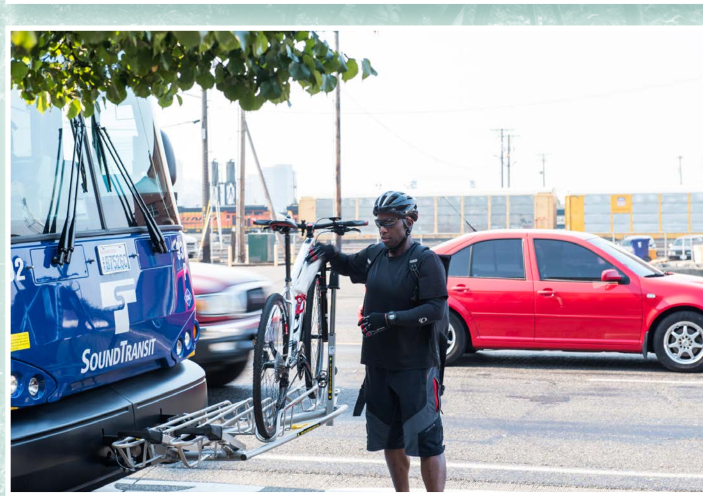
Washington State
Department of Transportation

WASHINGTON STATE ACTIVE TRANSPORTATION PLAN

2020 AND BEYOND



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December 20, 2021

The Washington State Department of Transportation is pleased to present the State Active Transportation Plan, including the chapters published as Part 1 in May 2021 and the additional chapters that received public comment as Part 2 in fall 2021. This plan establishes a new understanding of a key element of the state's transportation system: Its state routes and the role they play in connecting people who walk, cycle, or roll.

Every person in Washington uses what we now call "active transportation." People move along and across our streets and roads walking, biking, moving in a wheelchair, walking with a cane, riding a scooter or the next creative device to be invented. This plan starts with their needs. It also directly acknowledges the historical inequities and consequences created by infrastructure decisions—a necessary step to address the most critical issues in transportation safety, mobility, and access. This plan truly addresses transportation for all.

As we worked on this plan, input from people and partners across the state matched up with the latest concepts for creating safer and more comfortable connections. We held many conversations, meetings, and webinars. We asked what matters most when people simply need to cross the road or get to the bus stop. We assessed state routes in a way that considers growth and land use changes so WSDOT can help complete the walking and rolling networks. This new approach positions Washington to complete the work of creating a fully integrated and multimodal transportation system.

The State Active Transportation Plan addresses the transportation policy goals identified in statute, building on the Washington Transportation Plan 2040 and Beyond. It also connects with the Strategic Highway Safety Plan known as Target Zero, the Highway System Plan, and other modal plans. Because trips start or end at a front door, this plan is designed to help WSDOT align with the plans of our local partners. It analyzes state routes based on the best available data; notes the limitations on data sources that constrain our understanding; establishes performance metrics we will track to report on progress; and lays out strategies that WSDOT and its partners can pursue to improve conditions.

People need to be connected rather than separated by the state's highways, which serve as the backbone of our transportation system. The obligation now before Washingtonians is to build and maintain a transportation system that serves each and every one of us. A modern transportation system must make a positive difference for the most pressing challenges the people of this state and nation face, from climate change to the harmful legacy of racism. While this plan is technical and written to conform to requirements of state and federal law, it begins with this understanding and the essential role that active transportation plays in rising to these challenges.

Active transportation must be a core element of our delivery of an integrated, sustainable, resilient, healthy, and just multimodal transportation system. WSDOT is committed to using this plan as our compass to guide us. We will be incorporating its principles into our planning, partnering, and practice, and will evaluate and report our progress as we move together to establish a resilient transportation system meeting the needs of all Washingtonians.

Sincerely,

Roger M, Millar, PE, FASCE, FAICP
Secretary of Transportation

CONTENTS

Chapter 3

Chapter 4:

Chapter 5:

Chapter 6:

EXECUTIVE SUMMARY

What people now label "active transportation" is the original transportation: people moving themselves. The term "right of way" in common law refers to the legally protected right of the individual to make their way over a piece of land, which they did long before the advent of the internal combustion engine. Today that movement might involve a wheelchair or skateboard, electric-assist bicycle or service animal, a stroll on a sidewalk or a hand-cranked tricycle. Even when people drive a car or ride a bus, every trip a person makes begins and ends in a human-scale space of some kind. People move along roads that today are paved, but once were traditional travelways of the land's first human inhabitants going in search of resources, social contact, and trade. The purposes, importance, and fundamental role of active transportation have persisted over the centuries no matter what label people apply.

