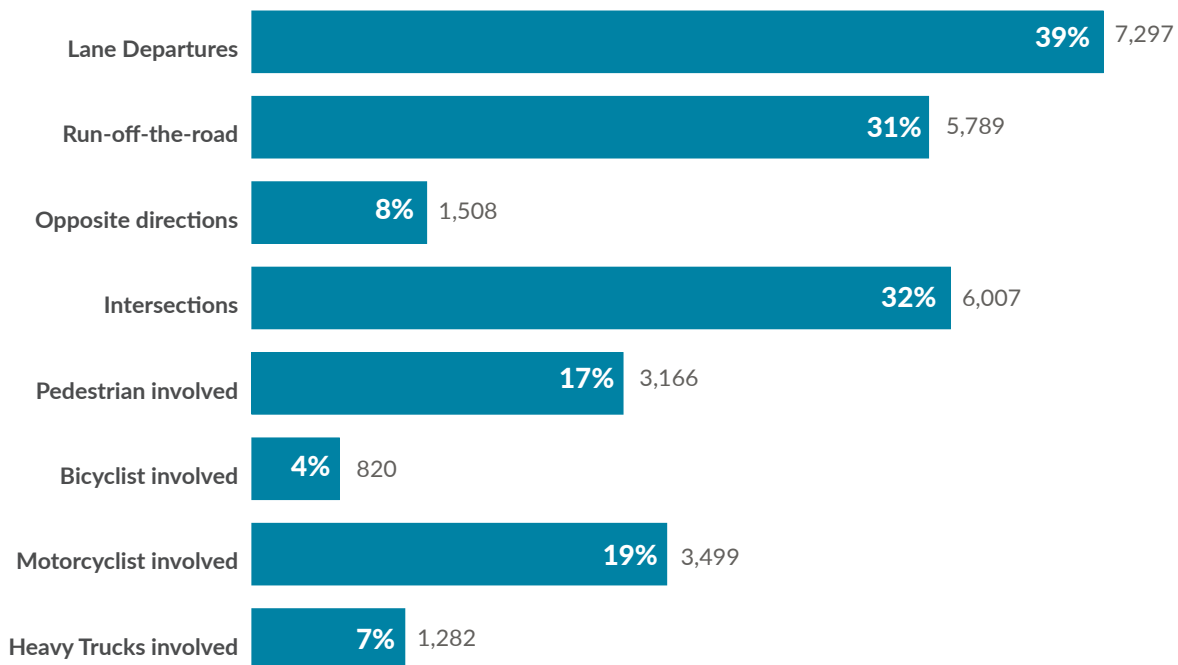


Exhibit 39. Target Zero Emphasis Areas as a Percentage of Fatal and Serious Injury Crashes

Washington state: Percentage fatal and serious injury crashes for each emphasis areas within Target Zero (2019-2023)



Countermeasure Performance

WSDOT continues to track a Crash Modification Factor Inventory based on Washington State data and project installation. Refer to **Appendix D on page 98**. This inventory is intended to aid in the assessment of the effectiveness of the countermeasures applied and their success in decreasing fatal and serious injury crashes, as well as guide WSDOT's limited resources on future investments. WSDOT did not perform updates of any countermeasures.

Opportunities

Target Zero emphasis areas are used to determine the subcategories within the I-2 Safety Program. These subcategories are outlined through discussion papers that are used in developing an implementation plan, and a two-year plan. Changes are made to the program based on evaluation results. The subcategories are typically reviewed and updated on an annual basis if necessary. Refer to **Exhibit 4 on page 9** for the current emphasis areas.

The increasing number of fatal and serious injury crashes involving vulnerable road users has led to the development of a method for active transportation investment considerations. A ranked list of these subcategories was developed in early 2023.

Evaluation of Countermeasures

If an observational before/after evaluation is conducted without any consideration of non-treatment sites (i.e., with no safety performance frameworks and no comparison group), this is referred to as a simple or naive before/after evaluation. Such evaluations do not compensate for regression-to-the-mean bias or compensate for general time trends in the crash data. For more information, Refer to the Highway Safety Manual, 1st Edition. 2010, AASHTO.



Exhibit 40. Summary of WSDOT's I-2 Subprogram Strategies, Emphasis Areas and Subcategories
 Target Zero emphasis areas; Washington state; 2022

Type of Investment	Emphasis area	Strategies/Subcategories
Crash Reduction Safety Investments	Intersection-related	Intersection Analysis Locations
	Lane departure	Crash Analysis Locations/Crash Analysis Corridors
Crash Prevention Safety Investments	Intersections	Compact roundabouts
	Lane departure	Rumble Strips
		High Friction Surface Treatment Program
		Systemic Curve Treatments
		Breakaway Cable Terminal Replacement
		Cable Median Barriers Conversion (paused for evaluation)
		Guardrail Infill and Retrofit
		Field Assessments
	Edge Line Visibility Pilot	
	Active Transportation	Walkways
Safety Decision-making and Performance Improvement	Rectangular Rapid Flashing Beacons	
		Safe System - Speed Management



The SR 510 diverging diamond in Lacey was the first of its kind in Washington and significantly reduced the number of potential conflict points for travelers entering and exiting I-5 from the busy state route.

Safe System Approach



WSDOT began its journey towards the Safe System Approach in 2013 and focused on proactive ways to address the contributing factors and crash types that lead to fatal and serious injury crashes. This approach also aims to install systems to reduce potential crash forces (such as roadside safety systems, roundabouts, and target speeds), and change design practices to consider context and modal priority on the state highway system.

Remaining consistent with the Cooper Jones Active Transportation Safety Council, WSDOT and its partners incorporated the Safe System Approach into the Washington State Target Zero plan in 2019. WSDOT's Active Transportation Plan in 2021 provided additional analysis concerning the disproportionate crashes for vulnerable road users, particularly in locations affected by decisions that created wide, fast, and busy roadways lacking

walking/biking facilities in certain neighborhoods while insulating others from these contributors to crash exposure.

WSDOT incorporates Complete Streets designs using the Safe System Approach for all projects greater than \$500,000. WSDOT is taking an equity-based approach to the safe system—recognizing that legacy routes and past decisions have left portions of the population reliant on walking, biking and rolling in areas without the sidewalks, separation, or medians that are often necessary for Complete Streets and adhering to the Safe System Approach.

WSDOT has added Safe Land Use to the elements for the safe system to recognize that land use and road interactions are critical, and need to provide for reduced vehicle demand, transit accessibility and connections to other modes of transportation. WSDOT continues to evolve the implementation of Complete

Streets, and sees the efforts as being beneficial to successfully applying the Safe System Approach. To further these efforts, the agency held a safety town hall meeting informing staff of the urgency needed in addressing fatal and serious injury crashes.

Key initiatives highlighted in that town hall included implementing speed management/injury minimization policy and advancing systemic safety for active transportation users with an equity lens. In addition, policy and guidance development prioritized implementing of the Safe System Executive Order (EO 1085.01), updating the Strategic Highway Safety Plan within the Safe System Approach, and developing a roundabout-first policy. As appropriate, WSDOT will fully incorporate the concept of the Safe System approach in all design and operations training.

WSDOT's updated Executive Order 1085, Road Safety – Advancing the Safe System Approach for All Road Users was published in April 2023. In this update, WSDOT varies from FHWA in describing the Safe System Principles to be more in alignment with the international approach as it provides a more active description of the Safe System Approach.

Consistent with AASHTO's Action Plan of 2024, WSDOT defines safety within the safe system as:



- **Exposure** refers to all road users, in what number and for how long they are using the road therefore are exposed to a potential crash. What strategies—infrastructure, behavioral, or vehicular—will reduce exposure to fatalities and serious injuries, measurable by factors such as road user volumes, segment lengths and conditions, and conflicts between road users.
- **Likelihood** refers to factors affecting the probability of a crash occurring. What strategies will reduce the potential for fatal and serious injury crashes? What strategies will reduce the potential for—and improve road users' knowledge of—preventing physical damage to themselves and other roadway users? What countermeasure programs are being utilized to effectively plan data-driven programs focused on affected communities or high-risk road users? What patterns exist that demonstrate a need to address a safety issue within disadvantaged or historically under-invested communities and populations?

- **Severity** refers to factors affecting the probability of injury should a crash occur, with particular focus on fatal and serious injury crashes. How do we consider kinetic energy in crashes, the human body's tolerance of impacts, and protections from the system (vehicle, roadway environment, road users) to prioritize strategies that will limit crash severity? How do we effectively foster safe speeds relative to the context of the roadway and the surrounding environment?

Target Zero is focused around the principles and elements of the updated WSDOT Safe System Approach as outlined by **Exhibit 41**.

WSDOT recognizes the value of implementing the Safe System by updating its authoritative documents, such as the Design Manual, and safety analyses to include active transportation by explicitly requiring that all road users be considered when changes are made to improve vehicle operations.

Exhibit 41. WSDOT Safe System Approach Elements & Principles



Exhibit 42. Safe System Alignment

Type of Investment	Strategy Subcategories	Safe System Approach		
		Exposure	Likelihood	Severity
Reactive Safety Category	Intersection Analysis Locations	✓	✓	✓
	Crash Analysis Locations/Crash Analysis Corridors	✓	✓	✓
Proactive Safety Category	Intersection Systemic Safety	✓	✓	✓
	Rumble Strips		✓	
	High Friction Surface Treatment		✓	✓
	Systemic Curve Treatments		✓	
	Breakaway Cable Terminal Replacement			✓
	Cable Median Barriers			✓
	Guardrail Infill and Retrofit			✓
	Field Assessments			
	High Visibility Edge Line		✓	
	Active Transportation	✓	✓	✓
	Speed Management			✓
Decision Making and Performance Improvement	✓	✓	✓	

Exhibit 42 shows the WSDOT program is developed to address the Safe System holistically and comprehensively. The chart shows that the principles of *Death and Serious Injuries, Shared Responsibilities and Strengthen All Parts* are identified in all subcategories. The Safety Improvement Subprogram has been developed to reduce fatal and serious injury crashes across all subcategories.

WSDOT reviews the contributing factors to crashes. Common human behaviors are apparent in the factors that have led to a crash or are known to increase the potential for a crash. While the traditional approach to road safety might lead other agencies to determine that behavioral interventions should occur at that location as the sole countermeasure, WSDOT analyzes whether a crash reduction or crash prevention infrastructure countermeasure could be put in place to reduce the frequency of fatal and serious injury crash outcomes. These considerations are in recognition of the *Shared*

Responsibility and Strengthen All Parts elements in the Safe System Approach. Approximately 70% of WSDOT's Safety Program addresses Proactive Safety.

Intersection Analysis Locations, Crash Analysis Locations/Corridors

The IAL, CAL/CAC subcategories focus on crash reduction. The elements addressed in these subcategories are safe roads, safe speeds, and road users. A common treatment for these locations is to reduce angle and higher speed rear end crashes to prevent large crash forces. Countermeasures often include adding roundabouts and turn lanes.

To support safe road user behaviors, lighting, signing, striping, and channelization consistent with crash contributing factors help increase awareness and understanding within the given context of the road. The subcategory allows for projects that separate users in space and time, reduce speeds, and remove signals.

Intersection Systemic Safety

This subcategory commonly installs compact roundabouts which help reduce large crash forces and support safe road user behaviors through speed management. WSDOT designs these intersections to reduce speeds to approximately 25 mph in the roundabout, greatly benefiting crossing treatments for those walking and biking while resulting in higher yielding rates by drivers.

Rumble Strips, High Friction Surface Treatments, Systemic Curve Treatments and High Visibility Edge Lines

This group of proactive treatments are directed towards reducing crashes related to a specific crash types such as lane departure, wet weather, and run off road crashes. WSDOT's goal within these subcategories is to reduce crash potential by supporting safe road use.

Rumble strips help alert drivers to errors and lane departure; high friction surface treatment helps maintain traction that is beneficial to sudden stopping at intersections and control issues in curves; systemic curve treatments provide drivers information and warning; and high visibility edge lines provide information about lane departure and assist drivers' decisions in lower visibility conditions.

Breakaway Cable Terminal Replacement, Cable Median Barrier, Guardrail infill and Retrofit

When drivers run off the road these roadside systems are installed to reduce fatal and serious injury outcomes by reducing the occupant forces



Three-strand cable barrier on I-5 near Bellingham prevented this vehicle from crossing over the highway median into oncoming traffic.

in the crash. It is recognized by safety professionals that roadside crashes are often the result of behavioral factors, and roadside safety barrier is placed recognizing that should a crash occur, these systems can reduce injury outcomes.

Roadside safety hardware provides system redundancy and are provided along with other road safety components, such lane striping, rumble strips, signage.

Active Transportation and Speed Management

The Active Transportation subcategory is provided to reduce potential crashes to those walking, biking, and rolling.

The intent is to create systems that reduce exposure to large crash forces by reducing speeds; increase the alertness and attentiveness for those in vehicles by providing crossings;

and provide separation or facilities at appropriate locations. In doing so the subcategory intends to support safe road user behaviors and reduce exposure to large crash forces.

Field Assessments and Decision Making and Performance Improvement

This subcategory recognizes the importance of the 5th E of Safety (Evaluation, Analysis and Diagnosis). In the Safe System Approach the 5th E is a critical component of Safety Management. Safety decisions are made based on the understanding of road systems contexts, priorities, and needs.

These subcategories are used to assess potential opportunities where safety investments would be beneficial, as well as to evaluate, analyze, and diagnose what modifications could occur at a project, subcategory, or at the statewide level.

Complete Streets



WSDOT prioritizes Complete Streets tools and processes to support the agency's [Target Zero](#) commitment to ending fatal and serious injury traffic crashes on Washington's transportation network.

Complete Streets is an approach to planning, designing, building, operating and maintaining the state's integrated multimodal transportation network to offer everyone safer, more convenient access to destinations no matter how they travel. [RCW 47.04.035](#) requires that all state transportation projects exceeding \$500,000 include a Complete Streets approach to planning, designing, and constructing facilities that contribute to network connectivity and safety for pedestrians, bicyclists, and people accessing public transportation and other modal

connections. As a result, correcting deficiencies in facilities for the most vulnerable users of the transportation system is a standard component of most state transportation projects.

Complete Streets aligns with the Safe System Approach and Traffic Zero, which means that whether WSDOT is building new facilities or preserving an existing roadway, the agency will make design decisions that reduce the exposure, likelihood, and severity of crashes for all road users. Complete Streets creates appropriate and comfortable space for all users, and reduces conflicts between them in line with recommendations from WSDOT's Vulnerable Road User Safety Assessment and Injury Minimization and Speed Management Policy Elements and Recommendations.

The following outlines steps WSDOT has taken toward this successful integration over the past two years, and how these steps connect with the agency's highway safety goals:

Establishing organizational structures and internal knowledge bases that support this work:

- The initial stages of implementing Complete Streets required establishing organizational structures and teams that support cross-agency collaboration, improving WSDOT's ability to integrate Complete Streets projects while aligning with legislative requirements. WSDOT developed multidisciplinary Complete Streets teams, consisting of experts in project design and implementation, in each region to better embed the agency's approach.

WSDOT also initiated staff training to strengthen internal understanding of the requirement and developed specific workflows for processing Complete Streets, which bolstered the agency's ability to deliver projects that accounted for every road user.

- As WSDOT created these organizational structures, it prioritized equity from the outset. There are a number of ways to implement Complete Streets improvements on a location-by-location basis. A core part of WSDOT's approach is to focus on communities and ensure collaboration with local partners—taking measures like reallocating existing roadways towards active transportation connections, reducing vehicle speeds, and other actions recommended for improved safety performance.

Improving internal knowledge of Complete Streets tools and practices:

- By leveraging its expertise in Complete Streets requirements and existing project workflows, WSDOT is developing and disseminating tools to help people across the agency integrate Complete Streets into their practices. These tools help staff fully understand needed changes to their design processes to account for Complete Streets, but also institutionalize the fact that Complete Streets—and

consequently equitable multimodal considerations—are necessary to the way WSDOT designs streets.

Tools include updates to agency standards, criteria, and guidance like WSDOT's design manual; agency-wide staff trainings on these design updates, as well as the Complete Streets approach; and communication strategies such as informational documents, talking points and videos that help staff convey the benefits of the Complete Streets approach to partners, community members and each other. WSDOT also uses a continuous improvement approach to ensure the direction employees are receiving carries through all steps of project delivery.

- In line with that approach, WSDOT is continuously enhancing understanding of design through updates to design policies that consider the unique needs of varied infrastructure—like ferries and intersections—while ensuring comprehension of safety performance design criteria such as level of traffic stress. WSDOT is expanding an internal database of webinars and trainings that serve as a living library of educational materials, as well as case studies of how Complete Streets are being implemented at the agency.

Moving projects and research forward:

- In addition to establishing the teams and tools required to advance Complete Streets, projects have moved forward through screening, pre-design and design processes. Every WSDOT region has projects being screened for Complete Streets, with more than 780 screened to date, more than a third of which are in contexts that lend themselves towards walking and biking, and will be developed with a Complete Streets approach.

