Regional Safety Action Plan

May 2025

Puget Sound Regional Council

American with Disabilities Act (ADA) Information

Individuals requiring reasonable accommodations may request written materials in alternate formats, sign language interpreters, physical accessibility accommodations, or other reasonable accommodations by contacting the ADA Coordinator, **Thu Le**, at **206-464-6175**, with two weeks' advance notice. Persons who are deaf or hard of hearing may contact the ADA Coordinator, **Thu Le**, through TTY Relay 711.

Title VI Notice

PSRC fully complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations in all programs and activities. For more information, or to obtain a Title VI Complaint Form, visit www.psrc.org/title-vi.

Language Assistance

العربية(Arabic), 中文 (Chinese), Deutsch (German), Français (French), 한국 (Korean), Русский (Russian), Español (Spanish), Tagalog, Tiếng Việt (Vietnamese)

For language assistance, visit www.psrc.org/contact-center/language-assistance.

Additional copies of this document may be obtained by contacting:

Puget Sound Regional Council, Information Center
1201 Third Avenue, Suite 500
Seattle, WA 98101-3055
206-464-7532 I info@psrc.org I www.psrc.org

Technical consultant team led by:

Consultant team:

Table of Contents

CHAPTER 3

CHAPTER 4

CHAPTER 5

APPENDICES

Table of Figures

Table of Tables

List of Acronyms

Abbreviation	Definition
ADT	Average Daily Traffic
BIL	Bipartisan Infrastructure Law
BIPOC	Black, Indigenous, and People of Color
CMF	Crash Modification Factor
EFA	Equity Focus Area
FARS	Fatality Analysis Reporting System
HAWK	High-Intensity Activated Crosswalk Beacon
HIN	High Injury Network
HSM	Highway Safety Manual
MPS	Motorcycle Protection System
MUTCD	Manual of Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
ODOT	Oregon Department of Transportation
PHB	Pedestrian Hybrid Beacon
PSRC	Puget Sound Region Council
RRFB	Rectangular Rapid Flashing Beacons
RSAP	Regional Safety Action Plan
RTP	Regional Transportation Plan
SS4A	Safe Streets and Roads for All
UGA	Urban Growth Area
VMT	Vehicle Miles Travelled
WSDOT	Washington State Department of Transportation
USDOT	United States Department of Transportation

CHAPTER 1

Overview

Introduction

PSRC is committed to eliminating deaths and serious injuries in the central Puget Soud region through a regional safety approach that is proactive, data-informed, and community-based. Implementing the Regional Safety Action Plan will help achieve the vision of safe, accessible, and convenient travel in the region for all road users, especially those most vulnerable. Specifically, it helps PSRC and its partners to identify actionable strategies and resources, improve project development, implement improvements, track progress toward meeting regional and state safety targets, and promote a culture of safety in the central Puget Sound region.

This plan has been developed in response to the dramatic increase in deaths and serious injuries. The central Puget Sound region experienced a total of 205,093 injuries and deaths due to road crashes between 2016 and 2023. Furthermore, 1 in 16 people involved in an injury-level crash were seriously injured or killed. Safety is one of the primary policy focus areas in the Regional Transportation Plan (RTP) adopted in 2022 and the RTP directs PSRC to develop a Regional Safety Action Plan (RSAP), including actions, targets, and performance indicators.

- *In June 2023, PSRC hosted a Regional Safety Summit to bring together a wide variety of voices, including elected officials, transportation experts, engaged citizens, local agency staff and others to advance the conversation on the state of road safety in the region.*
- *Also in 2023, PSRC received Safe Streets and Roads for All (SS4A) discretionary grant funds from the U.S. Department of Transportation for the development of a Regional Safety Action Plan with the goal of achieving zero fatalities and serious injuries in the future.*

Plan Purpose

The purpose of the PSRC RSAP is fundamentally to reduce serious injuries and fatalities for all road users in the central Puget Sound region, working towards the ultimate goal of zero deaths and serious injuries. PSRC underwent a regional safety assessment of crashes resulting in serious injuries and fatalities, setting a baseline understanding for safety in the region. Findings from this assessment indicate portions of the region experience more severe outcomes than others.

PSRC envisions that this RSAP will be complimentary to city and county frameworks with the goal of consistent and effective safety planning and implementation throughout the region. This plan lays out a roadmap to eliminate crashes resulting in serious injuries and fatalities by:

- Developing tools for a shared understanding of the existing state of safety in the region.
- Engaging with a diverse population of community members, elected officials and regional staff across the four-county central Puget Sound region to understand their experience of safety issues.
- Developing actionable and proven strategies for crash severity reduction in a manual-style guide.
- Updating existing plans, policies, and procedures aligning with Safe System Approach principles.

Transportation safety more broadly encompasses elements aside from roadway traffic safety, including public transit, personal security, and safety issues related to modes such as freight, aviation, ferries and rail. PSRC recognizes the importance of these issues, however they are outside the scope of the current plan. While PSRC develops strategies and guidance and can establish regional priorities, it is the responsibility of local transportation agencies to develop, implement, and operate safety projects and programs.

Supporting the Regional Growth Strategy

VISION 2050, the central Puget Sound region's shared regional plan for moving toward a sustainable and more equitable future, provides a framework for long-range transportation planning in the region. It builds on the state Growth Management Act and the regional emphasis of focusing growth into centers and near high-capacity transit options to create safer, accessible communities and reduce greenhouse gas emissions.

VISION 2050 emphasizes that a safe and efficient transportation system is essential to the region's quality of life and serves as the backbone of the economy. It includes a commitment to achieve the goal of zero fatalities and serious injuries on the region's roadways.

Land use is the foundation that shapes the region's transportation plans and systems. The way that our communities develop can have tremendous impact on the safety of the transportation system. Thoughtful land use and transportation planning can bring daily needs closer together and easier to access, reducing exposure to crashes, promoting walking and biking, and reducing congestion and air pollution. Safer, more comfortable environments can increase human interaction, making communities healthier, safer, and more vibrant. WSDOT's State Highway Safety Plan, Target Zero, recognizes this relationship of land use and travel choices, and builds on the USDOT Safe System Approach by including Safer Land Use as an additional element. This RSAP follows WSDOT's lead in emphasizing the important relationship of land use and roadway safety, which makes the need for transportation systems that safely accommodate all modes even more critical.

The RSAP was developed within this planning framework to identify how roadway infrastructure can interact more safely and efficiently with surrounding land uses, which in turn affect their operation. More active and varied activities in an area - such as housing, schools, retail, and community services - require roadway designs that support walking, biking, and transit to provide safe and convenient access and connections. Features such as signalized intersections, shorter road crossings, wide sidewalks, and protected bike lanes reduce exposure to vehicles and can reduces the likelihood and severity of crashes for all users.

The Regional Transportation Plan directed PSRC to develop the RSAP for the purpose of identifying key regional transportation safety issues and developing tools to address them. However, the Regional Safety Action Plan is not the only plan addressing safety. There are 86 jurisdictions within the central Puget Sound region, many of which have their own transportation safety-related priorities, policies, High Injury or High Risk Networks, and plans. The RSAP acts as an umbrella for these related priorities, policies, networks, and plans, and is a resource to help local jurisdictions with a baseline of tools and strategies for understanding the current transportation safety issues existing today and potential solutions into the future. Conversely, local plans, policies, and priorities, including High Injury or High Risk Networks, may go beyond what is presented in the RSAP in addressing locally-specific risk factors, contexts, and emphasis areas. For more information on safety planning best practices, see Appendix D.

Safe Streets and Roads for All

The federal Bipartisan Infrastructure Law (BIL) enacted in 2021 established the Safe Streets and Roads for All (SS4A) discretionary program. The program funds regional, local, and Tribal initiatives through grants with a focus on preventing roadway deaths and serious injuries. The SS4A program was funded for Federal Fiscal Years 2022 through 2026, with an appropriation of $1 billion per year, allocated for planning and implementation activities.

SS4A Goals

The goal of a **Safety Action Plan** is to develop a holistic, well-defined strategy to prevent roadway fatalities and serious injuries. A successful action plan includes the following key components:

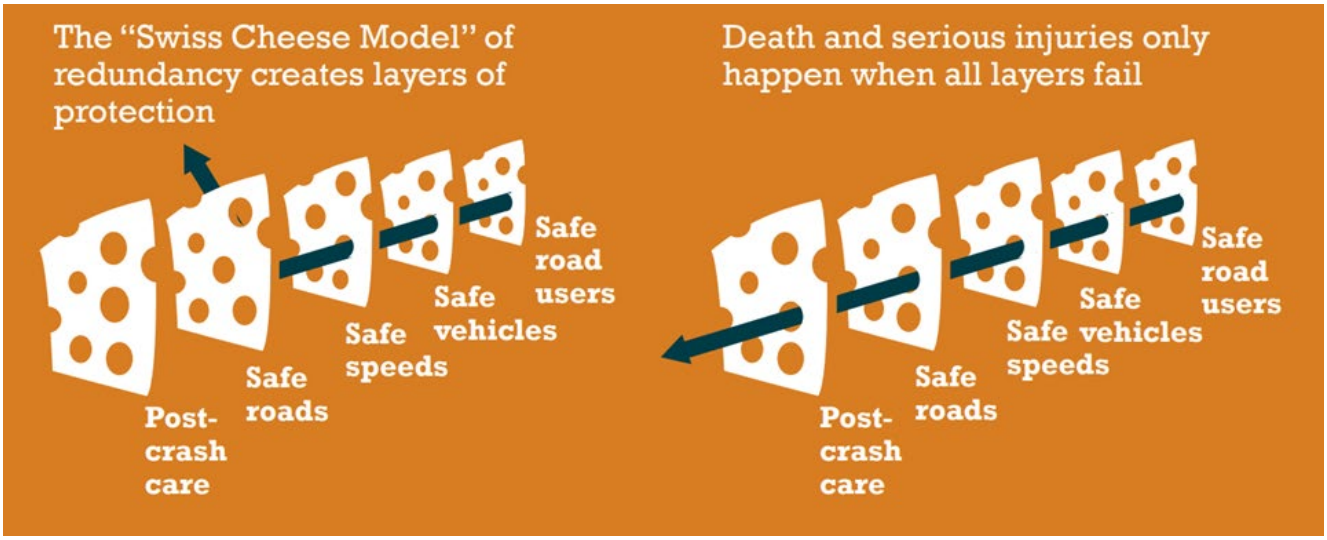
1. **Leadership commitment and goal setting.** An official commitment to an eventual goal of zero roadway fatalities and serious injuries.
2. **Planning structure.** A committee or group charged with oversight of the Action Plan development, implementation, and monitoring.
3. **Safety analysis.** An analysis of existing conditions, trends, and needs to provide a baseline level of fatal and serious injury crashes, detail contributing factors and crash types, and understand systemic and specific safety needs.
4. **Engagement and collaboration.** Robust engagement with the public and relevant stakeholders.
5. **Equity considerations.** Plan development using inclusive and representative processes.
6. **Policy and process changes.** Assessment of current policies, plans, guidelines, and/or standards to identify opportunities to improve how processes prioritize transportation safety.
7. **Strategy and project selections.** Identification of a comprehensive set of projects and strategies, shaped by data, the best available evidence and noteworthy practices, as well as stakeholder input and equity considerations, that will address the safety problems described in the Action Plan.
8. **Progress and transparency.** Method to measure progress over time after an Action Plan is developed or updated, including outcome data.

Safe System Approach

USDOT has promoted the Safe System Approach as an effective way to address and mitigate the risks inherent in the surface transportation system. It works by building and reinforcing multiple layers of protection to prevent crashes and minimize the harm caused to those involved when crashes do occur. This comprehensive approach provides overarching guidance for roadway safety.

This is a shift from a conventional safety approach because it focuses on human mistakes and vulnerability and designs a system with many redundancies to protect everyone. The Safe System Approach functions as a framework that integrates policymaking, system design, and user behavior to foster a robust safety culture. Emphasizing a multilayered strategy, the Safe System Approach recognizes that if one part of the system fails, other layers can act as safeguards to mitigate crashes (see Figure 1-1).

The Washington State Strategic Highway Safety Plan is structured around the Safe System Approach, and in 2024 that document was updated to fully embrace and promote it as the recommended framework statewide.



Source: Safe Systems Approach

Figure 1-1. The Swiss Cheese Model

Safe System Principles

These six core principles direct the Safe System Approach vision, ensuring it remains people-centered, proactive, and collaborative. These principles form the foundation for strategies to lower serious injuries and fatalities.

1. **Death and Serious Injury are Unacceptable.** Loss of life or serious injury on roads is unacceptable. Everyone deserves safety while traveling, whether they drive, cycle, walk, or use public transit.
2. **Humans Make Mistakes.** Individual road user behavior remains a significant influence. This principle acknowledges that people make errors; therefore, road designs should minimize the risk of these errors leading to fatal and serious injury crashes. Designing self-explanatory roads guide drivers, pedestrians, and cyclists to act safely. Education campaigns and law enforcement also promote safe behaviors.
3. **Humans are Vulnerable.** Human vulnerability to crash forces is a key consideration in the Safe System Approach. As the weight and speed of vehicles increase, so does the potential for serious injury in a crash. This principle stresses creating a transportation system that accommodates human limitations by managing the forces involved in crashes.

Figure 1-2. Principles of a Safe System Approach

4. **Responsibility is Shared.** Creating a safer transportation system requires the commitment of all system participants, including governments, private sector organizations, nonprofits, emergency responders, and individual road users. This principle builds a collective framework that encourages collaboration across sectors, from engineers designing safer roads to health providers offering timely trauma care.
5. **Safety is Proactive.** The Safe System Approach encourages a proactive rather than reactive approach, emphasizing preventive measures before crashes occur. Identifying risk factors and analyzing trends and patterns can help agencies apply preventative treatments. Expanding safety data analysis to more than crash history and applying low-cost systemic countermeasures support proactive safety.
6. **Redundancy is Crucial.** The Safe System Approach emphasizes that all parts of the transportation system be strengthened, so that if one part fails, the other parts still protect people.

The Safe System Approach is ever evolving, and other principles are likely to emerge as time continues.

How to Use the Plan

The RSAP uses a data-driven approach to identify key transportation safety issues using crash trends, assessment of crash contributing factors, and specific crash locations. Engagement with community members, elected officials and regional staff across the four-county central Puget Sound region informed the safety action planning process and illuminated key concerns and shared goals for eliminating traffic-related serious injuries and fatalities. The RSAP uses crash assessment information to build tools for agency staff to understand particular crash information relevant to their locations, and to develop a manual-style guide of strategies, countermeasures, and actions within five crash emphasis areas developed to address context-specific problems.

Following this overview, Chapter 2 provides a summary of the crash data analysis, including key findings related to crash outcomes and identified emphasis areas. Chapter 3 includes an overview of the engagement and outreach process, while Chapter 4 provides a Strategies Toolbox that PSRC member agencies can utilize to determine the most effective strategies for their specific safety issues and contexts. The Plan concludes with Chapter 5, which discusses Plan implementation and next steps.

CHAPTER 2

Safety Analysis

Introduction

Chapter 2 summarizes high level findings from regional crash analysis that can be found in an in-depth report titled the "State of Safety in the Region," provided as Appendix A.

To better understand the long-term safety trends in the region, a broad range of crash data for the four-county region was analyzed for the period between 2010 and 2023. A more focused analysis for the period between 2016 and 2023 was analyzed to establish the current state of safety. This date range includes the periods leading up to and following the COVID-19 pandemic.. Overall, the total number of crashes with traffic injuries have gradually declined throughout the region. However, crashes resulting in deaths and serious injuries have grown, illustrating that crash injuries have become less common but more severe in the central Puget Sound region. Additionally, vehicle size and safety features can protect individuals inside of vehicles during a crash, but fatal and serious crash-related injuries to vulnerable road users including people walking, biking or rolling has increased.

To facilitate a more in-depth regional analysis, crash data was applied to PSRC's regional roadway network. consisting of interstates, state highways, principal arterials, and minor arterials of regional significance. A geospatial assessment indicates that 93 percent of the fatal and serious injury crashes in the central Puget Sound region are located on PSRC's regional network. A full list of findings and supportive data can be found in Appendix A, "State of Safety in the Region."

> ***PSRC defines equity*** *as when all people have the resources and opportunities that improve their quality of life and help them to reach their full potential. Those affected by economic hardship, communities of color, and historically marginalized communities are engaged in decision making processes, planning, and policy making. Differences in life outcomes cannot be predicted by race, class, or any other identity.*

The Regional Safety Action Plan was developed with equity as a core principle. Equity was interwoven throughout the plan development process, with underserved communities identified in the regionwide data and in Equity Focus Areas, consistent with previous PSRC analyses of the Regional Transportation Plan, Transportation Improvement Program, and Regional Demographic Profile and in all of PSRC's equity work program. Equity Focus areas are census tracts with higher proportions of people of color, people with low incomes, older adults, youth, people with disabilities, and people with limited English proficiency than regional averages. The crash data and high-injury network analyses evaluated fatal and serious injury crashes to understand if any disparities exist for these communities. This analysis is reflected in the findings below.

Key Findings

The following key findings provide critical insights into transportation safety trends and conditions within the central Puget Sound region. These overall findings can apply to multiple Emphasis Areas and are descriptive of where fatal and serious injury crashes occurred and who has been burdened by the crashes. These key findings include:

1. **Increase in Deaths.** Deaths on the region's roadways have nearly doubled in the last decade, which is concerning and unacceptable. The regionwide trends underscore that severe outcomes are becoming more common despite an overall decline in total crashes per capita.
2. **People Walking and Biking.** People walking and biking represent nearly half of the increase in deaths, with people walking making up the majority.
3. **Geographic Distribution.** Crashes occur everywhere in the region, with rural areas having more than twice as many deaths as the biggest cities when adjusted for population.
4. **Equity Disparities.** Communities with over fifty percent of residents with lower incomes experience 37 percent higher rates of deaths and serious injuries than the regional average. Similarly, communities with higher proportions of people of color experience 32 percent higher rates of deaths and serious injuries compared to the regional average.
5. **Compounded Equity Disparities.** Additionally, in census tracts where these two equity areas overlap, the rate of deaths and serious injuries is 70 percent above the regional average.
6. **Native American and Alaskan Native Communities.** Native American and Alaskan Native community members have been seven times more likely to die in crashes than white residents.
7. **Crash Locations.** Deaths and serious injuries occur more frequently on major arterials with higher posted speeds.
8. **Vehicle Types.** The majority of crashes involve passenger cars and light duty trucks. Crashes with motorcyclists are less common, but when they do occur, motorcyclists have faced a one in four risk of death or serious injury, five times that of passenger cars or light duty trucks.
9. **Vehicle Types and Vulnerable Road Users.** In crashes involving light trucks and SUVs, pedestrian and bicyclist deaths are 43 percent higher than crashes involving passenger cars.
10. **Contributing Factors.** Speeding, impairment, distraction, and failure to yield are the most frequent factors resulting in crashes resulting in deaths and serious injuries.

Data Analysis Methods

Crash analysis and trends were developed using crash data from 2010 to 2023 provided by the Washington State Department of Transportation (WSDOT). WSDOT compiles this data from local law enforcement and Washington State Patrol accident reports, as well as the federal Fatality Analysis Reporting System (FARS) database.

While the 2010 – 2023 data supported review of regional trends, a more focused analysis of data between 2016 and 2023 was conducted to assess existing conditions including contributing factors, crash types, and emphasis areas. Additional spatial analysis metrics were added by PSRC including geographic typologies distinguishing between Urban and Rural portions of the central Puget Sound region and other regional geographies.

WSDOT Crash Data

WSDOT collects and maintains crash-related data for the state of Washington. PSRC acquired this crash information for the period from 2010 through 2023. This dataset includes information for each person involved in reported injury crashes, as well as those not injured in a crash. Other pertinent information is provided for motor vehicle drivers, motor vehicle passengers, and people walking and biking. Other types of available information such as location, date and time, roadway and weather conditions, quantities of vehicles, people walking and biking involved, injuries, driver actions, and impairment information help in analyzing trends.

In addition to the information provided by WSDOT, additional PSRC geographic data was appended to each WSDOT crash, linking it to PSRC's regional geography typologies and census tracts.

Please Note

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.

PSRC Regional Network

Crash data was connected to the regional network for analysis. This network includes the roadway network from the regional travel demand model network used by PSRC. It consists of interstates, state highways, principal arterials, minor arterials of regional significance (e.g. that serve transit), and in some cases other local roadways that connect these facilities. For the analysis period of this study (2016 through 2023), 93 percent of injury crashes, including serious injury crashes and deaths in the four-county region, occurred along this network. The regional network accounts for less than 20 percent of the four-county public roadway mileage but represents the major linkages between employment, residential, and economic centers.

Regional Crash Trend Analysis Findings

Injuries resulting from crashes per 100,000 people in the central Puget Sound region have generally declined from peak levels in 2016. However, the region has experienced increases in more severe outcome crashes, including those resulting in serious injury and death. Figure 2-1 shows the upward trend in traffic-related deaths and serious injuries and deaths combined, which has occurred primarily from 2020 onwards. Traffic-related deaths have almost doubled since 2010.

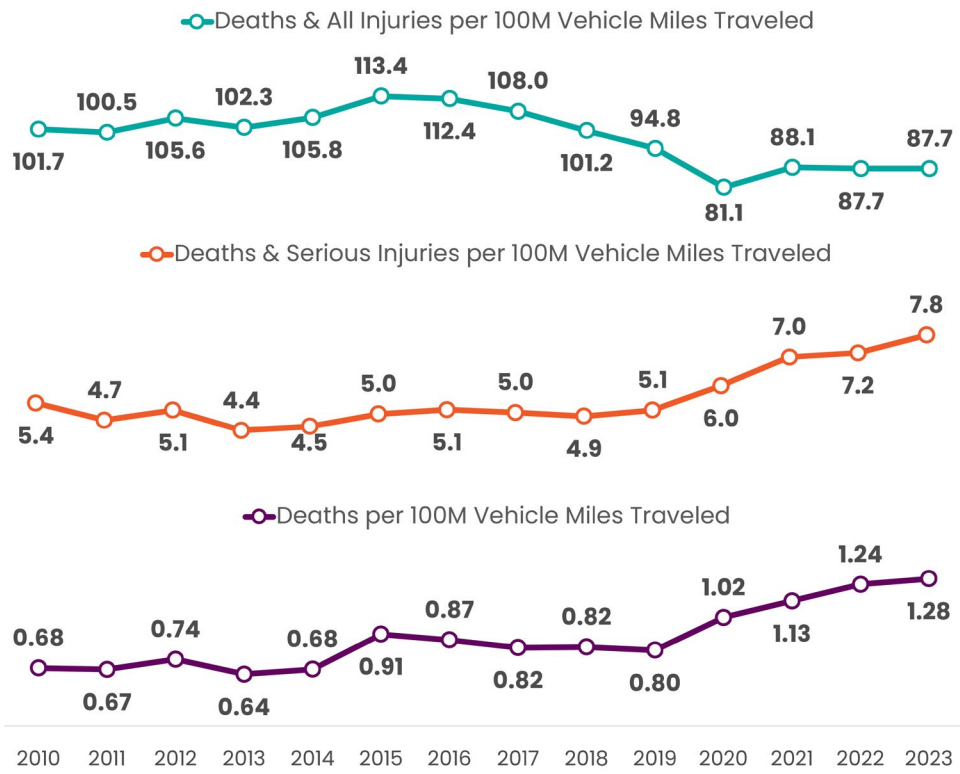


Figure 2-1. Comparison of Traffic-Related Injury Severity Per 100,000 People in Central Puget Sound Region

Crash trends were also identified for vulnerable road users, including pedestrians and bicyclists[1]. Crash information for people walking and biking was combined into a single dataset (and sorted into categories by injury severity (Figure 2-2):

- Bike and pedestrian deaths and all injuries
- Bike and pedestrian deaths and serious injuries
- Bike and pedestrian deaths

While the total of bike and pedestrian deaths and injuries per 100,000 people decreased between 2010 and 2023, the fatality rate doubled in this time period. Figure 2-2 shows the fatality rate for people walking and biking is increasing faster than deaths and serious injuries combined. Additionally, deaths per 100,000 people in the bike and pedestrian group doubled compared to all injury classes (Figure 2-2), which has also increased by 1.6 times since 2010 (see Appendix A).