Active transportation use takes place within all the complexity of today's society, as well as within existing facilities developed to accommodate travel. Land use decisions, economics, and many other institutional and societal forces shape the active travel experience. Those factors determine whether it is easy or convenient for children to walk or bike to school and whether it is possible to buy food close to home or only many miles away. Those factors also determine whether transit service is available to extend one's total journey, and whether there are accessible and maintained sidewalks on the way to a bus stop. Considered more broadly, those factors influence whether plans for climate change resiliency will fully support these cleanest and greenest forms of transportation.

This plan does not address all of the many tools needed to establish walking, rolling, and cycling as fully available and accessible forms of transportation. It focuses primarily on engineering questions—what makes a good network—and whether such facilities are available on state routes. The analysis centers on population centers, noting the importance of continuing examination of state routes in more rural areas as an extension of the methods discussed here. As Chapter 1 discusses, this planning effort provides a new beginning to the full range of questions that will need to be addressed in future updates on equity, education, statutes and ordinances that discourage rather than support active transportation, and other topics.

The obligation now before Washingtonians is to build and maintain a transportation system that serves every person and makes a positive difference for the most pressing challenges the people of this state and nation face, from climate change to the harmful legacy of racism. While this plan is fairly technical and written to conform to requirements of state and federal law, it begins with this understanding.

The 2020 Washington State Active Transportation Plan replaces the 2008 Bicycle Transportation and Pedestrian Walkways Plan. This plan:

- Assesses the statewide needs of active transportation users: people who walk, run, use a mobility assistive device such as a wheelchair, cycle (whether on two wheels or three), or use a small personal device such as a foot scooter or skateboard.

- Defines the state's interest in active transportation infrastructure and the myriad benefits of increased use of active transportation for state transportation goals and other policy goals.
- Focuses on multimodal network connectivity and how level of traffic stress measures can be used to evaluate routes for future changes, particularly in population centers.
- Describes effects of infrastructure decisions on safety and mobility in places with deeper health and transportation inequities and provides criteria for prioritizing and evaluating investments to address these issues.
- Provides information that decision makers can use in making policy and investment recommendations to finish building the active transportation network. For example, local and regional efforts have created segments of high-quality trail facilities. Closing gaps by leveraging past investments by the state and its partners can create safer connections in and between communities and support local economies seeking to recover from the effects of the COVID-19 pandemic and other challenges.
- Recommends how to measure and report performance and progress and introduces the concept of equity checks to be applied to performance metrics.
- Recommends strategies for each of the five goals with examples of actions, with further detail and timelines to be developed in an implementation plan and collaboration with partners.

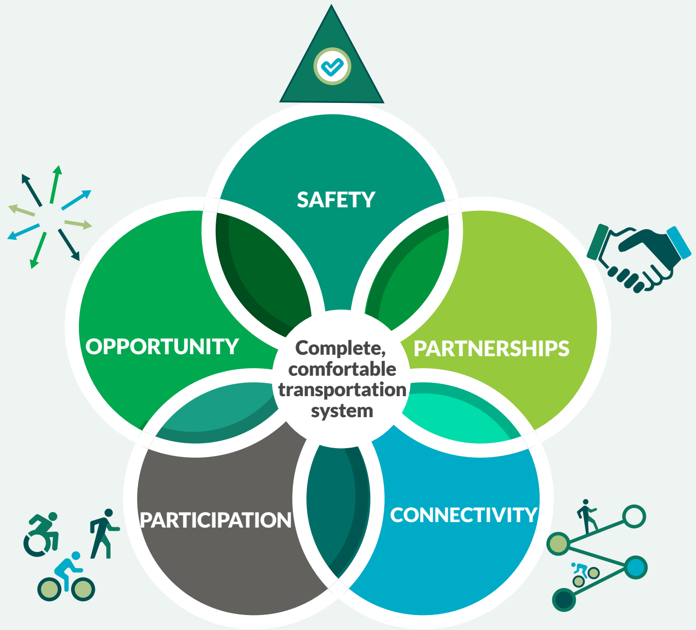

Figure ES-1: Achieving the Active Transportation Plan goals of connectivity, safety, opportunity, participation, and partnerships will result in complete, comfortable connections for all.