Almost 70% of the 290 identified Complete Streets projects are preservation projects, but the majority of these are on hold due to a lack of funding. If WSDOT doesn't have project funding, the agency cannot make these Complete Streets improvements. Preserving Washington's transportation system and

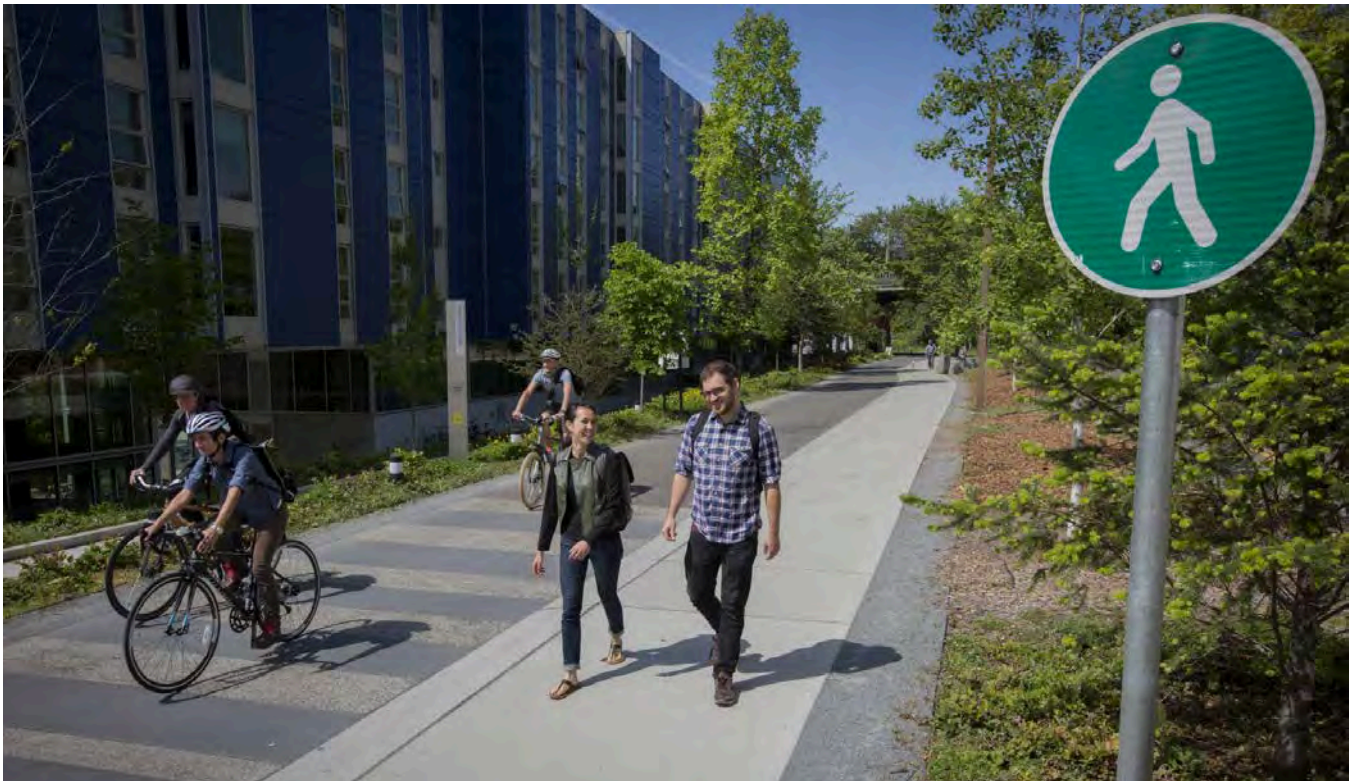
implementing Complete Streets are equally important, and WSDOT needs to deliver both. With insufficient funding for maintenance and preservation, WSDOT is falling further and further behind on the agency's ability to make the transportation system work well for everyone who uses it.

Complete Streets provides the opportunity to use projects to preserve the system while meeting goals for safety, equity, greenhouse gas reduction, resilience, and thriving communities. However, projects must be fully funded to implement Complete Streets on the existing system.

- Nationally and internationally, this is a time of rapid innovation in best practices in

building, operating, and maintaining active transportation facilities. WSDOT is actively contributing to that knowledge development as well as keeping up to date on innovations led by others and appropriately incorporating them into agency guidance, criteria, standards, and business processes.

One example is a research project WSDOT is undertaking with assistance from the University of Washington that will inform the agency's understanding of needed maintenance on active transportation facilities to help maintain them in long-term good condition. Another example is a research project WSDOT is doing with Portland State University to expand on and refine the integration of a Safe System approach into project decision-making.



Students at the University of Washington in Seattle enjoy safe access to and from housing via easily accessible paths that can be walked and biked.

Crash Analysis Location/Crash Analysis Corridor/ Intersection Analysis Location



The Crash Reduction subcategory intends to reduce the number of fatal and serious injury crashes consistent with the goals outlined in Target Zero. There are two methods of analysis used to identify locations for further investigation: Crash Analysis Locations/Crash Analysis Corridors (CAL/CAC) and Intersection Analysis Locations (IAL) on the state highway system.

Background

In 2011, WSDOT's Highway Safety Executive Committee formally adopted the Highway Safety Manual (HSM) for statewide implementation. The HSM provides information and tools to evaluate roadway sites and select those that have a high potential for countermeasures to reduce crash severity and frequency.

The HSM helps assess potential countermeasures to mitigate the factors contributing to crashes.

Each biennium, WSDOT uses AASHTOWare SafetyAnalyst® to create ranked CAL/CAC & IAL lists for review by WSDOT's regional offices as a part of the capital project safety programming process for the I-2 program.

The CAL/CAC and IAL on state highway system strategies address crashes that fall within all Target Zero monitored emphasis areas: high risk behavior, crash type, road users, and other monitored emphasis areas.

In 2024, WSDOT is transitioning from AASHTOWare SafetyAnalyst® to the SPF tool. In addition in Accordance with EO 1085.01, WSDOT will be reviewing and updating its

Key Takeaways

- CAL/CAC and IAL on state highway system are methods to screen corridors and intersections for project sites where crash severity and frequency could potentially be reduced.
- WSDOT estimates that constrained needs for this program are approximately \$84 million, or 12.8% of the entire 10-year safety plan.

practices related to network screening for the Crash CAL/CAC, IAL processes as needed. In this transition, the agency will begin using the new SPF tool. WSDOT may also include quantitative tools related to the Safe System. Because of this the current CAL/CAC and IAL ranked lists will be retired and replaced as the Department reviews and updates the overall I-2 safety subprogram. WSDOT may also combine CAL/CAC/IAL into a single list.

Methodology

- Identify sites where average fatal and injury crash frequency and severity could potentially be reduced.
- Perform network screening using a sliding window and peak searching to establish reference populations. Managed access highways within cities with a population over 30,000 are not included, as these rights of way are managed by the cities in which they are located.
- Rank sites from high to low based on the expected average crash frequency using Empirical Bayes (EB) adjustment—a type of statistical estimation that addresses randomness and provides increased statistical reliability compared to using a crash history for safety performance estimations.
- Screen locations using a cutoff criterion of 0.5 expected (CAL/CAC) or 0.3 excess (IAL) crashes per year.

The CAL/CAC and IAL lists are created and distributed (CAL/CAC in odd years, IAL in even years) to regions for the following actions:

- Review the lists and confirm the Safety Analyst crash data is accurate.
- Determine if modifications are appropriate based on the context, type and contributing factors for the crashes. Consistent with the Safe System analyze the sites to determine whether education, enforcement or engineering countermeasures alone or together would be appropriate to address crashes at individual locations.
- If countermeasure(s) are determined to be appropriate, identify locations that can be addressed with Low Cost Enhancement (LCE) funding. If the action needed exceeds the LCE funding limit, analyze the location for possible inclusion in the I-2 program.
- Use the Crash Analysis Report (CAR) template to document an evaluation of the site and the benefit/cost analysis results for selected alternatives. This benefit/cost data will be considered in the priority ranking of projects. Document all proposed actions or reasons for no actions taken in the CAR report.
- Present the crash analysis report for proposed I-2 projects to the selected I-2 safety panel of senior and executive level traffic engineers, designers and safety experts from across the state. This group recommends modifications or acceptance of each project, emphasizing countermeasures that are both lower cost and cost-effective for CPDM's programming consideration.

Benefits

The implementation of a science-based, technical approach for selecting countermeasures with the highest benefit-cost ratio is in line with the agency's Safe Systems Safety Program. Additional benefits of the program include:

- Reducing the potential for and severity of crashes occurring on roadways.
- Providing a reliable assessment of crash potential before and after modifications.
- Considering how modifications might change crash potential for all types of road users.
- Improving the skills and developing the abilities of WSDOT's workforce in crash analysis and in-field reviews, achieving increased consistency in crash analysis reporting across the state.

Costs and Benefit/Cost Ratios

Cost and benefit/cost ratios are developed after the regions develop Crash Analysis Reports that are endorsed by the I-2 Panel and programmed by CPDM.

Ten-Year Constrained Budget Outlook for the I-2 program

The current estimated 10-year needs for the I-2 program under the \$657 million revenue available is approximately \$84 million. This would account for 12.8% of the 10-year safety plan.

Note: Refer to **Appendix C** for FFY 2025 projects.



Intersection Systemic Safety



Intersection systemic modifications can result in substantial increases to intersection safety performance where investigation of speed, approach skew angle, crash history, traffic volumes, and other criteria indicate potential for improvement.

Background

The Strategic Highway Safety Plan (SHSP) identifies intersection related crash types as a Target Zero “level one” priority, and further identifies the most common type of fatal and serious injury crashes at intersections as enter-at-angle. According to the 2019 SHSP, there were 377 fatalities and 2,256 serious injuries at intersections in Washington state. The SHSP states, “Some of the most effective strategies to reduce the likelihood or severity of crashes at intersections for all users include converting intersections to roundabouts.” This effort is part of the I-2 Safety Program, Crash Prevention, intersection modifications (with compact roundabouts being a strategy).

WSDOT has recently constructed several compact roundabouts (inscribed circle diameter of approximately 90 feet) as a practical solution that minimized costs while reducing fatal and serious injury crash potential at locations with enter-at-angle crash type. This effort continues that successful approach under the I-2 Safety, Crash Prevention program.

Key Takeaway

- Recently installed compact roundabouts have benefit/cost ratios ranging from 15:1 to 50:1.

The statewide intersection list of potential compact roundabout locations has been developed, ranked, and screened for feasibility. Locations that are feasible for a compact roundabout will be programmed within the safety program according to rank and other considerations, such as average annual daily traffic, posted speed limit, biennial funding available, and other projects being delivered. Once these locations have been fully programmed and there is identified capacity within the crash prevention program, the intent is to re-evaluate statewide intersection performance and update the list, as needed.

Methodology

Intersection systemic safety modifications are intended to reduce crash potential by reducing operating speeds and conflict points. The screening criteria targeted intersections that:

- Had a recent five-year crash history of an annual excess crash frequency of 0.5 or more for fatal and all injury crashes per the Highway Safety Manual methodology
- Had space for an approximately 90-foot inscribed circle diameter center island
- Categorized as a stop-controlled intersections
- Intersections within cities having a population over 30,000 are excluded per [RCW 47.24](#).

Using the screening criteria, a statewide un-signalized intersection list was developed. The list was ranked based upon excess crash frequency. This list was provided to region engineers in the fall of 2020.

Region engineers screened out locations that were considered not feasible for a compact roundabout; such as in cases where the intersection could not accommodate a 90-foot inscribed circle diameter,

had too high of traffic levels, or if other recent countermeasures had been applied that should be monitored prior to additional countermeasure application. The remaining locations formed the I-2 Crash Prevention – Compact Roundabout List.

Benefits

When a high-speed stop-sign intersection is converted to a single-lane roundabout, the intersection may see up to a 90% reduction in fatal and serious injury crashes. Using the excess crash frequency from the ranked list and a Crash Modification Factor (CMF) of 0.22, twenty-year present worth of benefits were calculated and ranged from \$2.7 million to \$15 million, with an average of \$6.3 million. Using the estimated range of project costs (\$600,000 to \$1,000,000), implementation of the program translates to a benefit-cost ratio ranging between 6 and 10.

Costs

Compact roundabouts are low cost, with total costs ranging from \$2 million to \$3 million. Preliminary engineering costs are low because all work is done in existing right of ways. In addition, environmental permitting is minimal, the risk of cost escalation during construction is low, and construction working days are few so the impact to the public is minor. Because there are no moving parts to this intersection control type, maintenance costs are negligible, so adding this asset to WSDOT's inventory is essentially cost neutral.

Ten-Year Constrained Budget Outlook for the I-2 program

Without projects the legislature classifies as I-2, which may or may not align with Target Zero, it averages \$93.5 million per biennium. The current estimated 10-year revenue available would be \$468 million. Finally, we are not targeting a specific amount of roundabouts at this point.

High Friction Surface Treatment



High Friction Surface Treatment is a widely applied countermeasure that addresses run-off-the-road crashes and wet weather crashes. The higher pavement friction helps drivers maintain better vehicle control in both dry and wet driving conditions.

Background

High Friction Surface Treatment (HFST) has proven to be a valuable, low-cost tool for mitigating crashes at specific locations. This countermeasure is most often used at locations with a higher friction demand (i.e. ramps, horizontal curves) and is effective at sites with a history of wet weather crashes.

The potential crash reduction benefits of HFST align with the Washington State Strategic Highway Safety Plan

- Target Zero, as this treatment addresses two separate priority level 1 emphasis areas: Lane Departure and Speeding Involved crashes.

There has been significant debate over the potential for HFST to reduce pavement surface life due to the concerns about HFST epoxy and surface texture deterioration. Because of the potential for reduced service life, additional pavement treatment may be needed. Approximately 100 HFST projects have been completed by local agencies, with about half in King County.

WSDOT has applied HFST to several ramps in its Northwest and Southwest regions over the past five years. As a result, wet weather condition crashes at these locations were reduced by 85% to 95%.

Key Takeaways

- High Friction Surface Treatment has reduced wet weather condition crashes by 85% to 95% in locations where WSDOT has used it.
- Benefit/cost estimates for WSDOT's 13 identified potential HFST locations range from 3.7:1 to 13.4:1.

Methodology

I-2 Program

The following criteria are proposed for screening potential locations to implement HFST on the Washington state highway system:

- Locations are limited to horizontal curves located along freeway ramps. Other installations may be considered on a case-by-case basis (i.e. locations identified by CAL/CAC/IAL analysis).
- Locations have been paved within the last five years, with no upcoming paving scheduled within the next five years.
- Other countermeasures have been attempted at these locations prior to installing HFST (e.g. signing, delineation, etc.).

Locations that meet the above criteria will be further screened using the following parameters:

- Five or more wet weather injury crashes within a five-year period
- A minimum of 50% of crashes at this location are wet weather injury crashes.

Locations will then be ranked by total number of fatal and serious injury crashes. Seven years after implementing HFST, locations will be assessed to determine if HFST should be replaced. If not, HFST may be implemented at a new location.

Benefits

WSDOT applied HFST on four ramps with average annual daily traffic between 11,000 and 24,000 vehicles in 2015 and 2016. These ramps showed an 85%-95% reduction in wet run-off-the-road crashes and coefficient of friction numbers above 70. WSDOT defines an acceptable coefficient of friction on the roadway surface as 30 to 35.

Using the methodology and ranking criteria described above, WSDOT's initial screening identified 13 potential locations for implementing HFST on ramps. Implementing HFST at all 13 locations would provide an estimated annual reduction of 3.2 fatalities and serious injuries. For the purposes of calculating benefit/cost ratios, the benefit is the estimated reduction in societal cost due to avoiding these fatalities and serious injuries.

Costs

Based on construction costs from Northwest Region projects, initial HFST applications at each location will cost \$50,000 to design and \$150,000 to construct. If HFST is implemented at all 13 of the locations WSDOT has identified, the total cost will be approximately \$2.6 million.

Benefit/Cost Ratios

Benefit/cost ratios will be developed on a

HFST Applications and Advancements

The cost of applying HFST in 2015 and 2016 was approximately \$150,000 per ramp, but the HFST industry and technology is dynamic. Recent advances in the application method are lowering project costs. WSDOT has updated its construction specifications to keep up with these industry changes. The intent of this proposal is to install HFST on more ramps, monitor HFST applications, keep pace with industry changes, and expand HFST application locations.

location-by-location basis, and construction will be prioritized based on the individual benefit/cost values. Benefit/cost estimates for WSDOT's 13 identified potential HFST locations range from 3.7 to 13.4.

Ten-Year Constrained Budget Outlook for the I-2 program

The current estimated 10-year needs for state highways excluding those in cities with a population over 30,000 people under the \$657 million revenue available would be approximately \$84 million. This would account for 12.8% of the 10-year safety plan.

Systemic Curve Treatment



Lane Departure crashes are a Target Zero priority. Half of all run-off-the-road crashes occur on curves. While efforts like barrier installation, high-friction surfaces and signing treatments have been implemented, more efforts are needed.

Background

According to the 2019 Target Zero update, there were 1,650 fatalities and 6,537 serious injuries in Washington from 2015 to 2017. Of those, 796 fatalities and 2,458 serious injuries were run-off-the-road crashes. National studies estimate that run-off-the-road crashes in curves comprise 50% of all lane departure crashes. WSDOT estimates that 667 lane departure fatal and serious injury crashes occurred on 613 curves from 2014 through 2018—approximately 133 per year.

In addition, crashes involving motorcyclists—another Target Zero emphasis area—account for approximately 18% of fatal and serious injury crashes in Washington state. Many of these crashes involve run-off-the-road crashes, often in roadway sections with a series of curves.

Lane departure crashes involving curves can be categorized as head-on, sideswipe, or run-off-the-road to the inside or the outside of the curve. Efforts to address curve-related crashes have included treatments such as curve warning signs, chevrons, wide edge lines and high friction surface treatments (HFST). Curve warning and chevron modifications have been installed or are programmed for installation on curves where there is a 15-mph difference between the advisory speed and posted speed. WSDOT has also installed HFST on several

Key Takeaways

- WSDOT has identified 230 locations where countermeasures for lane departure crashes could be implemented.
- The average benefit/cost ratio for these projects is estimated to be 5.4:1.

curves. While more costly, HFST have shown significant potential benefit in curves where there is a greater potential for wet weather friction-related crashes.