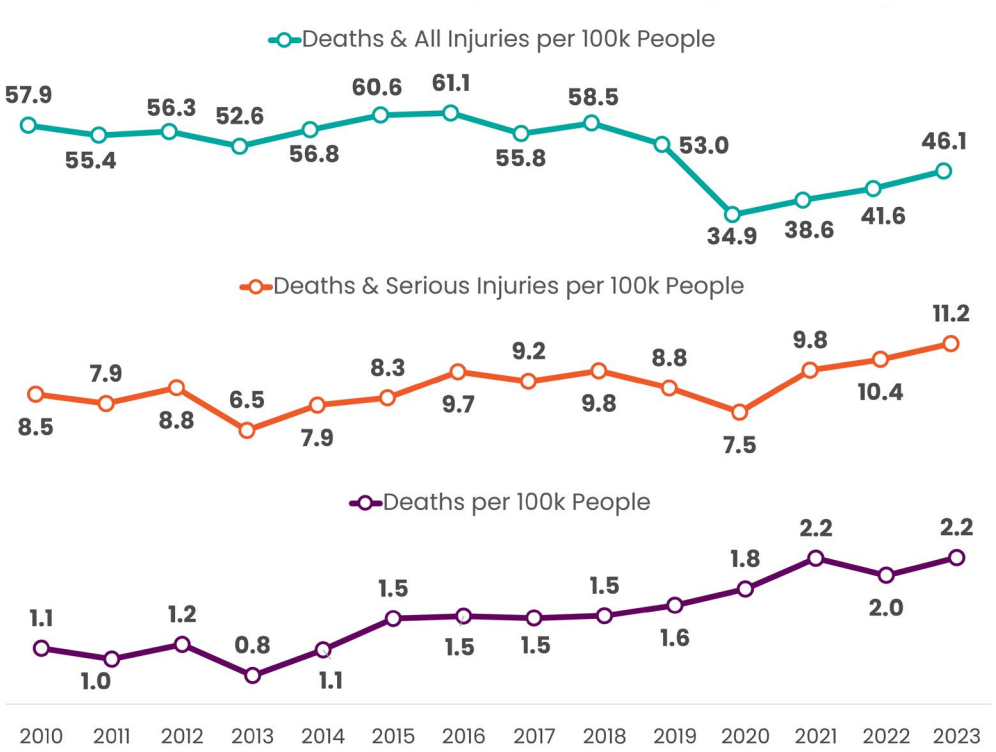


Figure 2-2. Comparison of Traffic-Related Pedestrian and Bicycle Injury Severity Per 100,000 People in Central Puget Sound Region

1 This includes people with disabilities who use wheelchairs or other mobility devices

Equity Analysis Summary

PSRC defines equity areas for census tracts with populations higher than the regional average for youth, people with disabilities, older adults, people of color, people with lower incomes, and people with limited English proficiency. These census tracts showed little variation between traffic injuries compared to regional averages.

However, census tracts with a majority (greater than 50 percent) of people of color and those with a majority of people with low incomes experienced deaths and serious injuries at 32 percent and 37 percent above the regional average, respectively. Additionally, census tracts where these equity areas overlap - areas that qualify as both majority people of color and a majority of people with low incomes - experience deaths and serious injuries 70 percent more than the regional average (see Appendix A).

These findings are based on locational data, not tied to individuals involved in the crashes themselves. Findings are being used to dive deeper into the data to identify what specific circumstances may be causing this, such as infrastructure details, and providing tools for local jurisdictions to dive deeper into the data on a location-by-location basis.

Contributing Factors for Serious Injury and Fatal Crashes

Table 2-1 shows the top five factors that contributed to serious injury and fatal crashes in the region between 2010 and 2023. These include: speeding, impairment[2], distraction, failure to yield to roadway users, and reckless driving. Of these contributing factors, speeding, impairment, and distraction were prevalent in both intersection and non-intersection crashes. However, at intersections, failure to yield to roadway user is attributed more frequently in crashes that resulted in deaths and serious injuries. Additionally, reckless driving was more frequently attributed to crashes at non-intersections that resulted in deaths or serious injuries.

Both impairment and distraction rank among the top five factors contributing to crashes in the central Puget Sound region. Due to the nature of the way empirical data are collected, impairment is underreported as a contributing factor. In particular, delays in completing toxicology reports and updating collision reports results in an underreporting of impairment in the latest available safety data. In fact, impairment appears to be the largest contributing factor to crashes statewide. This should be considered when assessing appropriate policies and projects in high crash locations. It should be noted that several factors can combine to contribute to a single crash, such as impairment, speeding, and distraction. PSRC will conduct research and potentially pursue additional datasets to better document this issue of underrepresenting impairment in future updates to the High Injury Network and Regional Safety Action Plan.

Table 2-1. Regionwide Top 5 Contributing Crash Factors

Contributing Crash Factor	Deaths & Serious Injuries	Deaths
Speeding Driver	25%	31%
Impaired	18%	22%
Distracted	20%	18%
Failure to Yield (to Motorist & Non-Motorists Combined)	14%	9%
Reckless	5%	5%

2 Impaired includes people under the influence of drugs or alcohol or people under the influence of both drugs and alcohol.

Deaths by Vehicle Types

Passenger vehicles including cars, light trucks, and sport utility vehicles (SUVs) were involved in a similar number of crashes that resulted in deaths and injuries (Figure 2-3). However, the outcomes for crashes that involve light trucks and SUVs were substantially worse for people walking and biking. For example, people walking and biking were killed at a rate 43 percent higher in crashes involving light trucks and SUVs compared to those involving passenger cars highlighted in Appendix A. In addition, motorcycles and heavy vehicles (e.g., trucks and tractor-trailers) had more severe outcomes for people involved in a crash compared to all other vehicle types. However, they represent a small proportion of total traffic-related deaths and serious injuries.

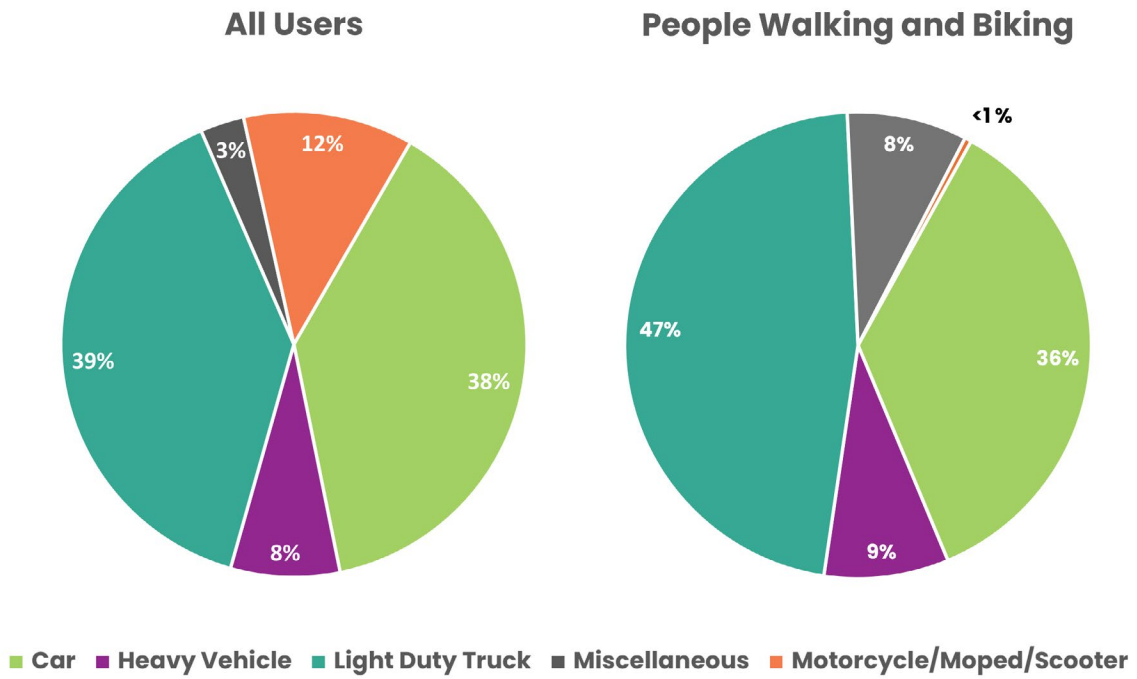


Figure 2-3. Crash Outcome Resulting in Death by Vehicle Types

Crash Types

Table 2-2 shows the top five regionwide crash types that resulted in deaths and serious injuries including fixed object (vehicles departing the roadway and colliding with a fixed object), crash with a person walking or biking, right angle (crashes that occur at intersections when vehicles driving on perpendicular roads collide), roll over, and head-on. At intersections, rear-end and head-on crashes resulting in death or serious injury occurred more frequently. However, at non-intersections, rollover and head-on crashes were more prevalent than other crash types that resulted in death or serious injury.

Table 2-2. Regionwide Top 5 Collison Types

Crash Type	Deaths & Serious Injuries	Deaths
Fixed Object	33%	40%
Crash with Person Walking or Biking	25%	28%
Right Angle	22%	16%
Roll Over	10%	11%
Head-On	7%	9%

Crash Analysis by Location

Crashes were also analyzed by location to determine which areas in the region experienced the highest density of crashes along corridors. The High Injury Network (HIN) represents the 85th percentile of deaths and serious injuries on roadways within the PSRC Regional Roadway Network. Similarly, a pedestrian and bicycle HIN was developed to represent the 85th percentile of vulnerable road users, including pedestrian and bicyclist fatal or serious injuries. Finally, a high crash location analysis was conducted to understand where groupings of fatal and serious injury crashes exist throughout the region, which is helpful for understanding places such as intersections, or roadway curvature issues which have a high count of death and serious injury crashes located near them.

High Injury Network

The HIN shown in Figures 2-4 through 2-7 represent the corridors with the highest concentration of traffic-related deaths and serious injuries in the central Puget Sound region from 2016 to 2023. The metric for ranking and identifying high-injury corridors is deaths and serious injuries per mile. Parameters for high-injury corridors include a minimum segment length of 1,000 meters (0.6 miles) and a minimum of two deaths or serious injuries. Given the extent of the regional roadway network, a shorter minimum segment is not appropriate for regional analysis. Shorter roadway segment lengths used for local analyses may identify additional roadways that do not meet the regional threshold. High Injury Networks developed by local jurisdictions for more detailed application may want to select shorter roadway lengths to understand conditions with more dense street networks.[3] The HIN helps communities and partners identify areas where they may want to prioritize safety investments.

High Injury Network (HIN) analyses can be conducted at the state, regional, and local levels, each focusing on identifying areas with high crash rates to prioritize safety interventions. Regional analyses examine crash data across multiple jurisdictions to inform regional-level safety planning on regional facilities, developing regional safety strategies, and promoting collaboration among jurisdictions. Equally important, state and local HIN analyses identify specific locations with high crash rates based on their own tailored methodologies and facilities. State, regional, and local HIN analyses, where available, should inform PSRC's safety planning and implementation.

3 WSDOT uses a project prioritization methodology consistent with the Highway Safety Manual and RCW 47.05. Notably, this methodology differs from the methodology PSRC used to identify its potential safety locations. While PSRC's analysis focuses on the four-county Puget Sound region, WSDOT project prioritization considers needs statewide. Therefore, not every location identified in PSRC's safety network will align and be funded in WSDOTs safety program.

Pedestrian & Bicycle High Injury Network

The Pedestrian and Bicycle HIN (Figure 2-8 through Figure 2-11) maps corridors with the highest concentration of traffic-related deaths and serious injuries (i.e., two or more per mile) of these vulnerable road users. These corridors have been developed as continuous elements of the network, avoiding short segments less than a quarter mile long.

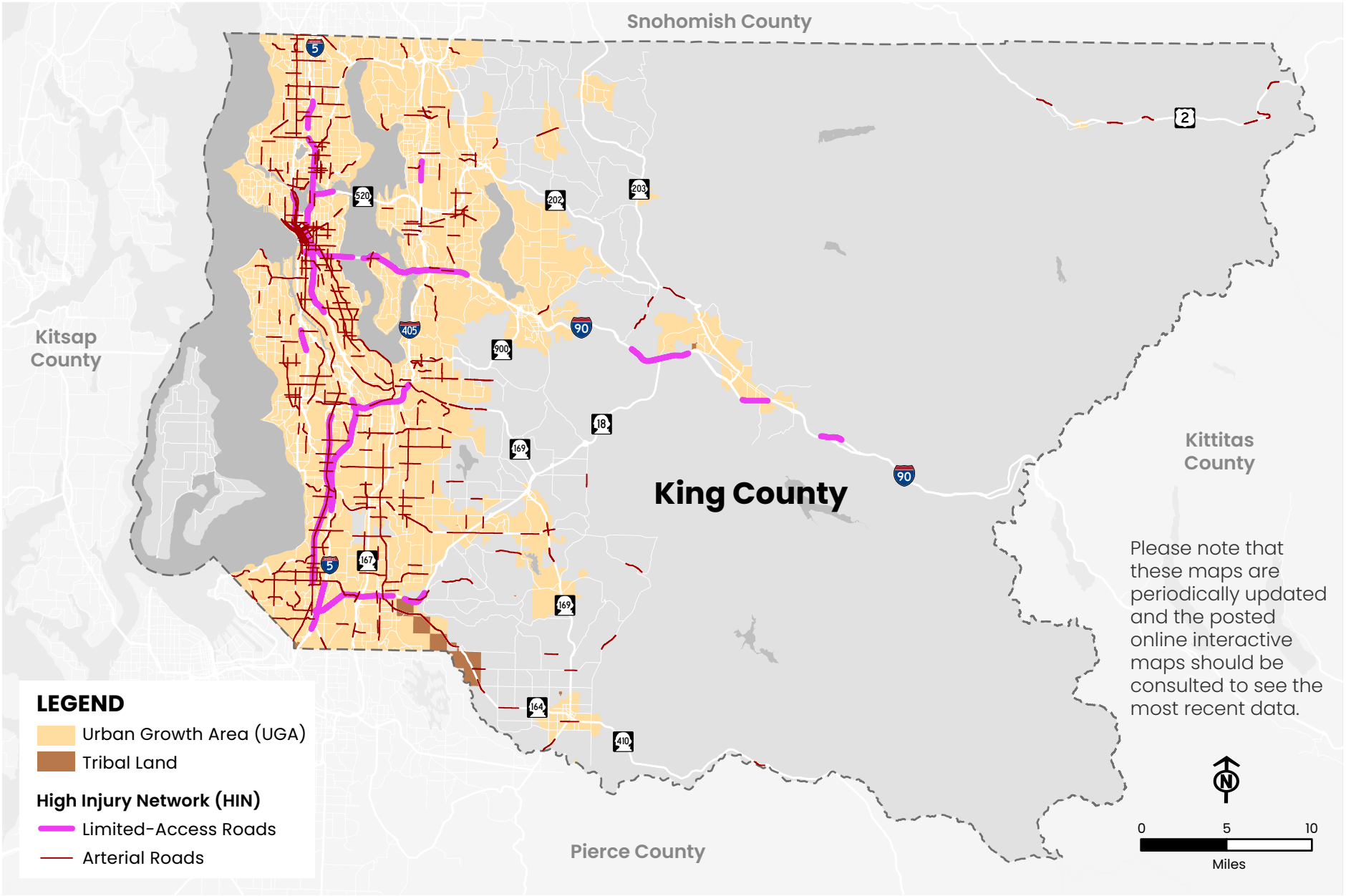


Figure 2-4. High Injury Network Showing Top Crash Corridors in King County

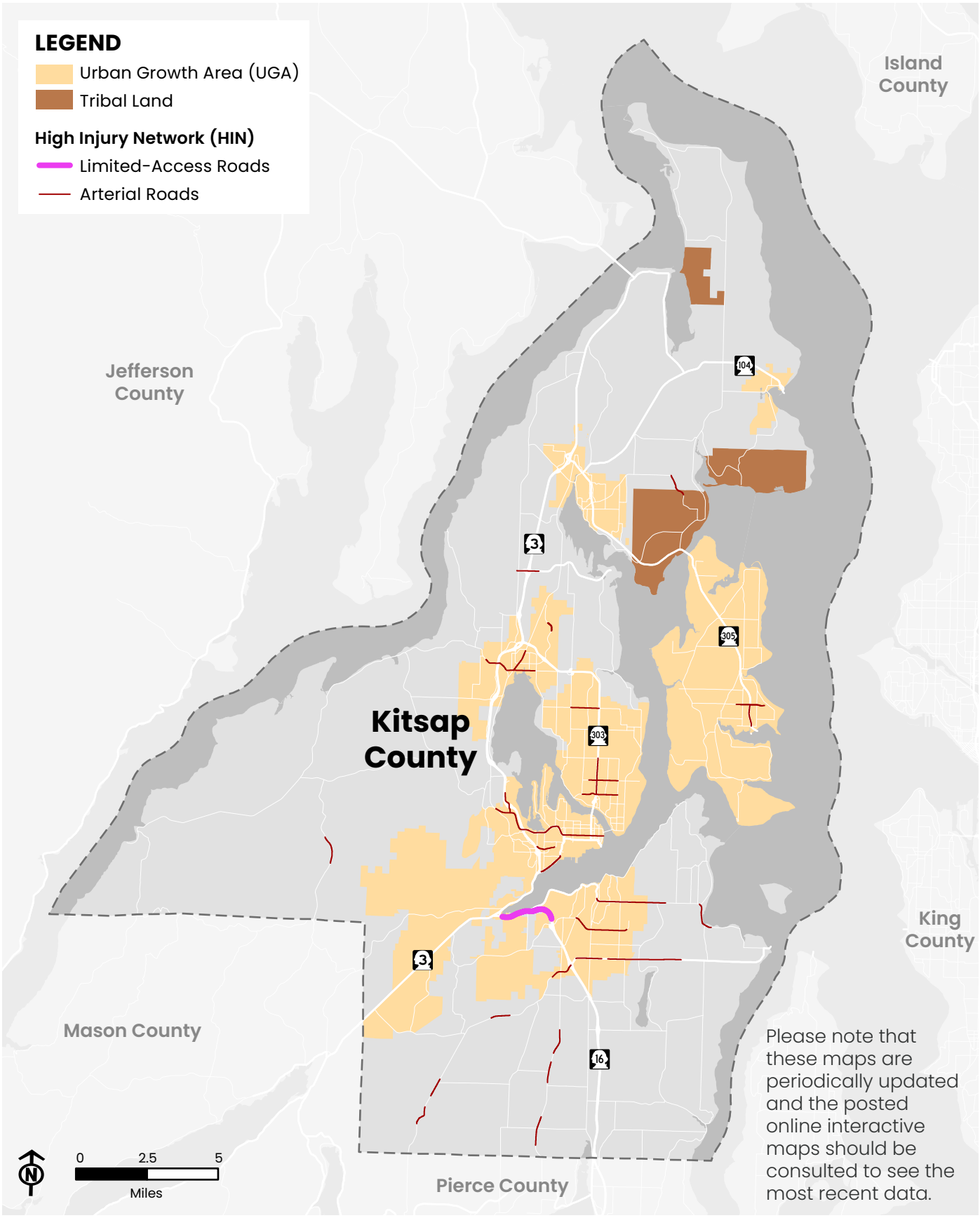


Figure 2-5. High Injury Network Showing Top Crash Corridors in Kitsap County

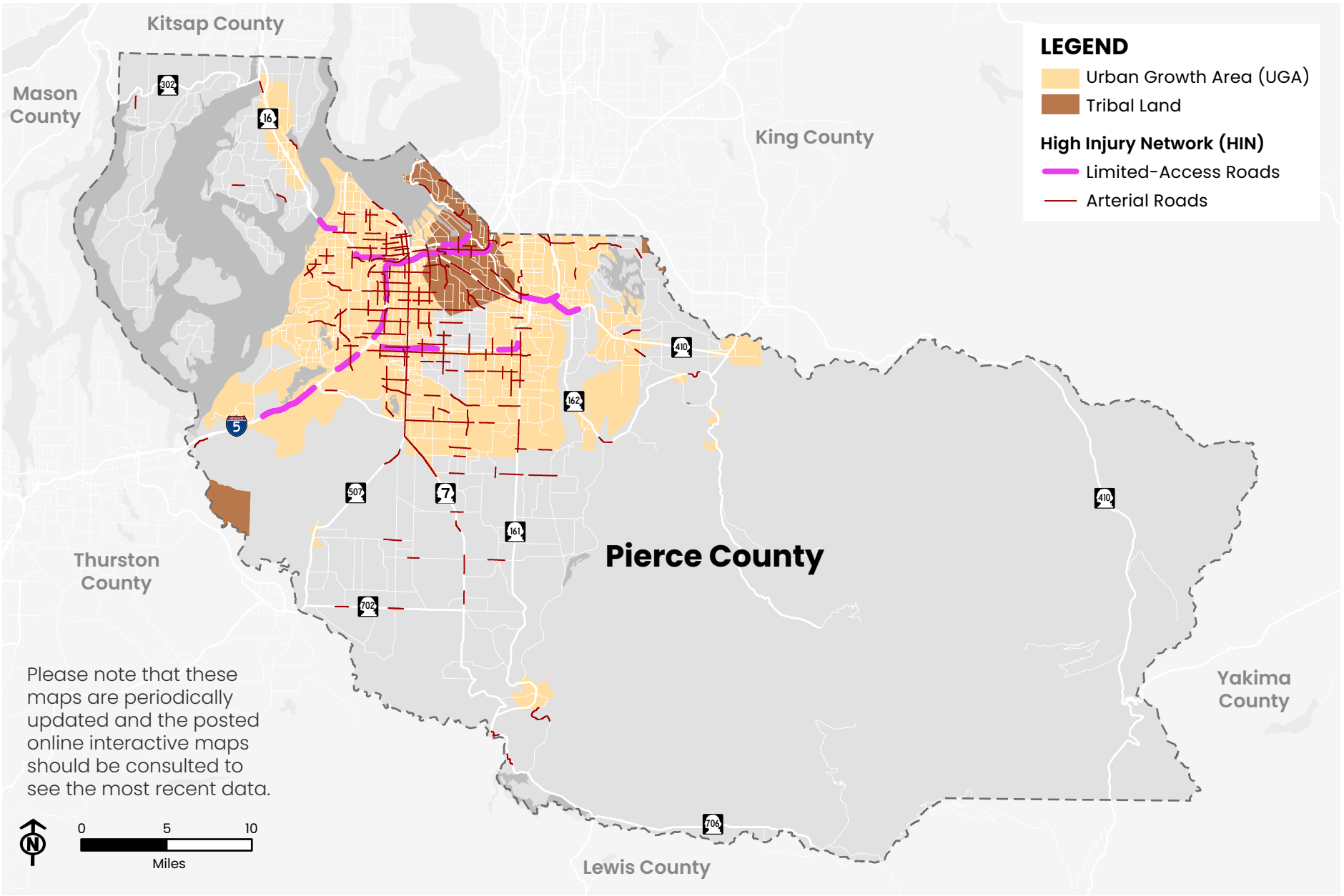


Figure 2-6. High Injury Network Showing Top Crash Corridors in Pierce County

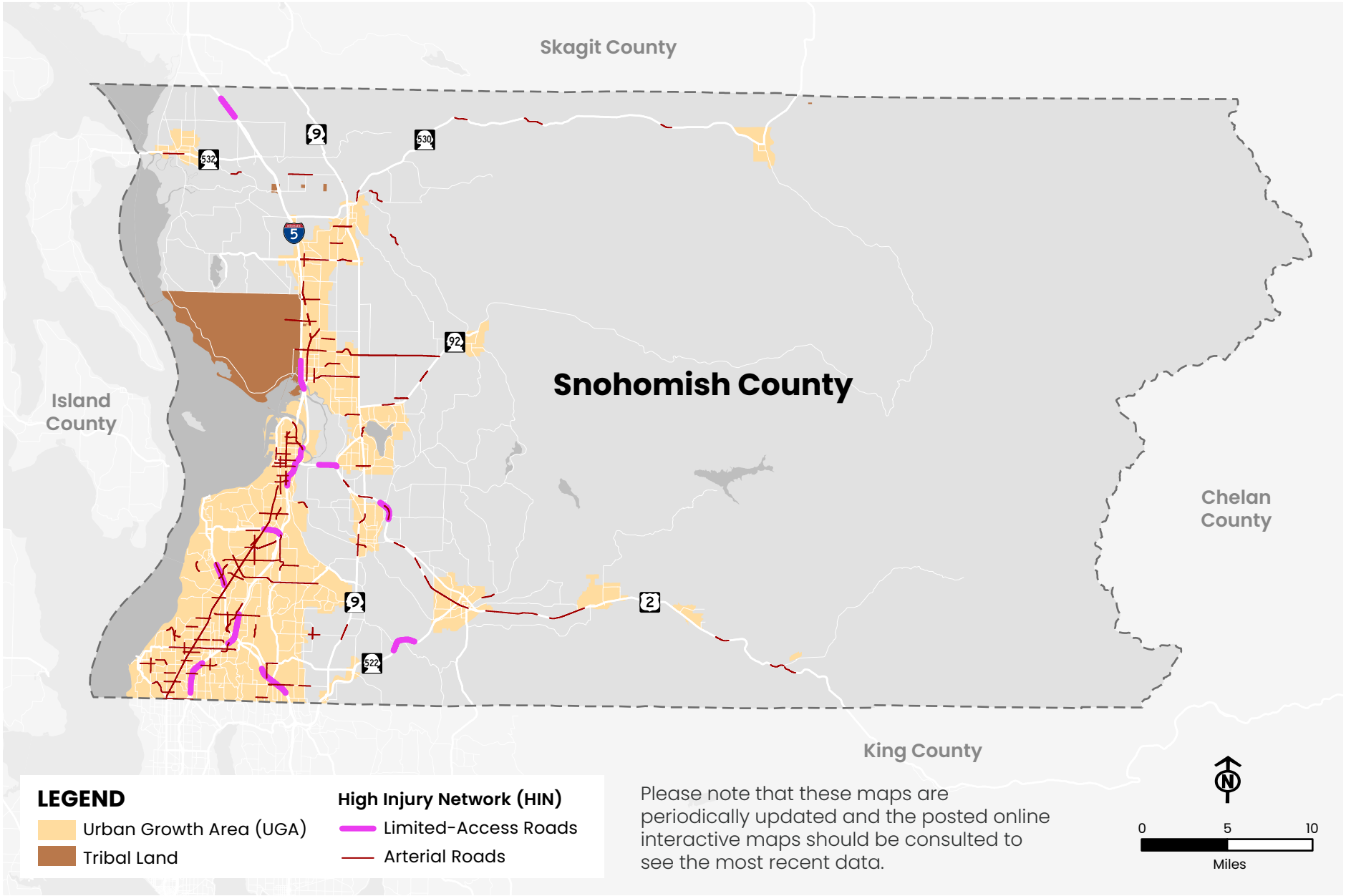


Figure 2-7. High Injury Network Showing Top Crash Corridors in Snohomish County

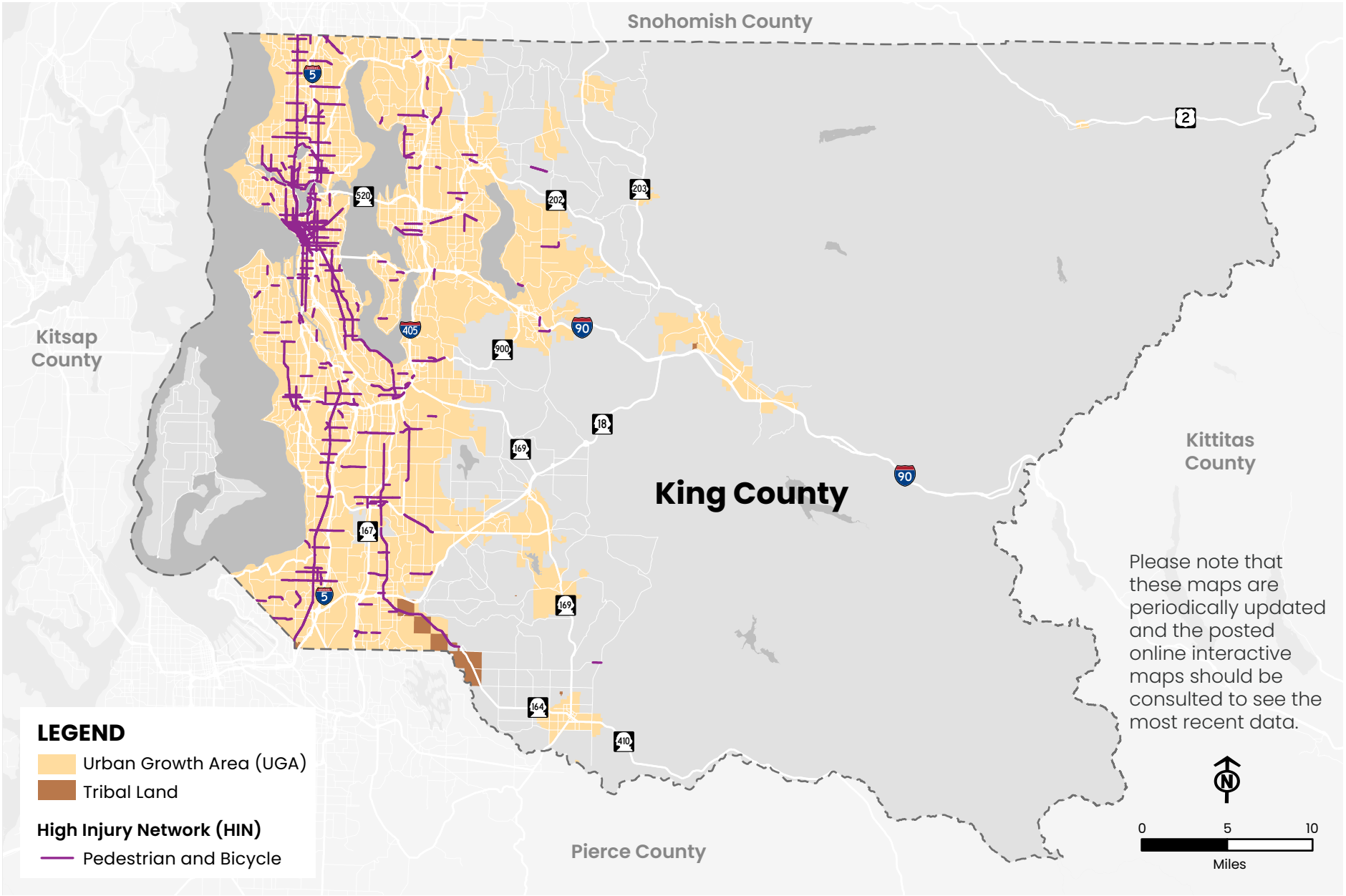


Figure 2-8. Pedestrian and Bicycle High Injury Network Showing Top Crash Corridors in King County

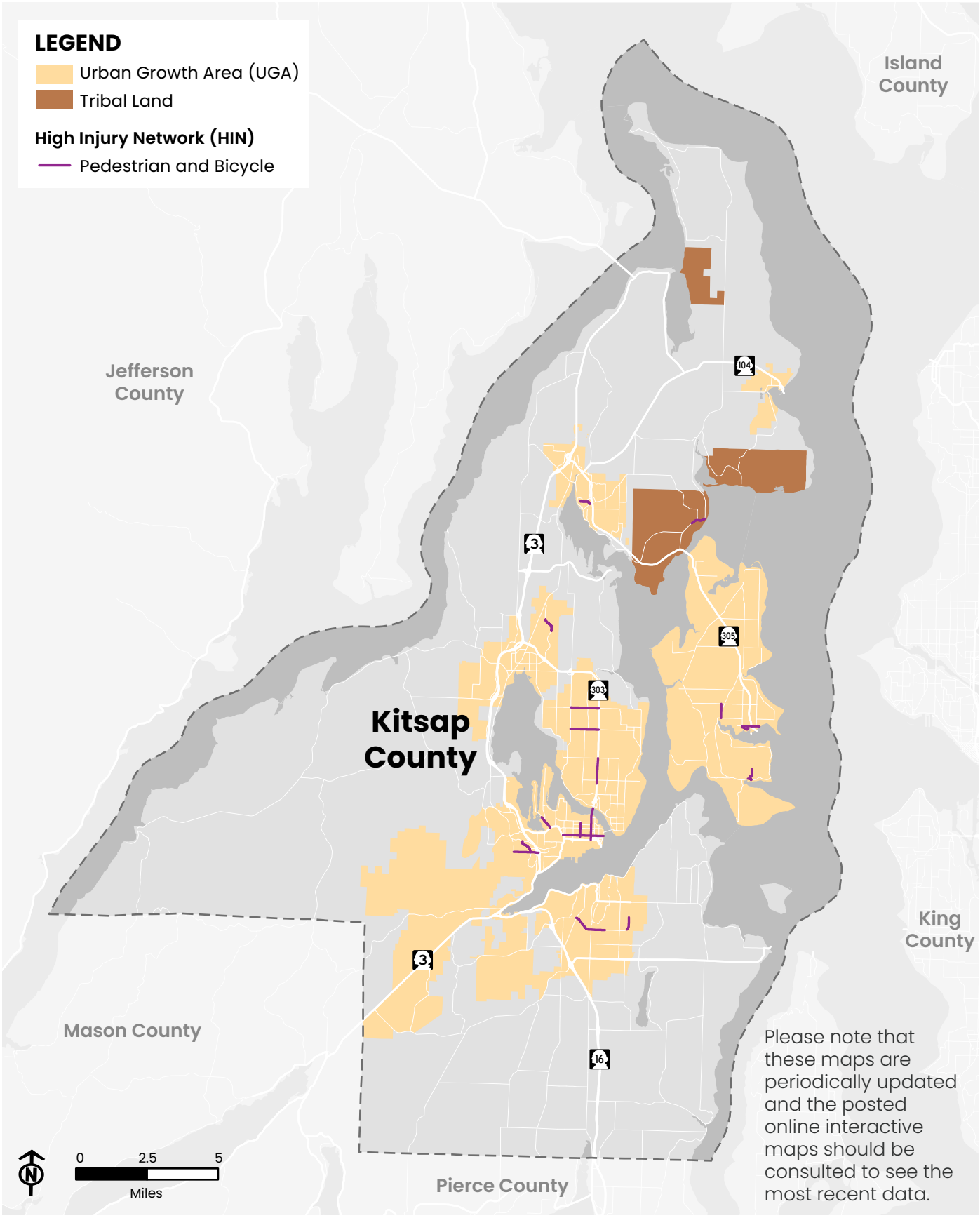


Figure 2-9. Pedestrian and Bicycle High Injury Network Showing Top Crash Corridors in Kitsap County

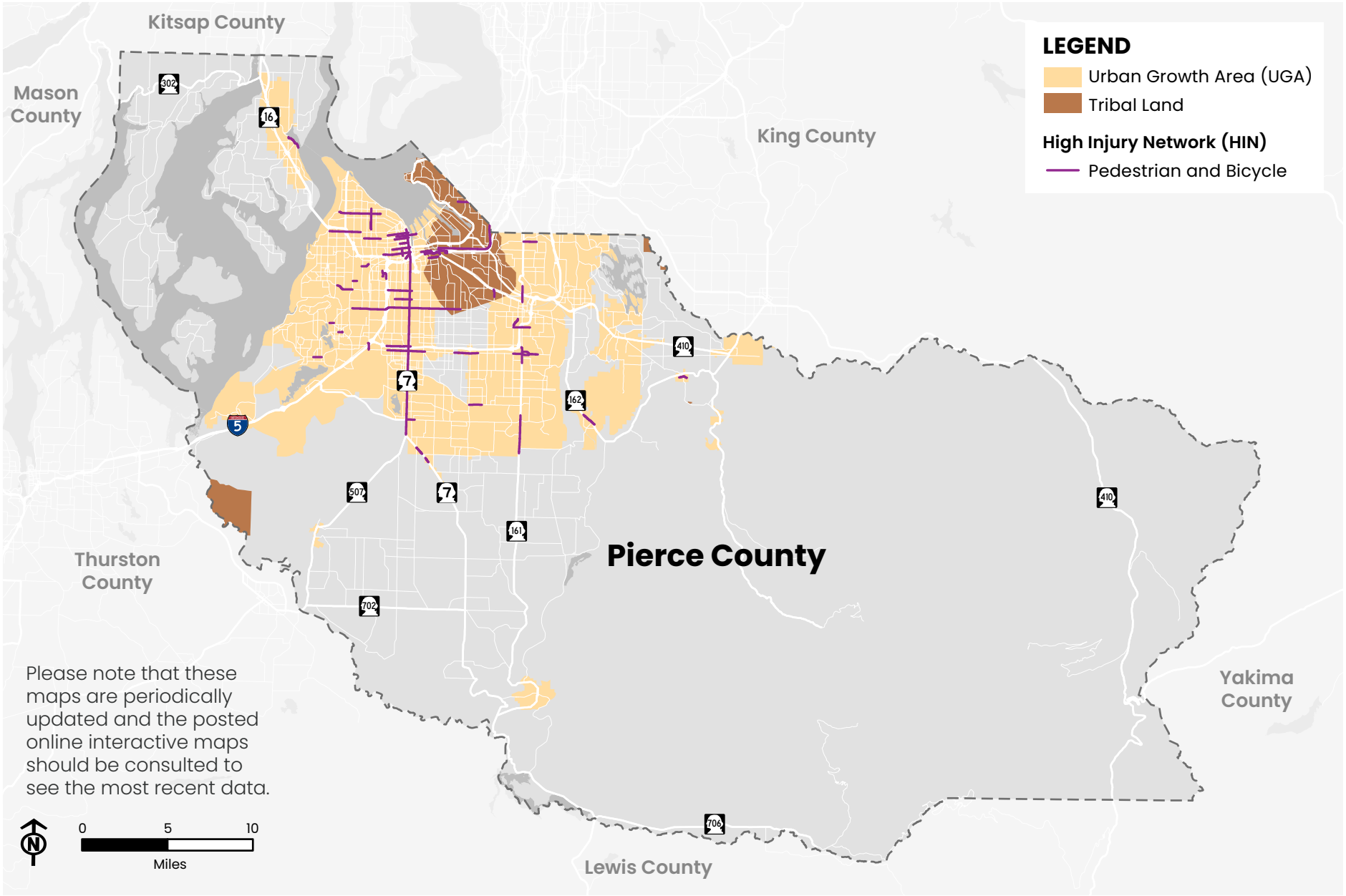


Figure 2-10. Pedestrian and Bicycle High Injury Network Showing Top Crash Corridors in Pierce County

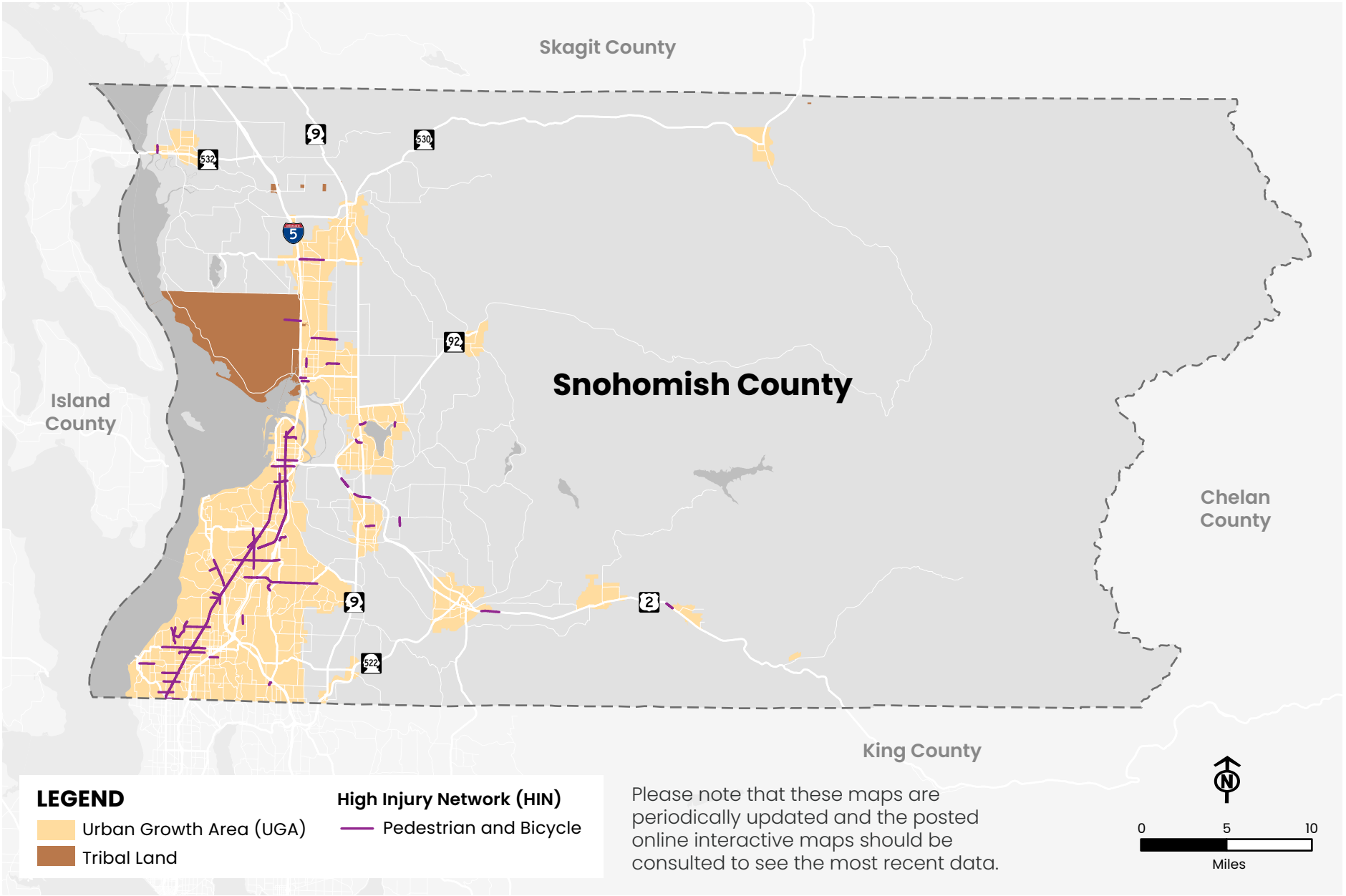


Figure 2-11. Pedestrian and Bicycle High Injury Network Showing Top Crash Corridors in Snohomish County

High Crash Locations

High crash locations are shown in Figure 2-12 through Figure 2-15 , which are clusters of deaths and serious injuries within 100 feet of each other to identify intersections and spot locations with more than two deaths or serious injuries within the 2016 to 2023 study period. High crash locations identify and isolate locations where safety investments may be needed as a counterpart to the corridor-based HIN approach. While high crash locations often overlap with the HIN, they can pinpoint safety issues such as unsafe intersections or curves on otherwise safe corridors.