Description of Program

The goal of assessing and re-signing curves was to reduce the potential for lane departure and run-off-the-road crashes, and to comply with the Manual on Uniform Traffic Control Devices (MUTCD). The Statewide Curve Data Collection & Analysis Project is designed to meet this goal. Data collected helps to identify the next locations for curve warning signs or chevron installation and allow WSDOT to correlate curve crashes, curve-banking data and signage.

Having addressed the curve warning signs, and currently assessing high visibility markings in a pilot project, WSDOT will begin to review HFST at curves as a potential additional countermeasure. From this, assessment, further discussion will occur with the HSEC to determine a method and approach to developing a HFST curve treatment applications approach. This approach will consider crash and asset elements in the decision-making process.

Methodology

After assessing crash data from 2014 through 2018 and the statewide geometric database, WSDOT set the screening parameter at curves with a radius of 1,250 feet or less—which tend to have a crash history—and a minimum of one fatal or one serious injury lane departure crash. This resulted in the identification of 230 curves with 252 total fatal and serious injury lane departure crashes, or approximately 50 fatal and serious injury crashes per year.

Curve crash data will be evaluated every five years to rank sites from high to low based on the expected average crash frequency. In 2023, locations were reviewed to determine whether to apply the following countermeasure for HFST.

Benefits

Implementation of the following countermeasures will potentially contribute to the reduction of curve-related lane departure and run-off-the-road serious and fatal related crashes:

- Application of high friction surface treatments

WSDOT will perform an assessment of fatalities and serious injuries on curves that might be correctible by HFST and will determine the benefits from that assessment.

Costs

A cost estimate of \$100,000 per curve is assumed. If all 230 identified locations are addressed, the cost would be \$23 million.

Benefit/Cost Ratio

If all 230 locations are addressed, their average benefit/cost ratio would be 5.4.

Ten-Year Constrained Budget Outlook for the I-2 program

The current estimated 10-year needs under the \$657 million revenue available would be approximately \$8 million. This would account for 1.3% of the 10-year safety plan.

Rumble Strips



WSDOT installs rumble strips on state highways to reduce the potential of lane departure. The benefits of both centerline and shoulder rumble strips have been well-established in retrospective studies, including those by WSDOT and FHWA. Research by the Federal Highway Administration (FHWA) shows rumble strips reduce the risk of crossover crashes by 30% and single-vehicle run-off-the-road crashes by 16%.

Background

WSDOT began installing rumble strips in the early 2000s because of their proven record of success in studies by FHWA. As of 2022, WSDOT had installed rumble strips on all multilane state highways and most rural highways in Washington. About 3,400 miles of centerline rumble strips and 710 miles of shoulder rumble strips have been installed on non-freeway rural highways in Washington state.

In 2022, 353 miles of centerline rumble strips were installed on the state highway network along with 240 miles of shoulder rumble strips as part of pavement preservation projects.

Key Takeaways

- WSDOT has identified approximately 1,500 centerline miles of state highways that are eligible for rumble strip installation.
- Installing centerline rumble strips in the identified locations is projected to provide \$435 million in societal benefit over the next 16 years and cost \$54.6 million.

Methodology

When considering two-lane rural highways, there are approximately 1,700 miles of locations that are likely suitable for centerline rumble strip installation, and 2,400 miles potentially eligible for shoulder line rumble strip installations.

Using the Highway Safety Manual predictive method WSDOT determines segments' eligibility for rumble strip installation by estimating the potential benefit to society and then dividing it by the projected costs of installation and maintenance over the rumble strips' 16-year estimated life span.

The costs of rumble strip installation and maintenance are affected by the type of pavement at the locations where the rumble strips are installed. A recent estimate indicated that the cost of rumble strip installation and maintenance on typical hot mix asphalt pavement is approximately \$2,000 per mile, while the same work on roads with bituminous surface treatments (BST, also known as chip seal) costs approximately \$35,000. Therefore, the type of pavement must be considered during location ranking and calculation of benefit/cost ratios.

Benefits

The agency performed predictive analysis on the two-lane rural state highway system to estimate societal benefits for existing and potential installation sites. This analysis found 335 miles of centerline rumble strips and 1,568 miles of shoulder rumbles strips that were eligible candidates for treatment. Statewide benefits were calculated by estimating the societal benefits of installing rumble strips at each eligible highway segments over ten years. Societal benefit for centerline rumble strips is estimated at \$259 million, and total benefits for shoulder rumble strips is estimated at \$1.21 billion.



Costs

To develop a preliminary benefit-cost ratio, WSDOT assumed a cost of \$35,000 per mile to install rumble strips, based on the higher costs required for BST roads.

Including 335 miles of centerline rumble strips and 1,568 miles of shoulder rumbles strips, the overall cost of this program is estimated to be \$66.6 million, with anticipated overall benefits of \$1.47 billion, resulting in an overall programmatic benefit/cost ratio of 22:1.

Ten-Year Constrained Budget Outlook for the I-2 program

A proposal to program new centerline rumble strips and associated shoulder rumbles strips where the benefit/cost ratio is currently estimated at 22:1 will cost \$83.5 million over 10 years, incorporating assumptions associated with the high cost of installing rumble strips in BST pavement. The cost of maintaining rumble strips in BST pavements is estimated to add \$40.5 million to this 10-year cost, although the benefits of doing so have not yet been determined.

Breakaway Cable Terminals



Replacing breakaway cable terminals (BCTs) with modern terminals provides a positive benefit/cost ratio by reducing the potential for fatal and serious injury crashes. It also brings WSDOT in line with long-standing agency policy and Federal Highway Administration (FHWA) guidance.

WSDOT has completed the conversion of known inventory of Interstate mainline and on/off ramps. It is in the process of completing other freeways and freeway on/off ramps. WSDOT anticipates making additional progress on the remaining BCTs as a part of its Preservation program and supplemented by stand-alone projects for high priority BCT locations that do not have a Preservation project over the next six years.

Background

WSDOT installed breakaway cable terminals at the end of guardrails in the 1970s and 1980s to reduce the severity of crashes. Later research by the Federal Highway Administration determined the terminals did not reduce crash severity as well as originally expected. WSDOT is following FHWA's direction to replace BCTs with terminals that meet Manual for Assessing Safety Hardware (MASH) standards.

Methodology

New MASH-standard terminals have been found to reduce the number of fatal and serious injury crashes in comparison to BCTs. Starting in 1997, WSDOT began replacing BCTs during pavement preservation activities (for more details on changes in BCT policy over time, refer to **Exhibit 43 on page 54**). However, hundreds remain on both interstate and non-interstate routes.

Key Takeaways

- WSDOT maintains an inventory to identify the locations of remaining breakaway cable terminals on the state system that would be eligible for replacement.
- The expected benefit/cost ratio for WSDOT's proposed approach to removing BCTs is 2:1.

Benefits and Costs

The agency analyzed the benefits of replacing all BCTs with MASH terminals over the next three years. Replacing all BCTs would reduce societal costs by \$21 million over the next 20 years. Based on the agency's experience, it would be conservative to estimate that the agency would also experience four risk-related events during the same 20-year period, assuming a cost of \$5 million each for a total of \$20 million. This brings the total benefits to \$41 million. Replacement of BCTs is estimated at \$20 million.

Benefit/Cost Ratio

Based on a benefits and costs listed above, the benefit/cost ratio for the proposed approach to removing BCTs is estimated at 2:1.

Progress

As part of its ongoing effort to remove BCTs and replace them with MASH-standard terminals, WSDOT removed 119 BCTs as part of dedicated BCT replacement contracts. Note that other BCTs were replaced as part of basic safety on other contracts but that these replacements cannot be tracked with existing construction data.

Ten-Year Constrained Budget Outlook for the I-2 program

WSDOT continues to update its inventory to account for BCT replacements already completed or in progress. As of December 2022, WSDOT had replaced or awarded contracts to update approximately 800 breakaway cable terminals. WSDOT identified BCTs in its inventory for future replacement, prioritizing locations with high annual average daily traffic on the interstate highway system, which will require approximately \$5.7 million.

Exhibit 43. State & Federal Breakaway Cable Terminal Policies
1994 through 2018

Year	Policy change
1994	FHWA directs states to stop installing BCTs on National Highway System routes one year after learning BCTs were not effective in reducing fatal and serious injury crashes.
1997	WSDOT issues its first policy on BCT removal, providing for their removal where the flare rate did not meet the initial design criteria (minimum 3-foot offset)
1998	FHWA directs states replace BCTs when they are within the boundaries of any resurfacing, restoration, or rehabilitation work.
2005	WSDOT policy is updated to require the removal of BCTs on all interstate routes.
2017	WSDOT policy is updated to require the removal of BCTs on all state highway routes.
2018	FHWA requires installation of guardrail terminals that meet MASH standards in all new installations and full repairs on the NHS.

Cable Median Barriers



No expansion of the cable median barriers countermeasure is proposed at this time. Three to four strand high tension cable conversions were halted given that these systems perform similarly.

WSDOT has completed a detailed inventory of median locations that fit existing criteria (50 feet wide and less). The agency reviewed the median inventory and associated crash data. The agency will continue to monitor national research on this topic and the safety performance of medians greater than 50 feet wide. If WSDOT finds sufficient evidence that a change in policy and/or additional treatments appear to be appropriate, then the agency will prepare a proposal for a programmatic response.

Background

WSDOT determined in 2019 that it had installed or had plans to install cable median barriers on all state roadways with speed limits of 45 miles per hour or higher and median widths of up to 50 feet. Cable median barriers—including double sided w-beam, and pre-cast or cast-in-place concrete—reduce the potential for crashes with oncoming traffic when vehicles veer off the roadway and into the highway median.

WSDOT completed a statewide inventory to verify that all appropriate locations have cable median barriers. No locations without barriers that fit the installation criteria (medians 50 feet wide or less, speeds of 45 mph or higher) were identified.

Key Takeaways

- WSDOT completed an in-service performance evaluation (ISPE) and compared performance of the three and four strand high tension cable.
- WSDOT is pausing conversions from three to four strand cable systems given that the ISPE indicated that the three and four strand cables performed similarly.

WSDOT conducted an in-service performance evaluation (ISPE) on all cable barrier systems installed on state highways, using the NCHRP 22-33 methodology. Using this analysis, WSDOT determined that three- and four-strand high tension cable performs similarly. Based on this finding, WSDOT halted any conversions from three to four strand systems that would have ultimately cost over \$70 million.

Methodology

Installing cable median barriers on medians 50 feet wide or less is WSDOT’s current policy and is accepted as a best practice in Washington and other states. In 2017, WSDOT reviewed this policy and analyzed crash statistics to determine whether installing barriers on medians greater than 50 feet wide was needed.

The agency determined there were no crossover crash fatalities at medians between 50 and 60

feet wide from October 2011 through September 2016 and concluded that installing barriers on medians wider than 50 feet was not necessary.

WSDOT will continue monitoring national research findings and considers changes to its cable median barrier policy as new research-based recommendations are made.

Benefits and Costs

No further work is proposed given that the inventory did not identify any additional locations for installation.

Ten-Year Constrained Budget Outlook for the I-2 program

No fundamental change in policy or programming is proposed at this time.



Guardrail Infill and Retrofit



Work continues on a quantitative approach to identifying locations for potential new barrier or treatments, including the cost and benefit of such treatments.

Background

WSDOT uses clear zones to provide drivers as much space as possible to regain control of their vehicles if they depart the roadway. Some clear zones contain objects that can be struck by drivers or features such as ditches or slopes that could increase the potential for fatal or serious injuries.

Guardrail is one mitigation option WSDOT uses to shield drivers from objects or areas in clear zones where fatal or serious injury crashes have occurred (refer to box below for more details on mitigation options). Guardrail infill was the original context of clear zone mitigation, and retrofit has been added in order to address accelerated deterioration identified in some weathering steel guardrail.

Key Takeaway

- WSDOT estimates that 73% of weathering steel guardrail installed on highways is showing accelerated deterioration.

WSDOT's options for reducing the potential for crashes in clear zones:

- Remove objects in the clear zone
- Redesign fixed objects to be traversable
- Relocate objects
- Use breakaway features to reduce impact severity
- Shield the area with traffic barriers
- Delineate by placing barrier, guardrail or cable barrier

Methodology

WSDOT estimates that 73% of weathering steel guardrail installed on state highways is showing accelerated deterioration. Locations with deterioration have been prioritized for replacement based on crash and traffic history.

The agency completed an updated inventory of guardrail on state highways in 2019 and is applying the Highway Safety Manual (HSM) predictive method to select cost-effective safety investments, instead of relying solely on previous crash data. The new tools acquired in 2019 include improved incident coding and a predictive analysis method from the Federal Highway Administration's new Interactive Highway Safety Design Model (HSDM) tool.

Exhibit 44. Estimated Cost For Replacing Weathering Steel Guardrail

Estimated cost in 2019: 2017-2019 through 2025-2027

Biennium	Estimated biennial cost
2017-2019	\$5 million
2019-2021	\$6 million
2021-2023	\$7 million
2023-2025	\$8 million
2025-2027	\$8 million
Total	\$34 million

Benefits and Costs

WSDOT will create a list of prioritized projects that includes locations for new guardrails, and locations with existing guardrails that need retrofitting or replacing. After the list is compiled the cost/benefit estimate will be calculated to establish a ranking order based on the cost-effectiveness of the project.

Ten-Year Constrained Budget Outlook for the I-2 program

Using previously available data, the agency has created plans to address all weathering steel guardrail locations of concern. Replacement cost is estimated at \$34 million over 10 years in the five biennia for state highways excluding those in cities with a population over 30,000. Refer to Exhibit 44.



High Visibility Edge Lines



Edge lines are the solid white longitudinal markings at the outside edge of roadways. High visibility edge lines increase the driver's ability to see the markings, helping reduce lane departure crashes. The Edge Line Visibility pilot will potentially reduce run-off-the-road crashes by installing high visibility edge lines on rural highways and freeways in Western Washington.

Background

The Edge Line Visibility pilot attempts to reduce lane departure crashes, which is one of the Target Zero focus areas. WSDOT will establish high visibility edge lines in three Western Washington regions. The pilot will focus on rural routes and freeways in western Washington. Studies have shown that increasing edge line visibility by having wider or thicker lines with high visibility beads can reduce run-off-the-road crashes by up to 35%. This pilot will

install high build, or thicker than average, 4-inch-wide edge lines on target roadways.

In Spring 2023, WSDOT's Transportation Operations and Maintenance Divisions coordinated efforts with Northwest Region and Olympic Region Maintenance to install wet reflective striping on SR 9 and SR 101. WSDOT found the application of the wet reflective beads were clogging application systems in the trucks.

Funding and striping trucks (to accommodate the wet reflective beads) remain concerns. Currently, WSDOT is using state funds for this effort, not Federal HSIP. WSDOT may not have other applications in 2024 due to a limited paving program.

Methodology

Crash Modification Factors (CMF) are used to compute the expected number of crashes

Key Takeaway

- Assuming a 20% reduction in crashes following edge line visibility treatments, the expected benefit/cost ratio is 30:1, with some estimates as high as 78:1.

after implementing a strategy intended to reduce crash frequency or severity on a road or intersection CMF No. 4792 in the Federal Highway Administration's clearinghouse for crash modification factors increases the edge lines from 4 inches to 6 inches and has a value of 0.78, or a 22% reduction in crashes. The CMF has a rating of 4/5 and used a before/after study with empirical Bayes methodology, a type of statistical estimation that addresses randomness and increases precision compared to using a crash history.

Exhibit 45. All Injury Crashes in Western Washington¹

Annual average, 2014-2018

Severity	Annual Lane Departure ² Crashes	Annual Societal Costs	Annual 20% Crash Reduction	Annual Societal Benefits with 20% Reduction
Possible	952	\$130,916,000	184.0	\$26,1863,200
Evident	519	\$123,115,640	103.7	\$24,623,128
Serious	129	\$442,987,960	25.9	\$88,597,592
Fatal	56	\$191,710,400	11.2	\$38,342,080
All	1,624	\$888,730,000	324.8	\$177,746,000

Notes: 1. Includes three WSDOT regions: Southwest Region, Olympic Region and Northwest Region. 2. Lane Departure includes all run-off-the-road crashes, plus any crash resulting from leaving the traveled lane.

WSDOT will examine the three Western Washington regions in this pilot, with a focus on rural highways and freeways. Urban highways were excluded as many have curbing and no edge line, and potentially have lower travel speeds. All injury lane departure crashes were included in the screening and a 20% crash reduction is assumed.

Using the proposed high build 4-inch edge lines will provide benefits for all conditions, according to the research cited in the introduction. Other benefits may include improved readability by smart vehicle technology and road stripes maintaining visibility over longer periods of time. Based on the available research and CMFs cited above, a 20% reduction in lane departure crashes is a reasonable estimate.

Benefits

The implementation of high visibility edge lines in Western

Washington could potentially result in 37 fewer fatal and serious injury lane departure crashes and \$177 million in societal benefit annually. Refer to **Exhibit 45 above**.

Costs

For Western Washington, the traditional paint package (paint, beads, labor and equipment) costs \$3,602,000 per year. Applying high visibility stripes and beads would cost an additional \$2,259,000 per year

for state highways excluding those in cities with a population over 30,000 people. Refer to **Exhibit 46 below** for more details.

Benefit/Cost Ratio

The benefit/cost ratio is based on the annual potential benefits of reduced societal costs from crashes and the annual material and labor costs of installing the high visibility edge lines. At a 20% reduction the expected benefit/cost ratio is 78:1.