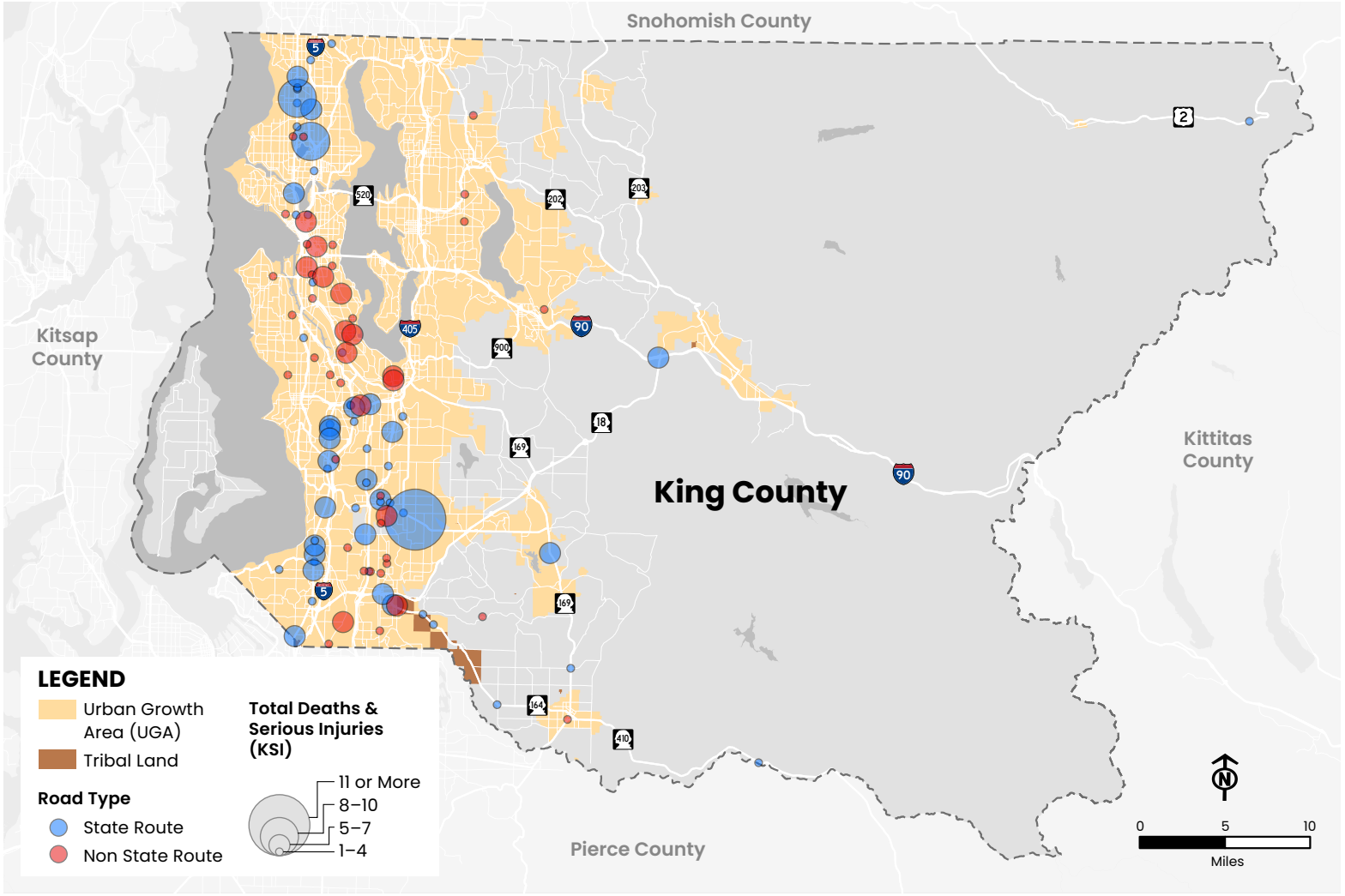


Figure 2-12. High Crash Locations/Intersections Map in King County

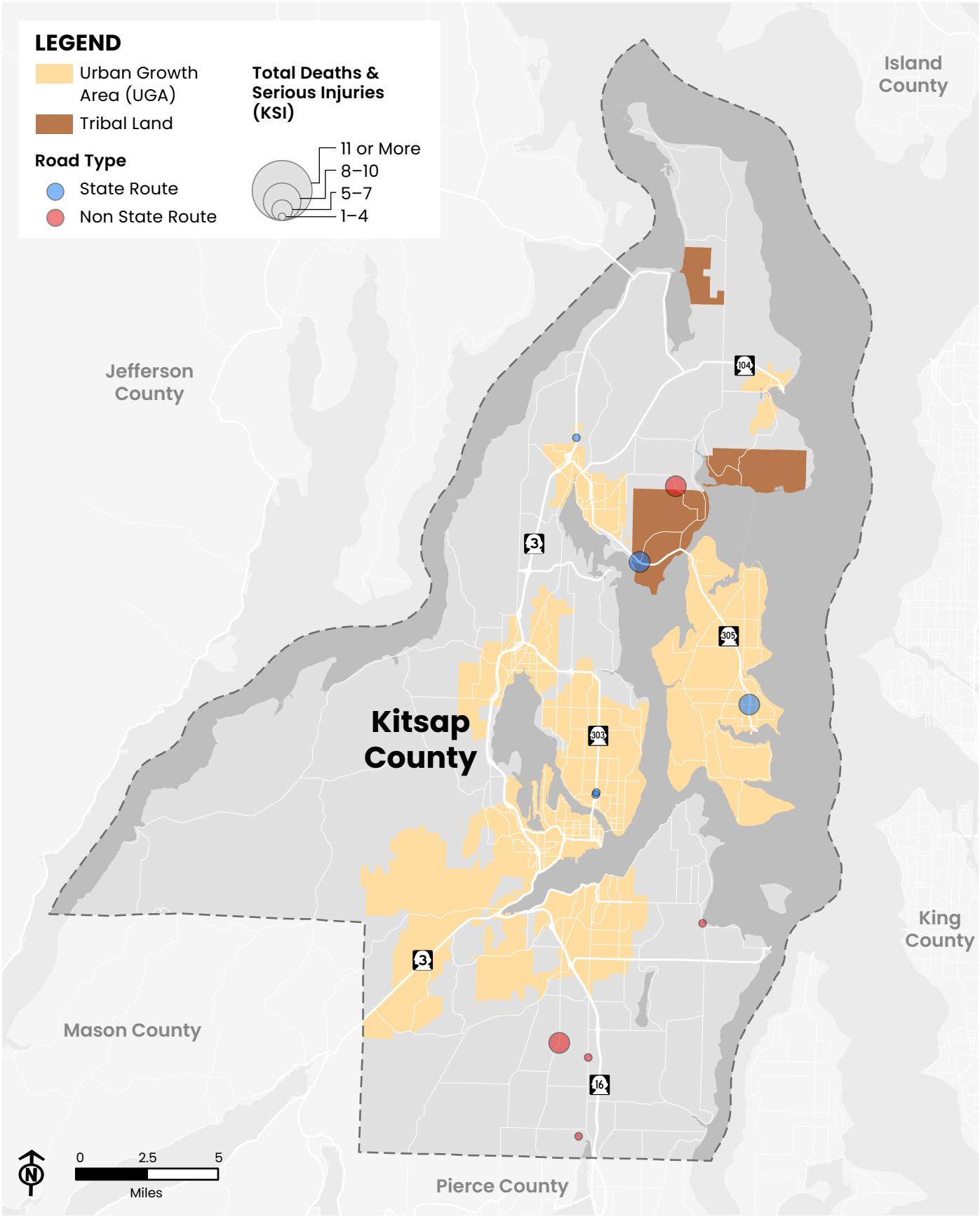


Figure 2-13. High Crash Locations/Intersections Map in Kitsap County

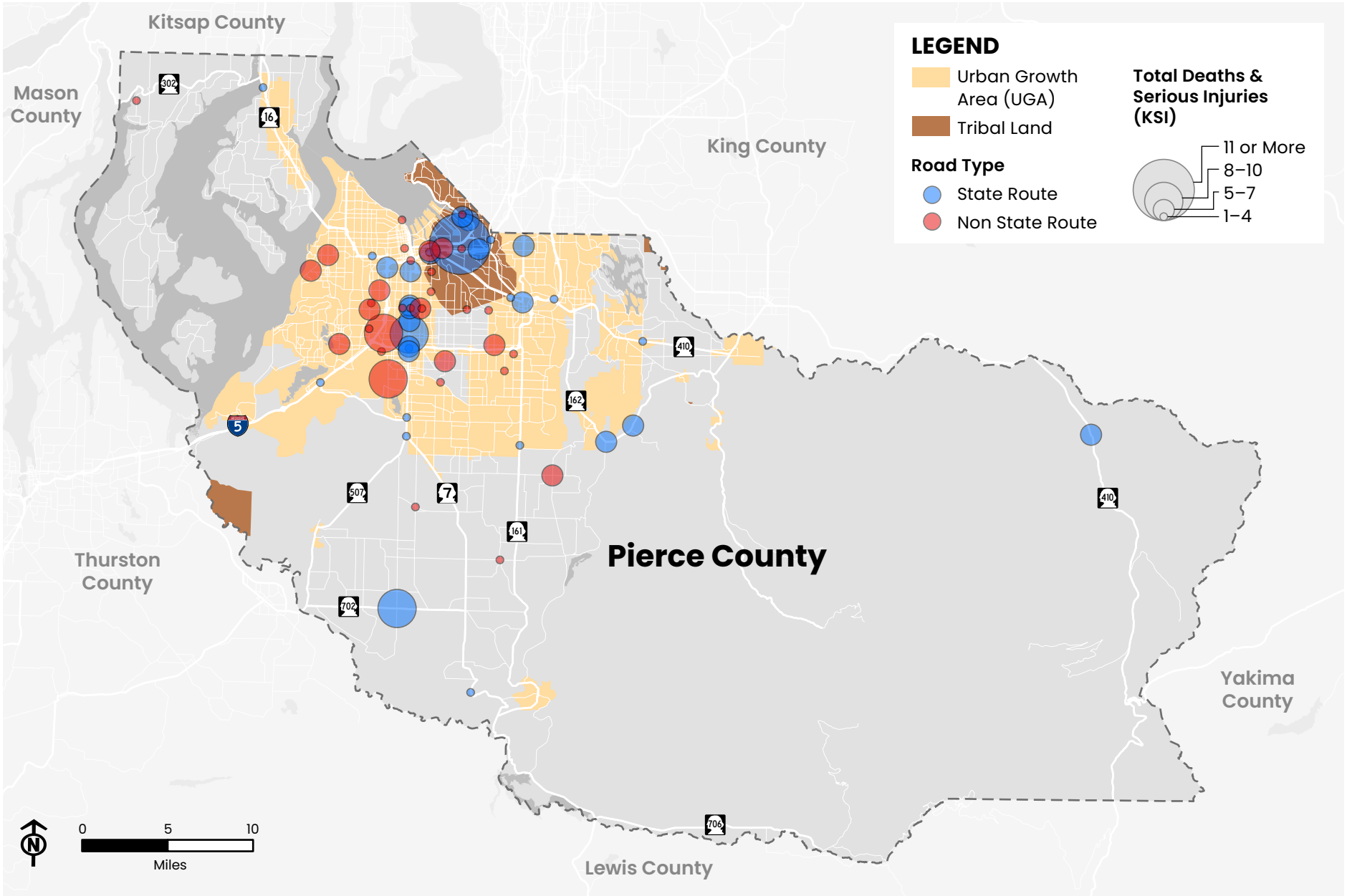


Figure 2-14. High Crash Locations/Intersections Map in Pierce County

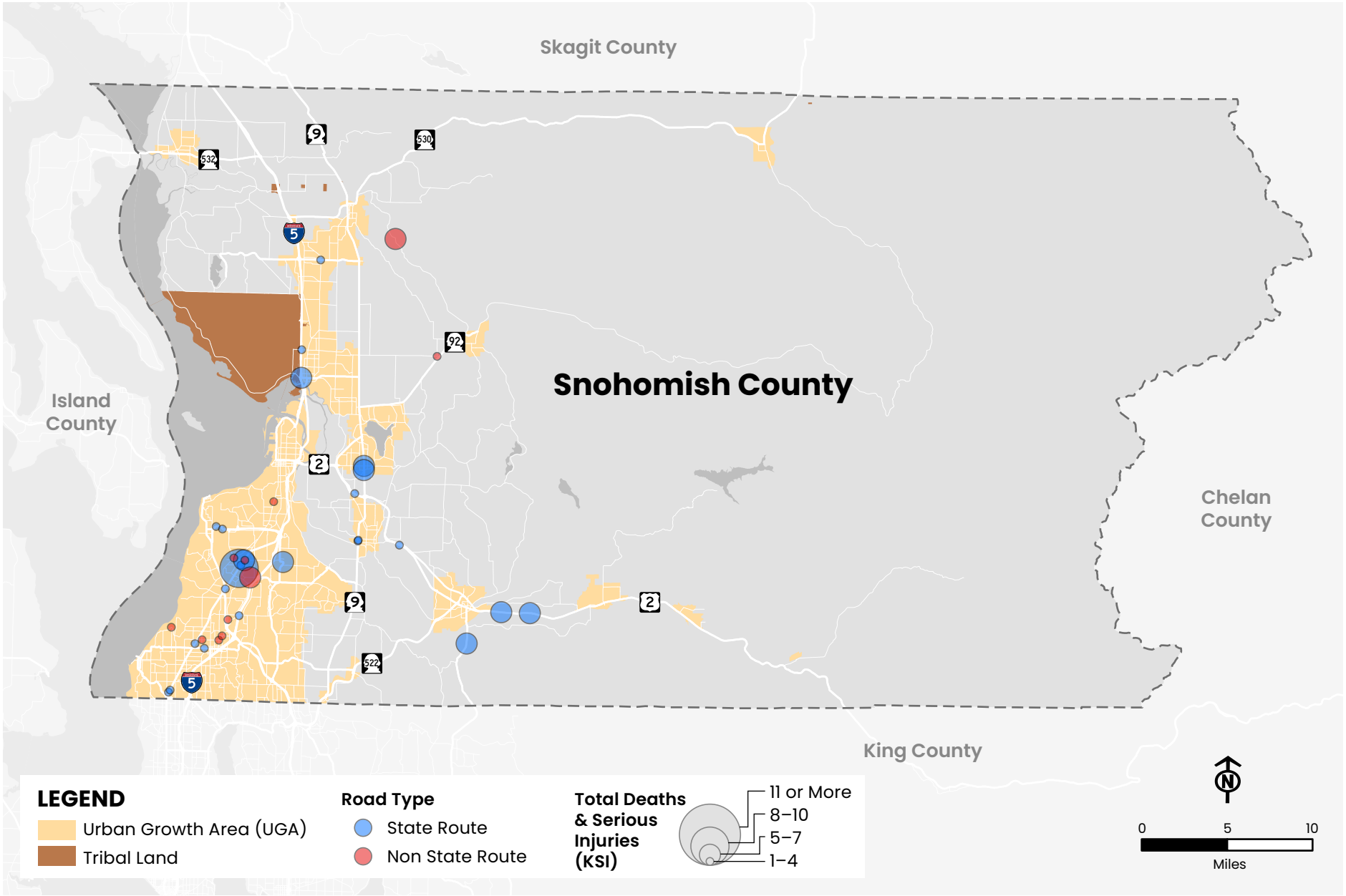


Figure 2-15. High Crash Locations/Intersections Map in Snohomish County

Regional Emphasis Areas

Analysis of the data reveals that serious injury and fatal crashes are most common around five types of places in the region, which are identified as Emphasis Areas for this plan:

- Urban multilane arterials
- Rural highways
- Tribal areas
- Frequent transit stations
- Areas of lower income

The comparison of crashes in each emphasis areas is measured by the number of crashes per 100,000 people which is referred to as the crash rate. A description of findings for the emphasis areas is provided below.

Urban Multilane Arterials

A high rate of death and serious injury crashes occurred on multilane arterials within central Puget Sound region urban areas. Overall, urban areas accounted for more than four times the number of deaths or serious injuries compared to rural areas. When specifically examining urban multilane arterials, there is nearly three times injuries and fatalities per mile when compared against the greater regional network as shown in Table 2-3.

Table 2-3. Urban Multilane Arterials Compared to the Regional Network

Type	Mileage	Deaths & All Injuries	Deaths & Serious Injuries	Deaths	Deaths & All Injuries per Mile	Deaths & Serious Injuries per Mile	Deaths per Mile
Urban Multilane Arterials	892	82,801	4,966	753	93	5.6	0.8
PSRC Network	6,153	190,576	11,564	1,952	31	1.9	0.3

Rural Highways

Rural areas, conversely, had a far lower injury crash rate (81%) compared to the overall region as shown in Table 2-4. However, the serious injury and fatal crash rate in rural areas was 47% higher than the overall region. and the death rate was 96% higher than overall region.

Table 2-4. Rural Areas Crash Severity Compared to the Central Puget Sound Region

	Deaths & All Injuries per 100k people	Deaths & All Injuries per 100k people compared to the PSRC Region	Deaths & Serious Injuries per 100k people	Deaths & Serious Injuries per 100k people compared to the PSRC Region	Deaths per 100k people	Deaths per 100k people compared to the PSRC Region	Ratio of Deaths to All Injuries	Ratio of Deaths & Serious Injuries to All Injuries	Ratio of Deaths to Deaths & Serious Injuries
Rural	33,857	81%	439	147%	97	196%	1 in 40	1 in 9	1 in 5
Regionwide	4,776	-	299	-	50	-	1 in 96	1 in 16	1 in 6

Tribal Areas

Tribal areas experienced three times more deaths per 100k people compared to the region as a whole, and more than two times the number of deaths or serious injuries. People living on Tribal lands experience serious injury or fatal crashes more than double the crash severity in the central Puget Sound region. A full depiction of crash information can be found in Table 2-5, which shows the summary of crashes and severity information for all Tribal Lands in comparison to non-tribal lands.

Table 2-5. 2016-2023 Tribal Lands Crash Severity Compared to the Central Puget Sound Region

	Deaths & All Injuries per 100k people	Deaths & All Injuries per 100k people compared to the PSRC Region	Deaths & Serious Injuries per 100k people	Deaths & Serious Injuries per 100k people compared to the PSRC Region	Deaths per 100k people	Deaths per 100k people compared to the PSRC Region	Ratio of Deaths to All Injuries	Ratio of Deaths & Serious Injuries to All Injuries	Ratio of Deaths to Deaths & Serious Injuries
All Tribal Areas	8,672	182%	703	235%	155	313%	1 in 56	1 in 12	1 in 5
Not on Tribal Areas	4,705	99%	291	98%	48	96%	1 in 99	1 in 16	1 in 6

Frequent Transit Stations

Frequent transit station are defined as an area with clusters of stations within 100 meters of each other that each have at least four transit trips per hour. These locations account for 14 percent of pedestrian and bicycle deaths or serious injuries. From 2016 to 2023, roughly 106 people walking or biking in these areas suffered a serious injury or fatality per square mile compared to less than three per square mile in the overall urban area. People walking or biking in frequent transit areas experienced a deadly crash at a rate nearly 30 times greater than people walking or biking in the region's urban areas outside of frequent transit station areas, shown in Table 2-6.

Table 2-6. 2016-2023 Crash Outcomes for People Walking or Biking at High-Frequency Transit Station Areas Compared to All Urban Areas

Land Coverage	Death and Serious Injuries for People Walking or Biking Per Square Mile	Death for People Walking or Biking Per Square Mile
Frequent Transit Station Areas	106.3	14.5
All Urban Areas (excluding Frequent Transit Station Areas)	2.7	0.5

Areas of Lower Income

Communities where over fifty percent of residents have lower incomes experience 37 percent higher rates of deaths and serious injuries than the regional average.

Communities where over fifty percent of residents have lower incomes and fifty percent residents are people of color experience 70 percent higher rates of deaths and serious injuries than the regional average. These regions also experience 54% higher rates of deaths than the regional average as shown in Table 2-7.

Table 2-7. Areas of Lower Income Crash Severity Compared to the Central Puget Sound Region

	Deaths & All Injuries per 100k people	Deaths & All Injuries per 100k people compared to the PSRC Region	Deaths & Serious Injuries per 100k people	Deaths & Serious Injuries per 100k people compared to the PSRC Region	Deaths per 100k people	Deaths per 100k people compared to the PSRC Region	Ratio of Deaths to All Injuries	Ratio of Deaths & Serious Injuries to All Injuries	Ratio of Deaths to Deaths & Serious Injuries
Majority People of Lower Incomes	6,347	133%	409	137%	59	119%	1 : 107	1 : 16	1 : 7
Majority People of Color	6,917	145%	394	132%	64	129%	1 : 108	1 : 18	1 : 6
Majority Both	7,540	158%	508	170%	76	154%	1 : 99	1 : 15	1 : 7

CHAPTER 3

Engagement and Collaboration

Introduction

For any regional safety plan to be effective, it must reflect and include the needs and values of local communities. A key part of this effort is talking directly with community members to hear about their safety concerns. By engaging with a wide range of voices, especially from underrepresented groups, we can develop solutions that are fairer and meet the needs of everyone.

PSRC's approach to community engagement helps create more inclusive safety recommendations that work for all neighborhoods in the region. PSRC developed a detailed Public Involvement Plan Framework to engage with community and partners about the PSRC Regional Safety Action Plan (RSAP), which is located in Appendix B.

PSRC outreach and engagement focused on understanding how members of the public view roadway safety, along with potential policy shifts and interventions such as traffic calming, infrastructure improvements, shifts in how jurisdictions design and permit roadways and highways, and other initiatives. This expansive engagement has led to robust community and partner conversations and resulted in impactful recommendations and a clear roadmap toward implementation throughout the region.

Public Involvement Plan Framework

The Public Involvement Plan Framework used six engagement touchpoints between June and November 2024 to present up-to-date road safety data and to collect partner feedback on potential road safety interventions.

Detailed descriptions of questions asked, engagement techniques employed, and participants involved in each of these touchpoints can be found in the RSAP Public Engagement Report. See Appendix B.

The six engagement touchpoints were:

1. **Internal Briefings.** PSRC internal boards and committees had the opportunity to review and engage in the public involvement process at two critical moments in June 2024 and September 2024 during presentations given by PSRC staff. In addition to PSRC's Executive, Transportation and Growth Management Policy boards, PSRC sought the input from the Bicycle Pedestrian Advisory Committee, the Coordinated Mobility and Accessibility Committee, the Equity Advisory Committee, the Regional Project Evaluation Committee, the Regional Staff Committee, the Freight Advisory Committee, and the Transit Operators Committee. Common themes emerging from board and committee feedback included the need for continued data analysis and sharing, questions about factors that contribute to crashes, the role of enforcement and education, and the importance of community engagement in development of the plan. PSRC's boards also emphasized the need to incorporated findings and recommendations from the Regional Safety Action Plan into other PSRC plans and policies, the importance of coordinating safety planning across jurisdictions, and questions about how recommendations would be incorporated into project selection and prioritization.
2. **Community Events and Interviews.** PSRC attended 17 regional community events, such as farmers markets, celebrations and festivals throughout the region to share early information about the project and encourage members of the community to get involved. In addition, 35 total stakeholder interviews with key stakeholders and interest groups were conducted to explore emerging themes of public feedback and to target engagement of specific partner types that have the potential to be underrepresented in more general outreach. Key issues discussed included the need for multimodal interventions, the importance of improving the quality of surface streets, and the intersection of freight and pedestrian/bicycle safety. Distracted driving enforcement, car-centered traffic safety culture, and the effectiveness of traffic cameras and driver education were also major concerns. Community members identified distracted driving, unsafe speeds, and the need for complete and safe networks for biking and walking as key concerns.

3. **Online Engagement Hub.** PSRC built and hosted an online open house space using a customized online engagement platform to provide information about the Regional Safety Action Plan's background, purpose, and components. The open house included an online comment feature to capture public comments. Nearly 1,300 visitors completed a questionnaire on safety in their communities. Approximately 50 percent of respondents believed the crash data analysis in the State of the System Report matched what they see in their communities. The top three safety concerns selected by respondents were distracted driving, speeding, and running red lights at stop signs. Approximately 80 percent of respondents selected distracted driving as a top factor of concern.
4. **Regional Public Meetings.** PSRC hosted four regional public meetings to hear from the public and solicit public comment on road safety issues and interventions. Meeting publication and location selection were carried out with deep attention to areas with high proportions of marginalized and underrepresented communities. Participants identified speeding and driver behaviors—such as distraction, aggression, and impairment—as primary safety concerns, alongside inadequate infrastructure for pedestrians and cyclists. While the regional safety report's key findings resonated with attendees, they emphasized the need for county-specific data to inform decisions. Community members advocated for data-based, holistic strategies that ensure safe streets for all users, including drivers, cyclists, pedestrians, freight drivers, and public transit users, with tailored solutions for specific locations. Key recommendations included implementing traffic-calming measures, ensuring enforcement, improving public transit access, and developing dedicated bicycle and pedestrian infrastructure.
5. **Focus Groups.** The engagement team coordinated seven focus groups to explore findings from the roadway safety data and to hear from different stakeholder groups regarding their perspectives on safety issues and tolerance for prospective interventions. These included a focus group in each of King, Kitsap, Pierce, and Snohomish counties, one focused on rural residents, one with representatives of the region's tribes, and a group representing law enforcement and first responders. These were identified to ensure voices were heard from throughout the region, from groups seen in the data to have disproportionately negative safety outcomes, and to hear and learn from stakeholders with unique perspectives or roles in roadway safety. While there were differences between responses around the region, five topics emerged as consistent areas of concern for central Puget Sound residents regardless of whether they were in more urbanized or rural areas. These included speeding, enforcement of traffic laws, disregard of social norms and expectations around obeying traffic laws, poor street maintenance and design, and lack of pedestrian and cyclist infrastructure. However, different top-two concerns identified by community focus group participants around the region are important and should be considered when addressing safety, as seen is Table 3-1.

Table 3-1. Community Focus Group Top Two Safety Concerns by County and Rural Areas

King	Kitsap	Pierce	Snohomish	Rural
Speed (50%)	Street design, development, and maintenance (100%)	Speed (54%)	Pedestrian and cyclist infrastructure (67%)	Inattentive drivers (33%)
Disregard for traffic laws (50%)	Speed (33%) Pedestrian and cyclist Infrastructure (33%)	Pedestrian safety (31%)	Speed (56%)	Street design and maintenance (22%)

Top concerns for law enforcement and first responders were the increasing number of collisions, clogged streets making it difficult for first responders to get to emergencies, and education for new drivers on car and traffic safety.

Tribal government leaders shared concerns around inconsistent or unbuilt road shoulders that put pedestrians and cyclists at risk, more driver education on roadway safety and adjusting to new safety infrastructure such as roundabouts.