Exhibit 46. Marginal Labor, Equipment, Materials and Operations (LEMO) Costs

Western Washington 4-inch high build package

Component	Estimated annual cost
Western Washington traditional paint LEMO	\$3,205,000
Western Washington high-build paint LEMO	\$4,543,000
<i>Paint delta</i>	\$1,338,000
Traditional beads	\$397,000
High-build beads	\$1,318,000
<i>Bead delta</i>	\$921,000
<i>High-build package delta</i>	\$2,259,000

Field Assessments



The Field Assessment strategy was created to replace WSDOT's previous spot safety investments, which were associated with pavement preservation. Field assessments are a programmatic approach to reviewing all state highways to identify safety opportunities, evaluate potential benefits, evaluate roadway and roadside characteristics, and develop lower-cost spot safety and operational modifications.

Background

The Field Assessment program provides the opportunity to address crash and operational locations across the state highway system.

By systematically reviewing all highways using a consistent statewide approach, Region Field Assessment Engineers are able to identify potential fatal and

serious injury crash reduction opportunities, address emerging crash trends, and recommend incremental solutions.

Countermeasures to reduce crashes are typically location-specific and prioritized according to the most effective and efficient use of resources.

Methodology

This program, given its dual purpose of serving operational and crash related aspects, is in the process of moving from the Safety Improvement program (I-2), to the Transportation Operations program (Q).

Further discussions will take place to assess whether any elements of the Field Assessments will be considered within I-2, and future funding of the field assessment personnel will be from the Transportation Operations Program.

Key Takeaway

- Region Field Assessment Engineers are able to identify potential fatal and serious injury crash reduction opportunities, address emerging crash trends and recommend incremental solutions.

Active Transportation



Even though fatal and serious injury crashes involving people walking and biking on the state system continue to increase, WSDOT does not currently have a specific funding program to reduce or eliminate these types of crashes on the state system. In the 2022 Move Ahead Washington transportation investment package, the legislature created the five-year \$50 million Connecting Communities Pilot Program, directing WSDOT to identify projects that reconnect the active transportation network where it has been severed by legacy state transportation facilities. WSDOT will prioritize projects based on equity, safety, identification as a gap in the state Active Transportation Plan, and other criteria.

The State Active Transportation Plan 2020 and Beyond includes data and analysis of state right-of-way that can inform safety program investments. The legislature also allocated 24% of ongoing revenues from the Climate Commitment Act to a new Climate Active Transportation Account that will fund expansion of Safe Routes to School and pedestrian/bicyclist grants to local agencies. Some projects funded by those programs may include improvements on WSDOT right-of-way. All these new programs address safety;

Key Takeaways

- From 2018 through 2022, more than 14,700 crashes on the Washington state route system involved people walking or biking.
- Projects that address safety outcomes for pedestrians and bicyclists also provide crash reduction benefits for other road users.

however, state system funding still does not include a dedicated active transportation safety program for WSDOT projects.

Background

Walking and biking are essential parts of an integrated, sustainable, multimodal transportation system. According to the 2017 National Household Travel Survey, an estimated 11.5% of all trips are conducted by walking or biking. More than 14,700 traffic crashes involved people walking and biking on the Washington state route system from 2018 through 2022. About 22% of these crashes resulted in a serious injury or fatality.

In 2021, 22% of all traffic fatalities were people walking and biking, which represents a disproportionately high number of deaths considering the walk/bike mode share. Pedestrian and bicyclist fatalities have increased 46% over the last 10 years, and continue to rise.

Significantly, an equity analysis indicates that these serious and fatal crashes occur disproportionately in locations with high percentages of Black, indigenous, and people of color, or people in low-income households. These same neighborhoods have more people who rely on active transportation and transit.

In WSDOT's previous 10-year plans, funding for pedestrian and bicyclist improvements came from the now defunct Pedestrian Risk and Pedestrian Accident Locations programs. WSDOT currently administers the Safe Routes to School and Pedestrian and Bicyclist Programs, providing funding for local agency needs. Projects under these programs occasionally include improvements to the state system in partnership with local agency plans, but the primary legislative intent in establishing these programs was to fund local system improvements.

It is recognized that the WSDOT State Active Transportation Plan 2020 and Beyond and the programs listed above will contribute to achieving a more walkable and bikeable system.

The Active Transportation subcategory is intended to

address the increasing trend of fatal and serious injury crashes involving those who walk and bike by identifying factors associated with crash potential, equity and demand.

The majority, 86%, of bicyclist and pedestrian related fatal and serious injury crashes in 2010-2019 occurred on roads with a posted speed over 25 mph. The majority of pedestrian fatalities and serious injuries, 62%, occurred when the pedestrian was crossing the street. WSDOT will continue to focus on reducing driving speeds in contexts with a mix of users, modes, and destinations; providing a connected network of facilities for pedestrians and bicyclists; and appropriately designing crossing treatments with pedestrian-scale lighting, sited at the right frequency to serve the needs of people walking and biking. The Active Transportation Plan incorporates specific recommendations from WSDOT's Safe Transportation for Every Pedestrian action plan developed under the FHWA Every Day Counts (EDC-4) program.

The Cooper Jones Active Transportation Safety Council studies specific issues and makes annual recommendations to the legislature. In 2020 and 2021, the council emphasized speed management to reduce serious and fatal crashes and advocated for the use of automated safety cameras. In 2022, the group examined sidewalks and crossings, among other topics.

Infrastructure life cycles affect program costs

Infrastructure investments for people who walk and bike must account for the life cycle of the installations. But first, WSDOT needs to take a complete inventory of bicyclist and pedestrian facilities on the state system. To make a reliable estimate of maintenance costs for these installations, WSDOT will also need to establish the expected service life of the various components:

- Pedestrian electronic systems operate like traffic systems with replacement often occurring on a 10-year basis.
- Paved surfaces and dedicated structures used by pedestrians and bicyclists will have longer life cycles than those used primarily by vehicles due to the limited wear and tear caused by walking and biking.

WSDOT estimates \$163.3 million is needed for preservation and maintenance of pedestrian and bicyclist infrastructure for 2021-2031. The agency needs to develop better data and refine its calculation methodology to understand lifecycle costs.

Methodology

The Washington State Active Transportation Plan 2020 and Beyond is complete. It includes a systematic analysis of the level of traffic stress (LTS) for vulnerable road users, which was developed into spatial data for use in active transportation project assessment and is available in WSDOT's GIS workbench. LTS defines and ranks traffic stress based on existing facility and associated road characteristics, posted speed, and vehicle volumes.

The creation of spatial data helps identify the locations of active transportation gaps on the state system. These gaps may reflect a complete lack of facilities, limited or non- ADA-compliant facilities, or lack of data to determine whether they meet WSDOT's guidance and criteria. A concurrent analysis provided spatial data identifying active transportation route directness, refer to **Exhibit 47 below**. This route directness index identifies locations at which an active transportation user has no direct route to common destinations and must travel out of their way to safely bypass vehicle traffic.

To develop a ranked list of locations as recommended in the HSIP Implementation Plan 2022, WSDOT conducted a systemic GIS analysis identifying locations on state jurisdiction roads:

- Where crash data (2010-2019) showed the locations of fatal and serious injury collisions involving active transportation,
- Within 200 feet of locations where high route directness index paths for active transportation road users intersect with high level of traffic scores,
- Within 200 feet of transit stops, as these are known active transportation user-generators.

WSDOT concatenated the resulting list of analysis locations with:

- Census tract data identifying percent minority, percent in poverty, percent English speaking, percent disabled,
- Distance to the nearest school,
- Posted speed limit (for reference only, as speed was already analyzed through the level of traffic stress data).

The intent was to use these variables to further refine the analysis and increase understanding of potential correlations. Second, this analysis resulted in a dataset that includes locations—where fatal and serious injury collisions involving active transportation road users occurred—that can be used to help inform where project funds

Exhibit 47. Criteria for Evaluating Locations for Pedestrian and Bicyclist Infrastructure

Criterion	Relevant to Gap Location	Score
Safety	Crash history	0 - 5
	Systemic safety issues	5 or 10
	Connectivity (conflict reduction infrastructure)	
	<ul style="list-style-type: none"> ■ Destination proximity ■ Trail proximity ■ Intermodal proximity 	0 - 10 0 or 10 0 - 10
Equity	Concentration of low-income households	1 - 10
	Concentration of people with a disability	1 - 10
	Concentration of people of color	1 - 10
Demand	Potential for walking/cycling	0 - 10

should be invested to best facilitate active transportation road user safety. The information will be shared with region staff to validate of costs and locations. Region scoping activities will include Active Transportation considerations in field reviews, which will be used as the basis for scoping.

Modifications at these locations may include proven treatments such as traffic safety cameras in school zones, road reconfigurations, raised pedestrian crossings, curb extensions, rectangular rapid flashing beacons, HAWK signals, separated/protected bicycle lanes, protected intersections, leading pedestrian intervals for traffic signals, roundabouts, sidewalks, shared use paths, etc. (refer to **Appendix C**).

Benefits

The benefits of projects that address safety outcomes for people who walk and bike can be measured by estimating the societal value of the deaths and serious injuries avoided by implementing the projects. WSDOT follows the USDOT guidance for calculating the value of lives saved and injuries prevented, available at [Departmental Guidance on Valuation of a Statistical Life in Economic Analysis](#).

From 2019 through 2021 the societal cost of the 351



pedestrian and bicyclist fatalities that occurred on state routes in Washington was approximately \$3.73 billion. Additionally, the 1,385 pedestrian and bicyclist serious injuries that occurred during that same time period had a societal value of approximately \$1.4 billion.

The total value to society of the lives affected during the three-year period was \$5.13 billion, which averages to an annual cost of \$1.71 billion. Projects that address safety outcomes for pedestrians and bicyclists provide crash reduction benefits for all road users; all people are pedestrians

at some point in every trip. Refer to **Appendix C** for FFY 2025 projects.

Ten-Year Constrained Budget Outlook for the I-2 program

The current estimated 10-year needs under the current revenue projections for the safety sub-program would be approximately \$85 million for state highways excluding those in cities with a population over 30,000 people. This would account for 12.9% of the 10-year safety plan.

Decision-Making and Performance Improvement



The Decision-Making and Performance Improvement subcategory helps meet Target Zero goals by improving efficiency and enabling:

1. Safety performance-based planning, design, maintenance, operations, and asset management;
2. Timely and quality crash diagnosis, analysis, and evaluation;
3. Compliance with federal requirements.

Background

WSDOT's approach to transportation safety continues to evolve from a standards-based to a quantitative, data-driven, and science-based approach. The transition to Sustainable Safety in 2013, Performance-Based Practical Solutions in 2015, Complete Streets in 2022 and finalizing the Safety System Approach Executive Order update in 2023 are indicative of this evolution.

WSDOT recognizes the value of data collection and analysis goes beyond safety and is vital to asset and performance management, which highlights a need for the integration of safety data into these efforts. Safety data evaluation, modeling, analysis, and diagnosis are a focus because the evolution of WSDOT's approach

Key Takeaways

- The benefit/cost ratio of investing in safety data and decision-making is 1.83:1.
- The data needed for safety diagnostics, analysis, and evaluation are also needed across WSDOT to support data-driven, performance-based approaches.

to the Safe System Approach creates a greater need for integrated safety data throughout the planning, programming, and project development processes.

The intent of this subcategory is to provide for timely data-driven decision making, and the ability to capture and use feedback for continual performance improvement. Work will focus on safety planning and target setting; collection and use of integrated safety data, including the fundamental [Model Inventory of Roadway Elements \(MIRE-FDE\), using LIDAR data collection](#); the tools necessary to support data analysis and other uses; and consistency in policy implementation across divisions and regions will continue to occur.

WSDOT has developed a scalable approach to safety analysis that ranges from a detailed safety performance analysis of contributing factors, crash types, and development of targeted solutions to a simple estimation of the societal benefit for crash reduction and prevention due to implementation or changes to existing conditions. These are outlined in two documents for safety analysis, one with planning, the other in project development. Without such analysis, decisions are based on perceptions or past practice, limiting reliability in decision making and the effectiveness of safety investments.

These activities require integrated, high quality, timely, accessible and complete safety data that includes multimodal crashes, roadway and asset inventory, and traffic volume data.

When data drives the making of safety decisions that affect the lives and health of the traveling public, data quality is of the utmost importance. Quality data provides a level of certainty that the crashes are properly located, and the location characteristics are correct. Quality, well designed data promotes the ability to integrate and reuse data effectively and efficiently.

Both MAP-21 and the FAST Act increased federal requirements for safety data at state DOTs. These federal mandates require states to collect a minimum level of safety data, establish performance measurement targets and use data-driven safety analysis for projects using

federal funding provided in the Highway Safety Improvement Program.

As part of the support state agency compliance and understanding of state-specific needs, several different types of national assessments related to safety data were carried out at WSDOT:

- 2010 Crash Data Improvement Program.
- 2012 Roadway Safety Data Capability Assessment.
- 2014 NHTSA Traffic Records Assessment.
- 2015 Feasibility Study for GIS Based Roadway Data Integration.
- 2018 Roadway Data Improvement Program (RDIP)

The agency has completed a roadside safety asset lifecycles and performance outcomes as part of asset management program and has made requests to pause or revise roadside based safety subcategories. This will require changes that support a greater ability to manage safety assets across programs and to optimize investment and decision making related to those assets, and these wins show the value of the Decision-Making and Performance Improvement subcategory.

Examples of decision and performance improvement include:

- Mobile LIDAR (intended to address linear reference system concerns, data quality and MIRE FDE).
- Minimum Inventory Roadway Environment Functional Data Elements (FHWA required data collection).
- Retire SafetyAnalyst and implement new network screening software, IHSDM, and predictive safety tools (planning, design and operational decision making).
- Evaluate vulnerable road users crash, roadway, and facility data collection and analysis.
- Addressing outdated mainframe systems.

The data needed for safety diagnostics, analysis, and evaluation are also needed across the agency to support data-driven, performance-based approaches. Therefore, the needs described in these assessments and plans represent what is adversely affecting WSDOT across divisions and regions as the agency plans, scopes, designs, and operates the system. This will be particularly true of understanding road user needs that have less data, such as active transportation.

Since 2019, WSDOT made significant progress in the area of asset management of roadside barriers. The department developed an inventory of all barrier installations: cable barrier systems, concrete barriers, guardrails, end treatments, and impact attenuators. In-service performance evaluations (ISPEs) were also completed on the cable systems, concrete barriers, end treatments, and impact attenuators. Findings from the ISPEs have been instrumental in guiding decisions regarding three- to four-strand conversions of cable barrier systems, and potential areas for further study and investment.

Mobile LIDAR data collection of the state highway system started in June 2023 and was completed by September 2023. This data will be used, among others, to extract information for MIRE-FDE, roadside barrier and clear zones, and active transportation facilities.

Methodology

The WSDOT Safety Data Business Plan, as well as previous and future assessments will be used to identify needs.

Benefits

Implementing a coordinated enterprise approach to technology and data management provides the safety program with the ability to:

- Identify locations most likely to reduce fatal and serious injury crashes.
- Scale investments appropriately in order to balance cost and societal benefit.
- Optimize trade-offs during planning, design, and operations to provide for the Safe System Approach.

- Evaluate how and if investments were successful in reducing fatal and serious injury crashes.
- Provide feedback to refine policy, decision making and implementation practices.

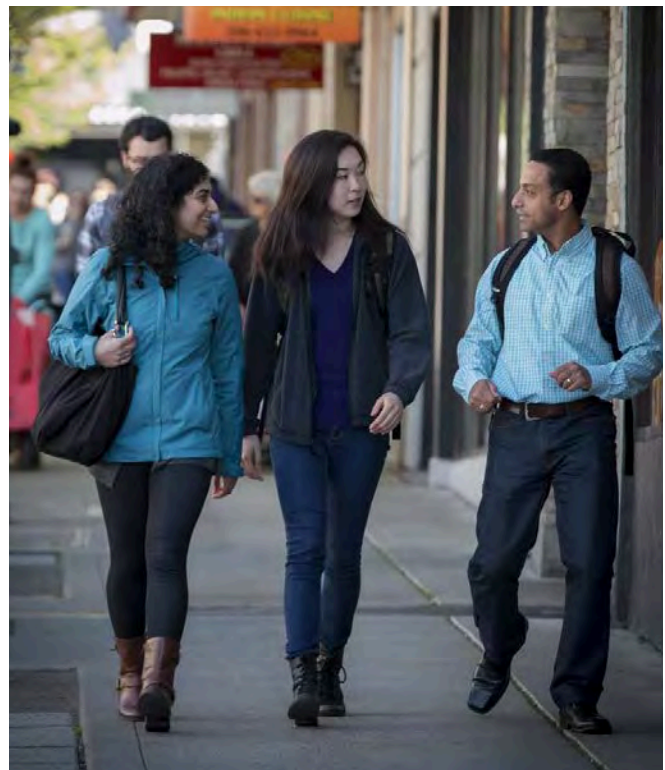
This is necessary for a strategic and coordinate performance and decision-making framework for the agency as a whole.

Benefit/Cost Ratios

According to [FHWA](#) the benefit/cost ratio of investing in safety data and decision-making is 1.83:1.

Ten-Year Constrained Budget Outlook for the I-2 program

WSDOT has estimated the need in the area of decision-making and performance improvement subcategory at 5% of the I-2 budget, or approximately \$25 million over a 10-year period. This effort will include MIRE FDE and LIDAR Data Collection.



Conclusion

Noteworthy Practices

In 2022, WSDOT continued to advance road safety with changes throughout its design and operational process to incorporate Complete Streets legislation as outlined in WSDOT legislative budgets. Consistent with WSDOT Sustainable Safety and Practical Solutions Executive Orders WSDOT has been incorporating the Safe System Approach into its design and operational policies and procedures. With specific funding and direction within the legislation the rate of implementation and institutionalization will be increased.

WSDOT updated the Safe System Executive Order 1085.01. The EO directs its safety subprogram to be consistent with the Safe System. Together with its partners WSDOT will do the same for the SHSP.

WSDOT intends to update its [Safety Analysis Guide](#) to provide guidance regarding expectations for safety analysis across WSDOT programs within each program area and consistent with the Safe System Approach.

Moving Forward

The goal of zero fatal and serious injuries is a daunting task that requires a commitment and understanding from the highest levels of WSDOT to every level of staff. WSDOT continues to emphasize that “Target Zero” is our guide and directive for our safety program.

The trend in fatal and serious injury crashes is troubling and has been increasing over many years. While investment in the Safety Program remains near the lower end of all programs, with the implementation of Complete Streets and associated funding for the Safe System Approach, as well as more federal and state safety grants to local agencies, reductions in fatal and serious injury crashes will occur over time.

In addition, WSDOT is challenged by increases in vehicle travel, population growth, more instances of driving while intoxicated by drugs and alcohol, and increasing speeds, and will investigate how self-explaining and enforcing roads can lead to reductions in fatal and serious injury crashes. To achieve WSDOT's zero goals, the agency must be able to sustain progress in both the near-term and long-term, but reversing statewide trends may not be immediate.

WSDOT's “Safe System Approach” is intended to focus on the principles of the Safe System: that deaths and serious injuries are unacceptable, we support safe road use, reduce large crash forces, that responsibility is shared, safety is proactive, and that we strengthen all parts.

WSDOT continues to encourage safety assessments, in-service performance evaluations, and performance assessments across organizational boundaries and at all levels of the project development process as outlined in the new Safe System Executive Order. These reviews are critical in reducing rework, aligning objectives, and improving the overall flow of information and knowledge as projects make their way through the development process.

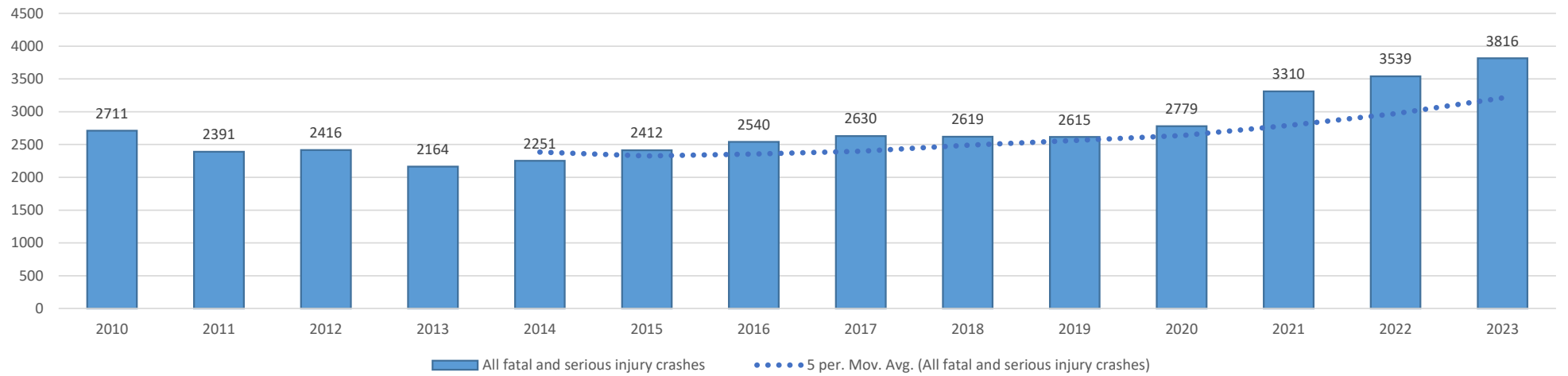
Therefore, WSDOT's success is contingent on our ability to work collaboratively within WSDOT and with our external partners and stakeholders. The ultimate goal of WSDOT's Safe System Approach is to reduce fatal and serious injury crashes and to do so in a matter that optimizes project planning, prioritization, design, and operation relationships to fatal and serious injury crash reduction and prevention.

Through our continued commitment to learning and improvement, we will achieve Target Zero. We must, because it means that our families, friends, and the public will arrive home safely.

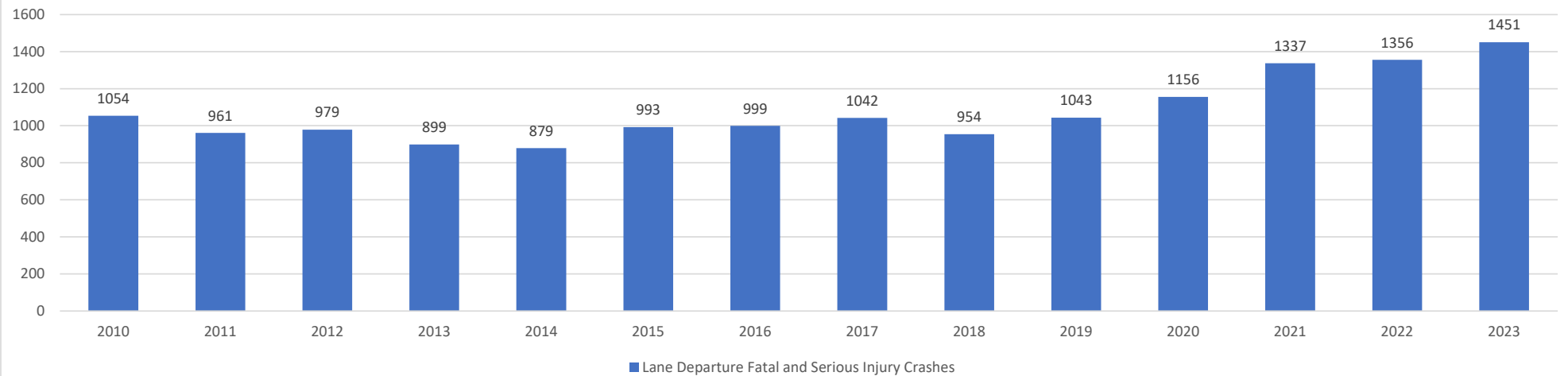
Appendix A: Emphasis Areas

Emphasis Areas	Fatal and Serious Injury Crashes													
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
All fatal and serious injury crashes	2711	2391	2416	2164	2251	2412	2540	2630	2619	2615	2779	3310	3539	3816
Lane Departure Crashes	1054	961	979	899	879	993	999	1042	954	1043	1156	1337	1356	1451
Run off the road	848	775	758	743	692	812	793	802	757	822	921	1056	1106	1127
Opposite direction	206	186	221	156	187	181	206	240	197	221	235	281	250	324
Intersection Related Crashes	905	804	778	693	772	757	881	832	846	816	867	1030	1153	1295
Involving people walking and biking	482	488	539	403	490	511	601	579	660	591	531	688	705	807
Involving people walking	360	362	418	309	378	387	458	470	518	475	422	571	548	632
Involving people biking	122	126	122	95	112	124	143	109	143	116	110	117	158	176
Heavy Truck Involved	151	139	165	130	152	143	183	230	181	198	165	267	251	220
Motorcyclist Involved	468	432	479	432	434	490	470	494	496	525	503	571	673	731
Older driver 70 (plus) involved crashes	247	182	207	198	226	251	238	254	263	310	298	340	373	407
Younger driver (16-25) involved crashes	959	839	755	708	698	741	836	847	754	743	815	972	1014	1137

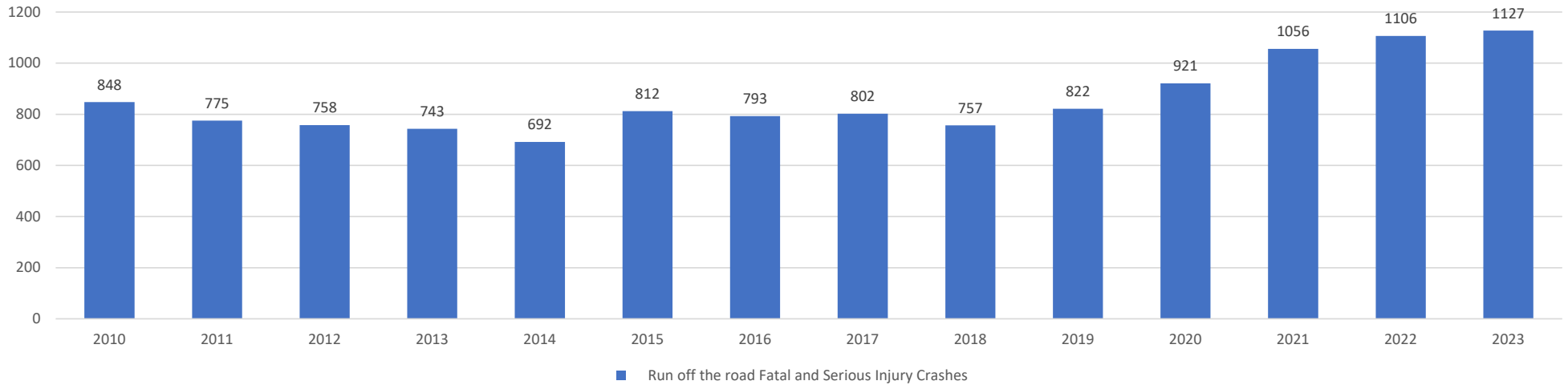
All fatal and serious injury crashes



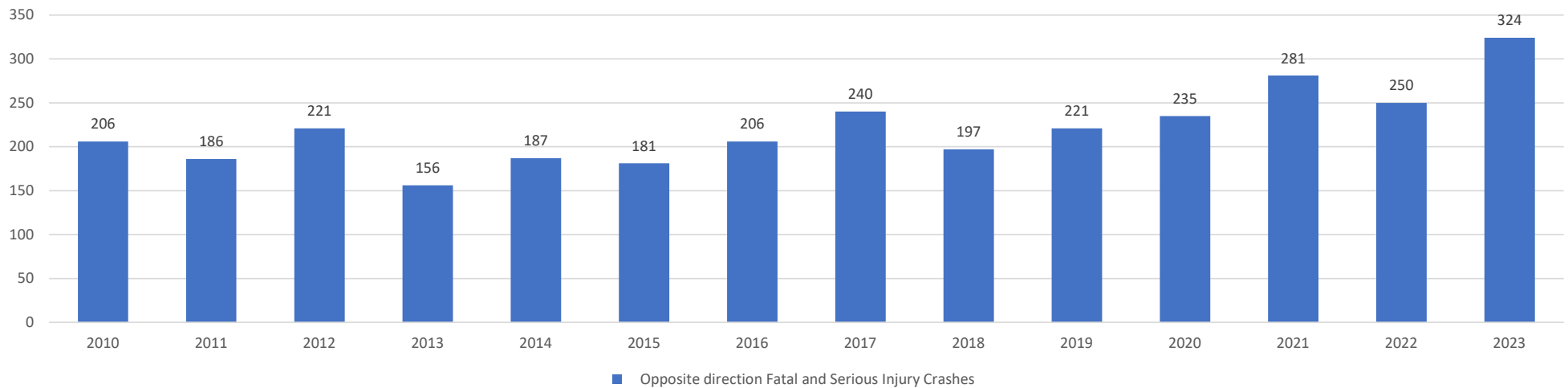
Lane Departure Fatal and Serious Injury Crashes



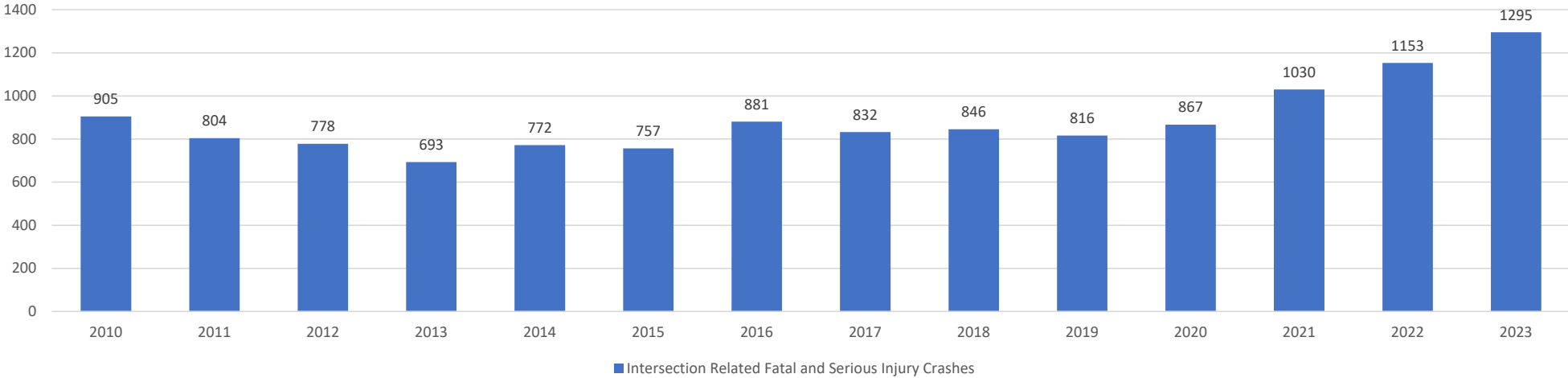
Run off the road Fatal and Serious Injury Crashes



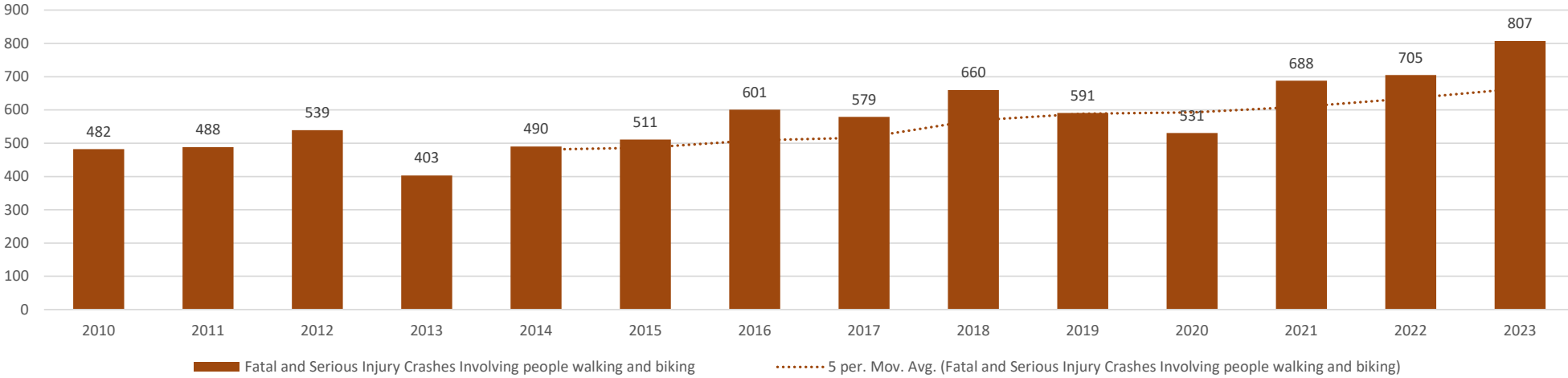
Opposite direction Fatal and Serious Injury Crashes



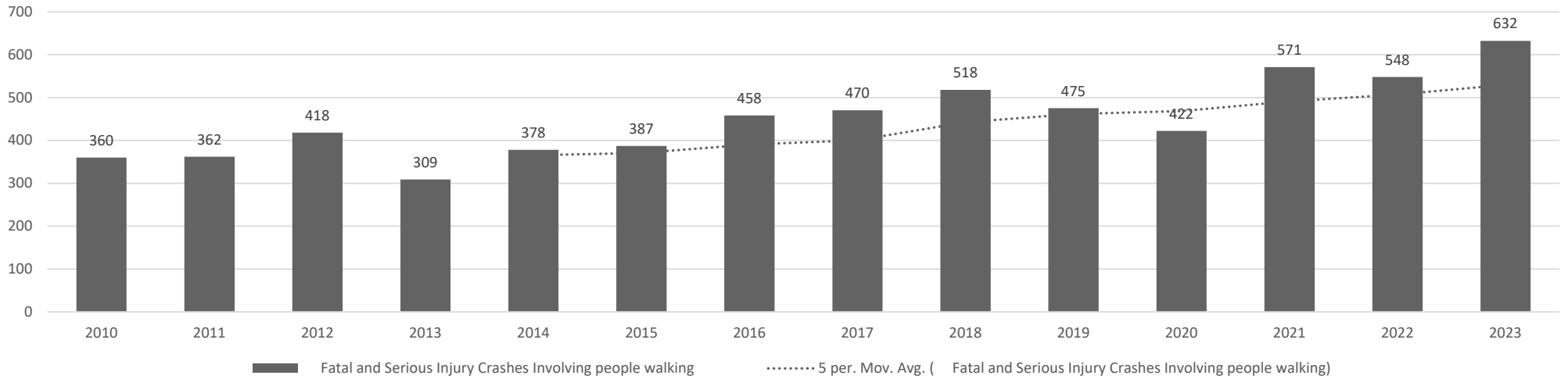
Intersection Related Fatal and Serious Injury Crashes