6. **Public Opinion Survey.** In spring 2025, PSRC conducted a region-wide public opinion survey to test residents' awareness, attitudes, and opinions on traffic safety issues and priorities at county and sub-county levels. Survey results will help PSRC in its ongoing roadway safety work program and implementation of the RSAP.

Findings and Results

PSRC learned from the unique perspectives provided during these community and board conversations, and community concerns and priorities are woven into the plan's strategies.

Several common themes emerged from the feedback PSRC gathered through these touchpoints, including:

- Shared data and information are extremely valuable to understand the state of safety in the region, as well as potential solutions.
- Both physical infrastructure improvements as well as policy approaches such as education and better traffic enforcement will serve critical roles in addressing safety.
- Distracted driving, speeding, and running red lights are top community concerns.
- Bicycle lanes, separated sidewalks and pathways, and safe crossings for pedestrians are important to community members.
- There are different opinions about lowering speed limits to reduce risk, using speed safety cameras, and roundabouts, depending on specific community circumstances.
- Implementing traffic-calming measures is a high priority.
- Ensuring safe access to public transit is important.
- Expectations, roles, and responsibilities need to be identified across all stakeholder groups involved in improving traffic safety.
- Infrastructure improvements are expensive, and current funding is insufficient to meet needs.
- Coordination and consistency across jurisdictions at the local, regional, and state levels is important. Context matters; there are a variety of factors that contribute to roadway safety, and no one size fits all solution. A regional toolbox with a range of solutions that can be scaled and contextualized to fit specific issues and situations will be useful.

Detailed documentation of public engagement processes and findings can be found in Appendix B.

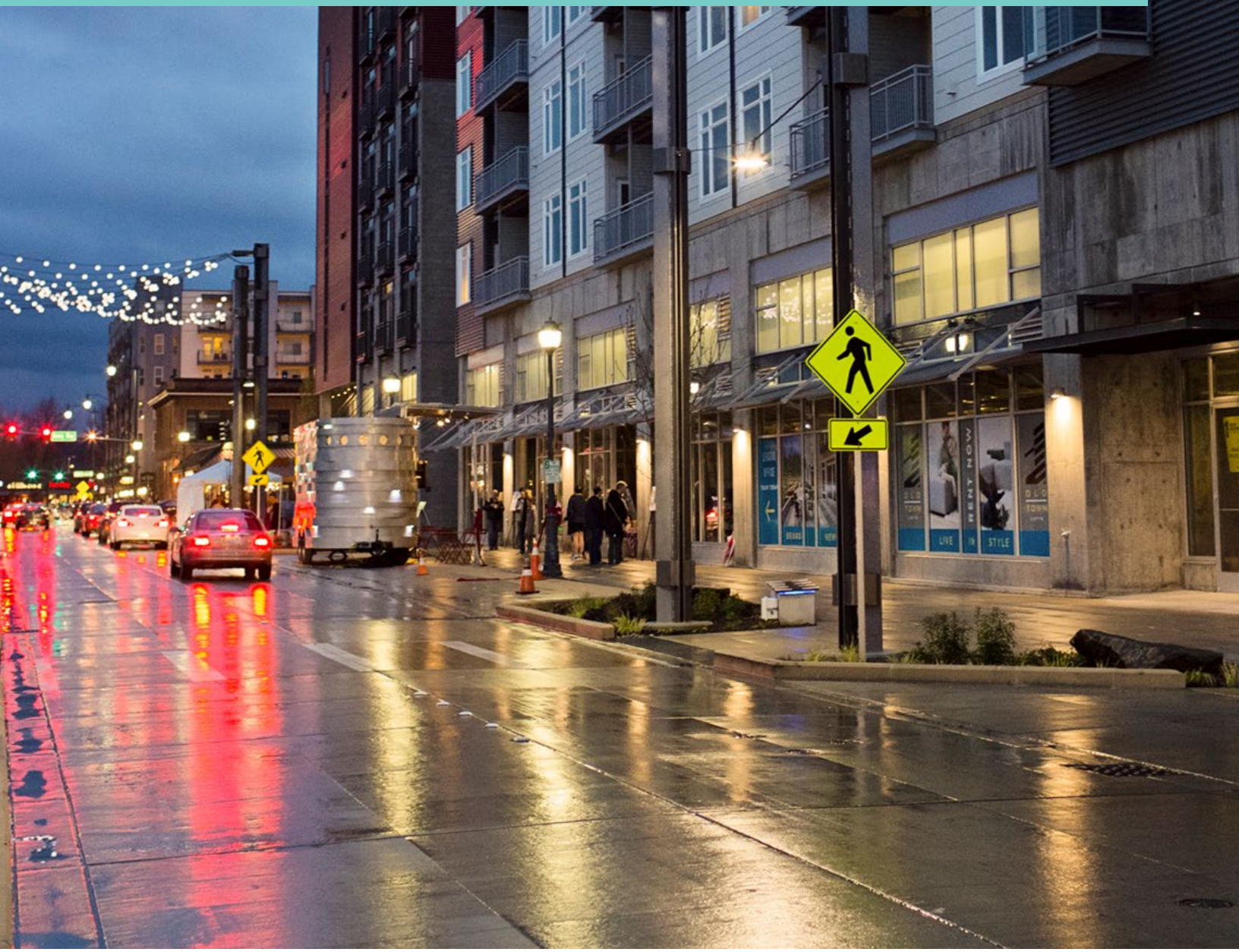
The overall themes heard during community outreach are consistent with the Emphasis Areas and the issues discovered in the "State of Safety in the Region" report. Recognizing that there is no one-size-fits-all solution, the RSAP is identifying a menu of tools and strategies to address context-specific safety issues. These strategies address many of the elements noted during community outreach, such as investments that safely separate the most vulnerable road users from vehicle traffic and provide greater accessibility. In addition, the RSAP will provide an overarching regional framework that will help guide local analysis and decision making, focused on equity and locations experiencing the most harm. As noted in the themes above, PSRC will continue to coordinate with jurisdictions and agencies throughout the region to advance the Safe System Approach and recognize that multiple and varied solutions must be implemented to reach the goal of zero deaths and serious injuries throughout the region.

The draft RSAP was released for a public comment period from January 15 through February 14, 2025, generating 203 separate comments from 62 commenters. These included comments from individuals, organizations, local governments, and others. The great majority of comments were either observations requiring no changes to the RSAP, or requests for technical corrections or clarifications. See Appendix B for a detailed discussion of all comments received.

Twenty-four comments were grouped into five themes for PSRC Board review and direction. These included requests for elements to be included in PSRC's future safety work program; calls for state and local safety planning to be recognized in the RSAP and PSRC safety work; clarification about the underreporting of impairment data in crash reports; acknowledgment of the unique needs of freight corridors and Manufacturing Industrial Centers; and support for incorporating state, regional, and local safety planning into PSRC's project selection criteria and project consistency review for the Regional Transportation Plan. PSRC's Boards supported these requests, and they have been incorporated into the RSAP.

CHAPTER 4

Strategies Toolbox



Introduction

The Strategies Toolbox is an easy-to-understand guide to safety improvements that are effective at addressing the most prevalent types of crashes that emerged from the regional safety analysis and public outreach. Wide-ranging community input from residents and stakeholders, paired with deep data-driven insights, have identified key emphasis areas described in this chapter for improving transportation safety in the central Puget Sound region.

To provide communities with the tools for these most critical safety issues and crash types, the Regional Safety Action Plan includes a tailored set of strategies in this toolbox. The toolbox provides PSRC members with a shared understanding of the most effective safety treatments in different contexts as well as implementation guidance.

There are two broad categories of strategy in the toolbox.

- **Design and engineering strategies.** Each design and engineering strategy includes an evidence-based Crash Modification Factor (CMF) that estimates its predicted safety benefit (defined below); the best available research is provided for strategies that do not have a formal CMF.
- **Planning, policy, and program strategies.** Each of these strategies, which may include one or more of the design and engineering strategies, includes best practices and case studies from communities around the country—including communities in the PSRC region when possible.

The Toolbox is not meant to replace engineering studies, feasibility assessments, or the design process. The selection of strategies for a specific location should always be sensitive to its context and include engineering judgment.

Lastly, consideration of local context and the core purpose and function of roadways will be paramount in determining which countermeasures may be appropriate for a given corridor. For example, designated freight corridors have unique heavy-duty transportation needs with few alternative routes. The application of certain strategies may not be suitable in these locations, for example those that may hamper the movement of freight and/or result in conflicting uses of the facility. Local jurisdictions and agencies must make this determination.

Organization and Definitions

The central Puget Sound region has a wide variety of land use contexts and thousands of miles of roadway. It is not feasible to identify potential safety strategies for every stretch of roadway in the region. However, the toolbox presents safety strategies that will help member jurisdictions focus on context-specific solutions to address those roadways with the highest number of fatal and serious injury crashes.

The crash analysis identified the most common crash types that are occurring in the region, the roadway types and land use contexts that have a disproportionate share of fatal and serious injury crashes, and the major contributing causes of crashes. The strategies in the toolbox are organized by their responsiveness to the crash types and they are cross-referenced to highlight their relevance to the emphasis areas and contributing factors.

Crash Types

The five most common crash types in the region resulting in fatal or serious injuries are those involving

- Pedestrians
- Bicyclists
- Road departures[1]
- Intersection collisions[2]
- Lane departures[3]

Pedestrian and Bicyclist collisions include any reported collision involving one of those modes. Road Departures include crashes where a vehicle may leave the roadway and roll over or strike a fixed object such as a tree, and by contrast, the Lane Departure type includes "head-on" crashes where a driver may cross the centerline and strike an oncoming vehicle. Intersection collisions include those classified as "angle" crashes.

1 Road Departure crashes include "Hit Fixed Object" and "Overturn" (more commonly known as rollover) crashes, as defined by WSDOT collision type data: https://wsdot.wa.gov/sites/default/files/2021-10/LP-DataDictionary-LRSP-Data-Summary.xlsx.

2 Intersection crashes include all "Angle" crashes, as defined by WSDOT collision type data: https://wsdot.wa.gov/sites/default/files/2021-10/LP-DataDictionary-LRSP-Data-Summary.xlsx.

3 Lane Departure crashes include "Head-On" crashes, as defined by WSDOT collision type data: https://wsdot.wa.gov/sites/default/files/2021-10/LP-DataDictionary-LRSP-Data-Summary.xlsx.

Emphasis Areas

The roadway type, location, and context where the highest number of fatal and serious injury crashes occur in the region are:

- Urban, multilane arterials
- Rural highways
- Tribal areas
- High Frequency Transit station areas
- Areas of lower income

Table 4-1 identifies the crash types that are most associated with each emphasis area. For example, in Tribal Areas crashes that resulted in fatal or serious injuries were likely to involve a pedestrian or a bicyclist, to occur at an intersection, or to involve a roadway departure, displayed with an "X" in the table.

Table 4-1. Emphasis Areas by Crash Types

		Crash Type				
		Pedestrian	Bicyclist	Road Departure	Intersection	Lane Departure
Emphasis Areas	Urban, Multilane Arterials	**X**	**X**	**X**	**X**	-
	Rural Highways	**X**	-	**X**	**X**	**X**
	Tribal Areas	**X**	**X**	**X**	**X**	-
	High-Frequency Transit Stations	**X**	**X**	**X**	-	-
	Areas of Lower Income	**X**	**X**	**X**	**X**	-

Contributing Factors

The top contributing factors to fatal and serious injury crashes in the region are:

- Speeding
- Impairment
- Distraction
- Failure to yield

In public outreach and engagement conducted in support of the development of this plan, these factors were also identified by stakeholders and members of the public as issues of great concern in their communities. Tables 4-2 through 4-6 (see below) identify how each proposed safety strategy addresses the most common contributing factors to crashes in the central Puget Sound region as well as the emphasis areas.

Effectiveness

The strategies in the toolbox are included because they are proven to prevent and mitigate fatal and serious injury crashes. Many are drawn from the Federal Highway Administration's list of Proven Safety Countermeasures; others come from state and local guidance documents and research. CMFs in the FHWA Crash Modification Factors Clearinghouse are assigned an identification number for further information.[4]

Wherever possible, the effectiveness of each measure is shown by an evidence-based Crash Modification Factor (CMF), a number which quantifies the estimated change in crashes following implementation of the measure. A CMF of 1.0 indicates that no change in the number of crashes is expected following implementation.[5] A CMF below 1.0 indicates the expected reduction in crashes—so a measure with a CMF of 0.75 would be expected to reduce crashes by up to one-quarter.[6]

CMFs do not exist for every strategy. In the absence of a CMF, the toolbox presents research and evaluation data to document the potential benefits of the proposed strategy. FHWA also cautions that CMFs should be considered in terms of the general effectiveness of the measure and not its application on any one road or community. Engineers should continue to exercise judgment and consider site-specific factors when selecting a strategy or measure to apply.

Safety Strategies

Each **design and engineering strategy** has the following elements:

- **Name**
- **Description:** A description of the measure with brief guidance on when, where, and how best to use it
- **Crash Type:** The crash type in the central Puget Sound region that the measure is designed to address
- **CMF:** Reference to the expected crash reduction, target crash type, and official CMF reference where applicable

Each **planning, program, and policy strategy** has the following elements:

- Strategy name or approach
- A brief description of the measure with guidance on implementation steps, benefits, and relevance to the crash type
- Case studies, enumerated in the Comprehensive List of Planning, Policy, and Program Strategies

An example of how to use the toolbox is provided in the How to Apply Strategies section.

These safety strategies address the unique crash situations in the central Puget Sound region today and the identified strategies are within the control and authority of PSRC members to implement. There are national traffic safety trends and corresponding federal and state strategies that are beyond the scope of this toolbox. For example, increasing vehicle size and weight and increased levels of distraction are critical factors driving the increase in pedestrian fatalities nationwide.[7] The potential solutions—such as improved vehicle technology and safety features—are the responsibility of federal and state agencies or lawmakers and thus are not part of this toolbox.

4 US DOT. 2023. Crash Modification Factors Clearinghouse. http://www.cmfclearinghouse.org/

5 US DOT. https://cmfclearinghouse.fhwa.dot.gov/collateral/CMF_brochure.pdf

6 CMF Clearinghouse. What is a CMF? https://cmfclearinghouse.fhwa.dot.gov/faqs.php#q1.

7 The National Highway Transportation Safety Administration (NHTSA) has proposed crash testing standards for vehicles designed to mitigate the risk of serious and fatal injury pedestrian crashes: NRPM Pedestrian Head Protection Standard (nhtsa.gov).

In addition, while strategies around enforcement, education and post-crash care are not the main focus of the toolbox, these are also important elements of the Safe System Approach that should be considered at the local, state and federal levels.

Lastly, consideration of local context and the core purpose and function of roadways will be paramount in determining which countermeasures may be appropriate for a given corridor. For example, designated freight corridors have unique heavy-duty transportation needs with few alternative routes. The application of certain strategies may not be suitable in these locations, for example those that may hamper the movement of freight and/or result in conflicting uses of the facility. Local jurisdictions and agencies must make this determination.

Strategies by Crash Type

The following sections for each crash type identify tools and strategies for the emphasis area and contributing factors that are of most concern in the region. Descriptions of the listed strategies are included below in each of these tables. The description includes a visual representation, general description, implementation guidance (if available), and a CMF value (if available). The implementation guidance is drawn from state and national engineering resources and is intended as information rather than a requirement for design and engineering at the local level.

Strategies have been identified for each of the crash types and are listed in Table 4-2 to Table 4-6 below. Planning, policy, and programmatic strategies are presented in subsections of each table, and are bolded in Table 4-2 to Table 4-6. Additional detail for each of those strategies is contained in the last section of this report.

Strategies to Address Pedestrian Crashes

Table 4-2 identifies strategies to address pedestrian crashes in the region. Strategies identified by a "✓" in the matrix target the emphasis areas and contributing factors shown in each column. Local context and conditions will be critical in determining which countermeasures may be appropriate for a given roadway or location. Following the table, each of the strategies to address pedestrian crashes is described in more detail.

Table 4-2. Strategies to Address Pedestrian Crashes

	Emphasis Areas					Contributing Factors			
	Urban, Multilane Arterials	Rural Highways	Tribal Areas	High-Frequency Transit Stations	Areas of Lower Income	Speeding	Impairment	Distraction	Failure to Yield
Design / Engineering Strategies									
Advance Stop Lines	✓	–	✓	✓	✓	–	–	–	✓
Floating Transit Island	–	–	–	✓	–	✓	✓	–	–
Hardened Centerline/Turn Hardening	✓	✓	✓	✓	✓	✓	–	✓	✓
High-Visibility Crosswalks	✓	✓	✓	✓	✓	–	–	–	✓
Lane Reduction or Reconfiguration	✓	–	✓	–	✓	✓	–	–	–
Leading Pedestrian Intervals	✓	–	✓	✓	✓	–	–	–	✓
No Right on Red	✓	–	–	✓	–	–	–	–	✓
Pedestrian Hybrid Beacons (PHB)	✓	–	✓	✓	✓	–	–	–	✓
Pedestrian Walkways	–	✓	✓	–	–	–	–	–	–
Protected Crossing Islands	✓	–	✓	–	–	✓	–	–	–
Protected Signal Phasing	✓	–	–	✓	–	–	–	–	✓
Raised Crossings	–	–	–	–	–	✓	–	–	–
Planning, Policy, and Program Strategies									
Consistent Transit Treatments	–	–	–	✓	–	–	–	–	✓
Improve Connections Across Arterials, Highways, and Interstates	✓	✓	✓	✓	✓	–	–	–	–
Improve Lighting	✓	✓	✓	✓	✓	–	–	–	✓
Low-Cost, Quick-Build Strategies	✓	✓	✓	–	✓	✓	–	–	✓
Reduce Vehicle Speeds and Speed Limits on Arterials	✓	✓	✓	✓	✓	✓	–	–	–

Design / Engineering Strategies to Address Pedestrian Crashes

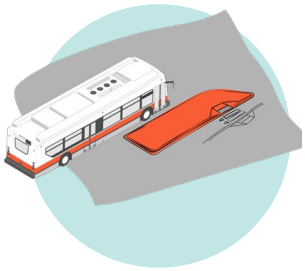
The following sections provide brief descriptions and CMFs for the design/engineering strategies identified in Table 4-2. A full list of design/engineering strategies can be found in Appendix C.

Advance Stop Lines

Description: Increase the likelihood that motorists stop for pedestrians and bicyclists at uncontrolled crossings by making the crossings more visible. Best practice recommends that advance stop lines are placed on all approaches with uncontrolled crossings and marked crosswalks. Pairing advance stop lines with a regulatory sign should increase compliance.

Crash Type: Pedestrian

CMF: Pedestrian Crashes: 0.75 (CMF ID: 9017)

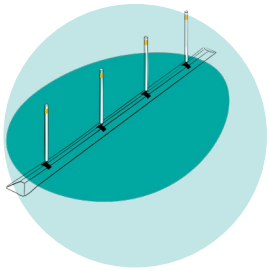


Floating Transit Island

Description: A floating transit island is a raised concrete area located between transit and traffic lanes and bike lanes. Passengers use this area to board and alight transit vehicles. The island eliminates conflicts between transit vehicles and bicyclists, which occur when a bus must pull across a bike lane to access a stop. Transit islands should be applied along streets with bike lanes, and may involve marked pedestrian crossings or channelized railings to direct transit passengers. Islands may be used at near-side, far-side, and midblock stop locations.

Crash Type: Bicyclist, Pedestrian

CMF: Not yet determined



Hardened Centerline/Turn Hardening

Description: Hardened centerlines are flexible delineators placed between opposing travel lanes. Turn hardening, such as turn wedges, are raised curbs or flexible delineators, with pavement markings, on both sides of a crosswalk at an intersection.

Crash Type: Pedestrian, Road Departure

CMF: All Crashes (at left turns): 0.90 (Source: ODOT Crash Reduction Factor Manual, 2023[8])

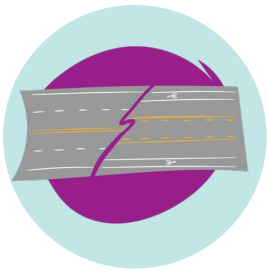
8 "Crash Reduction Factor Manual." Oregon Department of Transportation. 2023. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf. The Oregon Department of Transportation includes hardened centerlines and turn hardening (via corner wedges) as traffic calming treatments for intersections in its CRF manual and cites ODOT engineering judgment as the basis for an estimated 10% in reduction in left-turn crashes of all severities.

High-Visibility Crosswalks

Description: High-visibility crosswalk markings can be more easily seen by drivers than traditional parallel markings, and can be more effective in preventing crashes and injuries.

Crash Type: Pedestrian

CMF: Pedestrian Crashes: 0.60 to 0.81 (CMF ID: 4123, 4124)

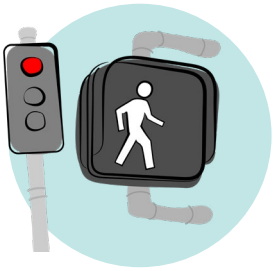


Lane Reduction or Reconfiguration

Description: Reconfigurations of lanes can reduce vehicle speeds and create space for turning lanes and pedestrian and bicycle facilities. Consider conversion of four-lane roadway to three lanes where ADT is less than 25,000 vehicles.[9] Consider combination with other speed calming features such as medians or separated bike lanes.

Crash Type: Pedestrian, Bicyclist, Road Departure

CMF: All Crashes: 0.53 (CMF ID: 2841)



Leading Pedestrian Intervals

Description: Leading pedestrian intervals are adjustments to traffic signals to give pedestrians a 3- to 7-second head start before motorists enter the intersection.

Crash Type: Pedestrian

CMF: Pedestrian Crashes: 0.81 (CMF ID: 9903)

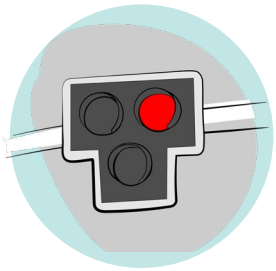
No Right on Red

Description: A policy, communicated via traffic sign or signal used to prohibit motor vehicles from turning right when the traffic light is red.

Crash Type: Pedestrian

CMF: Not yet determined, see Highway Safety Manual (HSM) for more information (CMF ID: 5194)

9 "Road Diets (Roadway Reconfiguration)." Federal Highway Administration. https://highways.dot.gov/sites/fhwa.dot.gov/files/Road%20Diets_508.pdf.



Pedestrian Hybrid Beacons

Description: Pedestrian hybrid beacons (PHBs) protect pedestrian and bicyclist crossings by stopping traffic via steady and flashing red light phases. They are generally used where traffic is too frequent and fast (speeds higher than 35 mph) for uncontrolled crossings or flashing beacons. PHBs increase motor vehicle yielding and pedestrian visibility, and may be paired with a pedestrian waiting area, and allowing two-stage crossings for slower pedestrians. PHBs can be installed at intersections or midblock crossings, and best practice is to install PHBs with high-visibility crosswalks and advance stop lines.

Crash Type: Pedestrian

CMF: Pedestrian Crashes: 0.54 (CMF ID: 10607)

Pedestrian Walkways

Description: A pedestrian walkway is any type of defined space or pathway for use by a person traveling by foot or using a wheelchair. These may be shared use paths, sidewalks, or roadway shoulders.