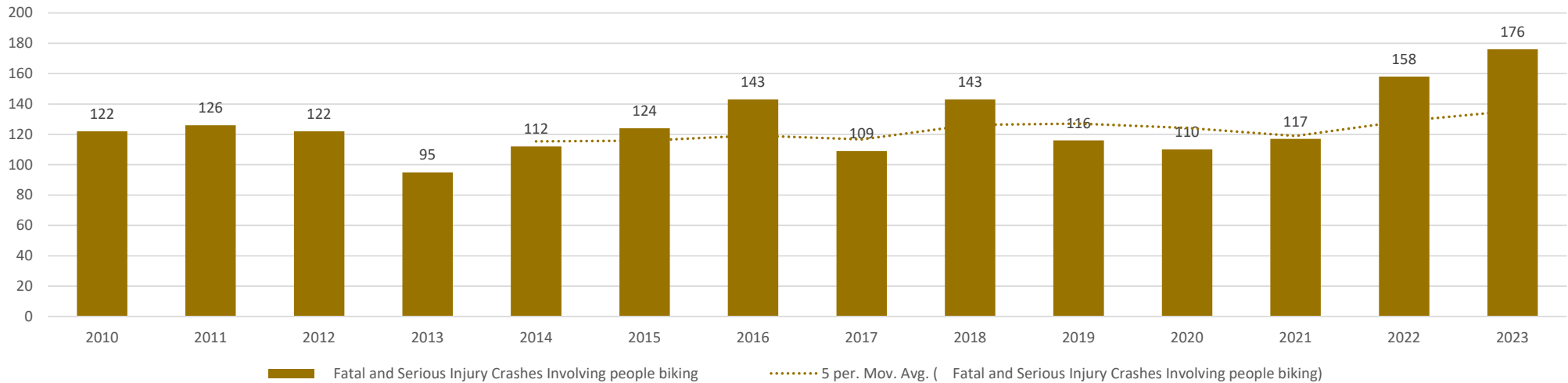
Fatal and Serious Injury Crashes Involving people walking and biking



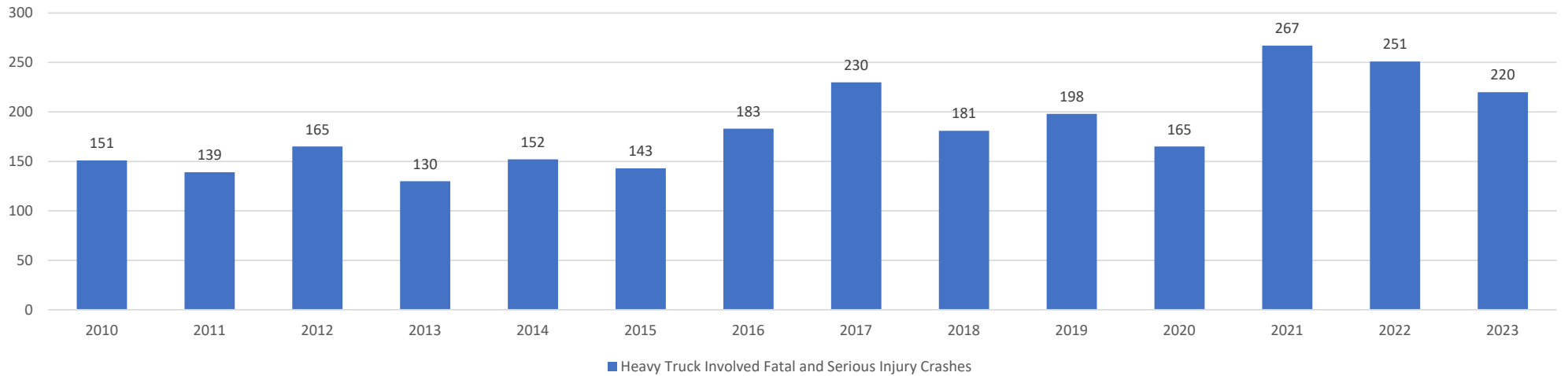
Fatal and Serious Injury Crashes Involving people walking



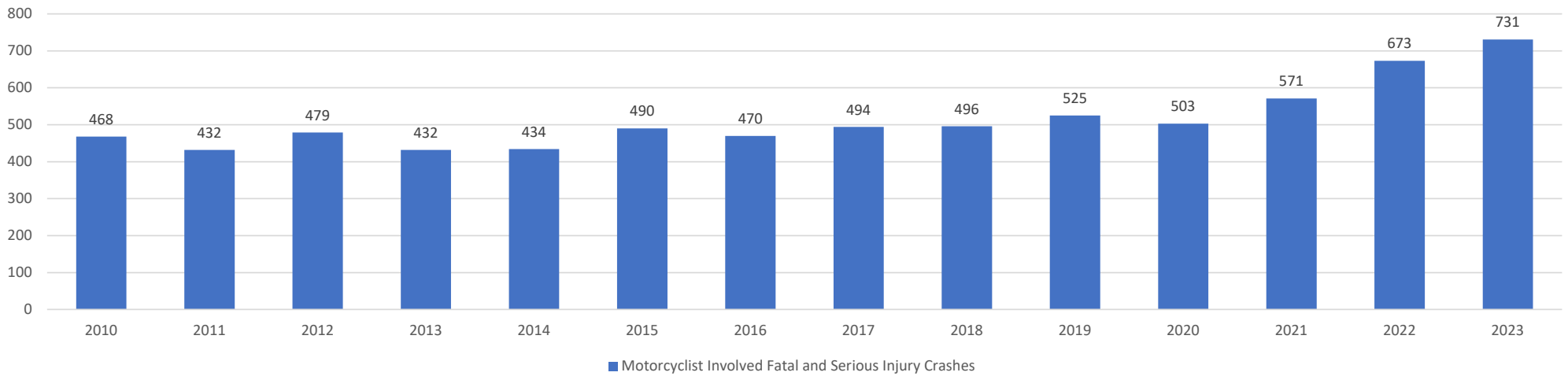
Fatal and Serious Injury Crashes Involving people biking

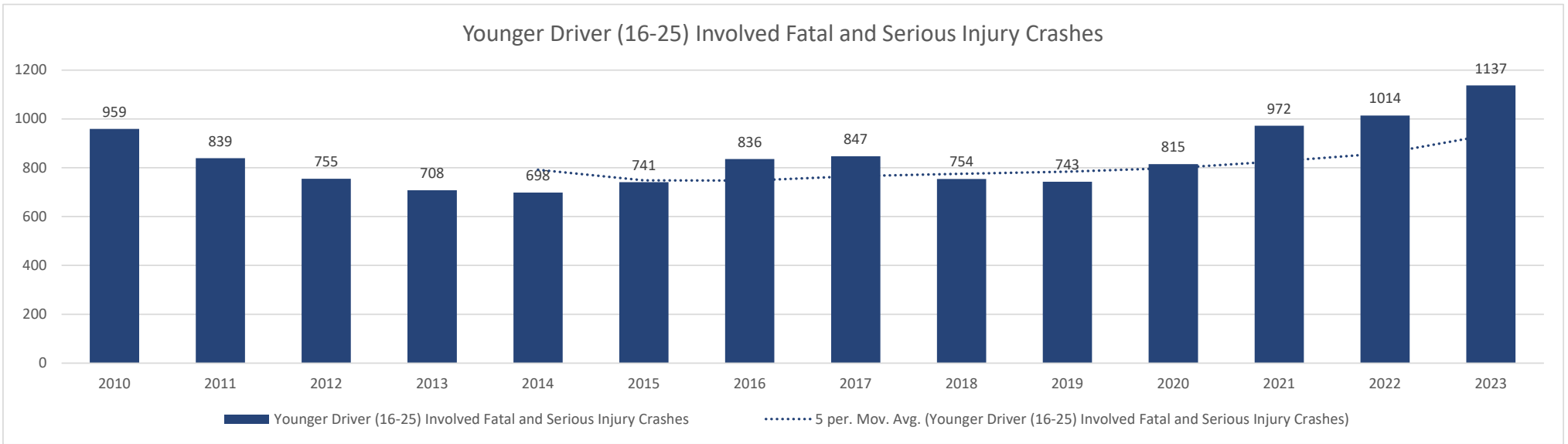
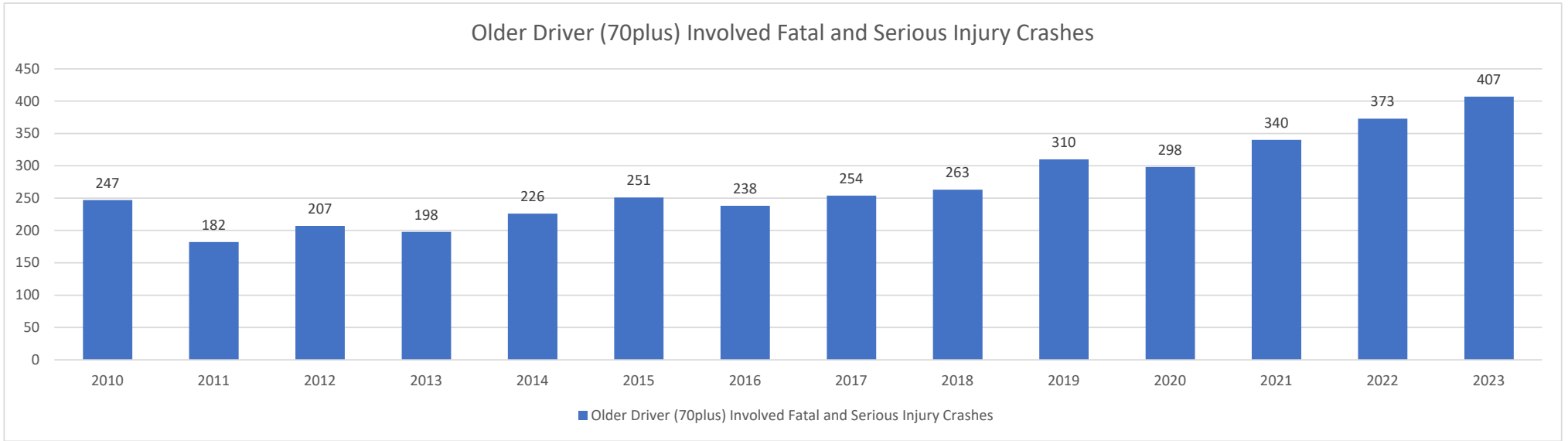


Heavy Truck Involved Fatal and Serious Injury Crashes



Motorcyclist Involved Fatal and Serious Injury Crashes





Appendix B: Fatal and Serious Injury Crashes Across Jurisdictions

Jurisdiction	All crashes	Fatal and serious injury crashes	% of fatal and serious injury crashes for the jurisdiction	Fatal and serious injury crash density for the jurisdiction (# of crashes/mi)	% of statewide fatal and serious injury crashes	Fatal and Serious Injury Crash Cost (2023, annual 5-year average)	Total Crash Cost (2023, annual 5-year average)
All public roadways in Washington state							
Miles 79,507.33							
Crashes	675,917	18,678	100.0%	0.23	100.0%	\$16,440,091,200	\$24,840,265,200
Crash types							
Lane departure	162,967	7,297	39.1%	0.09	39.1%	\$6,251,198,200	\$8,064,466,100
Run off the road	151,020	5,789	31.0%	0.07	31.0%	\$4,855,341,400	\$6,463,628,000
Opposite direction	11,947	1,508	8.1%	0.02	8.1%	\$1,395,856,800	\$1,600,838,100
Intersection related	254,060	6,007	32.2%	0.08	32.2%	\$5,579,119,000	\$9,210,232,600
Users							
Involving people walking or biking	18,228	3,982	21.3%	0.05	21.3%	\$3,476,717,400	\$4,068,920,000
Involving people walking	11,789	3,166	17.0%	0.04	17.0%	\$2,722,782,400	\$3,076,202,300
Involving people biking	6,444	820	4.4%	0.01	4.4%	\$758,243,200	\$997,025,900
Involving motorcyclists	12,405	3,499	18.7%	0.04	18.7%	\$3,149,294,200	\$3,441,245,300
Involving heavy trucks	40,805	1,282	6.9%	0.02	6.9%	\$947,804,000	\$1,347,581,700

Jurisdiction	All crashes	Fatal and serious injury crashes	% of fatal and serious injury crashes for the jurisdiction	Fatal and serious injury crash density for the jurisdiction (# of crashes/mi)	% of statewide fatal and serious injury crashes	Fatal and Serious Injury Crash Cost (2023, annual 5-year average)	Total Crash Cost (2023, annual 5-year average)
Local jurisdiction							
Miles 57,137.88							
Crashes	388,831	11,598		0.20	62.1%	\$10,486,158,800	\$15,596,454,900
Crash types							
Lane departure	93,418	4,131	35.6%	0.07	22.1%	\$3,532,724,000	\$4,561,514,500
Run off the road	84,993	3,333	28.7%	0.06	17.8%	\$2,770,172,600	\$3,659,569,200
Opposite direction	8,425	798	6.9%	0.01	4.3%	\$762,551,400	\$901,945,300
Intersection related	187,454	4,478	38.6%	0.08	24.0%	\$4,321,124,600	\$7,116,341,000
Users							
Involving people walking or biking	16,095	3,171	27.3%	0.06	17.0%	\$2,834,795,600	\$3,371,610,200
Involving people walking	10,241	2,475	21.3%	0.04	13.3%	\$2,171,332,800	\$2,488,227,100
Involving people biking	5,859	700	6.0%	0.01	3.7%	\$667,771,000	\$887,691,300
Involving motorcyclists	7,379	2,116	18.2%	0.04	11.3%	\$1,925,765,400	\$2,093,045,200
Involving heavy trucks	15,575	463	4.0%	0.01	2.5%	\$392,046,200	\$543,137,400

Jurisdiction	All crashes	Fatal and serious injury crashes	% of fatal and serious injury crashes for the jurisdiction	Fatal and serious injury crash density for the jurisdiction (# of crashes/mi)	% of statewide fatal and serious injury crashes	Fatal and Serious Injury Crash Cost (2023, annual 5-year average)	Total Crash Cost (2023, annual 5-year average)
WSDOT Jurisdiction							
Miles 6,782.98							
Crashes	286,869	7,077		1.04	37.9%	\$2,909,890,000	\$4,602,796,400
Crash types							
Lane departure	69,532	3,165	44.7%	0.47	16.9%	\$2,718,474,200	\$3,502,951,600
Run off the road	66,010	2,455	34.7%	0.36	13.1%	\$2,085,168,800	\$2,804,058,800
Opposite direction	3,522	710	10.0%	0.10	3.8%	\$633,305,400	\$698,892,800
Intersection related	66,471	1,527	21.6%	0.23	8.2%	\$1,257,994,400	\$2,093,872,300
Users							
Involving people walking or biking	2,126	810	11.4%	0.12	4.3%	\$641,921,800	\$697,309,800
Involving people walking	1,544	691	9.8%	0.10	3.7%	\$551,449,600	\$587,975,200
Involving people biking	582	119	1.7%	0.02	0.6%	\$90,472,200	\$109,334,600
Involving motorcyclists	5,025	1,382	19.5%	0.20	7.4%	\$1,223,528,800	\$1,348,200,100
Involving heavy trucks	25,216	819	11.6%	0.12	4.4%	\$555,757,800	\$804,444,300

Jurisdiction	All crashes	Fatal and serious injury crashes	% of fatal and serious injury crashes for the jurisdiction	Fatal and serious injury crash density for the jurisdiction (# of crashes/mi)	% of statewide fatal and serious injury crashes	Fatal and Serious Injury Crash Cost (2023, annual 5-year average)	Total Crash Cost (2023, annual 5-year average)
City Streets (excluding state routes within cities with a population over 30,000)							
Miles 17,738.91							
Crashes	261,242	6,451		0.36	34.5%	\$5,893,617,600	\$9,306,207,300
Crash types							
Lane departure	54,948	1,736	26.9%	0.10	9.3%	\$1,460,479,800	\$2,004,313,200
Run off the road	50,228	1,393	21.6%	0.08	7.5%	\$1,133,056,600	\$1,601,212,000
Opposite direction	4,720	343	5.3%	0.02	1.8%	\$327,423,200	\$403,101,200
Intersection related	132,250	2,955	45.8%	0.17	15.8%	\$2,886,494,000	\$4,863,983,100
Users							
Involving people walking or biking	12,813	2,294	35.6%	0.13	12.3%	\$2,020,545,800	\$2,466,788,000
Involving people walking	8,005	1,756	27.2%	0.10	9.4%	\$1,538,027,400	\$1,799,154,900
Involving people biking	4,813	542	8.4%	0.03	2.9%	\$486,826,600	\$671,941,300
Involving motorcyclists	4,295	1,109	17.2%	0.06	5.9%	\$1,016,735,200	\$1,117,220,500
Involving heavy trucks	10,321	225	3.5%	0.01	1.2%	\$185,252,600	\$278,450,000

Jurisdiction	All crashes	Fatal and serious injury crashes	% of fatal and serious injury crashes for the jurisdiction	Fatal and serious injury crash density for the jurisdiction (# of crashes/mi)	% of statewide fatal and serious injury crashes	Fatal and Serious Injury Crash Cost (2023, annual 5-year average)	Total Crash Cost (2023, annual 5-year average)
State routes within cities with a population over 30,000 (local jurisdiction)							
Miles 269.34							
Crashes	47,584	1,279		4.75	6.8%	\$1,176,138,600	\$1,807,950,000
Crash types							
Lane departure	3,313	211	16.5%	0.78	1.1%	\$176,636,200	\$215,247,500
Run off the road	2,723	146	11.4%	0.54	0.8%	\$107,705,000	\$135,263,300
Opposite Direction	590	65	5.1%	0.24	0.3%	\$68,931,200	\$79,984,200
Intersection related	29,097	642	50.2%	2.38	3.4%	\$611,764,400	\$1,030,820,700
Users							
Involving people walking or biking	1,893	465	36.4%	1.73	2.5%	\$478,210,200	\$530,573,800
Involving people walking	1,359	397	31.0%	1.47	2.1%	\$379,121,600	\$415,399,100
Involving people biking	534	68	5.3%	0.25	0.4%	\$99,088,600	\$115,174,700
Involving motorcyclists	786	229	17.9%	0.85	1.2%	\$206,793,600	\$224,985,700
Involving heavy trucks	2,200	69	5.4%	0.26	0.4%	\$51,698,400	\$75,821,700