Crash Type: Pedestrian

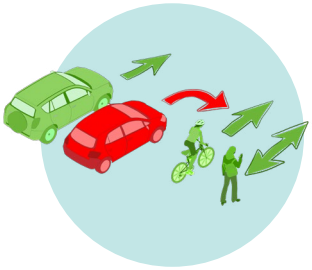
CMF: Pedestrian Crashes: 0.60 (CMF ID: 11246)

Protected Crossing Islands

Description: Median crossing islands have a cut-out area for pedestrian and bicyclist refuge and are used as a supplement to a crosswalk. Also known as pedestrian refuge islands or raised refuge islands. Protected crossing islands or pedestrian median islands are often installed at uncontrolled intersections or midblock crossings.

Crash Type: Pedestrian

CMF: Pedestrian Crashes: 0.68 (Source: Zeeger, et al (2017)[10])



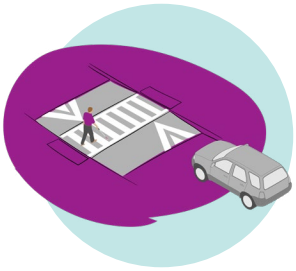
Protected Signal Phasing

Description: Protected signal phasing uses green- or red-arrow signals to restrict left or right motorist turning, allowing pedestrians and bicyclists to use crossings without interactions with turning vehicles.

Crash Type: Pedestrian

CMF: All Crashes (change from permissive left-turn phasing to protected only): 0.45 (CMF ID: 4144)

10 Zegeer, C., C. Lyon, R. Srinivasan, B. Persaud, B. Lan, and S. Smith. 2017. "Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments." Transportation Research Record: Journal of the Transportation Research Board 2636. Transportation Research Board of the National Academies. Washington, D.C. https://journals.sagepub.com/doi/abs/10.3141/2636-01. Median crossing islands were studied in this 2017 analysis, which conducted an empirical analysis of islands and three other types of pedestrian crossing treatments. Data collected from sites at 14 U.S. cities indicated that median islands were associated with a 32% reduction in pedestrian crashes, or a CMF of .68.



Raised Crossings

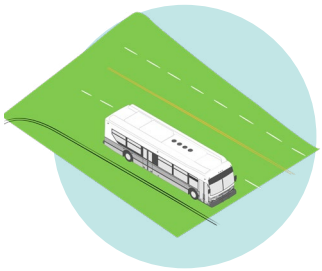
Description: Raised crossings are elevated at least 3 inches above the roadway, up to the sidewalk level.

Crash Type: Pedestrian

CMF: Pedestrian Crashes: 0.55 (CMF ID: 136)

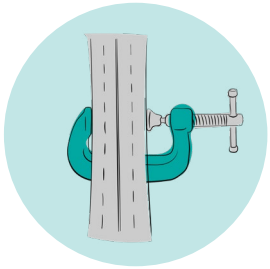
Planning, Policy, and Program Strategies to Address Pedestrian Crashes

A full list of planning, policy, and program strategies can be found in Appendix C.



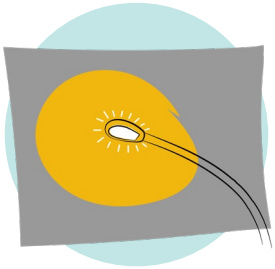
Consistent Transit Treatments

- Improve sight lines along transit corridors for transit operators, motorists, pedestrians, and bicyclists, such as including implementation of restricted parking along transit corridors.
- Systemic placement of transit stops on far side of intersections.
- Systemic crossing improvements at transit stops/hubs.
- Separate pedestrian and bicyclist infrastructure connecting to transit stops/hubs.
- Incorporate technological vehicle safety features in fleet purchasing standards.



Improve Connections Across Arterials, Highways, and Interstates

- Avoid widening existing roadways, except to create bicycle and pedestrian facilities, to ensure that existing barriers do not get worse.
- On roads that are already wide, with high motor vehicle speeds and traffic volumes, systemic implementation of countermeasures can improve safety outcomes. Countermeasures include gateway treatments at entrances to communities, road diets/roadway reallocation, leading pedestrian intervals, safer crossing treatments such as medians and pedestrian refuges, no turn on red, and HAWK signals at mid-block crossings, and above grade crossings over interstate highways. These countermeasures can be used individually or in combination to achieve the desired level of safety and comfort.



Improve Lighting

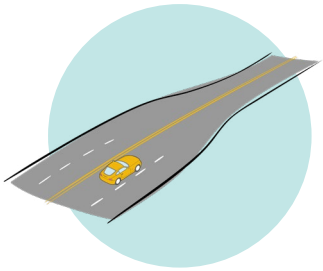
- Conduct lighting studies to identify locations where lighting can improve road safety. This may include locations with a history of crashes in dark conditions, at intersections, and where pedestrians walk along roadway shoulders.

Low-Cost, Quick-Build Strategies

- Quick-build demonstration projects are temporary street design installations aimed at rapidly enhancing safety and accessibility. Demonstration projects may incorporate temporary materials such as striping, flex posts, and curb stops, and may be applied to a number of countermeasure strategies in this section, such as pedestrian crossing islands or turn hardening treatments.
- They provide an opportunity to test new ideas, such as slowing traffic, creating connections, or encouraging walking and biking, while gathering real-time community feedback. Incorporate quick-build strategies and demonstration projects for rapid roll-out of safety improvements for pedestrians and bicyclists. As funding becomes available, convert temporary improvements to higher quality, more durable permanent improvements.

CASE STUDIES (SEE COMPREHENSIVE STRATEGIES SECTION FOR MORE DETAILS):

- The City of Emmett, Idaho improved pedestrian safety for children walking to a nearby elementary school by creating a cost-effective three-quarter mile pedestrian lane using an extruded curb, similar to projects in Washington cities like Kirkland and Bainbridge Island.
- Tacoma's Vision Zero Action Plan proposes a quick-build pilot program featuring low-cost traffic calming measures focused on enhancing pedestrian safety in areas with low Equity Index scores, supported by monitoring and evaluation methods.
- Hoboken, New Jersey enhances road safety on streets with high number of crashes, school zones, and near parks by initially implementing quick-build infrastructure improvements during routine maintenance, such as daylighting intersections, adding high-visibility crosswalks and medians, and widening sidewalks, and makes these changes permanent over time.



Reduce Vehicle Speeds and Speed Limits on Arterials

Approaches to reducing vehicle speeds can be categorized into sets of strategies related to policies, design, education, and enforcement, as summarized below. An effective speed management program includes several of the design/engineering strategies in this toolbox as well as additional education and enforcement initiatives.

SAFER SPEEDS POLICIES

- Reference National Association of City Transportation Officials (NACTO) "City Limits," National Cooperative Highway Research Program (NCHRP) Report 966, and "Manual of Uniform Traffic Control Devices (MUTCD) 11th Edition" guidance for setting speed limits.

SAFER SPEEDS DESIGN

- Utilize best practices in speed management street design to encourage slower motor vehicle speeds.
- Adjust traffic signal timing to encourage slower speeds.
- Increase frequency of speed limit signs.
- Use traffic signal video analytics to test signal adjustments that reduce vehicle conflicts and speeds.

SAFER SPEEDS EDUCATION

- Implement well-planned and researched awareness campaigns that are part of an overall speed reduction strategy, paired with other measures to support their implementation.

SAFER SPEEDS ENFORCEMENT

- Implement equitable enforcement practices that recognize current and historical impacts of enforcement activities on communities of color.
- This might include the use of Automated Traffic Safety Cameras, but these can also be deployed in ways that perpetuate historical inequities. Consequently, street designs that self-enforce lower speeds should be used in conjunction with cameras whenever possible.[11]

11 "Making Speed Safety Cameras Effective & Fair: From Planning to Action." Vision Zero Network. https://visionzeronetwork.org/promoting-equity-in-speed-safety-camera-programs-from-planning-to-action. Accessed 4/2/25"

Strategies to Address Bicyclist Crashes

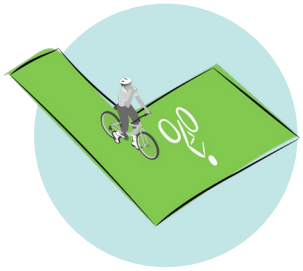
Table 4-3 identifies strategies to address bicyclist crashes in the region. Strategies identified by a "✔" in the matrix target the emphasis areas and contributing factors shown in each column. Emphasis areas and contributing factors that are not directly addressed with strategies are not shown. Local context and conditions will be critical in determining which countermeasures may be appropriate for a given roadway or location. Following the table, each of the strategies to address bicyclist crashes is described in more detail.

Table 4-3. Strategies to Address Bicyclist Crashes

	Urban, Multilane Arterials	Tribal Areas	High-Frequency Transit Stations	Areas of Lower Income	Speeding	Failure to Yield
Design / Engineering Strategies						
Bike Boxes/Two-Stage Turn Box	✔	–	–	–	–	✔
Bike Lane: Conventional	–	✔	✔	✔	–	✔
Bike Lane: Separated	✔	✔	✔	✔	✔	✔
Conflict Striping/Bicycle Crossing	✔	–	–	–	–	✔
Floating Transit Island	–	–	✔	–	✔	✔
Lane Reduction or Reconfiguration	✔	✔	–	✔	✔	–
Protected Intersection	✔	–	–	✔	✔	✔
Planning, Policy, and Program Strategies						
Consistent Transit Treatments	–	–	✔	–	–	–
Improve Connections Across Arterials, Highways, and Interstates	✔	✔	✔	✔	–	–
Improve Lighting	✔	✔	✔	✔	–	✔
Low-Cost, Quick-Build Strategies	✔	✔	–	✔	✔	✔
Reduce Vehicle Speeds and Speed Limits on Arterials	✔	✔	✔	✔	✔	–

Design / Engineering Strategies to Address Bicyclist Crashes

The following sections provide brief descriptions and CMFs for the design/engineering strategies identified in Table 4-3. A full list of design/engineering strategies can be found in Appendix C.

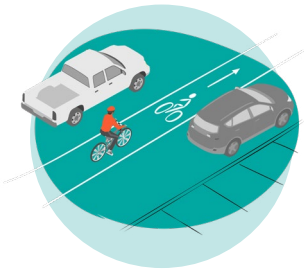


Bike Boxes/Two-Stage Turn Box

Description: Bike boxes and two-stage turn boxes provide bicyclists with a safer and visible way to position themselves ahead of queuing traffic during the red signal phase, improving their visibility. Bike boxes should be used to separate bicyclists from right-turning vehicles. Two-stage turn boxes offer a clear place for bicyclists to wait when taking a two-stage left. These treatments are primarily installed at signalized intersections and use green pavement markings to deter vehicle encroachment. A bike box should be paired with at least 50 feet of a bicycle lane to ensure a bicyclist does not need to weave through queued traffic to reach it. Bike boxes are often paired with "no turn on red" restrictions to minimize conflicts.

Crash Type: Bicyclist

CMF: Not yet determined

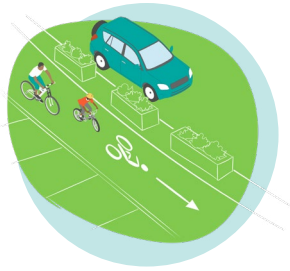


Bike Lane: Conventional

Description: With a conventional bike lane, a portion of the roadway is designated for the use of bicyclists using a combination of signage, white striping, and bicycle symbols placed on the lane. Conventional bike lanes are typically provided along the curb or between the curbside parking lane and the right-side travel lanes. Conventional bikeways typically provide adequate space for bicyclists between the travel lane and parked vehicles. Clear sight lines at driveways should be maintained. Best practice is to install conventional bike lanes where traffic speeds and volumes are lower; for higher-volume locations, consider separated bike lanes.

Crash Type: Bicyclist

CMF: All Crashes: 0.65 (CMF ID: 10743)



Bike Lane: Separated

Description: Separated bike lanes provide an exclusive on-street space for bicyclists. They are physically separated from motor vehicle traffic via vertical elements and are distinguished from sidewalk space. Vertical separation materials may include plastic bollards, planters, and concrete curbs. One-way, directional separated bike lanes are preferred on most streets with two to four lanes, because two-way lanes on one side of the street can create unexpected conflicts and require signal modifications. Best practice is to combine separated bike lanes with green conflict zone striping and protected intersections.

Crash Type: Bicyclist

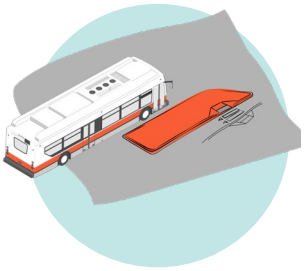
CMF: Bicyclist Crashes (Convert Traditional Bike Lane to Separated Bike Lane with Flexi-posts): 0.50 (CMF ID: 11294)

Conflict Striping/Bicycle Crossing

Description: Dashed or solid green striping marked in bicycle lanes to denote where bicycle lanes are crossing an intersection, and signaling to drivers that they are crossing a bicycle facility. Striping denoting a bicycle crossing is separate from pedestrian crossings. Can be applied at signalized intersections as well as at minor intersections where bicycles may cross driveways or other points of conflict.

Crash Type: Bicyclist

CMF: Not yet determined

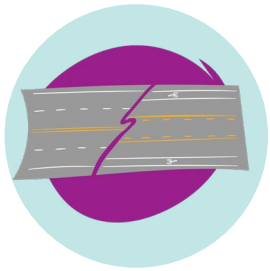


Floating Transit Island

Description: A floating transit island is a raised concrete island located between transit and traffic lanes and bike lanes. Passengers use this area to board and alight transit vehicles. The island eliminates conflicts between transit vehicles and bicyclists, which occur when a bus must pull across a bike lane to access a stop. Transit islands should be applied along streets with bike lanes, and they may involve marked pedestrian crossings or channelized railings to direct transit passengers. Islands may be used at near-side, far-side, and midblock stop locations.

Crash Type: Bicyclist, Pedestrian

CMF: Not yet determined

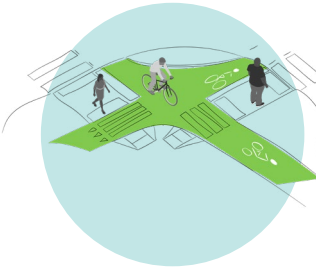


Lane Reduction or Reconfiguration

Description: Reconfigurations of lanes can reduce vehicle speeds and create space for turning lanes and pedestrian and bicycle facilities. Consider conversion of four-lane roadway to three lanes where ADT is less than 25,000 vehicles.[12] Consider combination with other speed calming features such as medians or separated bike lanes.

Crash Type: Pedestrian, Bicyclist, Road Departure

CMF: All Crashes: 0.53 (CMF ID: 2841)



Protected Intersection

Description: A protected intersection uses a combination of concrete floating curb wedges to separate bicyclists and pedestrians from drivers at an intersection, improving sight lines and reducing conflict points. Protected intersections are best applied at intersections with bicycle infrastructure and combined with countermeasures such as high-visibility crosswalks, conflict striping, directional curb ramps, and leading pedestrian intervals.

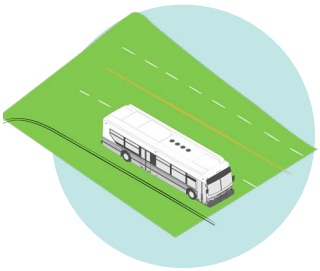
Crash Type: Pedestrian, Bicyclist

CMF: Not yet determined

12 "Road Diets (Roadway Reconfiguration)." Federal Highway Administration. https://highways.dot.gov/sites/fhwa.dot.gov/files/Road%20Diets_508.pdf.

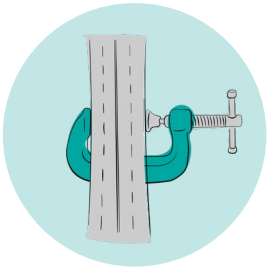
Planning, Policy, and Program Strategies to Address Bicyclist Crashes

The following sections summarize the planning, policy, and program strategies identified in Table 4-3. A full list of planning, policy, and program strategies can be found in Appendix C.



Consistent Transit Treatments

- Improve sight lines along transit corridors for transit operators, motorists, pedestrians, and bicyclists, including implementation of restricted parking along transit corridors.
- Systemic placement of transit stops on far side of intersections.
- Systemic crossing improvements at transit stops/hubs.
- Separate pedestrian and bicyclist infrastructure connecting to transit stops/hubs.
- Incorporate technological vehicle safety features in fleet purchasing standards such as blind stop detection and emergency brake assist systems.

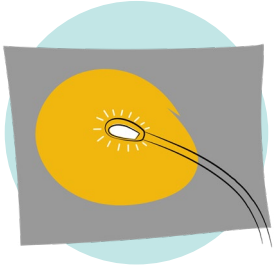


Improve Connections Across Arterials, Highways, and Interstates

- Avoid widening existing roadways, except to create bicycle and pedestrian facilities, to ensure that existing barriers do not become worse.
- On roads that are already wide, with high motor vehicle speeds and traffic volumes, systemic implementation of countermeasures can improve safety outcomes. Countermeasures might include conflict striping/bicycle crossing marking parallel to PHBs, RRFBs and other pedestrian crossings; protected intersections; and bike boxes. These may be installed individually or in combination with others.

Low-Cost, Quick-Build Strategies

- Quick-build demonstration projects are temporary street design installations aimed at rapidly enhancing safety and accessibility.
- They provide an opportunity to test new ideas, such as slowing traffic, creating connections, or encouraging walking and biking, while gathering real-time community feedback. Incorporate quick-build strategies and demonstration projects for rapid roll-out of safety improvements for pedestrians and bicyclists. As funding becomes available, convert temporary improvements to higher quality, more durable permanent improvements.

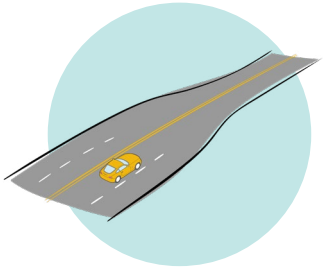


Improve Lighting

- Conduct lighting studies to identify locations where lighting can improve road safety. This may include locations with a history of crashes in dark conditions, at intersections, and where bicyclists may travel along roadway shoulders.

CASE STUDIES (SEE THE COMPREHENSIVE LIST BELOW FOR MORE DETAILS):

- The Second Avenue protected bike lane in Seattle, originally slated for 18 months, was accelerated to four months to align with the launch of a new bike-sharing system, incorporating features like dedicated bike signal phases. This rapid installation led to a tripling of bike volumes along the avenue and inspired additional quick-build bike network projects throughout the city.
- Jersey City, New Jersey, implemented 10 miles of protected bike lanes in one year using quick-build materials. This is approximately one quarter of the City's planned bicycle network. The City plans to rollout the remaining bike network with similar quick-build materials while gradually making facilities permanent with higher quality materials.
- In April 2017, the city of Ghent, Belgium, launched a circulation plan aimed at increasing bicycle mode share from 22% to 30% by 2030, by restricting vehicle traffic between districts while allowing direct access for bicycles and pedestrians. The plan was rapidly implemented in one weekend, incorporating quick-build traffic diverters, traffic calming measures, and automated traffic enforcement cameras, and led to a 60% increase in cycling, achieving the bicycle mode share target by 2018.



Reduce Vehicle Speeds and Speed Limits on Arterials

An effective speed management program includes several of the design/ engineering strategies in this toolbox as well as additional education and enforcement initiatives.

SAFER SPEEDS POLICIES

- Reference NACTO "City Limits," National Cooperative Highway Research Program Report 966, and "Manual of Uniform Traffic Control Devices 11th Edition" guidance for setting speed limits.

SAFER SPEEDS DESIGN

- Utilize best practices in speed management street design to encourage slower motor vehicle speeds.
- Adjust traffic signal timing to encourage slower speeds.
- Increase frequency of speed limit signs.
- Use traffic signal video analytics to test signal adjustments that reduce vehicle conflicts and speeds.

SAFER SPEEDS EDUCATION

- Implement well-planned and researched awareness campaigns that are part of an overall speed reduction strategy, paired with other measures to support their implementation.

SAFER SPEEDS ENFORCEMENT

- Implement equitable enforcement practices that recognize current and historical impacts of enforcement activities on communities of color. This might include the use of Automated Traffic Safety Cameras, but these can also be deployed in ways that perpetuate historical inequities. Consequently, street designs that self-enforce lower speeds should be used in conjunction with cameras whenever possible.

Strategies to Address Road Departure Crashes

Table 4-4 identifies strategies to address road departure crashes in the region. Strategies identified by a "✔" in the matrix target the emphasis areas and contributing factors shown in each column. Local context and conditions will be critical in determining which countermeasures may be appropriate for a given roadway or location. Each of the strategies to address road departure crashes are described in more detail following the table.

Table 4-4. Strategies to Address Road Departure Crashes

	Urban, Multilane Arterials	Rural Highways	Tribal Areas	High-Frequency Transit Stations	Areas of Lower Income	Speeding	Impairment	Distraction	Failure to Yield
Design / Engineering Strategies									
Automated Speed Enforcement Cameras	✔	–	–	✔	–	✔	–	–	–
Centerline Rumble Strips	–	✔	–	–	–	–	–	✔	–
Crash Cushions at Fixed Features	–	✔	–	–	–	–	✔	✔	–
Hardened Centerline/ Turn Hardening	✔	–	✔	–	✔	✔	–	–	–
Lane Reduction or Reconfiguration	✔	–	✔	–	✔	✔	–	–	–
Shoulder or Edge Line Rumble Strips	–	✔	–	–	–	✔	–	✔	–
Speed Feedback Sign	✔	✔	✔	–	–	✔	–	–	–
Warning Signs at Horizontal Curves	–	✔	–	–	–	✔	–	✔	–
Widen Edge Lines	–	✔	–	–	–	–	–	✔	–
Planning, Policy, and Program Strategies									
Improve Lighting	✔	✔	✔	✔	✔	–	–	–	✔
Reduce Risks for Motorcycle Crashes	–	✔	–	–	–	–	–	–	–
Reduce Vehicle Speeds and Speed Limits on Arterials	✔	✔	✔	✔	✔	✔	–	–	–

Design / Engineering Strategies to Address Road Departure Crashes

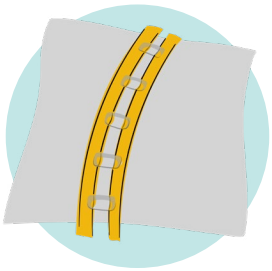
The following sections provide brief descriptions and CMFs for the design/engineering strategies identified in Table 4-4. A full list of design/engineering strategies can be found in Appendix C.

Automated Speed Enforcement Cameras

Description: Automated speed enforcement cameras are systems that automatically issue fines for speeding. A variety of system types exist (such as mobile and fixed units), which can be applied based on an analysis of the scope of speeding issues. Signage is typically installed to warn drivers in advance of the first speed camera on a corridor. Prior to installing, a jurisdiction is strongly encouraged to conduct an analysis of that location with respect to equity considerations.[13] Cameras are placed at legal zones and areas defined by state law, such as school speed zones and roadway work zones.[14]

Crash Type: Intersection, Road Departure

CMF: All Crashes: 0.85 (CMF ID: 10648)



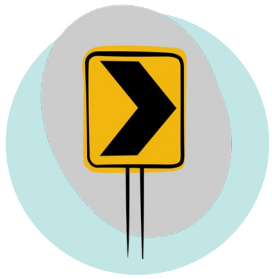
Centerline Rumble Strips

Description: Longitudinal centerline rumble strips are milled or raised elements on the pavement intended to alert drivers through vibration and sound that their vehicle has left the travel lane.