Jurisdiction	All crashes	Fatal and serious injury crashes	% of fatal and serious injury crashes for the jurisdiction	Fatal and serious injury crash density for the jurisdiction (# of crashes/mi)	% of statewide fatal and serious injury crashes	Fatal and Serious Injury Crash Cost (2023, annual 5-year average)	Total Crash Cost (2023, annual 5-year average)
City jurisdiction (city streets and state routes within cities with a population over 30,000)							
Miles 18,008.25							
Crashes	308,826	7,730	100.0%	0.43	41.4%	\$7,069,756,200	\$11,114,157,300
Crash types							
Lane departure	58,261	1,947	25.2%	0.11	10.4%	\$1,637,116,000	\$2,219,560,700
Run off the road	52,951	1,539	19.9%	0.09	8.2%	\$1,240,761,600	\$1,736,475,300
Opposite Direction	5,310	408	5.3%	0.02	2.2%	\$396,354,400	\$483,085,400
Intersection related	161,347	3,597	46.5%	0.20	19.3%	\$3,498,258,400	\$5,894,803,800
Users							
Involving people walking or biking	14,706	2,759	35.7%	0.15	14.8%	\$2,498,756,000	\$2,997,361,800
Involving people walking	9,364	2,153	27.9%	0.12	11.5%	\$1,917,149,000	\$2,214,554,000
Involving people biking	5,347	610	7.9%	0.03	3.3%	\$585,915,200	\$787,116,000
Involving motorcyclists	5,081	1,338	17.3%	0.07	7.2%	\$1,223,528,800	\$1,342,206,200
Involving heavy trucks	12,521	294	3.8%	0.02	1.6%	\$236,951,000	\$354,271,700

Jurisdiction	All crashes	Fatal and serious injury crashes	% of fatal and serious injury crashes for the jurisdiction	Fatal and serious injury crash density for the jurisdiction (# of crashes/mi)	% of statewide fatal and serious injury crashes	Fatal and Serious Injury Crash Cost (2023, annual 5-year average)	Total Crash Cost (2023, annual 5-year average)
County roads							
Miles 39,129.63							
Crashes	80,005	3,868	100.0%	0.10	20.7%	\$3,416,402,600	\$4,482,297,600
Crash types							
Lane departure	35,157	2,184	56.5%	0.06	11.7%	\$1,895,608,000	\$2,341,953,800
Run off the road	32,042	1,794	46.4%	0.05	9.6%	\$1,529,411,000	\$1,923,093,900
Opposite direction	3,115	390	10.1%	0.01	2.1%	\$366,197,000	\$418,859,900
Intersection related	26,107	881	22.8%	0.02	4.7%	\$822,866,200	\$1,221,537,200
Users							
Involving people walking or biking	1,389	412	10.7%	0.01	2.2%	\$336,039,600	\$374,248,400
Involving people walking	877	322	8.3%	0.01	1.7%	\$254,183,800	\$273,673,100
Involving people biking	512	90	2.3%	0.00	0.5%	\$81,855,800	\$100,575,300
Involving motorcyclists	2,298	778	20.1%	0.02	4.2%	\$702,236,600	\$750,839,000
Involving heavy trucks	3,054	169	4.4%	0.00	0.9%	\$155,095,200	\$188,865,700

Note: Statewide centerline miles from the 2019 Miles and Daily Vehicle Miles Travelled (DVMT) Information web page at <https://wsdot.wa.gov/mapsdata/travel/hpms/annualmileage.htm>.

The societal cost values were estimated using WSDOT specific crash costs derived using the methodology outlined in the FHWA Guide, Crash Costs for Highway Safety Analysis, 2018.

Costs used are as follows:

- Fatal Crash (K) - \$4,308,200
- Serious Injury Crash (A) - \$4,308,200
- Evident Injury Crash (B) - \$ 304,200
- Possible Injury Crash (C) - \$ 180,600
- Property Damage Only Crash (O) - \$ 19,300

Appendix C: I-2 Detailed Project List

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
City of Auburn - Roundabout Implementation at R Street SE and 21st Street SE	000S(654)	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$1,482,000	"Local Safety Program Intersections Roundabouts"	Intersections	Urban Minor Arterial	City
City of Everett - Casino Rd. and 5th Ave. W. Pedestrian Safety	2796(002)	Intersection Traffic Control (Modify Traffic Signal - Add Flashing Yellow Arrow)	\$814,880	"Local Safety Program Intersections Signal Operations/ Visibility"	Intersections	Urban Principal Arterial - Other	City
City of Everett - Citywide Innovative Safety	000S(508)	Intersection Traffic Control (Modify Traffic Signal - Add Flashing Yellow Arrow)	\$700,912	"Local Safety Program Intersections Signal Operations/ Visibility"	Intersections	Urban Principal Arterial - Other	City
City of Everett - Citywide Safety Flashing Yellow Arrow Improvements	000S(606)	Intersection Traffic Control (Modify Traffic Signal - Add Flashing Yellow Arrow)	\$550,960	"Local Safety Program Intersections Signal Operations/ Visibility"	Intersections	Urban Minor Arterial	City
City of Fife - Citywide Intersection Illumination	000S(669)	Lighting (Intersection Lighting)	\$475,000	"Local Safety Program Intersections Illumination"	Intersections	Urban Major Collector	City
City of Lakewood - Custer Rd Safety	3190(008)	Intersection Geometry (Add/Modify Auxiliary Lanes)	\$1,282,000	"Local Safety Program Intersections Left Turn Lanes"	Intersections	Urban Principal Arterial - Other	City
City of Port Angeles - E 1st St, Front St, and Marine Dr Ped Safety	000S(666)	Pedestrians & Bicyclists (Rectangular Rapid Flashing Beacons - RRFB)	\$1,039,000	"Local Safety Program Pedestrians & Bicycles RRFBs"	Pedestrians & Bicycles	Urban Minor Arterial	City

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
City of Pullman - Citywide Intersections	N/A	Intersection Traffic Control (Modify Traffic Signal - Add Flashing Yellow Arrow)	\$1,062,000	"Local Safety Program Intersections Signal Operations/ Visibility"	Intersections	N/A	City
City of Pullman - Citywide Pedestrian Crossings	N/A	Pedestrians & Bicyclists (Rectangular Rapid Flashing Beacons - RRFB)	\$574,000	"Local Safety Program Pedestrians & Bicycles RRFBs"	Pedestrians & Bicycles	N/A	City
City of Shelton - Systemic Pedestrian Safety	N/A	Pedestrians & Bicyclists (Install Sidewalk)	\$1,295,000	"Local Safety Program Pedestrians & Bicycles Sidewalks"	Pedestrians & Bicycles	N/A	City
City of Shoreline - Meridian Avenue Bicycle Lanes	N/A	Roadway (Roadway Narrowing - Road Diet, Roadway Reconfiguration)	\$625,000	"Local Safety Program Pedestrians & Bicycles Road Diets"	Pedestrians & Bicycles	N/A	City
City of Spokane - Pedestrian Hybrid Beacons	000S(663)	Pedestrians & Bicyclists (Pedestrian Hybrid Beacon)	\$1,786,000	"Local Safety Program Pedestrians & Bicycles Pedestrian Hybrid Beacons"	Pedestrians & Bicycles	Urban Principal Arterial - Other	City
City of Sumner - Systemic Horizontal Curve and Roadway Departure Safety	000S(668)	Roadside (Barrier - Metal)	\$613,000	"Local Safety Program Lane Departure Guardrail"	Lane Departure	Urban Minor Collector	City
City of Tacoma - S 25th St Traffic Safety	3240(002)	Pedestrians & Bicyclists (On Road Bicycle Lane)	\$1,569,000	"Local Safety Program Pedestrians & Bicycles Bike Lanes/Cycle Tracks"	Pedestrians & Bicycles	Urban Minor Collector	City

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
City of Wenatchee - Fifth and Emerson Pedestrian Crossing	5836(002)	Pedestrians & Bicyclists (Rectangular Rapid Flashing Beacons - RRFB)	\$239,000	"Local Safety Program Pedestrians & Bicycles RRFBs"	Pedestrians & Bicycles	Urban Minor Arterial	City
Adams County - High Volume Corridors Intersection Project	N/A	Roadway Signs & Traffic Control (Roadway Signs - Including Post - New or Updated)	\$783,000	"Local Safety Program Intersections Signing"	Intersections	N/A	County
Chelan County - Countywide Barrier Terminal Improvements 2025	000S(692)	Roadside (Barrier - Metal)	\$442,000	"Local Safety Program Lane Departure Guardrail"	Lane Departure	Rural Minor Arterial	County
Douglas County - Grant Rd & Nile Ave Roundabout	5908(012)	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$1,241,582	"Local Safety Program Intersections Roundabouts"	Intersections	Urban Principal Arterial - Other	County
Franklin County - Taylor Flats & Ringold Rds Safety	000S(641)	Shoulder Treatments (Widen Shoulder - Paved or Other)	\$1,620,000	"Local Safety Program Lane Departure Shoulders"	Lane Departure	Rural Major Collector	County
Garfield County - Lower Deadman Road Safety	T120(003)	Roadside (Barrier - Metal)	\$560,000	"Local Safety Program Lane Departure Guardrail"	Lane Departure	Rural Major Collector	County
Island County - Non-Compliant Regulatory and Warning Sign Replacement - County-wide	N/A	Roadway Signs & Traffic Control (Roadway Signs - Including Post - New or Updated)	\$490,000	"Local Safety Program Lane Departure Signing"	Lane Departure	N/A	County

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
Island County - Non-Standard Guardrail Replacement - Camano Island	N/A	Roadside (Barrier - Metal)	\$1,089,000	"Local Safety Program Lane Departure Guardrail"	Lane Departure	N/A	County
King County - S 360th St & Military Rd S Roundabout	N/A	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$450,000	"Local Safety Program Intersections Roundabouts"	Intersections	N/A	County
King County - SE Covington-Sawyer Road at 164th Place SE Sightline Improvements	N/A	Intersection Geometry (Intersection Geometry - Other)	\$1,126,000	"Local Safety Program Intersections Sight Distance"	Intersections	N/A	County
Kitsap County - Sidney & Pine	000S(680)	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$50,000	"Local Safety Program Intersections Roundabouts"	Intersections	Rural Major Collector	County
Kittitas County - Horizontal Curve Safety Project	000S(678)	Roadway Signs & Traffic Control (Roadway Signs - Including Post - New or Updated)	\$225,000	"Local Safety Program Lane Departure Signing"	Lane Departure	Urban Minor Arterial	County
Kittitas County - Huntzinger Rd Safety Improvements - Phase 1	000S(679)	Roadside (Barrier - Metal)	\$1,391,000	"Local Safety Program Lane Departure Guardrail"	Lane Departure	Rural Minor Collector	County
Lewis County - 2023 County Safety Program	000S(675)	Roadside (Slope Flattening)	\$1,980,000	"Local Safety Program Lane Departure Slope Flattening"	Lane Departure	Urban Minor Arterial	County
Pend Oreille County - North County Guardrail Phase II - LeClerc Road North MP 16.2-32.4 and Boundary Road MP 4.0-10.2	N/A	Roadside (Barrier - Metal)	\$2,204,000	"Local Safety Program Lane Departure Guardrail"	Lane Departure	N/A	County

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
Pierce County - Golden Given Rd E & 99th St E Roundabout	000S(612)	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$1,001,000	"Local Safety Program Intersections Roundabouts"	Intersections	Urban Major Collector	County
Pierce County - Road Safety - Centerline Rumble Strips & Safety Edge & High Friction Surface Treatment	000S(684)	Roadway (Rumble Strips - Edge or Shoulder)	\$606,000	"Local Safety Program Lane Departure Rumble Strips"	Lane Departure	Urban Minor Arterial	County
Skagit County - Francis Road Section 3	F294(002)	Alignment (Horizontal Curve Realignment)	\$220,670	"Local Safety Program Lane Departure Realignment"	Lane Departure	Rural Major Collector	County
Snohomish County - 84th St NE & 123rd Ave NE Roundabout	000S(622)	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$1,312,000	"Local Safety Program Intersections Roundabouts"	Intersections	Rural Minor Arterial	County
Spokane County - 2023 Horizontal Curve Signing	000S(685)	Roadway Signs & Traffic Control (Curve-Related Warning Signs and Flashers)	\$318,000	"Local Safety Program Lane Departure Signing"	Lane Departure	Urban Principal Arterial - Other	County
Spokane County - Bruce Road and Peone Road Roundabout	N/A	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$179,000	"Local Safety Program Intersections Roundabouts"	Intersections	N/A	County
Spokane County - Hastings Road Channelization - Wall Street and Graves Road Pedestrian Safety	000S(689)	Pedestrians and Bicyclists (Medians and Pedestrian Refuge Areas)	\$508,000	"Local Safety Program Pedestrians & Bicycles Median Curbs"	Pedestrians & Bicycles	Urban Principal Arterial - Other	County
Spokane County - Wellesley & Appleway Aves Roundabout	3892(001)	Intersection Traffic Control (Modify Control - Modern Roundabout)	\$1,141,000	"Local Safety Program Intersections Roundabouts"	Intersections	Urban Principal Arterial - Other	County

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
Walla Walla County - Reser Road Complete Street Improvements, MP 0.49-0.97	7156(005)	Pedestrians and Bicyclists (Install Sidewalk)	\$300,000	"Local Safety Program Pedestrians & Bicycles Sidewalks"	Pedestrians & Bicycles	Urban Minor Arterial	County
Whitman County - Countywide Guardrail and Guideposts	N/A	Roadside (Barrier - Metal)	\$1,310,000	"Local Safety Program Lane Departure Guardrail"	Lane Departure	N/A	County
State projects							
Safety Support I2	099901U	RISK-ROADWAY	\$705,509	N/A	Systemic safety	N/A	HSIP
SR 20/W Fakkema Road - Intersection Improvements	102022D	RISK-I/S ROUNDABOUT ONE LANE	\$2,498,097	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 20/Burlington to Sedro-Woolley - Corridor Improvements	102061A	RISK-I/S CHANNELIZATION	\$699,300	Crash Analysis Location/Crash Analysis Corridor	Lane Departure	PRINCIPAL ARTERIAL, NHS	HSIP
SR 20/Burlington to Sedro-Woolley - Corridor Improvements	102061A	RISK-I/S CHANNELIZATION	\$8,846,567	Crash Analysis Location/Crash Analysis Corridor	Lane Departure	PRINCIPAL ARTERIAL, NHS	HSIP
SR 203/High Rock Rd & 203rd St SE - Intersection Improvement	120320B	RISK-I/S ROUNDABOUT ONE LANE	\$1,058,012	Intersection Analysis Location	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 546/Benson Road - Intersection Improvements	1546001	RISK-I/S ROUNDABOUT ONE LANE	\$252,314	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 546/Benson Road - Intersection Improvements	1546001	RISK-I/S ROUNDABOUT ONE LANE	\$571,550	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
NCR Sign Update 19-21	200007P	PRESERVATION SIGNING	\$461,167	Signing	Systemic safety	N/A	HSIP
SR 17/Cunningham Rd - Roundabout	201701Y	RISK-I/S ROUNDABOUT ONE LANE	\$4,971,951	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 26/1st Ave - Roundabout	202601V	RISK-I/S ROUNDABOUT ONE LANE	\$2,822,606	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 28/White Trail Rd - Roundabout	202804L	RISK-I/S ROUNDABOUT ONE LANE	\$3,187,605	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 282/Nat Washington Way - Roundabout	228201E	RISK-I/S ROUNDABOUT ONE LANE	\$442,978	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 282/Nat Washington Way - Roundabout	228201E	RISK-I/S ROUNDABOUT ONE LANE	\$896,602	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 3/E Agate Rd Intersection - Compact Roundabout	300309Q	RISK-I/S ROUNDABOUT ONE LANE	\$25,250	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 3/E Agate Rd Intersection - Compact Roundabout	300309Q	RISK-I/S ROUNDABOUT ONE LANE	\$1,726,815	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 3/Division Ave & W Pleasant St Intersection - Roundabout	300383R	RISK-I/S ROUNDABOUT ONE LANE	\$336,508	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	STP
SR 3/Division Ave & W Pleasant St Intersection - Roundabout	300383R	RISK-I/S ROUNDABOUT ONE LANE	\$72,432	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	STP