Crash Type: Lane Departure, Road Departure

CMF:

- Head-On Crashes: 0.63 (CMF ID: 3355)
- Fixed Object Crashes: 0.58 (CMF ID: 9840)



Warning Signs at Horizontal Curves

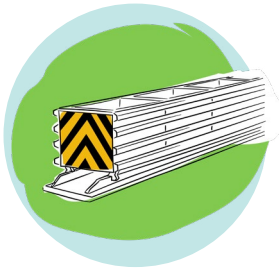
Description: Installation of advance signage elements raises driver awareness of oncoming curves and driver attentiveness. Warning sign treatments should include elements such as advance warning signs, chevron signs within the curve, retroreflective signposts, and delineators. Treatments may be applied in advance of curves and within curves.

Crash Type: Road Departure

CMF: All Crashes: 0.96 (CMF ID: 2436)

13 "Automated Traffic Safety Cameras." MRSC. https://mrsc.org/explore-topics/public-safety/traffic-safety/traffic-safety-cameras.

14 "RCW 46.63.210 Definitions." Washington State Legislature. https://app.leg.wa.gov/RCW/default.aspx?cite=46.63.210

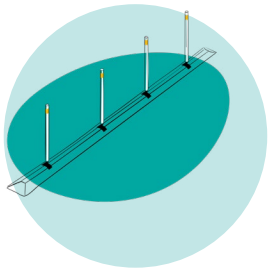


Crash Cushions at Fixed Features

Description: Crash cushions are barriers made from a variety of materials that absorb the energy of crashes and reduce the impact force for drivers. Cushions may be placed in advance of fixed objects such as poles or trees, or in narrow shoulder spaces as a barrier.

Crash Type: Road Departure

CMF: Fixed Object, Fatal Crashes: 0.31 (CMF ID: 55)

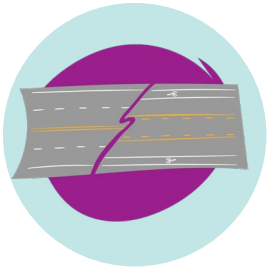


Hardened Centerline/Turn Hardening

Description: Hardened centerlines are flexible delineators placed between opposing travel lanes. Turn hardening treatments, such as turn wedges, are raised curbs or flexible delineators, with pavement markings on both sides of a crosswalk at an intersection.

Crash Type: Pedestrian, Road Departure, Lane Departure

CMF: All Crashes: 0.90 (Source: ODOT Crash Reduction Factor Manual, 2023)[15]

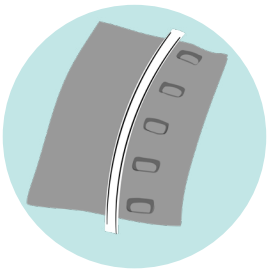


Lane Reduction or Reconfiguration

Description: Reconfigurations or reductions of lanes can reduce vehicle speeds and create space for turning lanes and pedestrian and bicycle facilities. Consider conversion of four-lane roadway to three lanes where average daily traffic (ADT) is less than 25,000 vehicles.[16] Consider combination with other speed-calming features, such as medians or separated bike lanes.

Crash Type: Road Departure, Bicyclist, Pedestrian

CMF: All Crashes: 0.53 (CMF ID: 2841)



Shoulder or Edge Line Rumble Strips

Description: Installation of milled asphalt rumble strips on the outer edge line of a roadway encourages drivers to maintain alertness and reduces instances of leaving the roadway. Care should be taken when applying edge line rumble strips near bicycle facilities or on shoulders that may be used as a bicycle facility.

Crash Type: Road Departure

CMF: Fixed Object Crashes: 0.56 to 0.80 (CMF ID: 6850, 6946 for shoulder rumble strips)

15 Crash Reduction Factor Manual." Oregon Department of Transportation. 2023. https://www.oregon.gov/odot/Engineering/ARTS/CRF-Manual.pdf. The Oregon Department of Transportation includes hardened centerlines and turn hardening (via corner wedges) as traffic calming treatments for intersections and cites ODOT engineering judgment as the basis for an estimated 10% in reduction in left-turn crashes of all severities.

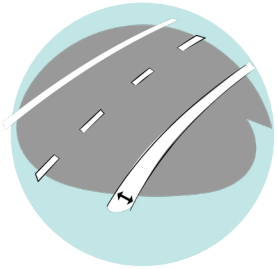
16 "Road Diets (Roadway Reconfiguration)." Federal Highway Administration. https://highways.dot.gov/sites/fhwa.dot.gov/files/Road%20Diets_508.pdf.

Speed Feedback Sign

Description: Speed feedback signs are automated sign installations that display recorded speeds for approaching vehicles, to remind them of their actual speed against the stated limit. Feedback signs can be programmed to flash messages such as "Slow Down" if a driver exceeds a certain threshold. Feedback signs may be permanent installations or temporary countermeasures. They may be installed ahead of key safety locations such as school zones, work zones, or horizontal curves.

Crash Type: Road Departure

CMF: All Crashes (on rural highways): 0.95 (CMF ID: 6885)



Widen Edge Lines

Description: Clearly delineated, wider edge lines improve the visibility of the edge of the roadway for drivers, reducing the likelihood that they will leave the roadway. Consider systemic application along rural highways.

Crash Type: Road Departure

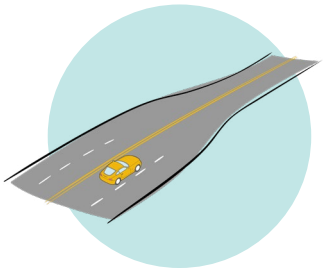
CMF: Fixed Object Crashes: 0.71 (CMF ID: 4764)

Planning, Policy, and Program Strategies to Address Road Departure Crashes

The following sections summarize the planning, policy, and program strategies identified in Table 4-4. A full list of planning, policy, and program strategies can be found in Appendix C.

Reduce Risks for Motorcycle Crashes

- High-friction treatments to reduce motorcyclist run-off road crashes on curve.
- Use of motorcycle protection system (MPS) barriers instead of guard rails to reduce injuries to motorcyclists.
- Pave the first 15 feet of gravel driveways that intersect with a roadway to reduce debris on roadway surface.
- Use high-friction pavement markings. Pavement marking suppliers should be required to provide friction numbers/ratings for all the pavement markings. Road agencies should choose those with higher friction ratings.
- Provide regular maintenance to reduce potholes, uneven pavement conditions, and gravel or debris on roadway.
- During road construction projects, do not allow traffic to run on roads with raised manhole covers and apply friction to steel plate surfaces. Post warning signs for both conditions.
- Post warning signs after chip sealing operations have taken place and sweep loose aggregate off roadway as soon as tar has set.
- Awareness campaigns regarding helmet use, reducing impaired driving, and speeding.
- Practical advanced motorcycle safety training programs.



Reduce Vehicle Speeds and Speed Limits on Arterials

Approaches to reduce vehicle speeds can be categorized into sets of strategies related to policies, design, education, and enforcement, as summarized below. An effective speed management program includes several of the design/engineering strategies in this toolbox as well as additional education and enforcement initiatives.

SAFER SPEEDS POLICIES

- Reference NACTO "City Limits," National Cooperative Highway Research Program Report 966, and "Manual of Uniform Traffic Control Devices 11th Edition" guidance for setting speed limits.

SAFER SPEEDS DESIGN

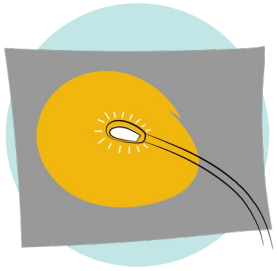
- Utilize best practices in speed management street design to encourage slower motor vehicle speeds.
- Adjust traffic signal timing to encourage slower speeds.
- Increase frequency of speed limit signs.
- Use traffic signal video analytics to test signal adjustments that reduce vehicle conflicts and speeds.

SAFER SPEEDS EDUCATION

- Implement well-planned and researched awareness campaigns that are part of an overall speed reduction strategy, paired with other measures to support their implementation.

SAFER SPEEDS ENFORCEMENT

- Implement equitable enforcement practices that recognize current and historical impacts of enforcement activities on communities of color.
- This might include the use of Automated Traffic Safety Cameras, but these can also be deployed in ways that perpetuate historical inequities. Consequently, street designs that self-enforce lower speeds should be used in conjunction with cameras whenever possible.



Improve Lighting

- Conduct lighting studies to identify locations where lighting can improve road safety. This may include locations with a history of crashes at intersections and places where lighting conditions are a contributing factor in crashes.

Strategies to Address Intersection Crashes

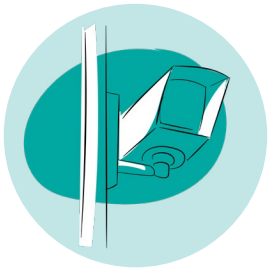
Table 4-5 identifies strategies to address intersection crashes in the region. Strategies identified by a "✔" in the matrix target the emphasis areas and contributing factors shown in each column. Emphasis areas and contributing factors that are not directly addressed with strategies are not shown. Local context and conditions will be critical in determining which countermeasures may be appropriate for a given roadway or location. Following the table, each of the strategies to address intersection crashes is described in more detail.

Table 4-5. Strategies to Address Intersection Crashes

	Urban, Multilane Arterials	Rural Highways	Tribal Areas	Areas of Lower Income	Speeding	Impairment	Distraction	Failure to Yield
Design / Engineering Strategies								
Automated Speed Enforcement Cameras	✔	–	–	–	✔	–	–	–
Automated Red Light Running Enforcement Cameras	✔	–	–	–	✔	–	–	–
Roundabouts	–	✔	–	–	✔	–	–	–
Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections	–	✔	✔	–	–	–	–	✔
Traffic Signal Backplates with Retroreflective Borders	✔	✔	✔	✔	–	–	–	–
Yellow Change Intervals	✔	–	–	–	–	–	–	✔
Planning, Policy, and Program Strategies								
Improve Lighting	✔	✔	✔	✔	–	–	–	✔
Reduce Vehicle Speeds and Speed Limits	✔	✔	✔	✔	✔	–	–	–

Design / Engineering Strategies to Address Intersection Crashes

The following sections provide brief descriptions and CMFs for the design/engineering strategies identified in Table 4-5. A full list of design/engineering strategies can be found in Appendix C.

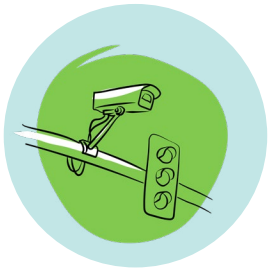


Automated Speed Enforcement Cameras

Description: Automated speed enforcement cameras are systems that automatically issue fines for speeding. A variety of system types exist (such as mobile and fixed units), which can be applied based on an analysis of the scope of speeding issues. Signage is typically installed to warn drivers in advance of the first speed camera on a corridor. Prior to installing, a jurisdiction is strongly encouraged to conduct an analysis of that location with respect to equity considerations.[17] Cameras are placed at legal zones and areas defined by state law, such as school speed zones and roadway work zones.[18]

Crash Type: Intersection, Road Departure

CMF: All Crashes: 0.85 (CMF ID: 10648)

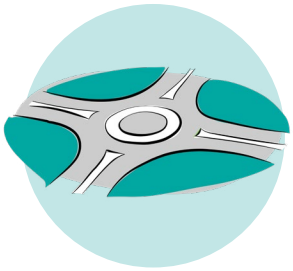


Automated Red Light Running Enforcement Cameras

Description: Automated red light running enforcement cameras are systems that automatically issue fines for running red lights. Signage is typically installed to warn drivers in advance of the first red light camera on a corridor. Prior to installing, a jurisdiction is strongly encouraged to conduct an analysis of that location with respect to equity considerations.[19] Cameras are placed at legal zones and areas defined by state law, such as school speed zones and roadway work zones.

Crash Type: Intersection

CMF: Angle Crashes: 0.75 (CMF ID: 420)



Roundabouts

Description: Roundabouts are circular intersections controlled by yield control rather than a signal or stop. Roundabouts provide safety improvements over other intersection types by reducing the number of potential conflict points and slowing vehicle speeds.

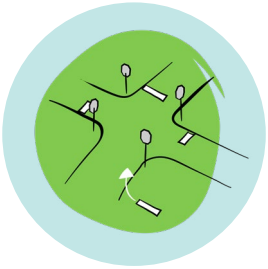
Crash Type: Intersection

CMF: Angle Crashes: 0.17 (CMF ID: 4705)

17 "Automated Traffic Safety Cameras." MRSC. https://mrsc.org/explore-topics/public-safety/traffic-safety/traffic-safety-cameras.

18 "RCW 46.63.210 Definitions." Washington State Legislature. https://app.leg.wa.gov/RCW/default.aspx?cite=46.63.210.

19 "Automated Traffic Safety Cameras." MRSC. https://mrsc.org/explore-topics/public-safety/traffic-safety/traffic-safety-cameras.

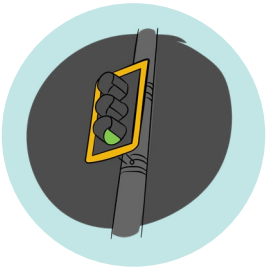


Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections

Description: This systemic approach to intersection safety involves deploying a package of multiple low-cost countermeasures, including enhanced signing and pavement markings, at a large number of stop-controlled intersections within a jurisdiction.

Crash Type: Intersection

CMF: Dependent upon selection of countermeasures

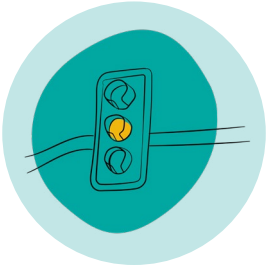


Traffic Signal Backplates with Retroreflective Borders

Description: Retroreflective borders on backplates added to traffic signals improve the visibility of the illuminated face of traffic signals in both day and nighttime conditions. This typically involves framing the signal with 1- to 3-inch-wide retroreflective border.

Crash Type: Intersection

CMF: All Crashes: 0.85 (CMF ID: 1410)



Yellow Change Intervals

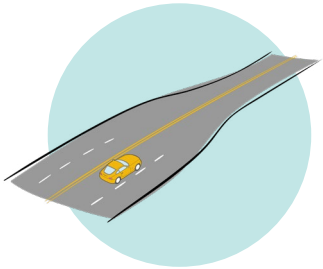
Description: At a signalized intersection, the yellow change interval is the length of time that the yellow signal indication is displayed following a green signal indication. Reviewing and updating traffic signal timing policies and procedures concerning the yellow change interval can reduce red light running.

Crash Type: Intersection

CMF: Ranges, depending upon time of change and relation to Institute of Traffic Engineers (ITE) recommended practice

Planning, Policy, and Program Strategies to Address Intersection Crashes

The following sections summarize the planning, policy, and program strategies identified in Table 4-5. A full list of planning, policy, and program strategies can be found in Appendix C.

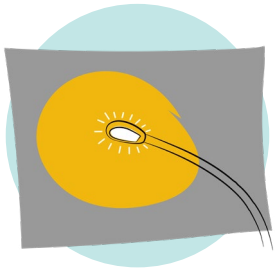


Reduce Vehicle Speeds at Intersections and Speed Limits on Arterials

- Lower speeds on arterials make it easier for motorists to stop at intersections. Smaller curve radii reduce turning motor vehicle speeds. Other features at intersections such as hardened centerline, channelize motor vehicle movements.
- Adjust traffic signals during routine maintenance to implement systemwide changes that slow the speeds of vehicles at intersections by prohibiting right turn on red and adding Leading Pedestrian Intervals.

CASE STUDIES

- Seattle implemented a "No Turn on Red" restrictions at 17 intersections on Aurora Avenue North and over 40 downtown intersections to enhance safety for pedestrians and cyclists, as right turns on red contribute to 9% of collisions with crossing pedestrians. This change works to create a more predictable crossing experience without causing significant delays for drivers, while also supporting SDOT's new policy that establishes the broad use of "No Turn on Red" restrictions at intersections throughout the city.[20]
- The City of Bellevue, Washington adjusted traffic signal operations at 124th Avenue Northeast and Northeast Eighth Street. Using an existing traffic camera, the City conducted before and after video analytics of flow, conflict, and speed data. In addition to identifying conflict hot spots, the video analytics offered rapid insight on whether a countermeasure achieves a favorable outcome. The video analysis suggested there was a 60% decrease in critical conflicts. This quick study (~one week of data collection compared to many years of crash report documentation) demonstrated a strong return on investment for the $10,000 cost. Bellevue has since begun using this technology on high-injury corridors, incorporating conflict analytics into road safety assessments to identify and prioritize future safety projects.[21]



Improve Lighting

- Conduct lighting studies to identify locations where lighting can improve road safety. This may include locations with a history of crashes in dark conditions, at intersections, and where pedestrians walk along roadway shoulders.

20 Walline, Caryn. 2023. "No Turn on Red Restrictions Expanding to Aurora Ave I Vision ZerotzSDOT Blog." SDOT Blog. May 4, 2023. https://sdotblog.seattle.gov/2023/05/04/new-right-turn-on-red-restrictions-increase-safety-at-downtown-intersections-i-vision-zero/.

21 Roadway Safety Foundation. n.d. "City of Bellevue, WA: Video Analytics towards Vision Zero Program." https://www.roadwaysafety.org/city-bellevue-wa-video-analytics-towards-vision-zero-program.

Approaches to reduce vehicle speeds can be categorized into sets of strategies related to policies, design, education, and enforcement, as summarized below An effective speed management program includes several of the design/engineering strategies in this toolbox as well as additional education and enforcement initiatives.

SAFER SPEEDS POLICIES

- Reference NACTO "City Limits," National Cooperative Highway Research Program Report 966, and 2023 updated Manual of Uniform Traffic Control Devices guidance for setting speed limits.

SAFER SPEEDS DESIGN

- Utilize best practices in speed management street design to encourage slower motor vehicle speeds.
- Adjust traffic signal timing to encourage slower speeds.
- Increase frequency of speed limit signs.
- Use traffic signal video analytics that test signal adjustments to reduce vehicle conflicts and speeds.

SAFER SPEEDS EDUCATION

- Implement well-planned and researched awareness campaigns that are part of an overall speed reduction strategy, paired with other measures to support their implementation.

SAFER SPEEDS ENFORCEMENT

- Implement equitable enforcement practices that recognize current and historical impacts of enforcement activities on communities of color. This might include the use of Automated Traffic Safety Cameras, but these can also be deployed in ways that perpetuate historical inequities. Consequently, street designs that self-enforce lower speeds should be used in conjunction with cameras whenever possible.

Strategies to Address Lane Departure Crashes

Table 4-6 identifies strategies to address lane departure crashes in the region. Strategies identified by a "✔" in the matrix target the emphasis areas and contributing factors shown in each column. Emphasis areas and contributing factors that are not directly addressed with strategies are not shown. Local context and conditions will be critical in determining which countermeasures may be appropriate for a given roadway or location. Following the table, each of the strategies to address lane departure crashes is described in more detail.

Table 4-6. Strategies to Address Lane Departure Crashes

	Rural Highways	Speeding	Impairment	Distraction	Failure to Yield
Design / Engineering Strategies					
Centerline Buffer Area	✔	–	✔	✔	–
Centerline Rumble Strips	✔	–	✔	✔	–
Median Barriers	✔	✔	–	–	–
Pavement Friction Management (High-Friction Surface Treatment)	✔	✔	–	–	–
Planning, Policy, and Program Strategies					
Improve Lighting	✔	–	–	–	✔
Reduce Risks for Motorcycle Crashes	✔	–	–	–	–
Reduce Vehicle Speeds and Speed Limit on Arterials	✔	✔	–	–	–

Design / Engineering Strategies to Address Lane Departure Crashes

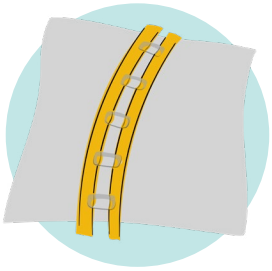
The following sections provide brief descriptions and CMFs for the design/engineering strategies identified in Table 4-6. A full list of design/engineering strategies can be found in Appendix C.

Centerline Buffer Area

Description: Centerline buffer areas provide additional lateral separation between the two solid centerline markings on rural two-lane highways that can reduce head-on crashes.

Crash Type: Lane Departure

CMF: Head-On and Sideswipe Crashes: 0.65 (with 2 ft-foot buffer) (Source: NCHRP)[22]



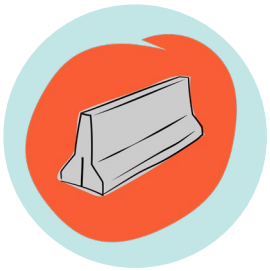
Centerline Rumble Strips

Description: Longitudinal centerline rumble strips are milled or raised elements on the pavement intended to alert drivers through vibration and sound that their vehicle has left the travel lane.

Crash Type: Lane Departure, Road Departure

CMF:

- Head-On Crashes: 0.63 (CMF ID: 3355)
- Fixed Object Crashes: 0.58 (CMF ID: 9840)



Median Barriers

Description: Median barriers are longitudinal barriers that separate opposing traffic on a divided highway and are designed to redirect vehicles striking either side of the barrier. Median barriers significantly reduce the number of cross-median crashes, which are attributed to the relatively high speeds that are typical on divided highways.

Crash Type: Lane Departure

CMF:

- All Crashes: 1.24 (CMF ID: 44)
- All Crashes, fatal: 0.47 (CMF ID: 42)

22 "Guidelines for Treatments to Mitigate Opposite Direction Crashes." National Cooperative Highway Research Program. https://nap.nationalacademies.org/catalog/26586/guidelines-for-treatments-to-mitigate-opposite-direction-crashes#:~:text=The%20TRB%20National%20Cooperative%20Highway,the%20selection%20of%20cost%20effective. These guidelines cite a study of centerline buffer treatments on Texas highways, which found they helped reduce opposite direction crashes, especially on two-lane rural highways.

Pavement Friction Management (High-Friction Surface Treatment)

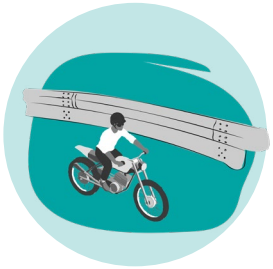
Description: Measuring, monitoring, and maintaining pavement friction—especially at locations where vehicles are frequently turning, slowing, and stopping—can prevent many lane departure and-related crashes.

Crash Type: Lane Departure

CMF: Head-On Crashes: 0.50 (CMF ID: 11384)

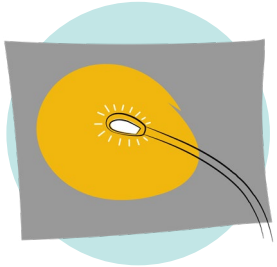
Planning, Policy, and Program Strategies to Address Lane Departure Crashes

The following sections summarize the planning, policy, and program strategies identified in Table 4-6. A full list of planning, policy, and program strategies can be found in Appendix C.



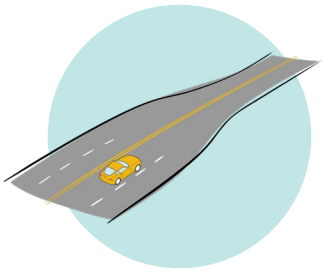
Reduce Risks for Motorcycle Crashes

- High-friction treatments to reduce motorcyclist run-off road crashes on curve.
- Use of MPS barriers instead of guard rails to reduce injuries to motorcyclists.
- Pave the first 15 feet of gravel driveways that intersect with a roadway to reduce debris on roadway surface.
- Use high-friction pavement markings. Pavement marking suppliers should be required to provide friction numbers/ratings for all the pavement markings. Road agencies should choose those with higher friction ratings.
- Provide regular maintenance to reduce potholes, uneven pavement conditions, and gravel or debris on roadway.
- During road construction projects, do not allow traffic to run on roads with raised manhole covers and apply friction to steel plate surfaces. Post warning signs for both conditions.
- Post warning signs after chip sealing operations have taken place and sweep loose aggregate off roadway as soon as tar has set.
- Awareness campaigns regarding helmet use, reducing impaired driving, and speeding.
- Practical advanced motorcycle safety training programs.