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
SR 3/Division Ave & W Pleasant St Intersection - Roundabout	300383R	RISK-I/S ROUNDABOUT ONE LANE	\$3,542,000	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	STP
SR 3/Pickering Rd Intersection - Compact Roundabout	300399C	RISK-I/S ROUNDABOUT ONE LANE	\$25,550	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 3/Pickering Rd Intersection - Compact Roundabout	300399C	RISK-I/S ROUNDABOUT ONE LANE	\$1,475,330	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 7/S of 260th St E to N of SR 507 Intersection - Roundabouts & Paving	300726R	RISK-I/S ROUNDABOUT ONE LANE	\$6,010,354	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP, NHPP
SR 7/S of 260th St E to N of SR 507 Intersection - Roundabouts & Paving	300726R	RISK-I/S ROUNDABOUT ONE LANE	\$2,420,319	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP, NHPP
SR 7/S of 260th St E to N of SR 507 Intersection - Roundabouts & Paving	300726R	RISK-I/S ROUNDABOUT ONE LANE	\$43,826,058	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	NHPP, STP
US 101/SR 3 Safety Median Barriers	310114Q	RISK-I/S CHANNELIZATION	\$844,651	Barriers	Lane Departure	PRINCIPAL ARTERIAL, NHS	NHPP
SR 104/Paradise Bay-Shine Road - Intersection Safety Improvement	310401D	RISK-I/S ROUNDABOUT ONE LANE	\$6,635,451	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 104/SR 19 Intersection - Safety Improvements	310441A	RISK-I/S ROUNDABOUT ONE LANE	\$6,132,951	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 109/South of Taholah - Temporary Bypass	310938R	GENERAL PURPOSE RURAL/URBAN MO	\$284,200	Crash Analysis Location/Crash Analysis Corridor	Lane Departure	MAJOR COLLECTOR, NON-NHS	PROT
SR 109/South of Taholah - Temporary Bypass	310938R	GENERAL PURPOSE RURAL/URBAN MO	\$13,403,597	Crash Analysis Location/Crash Analysis Corridor	Lane Departure	MAJOR COLLECTOR, NON-NHS	PROT

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
SR 160/Long Lake Rd SE - Roundabout	316011B	RISK-I/S ROUNDABOUT ONE LANE	\$153,836	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 160/Long Lake Rd SE - Roundabout	316011B	RISK-I/S ROUNDABOUT ONE LANE	\$3,763,369	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 162/Orville Rd E Intersection - Roundabout	316211R	RISK-I/S ROUNDABOUT ONE LANE	\$926,479	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 162/Orville Rd E Intersection - Roundabout	316211R	RISK-I/S ROUNDABOUT ONE LANE	\$114,156	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 162/Orville Rd E Intersection - Roundabout	316211R	RISK-I/S ROUNDABOUT ONE LANE	\$3,978,229	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 302/118th Ave NW Intersection - Roundabout	330212R	RISK-I/S ROUNDABOUT ONE LANE	\$23,872	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 302/118th Ave NW Intersection - Roundabout	330212R	RISK-I/S ROUNDABOUT ONE LANE	\$2,737,921	Roundabouts	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 507/Vail Rd SE Intersection - Compact Roundabout	350730R	RISK-I/S ROUNDABOUT ONE LANE	\$575,771	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 507/Vail Rd SE Intersection - Compact Roundabout	350730R	RISK-I/S ROUNDABOUT ONE LANE	\$9,990	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 507/Vail Rd SE Intersection - Compact Roundabout	350730R	RISK-I/S ROUNDABOUT ONE LANE	\$2,499,578	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 507/208th St E Intersection - Compact Roundabout	350742R	RISK-I/S ROUNDABOUT ONE LANE	\$1,342,640	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
SR 510/McAllister Ct SE & Rockcross Dr I/S - Compact Roundabout	351005R	RISK-I/S ROUNDABOUT ONE LANE	\$634,575	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 510/McAllister Ct SE & Rockcross Dr I/S - Compact Roundabout	351005R	RISK-I/S ROUNDABOUT ONE LANE	\$871,584	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 702/Harts Lake Rd S Intersection - Compact Roundabout	370201R	RISK-I/S ROUNDABOUT ONE LANE	\$1,548,583	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 702/40th Ave S & Allen Rd Intersection - Compact Roundabout	370203R	RISK-I/S ROUNDABOUT ONE LANE	\$173,852	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 702/40th Ave S & Allen Rd Intersection - Compact Roundabout	370203R	RISK-I/S ROUNDABOUT ONE LANE	\$1,259,608	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 702/8th Avenue S Intersection - Compact Roundabout	370205A	RISK-I/S ROUNDABOUT ONE LANE	\$2,301,537	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
US 12/SR 7 - Intersection Improvements	401223I	AT-GRADE INTERSECTIONS (URBAN)	\$506,700	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
US 12/SR 7 - Intersection Improvements	401223I	AT-GRADE INTERSECTIONS (URBAN)	\$2,044,000	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 500/NE Robinson Rd and NE 3rd St. - Intersection Safety Improvements	450018S	REDUCT/COLLIS ANALY LOCATIONS	\$1,174,500	Intersection Analysis Location	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 500/NE Robinson Rd and NE 3rd St. - Intersection Safety Improvements	450018S	REDUCT/COLLIS ANALY LOCATIONS	\$4,823,503	Intersection Analysis Location	Intersections	MINOR ARTERIAL, NON-NHS	HSIP

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
SR 503/NE Rock Creek Rd - Intersection Improvements	450323I	RISK-I/S ROUNDABOUT ONE LANE	\$200,798	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 503/NE Rock Creek Rd - Intersection Improvements	450323I	RISK-I/S ROUNDABOUT ONE LANE	\$2,170,555	Roundabouts	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
US 12/Old Naches Highway - Build Interchange	501208J	AT-GRADE INTERSECTIONS (RURAL)	\$2,046,730	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
US 12/Eschbach Rd - Intersection Safety Improvements	501216X	RISK-I/S CHANNELIZATION	\$338,121	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
US 12/Eschbach Rd - Intersection Safety Improvements	501216X	RISK-I/S CHANNELIZATION	\$1,651,630	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
US 12/Ackley Rd/Clover Lane - Intersection Safety Improvements	501216Z	RISK-I/S CHANNELIZATION	\$368,859	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
US 12/Ackley Rd/Clover Lane - Intersection Safety Improvements	501216Z	RISK-I/S CHANNELIZATION	\$1,078,010	Intersection Analysis Location	Intersections	PRINCIPAL ARTERIAL, NHS	HSIP
SR 22/SR 223 Chambers Rd Intersection - Intersection Safety	502202Z	RISK-I/S ROUNDABOUT ONE LANE	\$155,196	Roundabouts	Intersections Systemic safety	MAJOR COLLECTOR, NON-NHS	HSIP
SR 22/SR 223 Chambers Rd Intersection - Intersection Safety	502202Z	RISK-I/S ROUNDABOUT ONE LANE	\$1,183,200	Roundabouts	Intersections Systemic safety	MAJOR COLLECTOR, NON-NHS	HSIP
SR 24/Bell Rd Intersection - Intersection Safety	502402Z	RISK-I/S ROUNDABOUT ONE LANE	\$362,628	Roundabouts	Intersections Systemic safety	PRINCIPAL ARTERIAL, NHS	HSIP

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
SR 24/Bell Rd Intersection - Intersection Safety	502402Z	RISK-I/S ROUNDABOUT ONE LANE	\$1,596,000	Roundabouts	Intersections Systemic safety	PRINCIPAL ARTERIAL, NHS	HSIP
I-90/Snoqualmie Pass Corridor - Rehab Weathering Steel Guardrail 23-25	509018K	PRESERVATION GUARDRAIL	\$493,835	Guardrail Infill	Lane Departure	INTERSTATE	HSIP
US 97/Lateral A Intersection - Intersection Improvements	509704S	RISK-I/S ROUNDABOUT MULTI LANE	\$5,102,839	Roundabouts	Intersection Systemic safety	PRINCIPAL ARTERIAL, NHS	HSIP
US 97/Robbins Rd - Intersection Improvements	509705H	REDUCT/COLLIS ANALY LOCATIONS	\$1,050,001	Intersection Analysis Location	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
US 97/Robbins Rd - Intersection Improvements	509705H	REDUCT/COLLIS ANALY LOCATIONS	\$136,900	Intersection Analysis Location	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
US 97/Robbins Rd - Intersection Improvements	509705H	REDUCT/COLLIS ANALY LOCATIONS	\$7,397,610	Intersection Analysis Location	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
US 97/Jones Rd - Intersection Improvements	509705O	REDUCT/COLLIS ANALY LOCATIONS	\$697,682	Intersection Analysis Location	Intersections	MINOR ARTERIAL, NON-NHS	HSIP
SR 241/Allen Rd Intersection - Intersection Safety	524103H	RISK-I/S ROUNDABOUT ONE LANE	\$248,932	Roundabouts	Intersections Systemic safety	MINOR ARTERIAL, NON-NHS	HSIP
SR 241/Allen Rd Intersection - Intersection Safety	524103H	RISK-I/S ROUNDABOUT ONE LANE	\$2,107,280	Roundabouts	Intersections Systemic safety	MINOR ARTERIAL, NON-NHS	HSIP
SR 241/E Edison Rd Intersection - Intersection Safety	524103I	RISK-I/S ROUNDABOUT ONE LANE	\$238,559	Roundabouts	Intersections Systemic safety	MINOR ARTERIAL, NON-NHS	HSIP

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Projects funded through WSDOT HSIP and Local Program Funding for FFY 2025

Project Name	Project Number	Improvement Type	Project Cost	Program, Strategy or Activity	SHSP Emphasis Area	Functional Classification	Fund Code
SR 241/E Edison Rd Intersection - Intersection Safety	524103I	RISK-I/S ROUNDABOUT ONE LANE	\$82,152	Roundabouts	Intersections Systemic safety	MINOR ARTERIAL, NON-NHS	HSIP
SR 241/E Edison Rd Intersection - Intersection Safety	524103I	RISK-I/S ROUNDABOUT ONE LANE	\$2,057,580	Roundabouts	Intersections Systemic safety	MINOR ARTERIAL, NON-NHS	HSIP

Note: Project numbers showing multiple entries indicate different phases of projects and do not indicate separate projects.

Exhibit 48. Estimated Funding and Benefits by Emphasis Area

Program, Strategy or Activity	Estimated # Projects	Estimated Funding	Estimated Benefits*
Intersections	79	\$164,317,607	\$786,867,810.00
Lane Departure	20	\$37,640,819	\$198,818,696.00
Pedestrian and Bicyclists	9	\$7,935,000	\$63,285,000.00
Systemic Safety	2	\$1,166,676	\$1,750,014.00
Total	110	\$211,060,102	\$1,050,721,520.00

Exhibit 49. Funding Obligations and Benefits by Investment Subcategory

I 2 Safety Subprogram	Estimated # Projects	Estimated Funding	Estimated Benefits*
Prevention	87	\$147,363,818	\$864,529,880.00
Reduction	23	\$63,696,284	\$186,191,640.00
Total	110	\$211,060,102	\$1,050,721,520.00

*Note: For this Detailed Project List the societal cost values were estimated using WSDOT specific crash costs derived using the methodology outlined in the FHWA Guide, Crash Costs for Highway Safety Analysis, 2018. Using the countermeasure type, as shown on project list, a typical cost/benefit ratio was developed. Benefits were assumed for a typical installation, as drawn from each of benefit cost sections for the respective reduction and proactive subcategories.

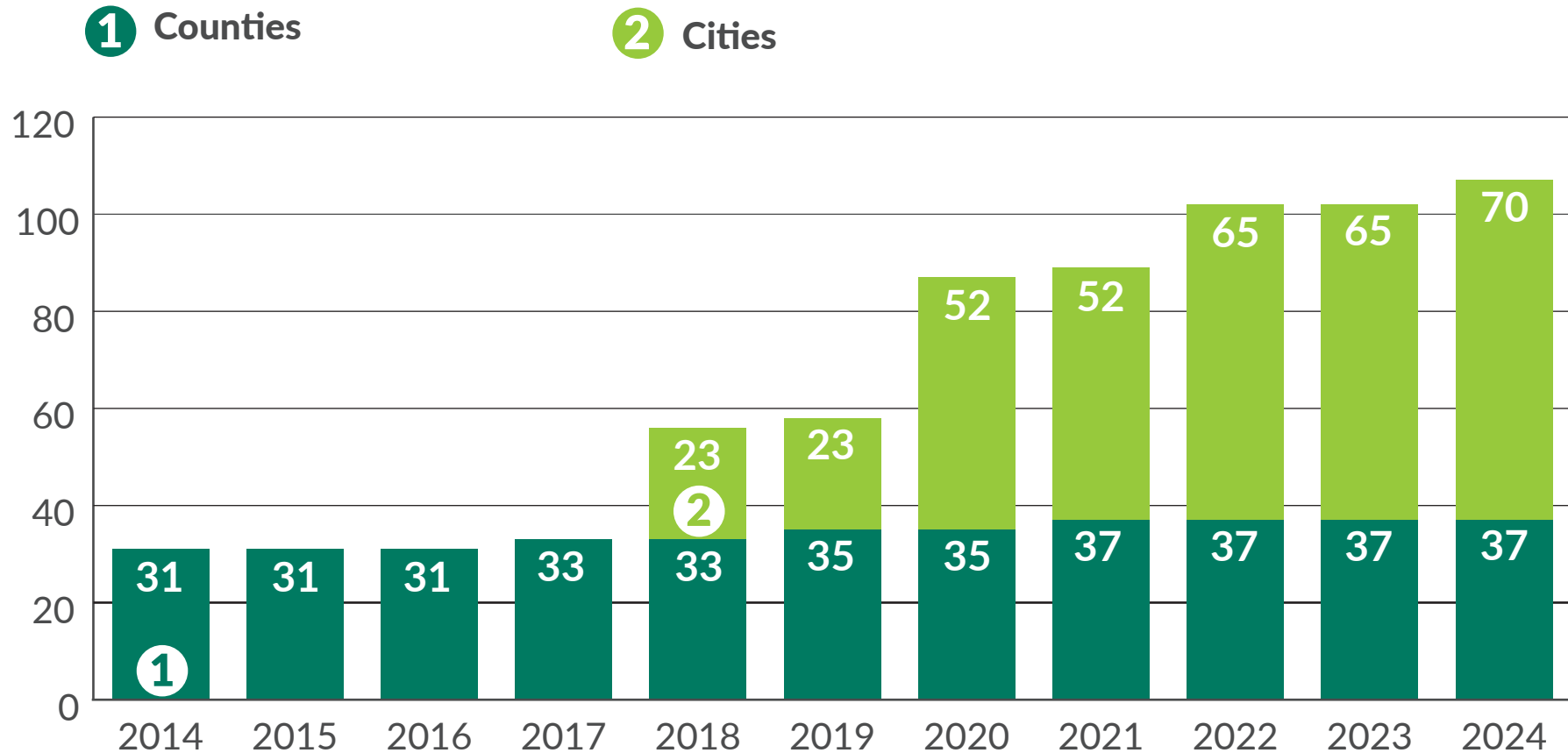
Appendix D: CMF Inventory

ID	CMF Title	CMF	Sites	Sample Size	Applicability of CMF
1	LED Stop Signs	0.339	8	Total: Before 8, After 2	Site Type: Rural 2L2W. Crash Type: All Countermeasure Relevant Crashes Crash Severity: All
2	HFST	CMF _{FI} = 0.074 CMF _{PDO} = 0.063	2	FI: Before 38, After 2; PDO: Before 130, After: 6	Site Type: Urban Freeway On-Ramp Crash Severity & PDO Crash Type: All Countermeasure Relevant Crashes
3	Curve Signage	0.462	7	Total: Before 21, After 7	Site Type: Rural 2L2W. Crash Type: All Countermeasure Relevant Crashes Crash Severity: All
4	24/7 Flashing Beacon Elk Crossing sign with 'next X miles' plaque	CMF _{-all animal} = 1.14 CMF _{-elk only} = 0.97	1	All Animal: Before 67, After 8 Elk Only: Before 55, After 59	Site Type: Rural 2L2W. Speed Limit: 55 mph Crash Type: Vehicle/Elk & Vehicle/All animal crashes. Crash Severity: All
5	Install 2 alternating 24/7 flashing beacons above the advanced reverse turn sign & to increase the 1st turn large arrow sign to add speed advisory	CMF=0.737	2	Total: Before 10, After 6	Site Type: Rural 2L2W, Speed Limit 50 mph Crash Type: All Curve Related Crashes (All Lane Departure & Vehicle Overturned Crashes). Crash Severity: All
6	ICWS (Intersection Control Warning System) -Various sign messages	CMF _{Total Intersection Crashes} = 1.12 CMF _{Rear-end Crashes} = 1.34 CMF _{Entering At Angle Crashes} = 0.86 CMF _{Entering At Angle Crashes' NWR} = 0.55	15 15 15 11	Total: Before 236, After 156; Rear-End: Before 103, After 68; Angle: Before 68, After 31 Angle NWR: Before 39, After 14	Site Type: Rural 2L2W Hwy, speed 35-60 mph Crash Type: All Intersection Crashes Crash Severity: All
7	PTSWF (Prepare To Stop When Flashing) System	Sites followed 2019 WSDOT Guidance: CMF _{Total Intersection Crashes} = 0.75 CMF _{Rear-End} = 0.75 All Sites in Study: CMF _{Total Intersection Crashes} = 1.01 CMF _{Rear-End} = 1.07	9 21	Total: Before 146, After 113 Rear-End: Before 103, After 75; Total: Before 363, After 383 Rear-End: Before 245	Site Type: Rural 2L2W. Speed 45-60 mph Crash Type: All Mainline Intersection Crashes & Rear-End Crashes Crash Severity: All

Appendix E: Local Program Safety Plans

Local road safety plans in Washington

By number of agencies



This chart shows the growth in the development of Local Road Safety Plans (LRSP) within the state over the past decade. LRSPs are a data-driven, risk-based approach to safety based on the identification of roadway characteristics common to locations with fatal and serious injury crashes. Those common roadway characteristics are identified across the network and then locations are prioritized based on the presence of those factors. The development of these LRSPs means that many agencies are now using a data-driven approach to identify safety priorities across their networks and are prioritizing projects for funding based on that process. The local safety program (HSIP) has established the development of a LRSP as a baseline requirement to apply for HSIP funding for safety projects, starting with counties in 2014, expanding to cities seeking systemic safety projects in 2018, and further expanding to all cities in 2020.