Improve Lighting

- Conduct lighting studies to identify locations where lighting can improve road safety. This may include locations with a history of crashes in dark conditions, at intersections, and where pedestrians walk along roadway shoulders.



Reduce Vehicle Speeds and Speed Limits on Arterials

An effective speed management program includes several of the design/engineering strategies in this toolbox as well as additional education and enforcement initiatives.

Reference NACTO "City Limits," National Cooperative Highway Research Program Report 966, and "Manual of Uniform Traffic Control Devices 11th Edition" guidance for setting speed limits.

SAFER SPEEDS DESIGN

- Utilize best practices in speed management street design to encourage slower motor vehicle speeds.
- Adjust traffic signal timing to encourage slower speeds.
- Increase frequency of speed limit signs.
- Use traffic signal video analytics to test signal adjustments that reduce vehicle conflicts and speeds.

SAFER SPEEDS EDUCATION

- Implement well-planned and researched awareness campaigns that are part of an overall speed reduction strategy, paired with other measures to support their implementation.

SAFER SPEEDS ENFORCEMENT

- Implement equitable enforcement practices that recognize current and historical impacts of enforcement activities on communities of color.
- This might include the use of Automated Traffic Safety Cameras, but these can also be deployed in ways that perpetuate historical inequities. Consequently, street designs that self-enforce lower speeds should be used in conjunction with cameras whenever possible.

How to Apply Strategies

The purpose of this section is to provide an example for member agencies to select strategies that are most appropriate for the Emphasis Areas or Contributing Factors that are most common on their streets. A planner or traffic engineer would use Steps A-F to address transportation safety concerns using strategies and proven countermeasures.

In addition, data across all roadways is available for download from PSRC's website by any jurisdiction, and the RSAP can be used as a guide for using this localized data to apply the same principles to identify mitigating strategies for these local issues.

Step A: Perform Crash Analysis

The first step is to perform a comprehensive crash analysis to assess crash patterns on streets.

The example crash analysis includes the following findings:

- Traffic fatalities for pedestrians have been trending upward for the last 5 years.
- Pedestrian crashes continue to have the largest share of all fatal and serious injury crashes.
- Pedestrian crashes typically happen at intersections with the "failure to yield" listed as the contributing factor.
- Most of these crashes occur on major streets in this city.

Step B: Determine Appropriate Emphasis Areas

The engineer or planner selects strategies that are most appropriate for the project area(s), found through the Crash Analysis. The toolbox organizes safety interventions by Emphasis Area and Crash Type. For pedestrian crashes, the Emphasis Area by Crash Type table below shows that pedestrian crashes are applicable in all five emphasis areas.

Table 4-7. Emphasis Areas and Applicable Crash Types Matrix

Emphasis Areas	Pedestrian	Bicyclist	Road Departure	Intersection	Lane Departure
Urban, Multilane Arterials	X	X	X	X	-
Rural Highways	X	-	X	X	X
Tribal Areas	X	X	X	X	-
High-Capacity Transit Stations	X	X	X	-	-
Areas of Lower Income	X	X	X	X	-

Step C: Select Strategies

To select strategies, look through the list and identify potential strategies based on the emphasis areas and contributing factors. Focusing on pedestrian crashes, the planner or engineer reviews the Strategies to Address Pedestrian Crashes table to identify potential safety interventions. This table includes a list of preselected strategies and marks the appropriate emphasis areas and the contributing factors they address.

The table includes a combination of engineering / design strategies and planning, policy, and program strategies. Using a combination of multiple strategies that are appropriate for the emphasis area will yield the greatest impact.

By examining safety from this comprehensive perspective, it allows for more effective and integrated solutions that address multiple factors contributing to crashes and injuries.

Descriptions of the strategies, as well as their applicable crash types and crash modification factors, are included in the comprehensive list of strategies. A few ideal strategies for this example project include High-Visibility Crosswalks, Leading Pedestrian Intervals, Improve Lighting, and Improve Connections Across Arterials, Highways, and Interstates.

Step D: Confirm Effectiveness

Determine the potential strategies based on an understanding of space, available right-of-way, and other opportunities and constraints for each location. After potential countermeasures are chosen, you must determine if they're feasible for the specific locations. For example, does the location already have pedestrian crossing signals? To install Leading Pedestrian Intervals, would the signals just need to be retimed or are pedestrian crossing signals needed? Are there resources to install them?

The crash modification factors for each strategy are included in the comprehensive list of strategies. High-Visibility Crosswalks have a CMF of 0.60 to 0.81, meaning installation of these will reduce pedestrian crashes by 19 to 40 percent. Leading Pedestrian Intervals have a CMF of 0.81, meaning a 19% reduction in pedestrian crashes. Combining these two countermeasures will have a combined CMF of 0.48 to 0.66, showing a potential 52 to 34 percent reduction in pedestrian crashes.

Step E: Deploy Strategies

Once the strategies are selected, considerations for design / engineering strategies include:

- **Crash History:** Begin by addressing the highest need locations first
- **Funding:** Determining how many locations could be implemented
- **Ongoing Implementation:** Include strategies in future projects
- **Maintenance:** Many of the measures include elements such as striping and traffic control devices that need to be integrated into ongoing maintenance policies and programs

Considerations for planning, policy and program strategies include:

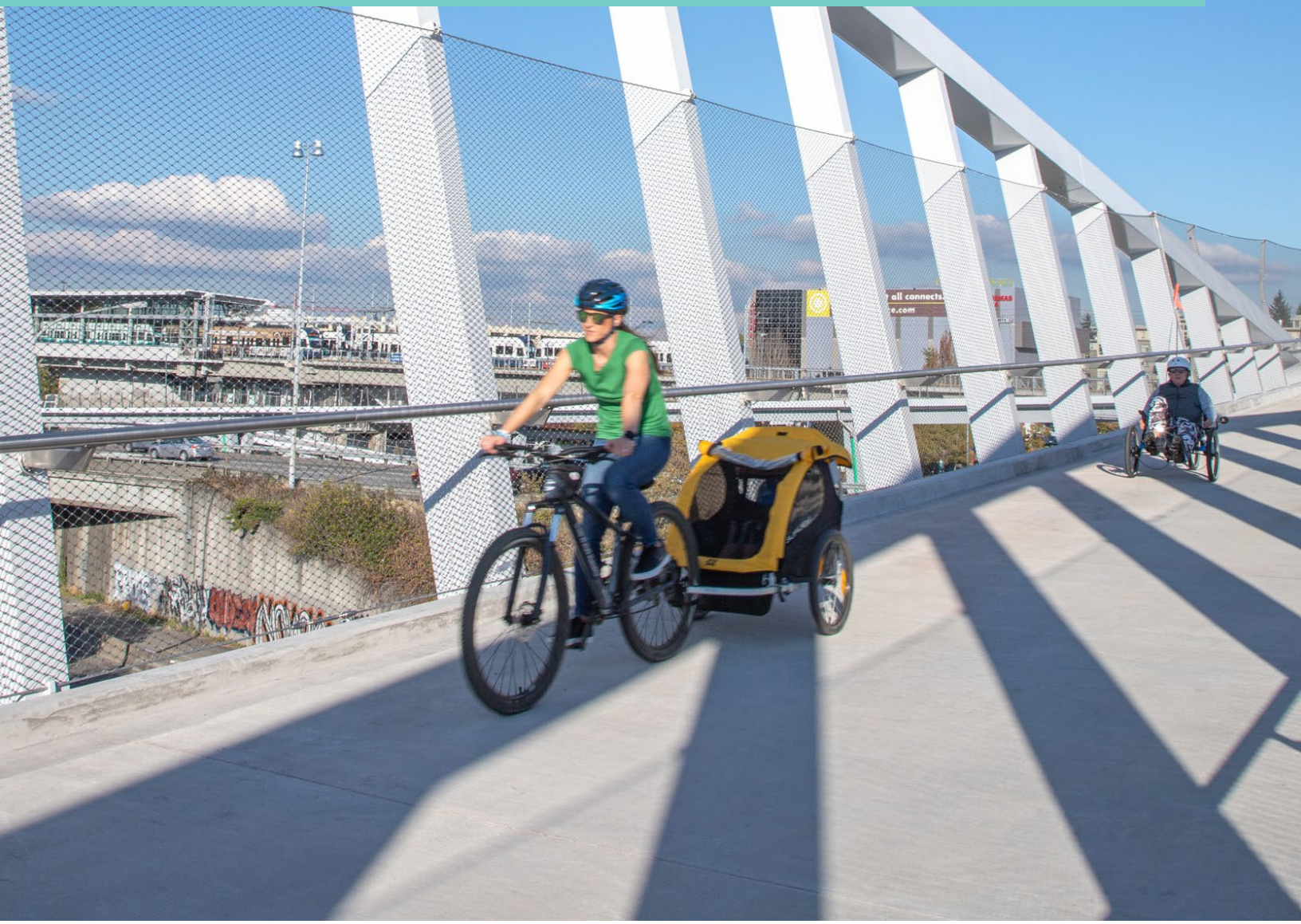
- **Comprehensive Approach:** There is no single safety measure that is going to eliminate fatal and serious injury crashes on its own. A combination of measures, packaged as part of a holistic program or policy, is necessary to tackle the issue effectively. A comprehensive approach to targeted problem areas and locations will be more likely to garner support and provide context-sensitive flexibility.

Step F: Monitor and Evaluate

Continue to review crash data for locations where interventions are installed to determine if the expected crash reduction is achieved.

CHAPTER 5

Implementation and Next Steps



Working Together to Implement the Regional Safety Action Plan

Deaths and serious injuries on the region's roadways continue to increase at an alarming rate. All regional safety stakeholders – including all levels of government, private industry, and the general public–must take action in order to reverse this trend. One of the key principles of the Safe System Approach is that "Responsibility is Shared." While shared responsibility does not necessarily mean equal responsibility, every stakeholder must do their respective part to improve traffic safety and achieve the state and regional policy goal of zero roadway deaths and serious injuries in our communities.

The Regional Safety Action Plan is a call to action for PSRC and our partner agencies. It provides a foundation and supportive tools for planning, prioritizing and implementing projects, policies and programs that utilize Safe System Approach principles to reduce deaths and serious injuries across the region. This chapter describes next steps for implementation of the Plan.

Preliminary Implementation Actions

Regional Safety Summit

In June 2023 PSRC hosted a Regional Safety Summit to hear from the region's residents and PSRC members about goals and priorities that should inform the RSAP. Feedback received from Summit attendees has been instrumental in the development of the Plan. PSRC will work with its members and explore holding similar regional summits in the future.

Facilitating the Development of Local Safety Action Plans

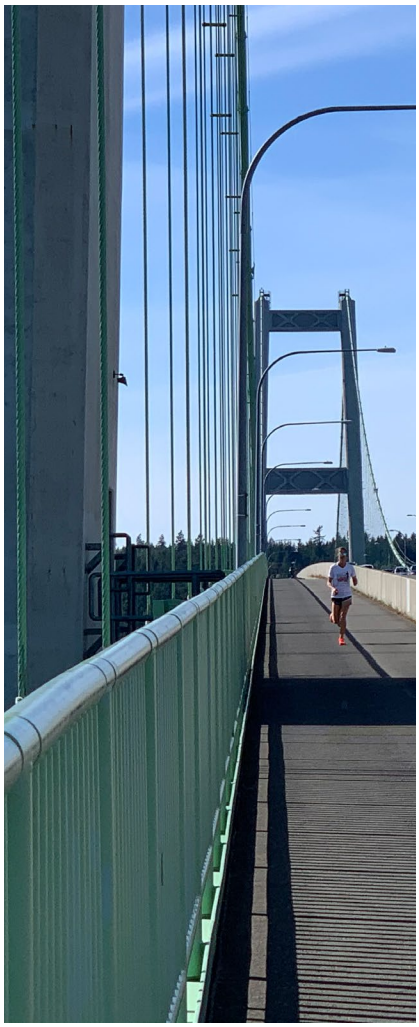
PSRC received two planning grants (in 2023 and 2024, respectively) from the USDOT Safe Streets and Road for All (SS4A) grant program. In addition to funding the development of the RSAP, these grants include subawards for the development of 16 local safety action plans across the region. PSRC has served as the sub-administrator for this process by providing local jurisdictions with guidance in plan development, tracking and regularly reporting to USDOT on progress being made and grant deliverables.

In addition, PSRC has coordinated with Tribal representatives to support their safety planning and implementation efforts. More work on this will continue into 2025. PSRC will continue to work with local jurisdictions through the conclusion of the grant performance period in 2027, and beyond.

Call for Local Action: Using the RSAP to Inform Local Plans and Investments

In addition to the 22 local plans currently being developed through the SS4A grant program, there are 28 other local jurisdictions that have developed stand-alone safety plans in recent years (as described in more detail in Appendix D).

However, there is still much work left to be done. The RSAP serves as a call to action for local agencies to leverage the toolbox of proven strategies, the regional data and analysis (including key findings and emphasis areas), and the best practices research to develop and build on their own action plans, including laying out a program of projects and initiatives that will efficiently and effectively address traffic safety within their jurisdiction. Staff propose to incorporate state, regional and local HINs and safety planning into both PSRC's project selection processes and the project consistency review for the Regional Transportation Plan.



The RSAP is complementary to local planning in that agencies can utilize the toolbox to identify which of a broad array of proven countermeasures will be most effective in addressing their specific safety issues and challenges. It provides a resource for agencies to define the roadway design and engineering projects that will serve to reduce deaths and serious injuries on the region's roadways. Local agencies can also utilize the toolbox to determine which policies and programs would be most beneficial to adopt. A guide for how to use the toolbox is provided in Chapter 4.

Jurisdictions can use the regional analysis and High-Injury Network (HIN) developed for the RSAP to supplement their own analysis and provide analytics where any gaps may currently exist. The regional scale of the analysis could also be leveraged to identify where there are opportunities for collaborating with neighboring jurisdictions. For example, if there are corridors on the HIN that spread across multiple jurisdictions, pooling resources could allow for a more efficient and holistic approach to addressing safety than stopping at the jurisdiction boundary. In addition, data across all roadways is available for download from PSRC's website by any jurisdiction, and the RSAP can be used as a guide for using this localized data to apply the same principles to identify mitigating strategies for these local issues.

Call for Analysis of Regional Policies and Procedures

PSRC's Transportation Policy and Executive Boards will provide direction on how the RSAP will inform the Regional Transportation Plan (RTP) currently under development and scheduled for adoption in May 2026. The Plan Consistency Framework by which regionally significant projects are evaluated prior to inclusion in the plan is being updated to reflect the principles of the Safe System Approach, and the RSAP will further inform development of this Framework. In addition, an overlay analysis of the HIN with existing infrastructure, programs and policies, and planned improvements will be conducted to provide a more detailed and nuanced assessment of conditions and needs along these corridors.

The Safe System Approach and implementation of proven safety countermeasures are captured in the criteria used to evaluate projects competing for PSRC-managed federal funds. Once adopted, PSRC's boards will provide direction on how the RSAP and the HIN will further inform PSRC's future project selection processes.

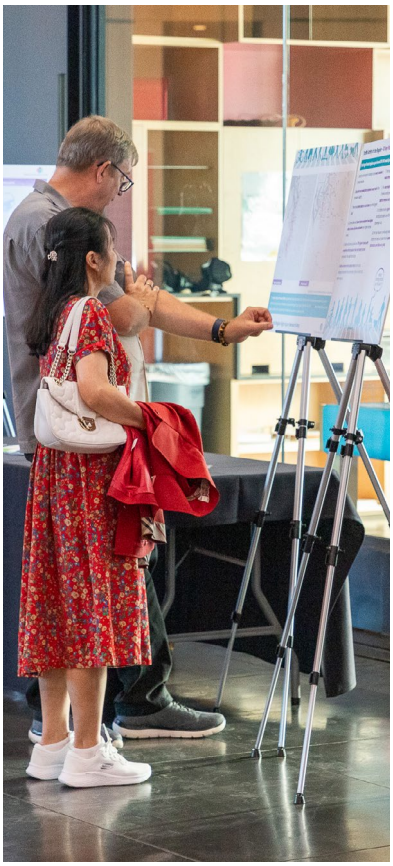
The RSAP includes design and engineering strategies as well as planning, policy and program strategies. However, there are many other policy, education and enforcement strategies outside of the scope of this RSAP that jurisdictions may wish to consider. For example, the Washington State Strategic Highway Safety Plan identifies a variety of policy suggestions related to legislation, enforcement, education. PSRC will continue to monitor the state of the practice and provide additional information to the boards on these topics for future discussions and updates to the RSAP.

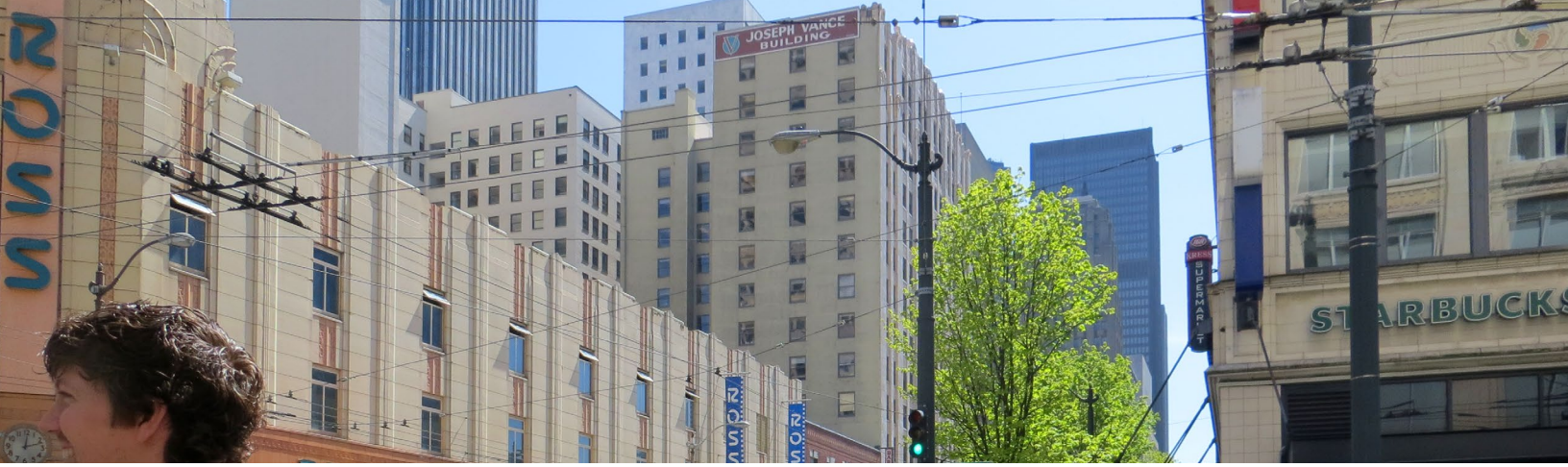
PSRC will continue to emphasize safety throughout all aspects of regional planning processes, from the overall system goal as identified in VISION 2050, to the long-range planning and investments identified in the Regional Transportation Plan, and through the more detailed project evaluation criteria that are used to award PSRC's federal transportation dollars to specific near-term transportation investments. PSRC's work program will not only periodically reassess safety conditions, but will build on the strategies and information contained in the RSAP to expand strategies, countermeasures, and information to help proactively eliminate deaths and serious injuries on the region's roadways. At PSRC board direction, this could include future work programs including research, convenings and workshops.

Implementation Pilot Project

As an early implementation action of the Regional Safety Action Plan, PSRC is considering the establishment of a Quick-Build Fund and support partner jurisdictions in each of the four counties to implement a series of quick-build demonstration projects throughout the region.

Quick-build demonstration projects are temporary installations to test new street design improvements that address safety and accessibility. They use low-cost materials such as paint, signs, pavement markings, plastic bollards, and movable planters to control intersections, narrow travel lanes, slow traffic, and create more space and visibility for people walking and biking. They are a great way to test new ideas and innovative best practices and build community support for more permanent solutions.

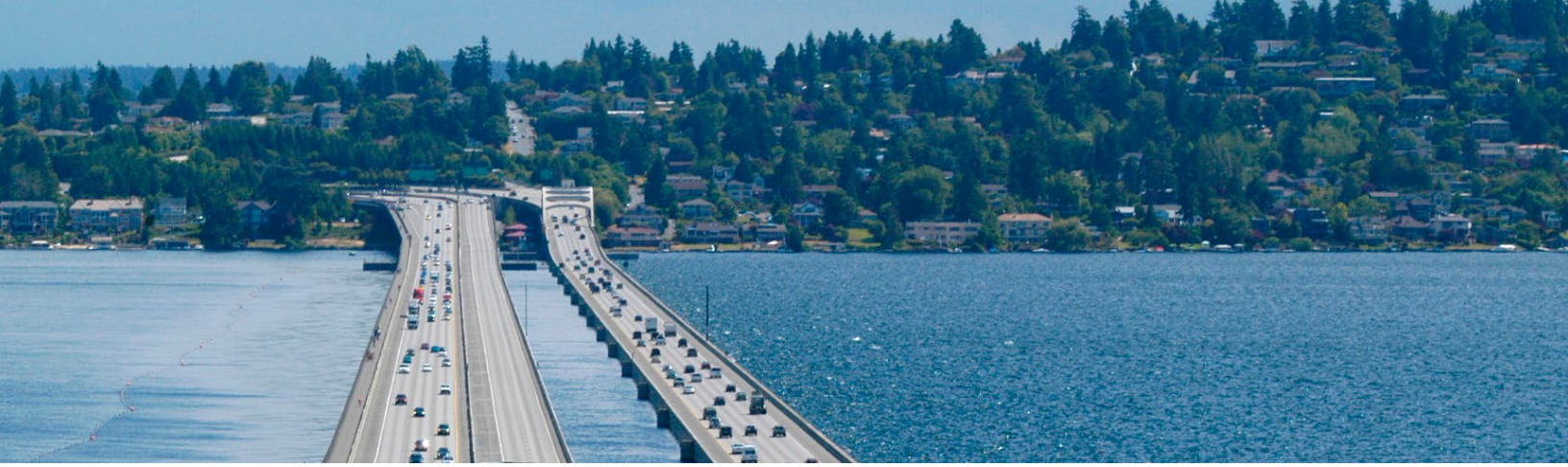




Monitoring and Tracking

PSRC will continue to track safety trends at the regional, state, and national levels. This includes regularly analyzing crash data, tracking emerging safety issues and community needs, and remaining up to date on the latest safety management practices and countermeasures. In terms of specific regional output measures, PSRC will annually track the following:

- Total deaths and serious injuries (single-year and 5-year rolling averages as required by FHWA's Safety Performance Management Program)
- Death and serious injury rates per 100 million VMT (same as above)
- Total pedestrian and bicyclist deaths and serious injuries (same as above)
- Adopted stand-alone local safety plans
- Outreach/engagement events held to promote safety in the region
- To the extent practicable, investments to improve safety issues on an identified HIN corridor



Plan Update Schedule

PSRC plans to revisit and update the Regional Safety Action Plan every four years as part of the RTP development cycle. This will include:

- Updating the crash data analysis.
- Based on the results of the analysis, reassessing the emphasis areas, crash types, and contributing factors highlighted in the existing plan to determine if they are still the most pertinent.
- Updating the High-Injury Network to incorporate new data.
- Updating the strategies toolbox to reflect the evolving state of the practice and any changes to the plan's emphasis areas.