The statewide active transportation network includes:

- State highways that allow active transportation use. Chapter 3 provides more information on existing facilities.
- City streets.
- County roads.
- Trails.
- Sidewalks, bike lanes, and paths in every type of jurisdiction.

- Connections to airports, ferry terminals, passenger rail, and transit.

The plan's findings identify the current condition of the active transportation network as a patchwork, with high-quality segments in some locations and no facilities in others. It has not historically been understood or managed as an overall network across jurisdictional boundaries, which has constrained use of active modes.

The needs of the network include complete facilities suitable for people of all ages and abilities; safer and well-marked crossings located for route directness; signage and wayfinding; improved capacity to understand and manage these assets; and consistent maintenance and preservation. An initial focus on population centers will support safety and mobility in places where current and future demand are greatest.

The larger context of active transportation use is grounded in a cyclical process reflected in this plan. It constitutes a positive feedback loop as investments are made:

- Improve the facilities so that,
- Participation increases so that,
- Society benefits from the effects of increased active transportation use.

WSDOT developed this plan through:

- Extensive research that documents the many benefits of active transportation including improved physical and mental health, economic vitality, access to opportunity, and environmental benefits. Chapter 2 provides more information.
- Evaluation of emerging tools and best practices that led to the application of level of traffic stress (LTS). LTS provides an objective, quantitative assessment of roadway characteristics that affect safety, mobility, and access for active transportation use. These recommended practices enable evaluation, prioritization, and measurement of change over time. Chapter 3 provides more information.
- Community engagement from thousands of people that identified major barriers or challenges for safety and mobility and reinforced findings from research into best practices. Key themes include the importance of complete and connected facilities, safer crossings, lower speed limits in places where more people need or want to walk or bike, maintenance, and accessible facilities designed to be used by people of all ages and abilities. Chapter 2 provides more information.
- Guidance of the Stakeholder Steering Committee that resulted in the plan's goals of Connectivity, Safety, Opportunity, Participation, and Partnership. These goals are interrelated and interdependent and acknowledge that partnerships are essential to creation of complete networks that increase and enhance safety, opportunity, and participation. Chapter 1 provides more information on the goals; Chapter 5 discusses the performance metrics developed with guidance from the Stakeholder Steering Committee.
- Participation of hundreds of WSDOT staff and agency partners who provided technical information and insight and ensured consistency with other planning efforts.

This plan focused on state facilities assessment to provide information that has not been available in the past. A number of comments received during the plan development and review of the draft highlighted topics such as the importance of land use decisions, education, encouragement, driver training, implications of new technologies such as autonomous vehicles, and other elements of the overall transportation system that affect active transportation access and use. Future updates to this plan will address these and other topics related to active transportation.

RECOMMENDATIONS

- Develop implementation plans with clear responsibilities for the strategies identified in this plan and others that may be identified as necessary for progress.
- Prioritize investments in locations with highest needs to make the most difference in addressing existing disparities in safety, mobility, access, and human and environmental health.
- Address gaps located on or created by state highways by identifying the best available locations to close these gaps. These locations may be on or off the state highway depending on local plans and facilities.
- Reduce the level of traffic stress on the network to make it possible for more people to use active transportation safely and comfortably.
- Align policy changes, funding, and commitment to meet the state's Target Zero goal to reduce traffic fatalities and serious injuries to zero and to meet the mobility and environmental goals for mode shift and reductions in vehicle miles traveled.
- Report on the performance metrics selected for the plan to track change over time.
- Ultimately, complete a statewide active transportation network across jurisdictional boundaries.

As this plan affirms, partnerships at every level of government and with the private and nonprofit sectors are essential to completion of an active transportation network that truly works for everyone. Today's Washington comprises the traditional territories of Native peoples who have walked these lands from time immemorial into the present. In its work WSDOT is guided by the Centennial Accord and chapter 43.376 RCW, respecting and affirming tribal sovereignty and working with tribal governments throughout the state in government-to-government partnership.

TERMS USED IN THIS PLAN

Accessibility: A measure of transportation mobility; as technically calculated, total travel time between areas weighted by the number of services and activities available at a given location. The term "accessibility" also sometimes refers to ADA accessibility; this plan uses it to refer to how many destinations can be reached, which aligns with WSDOT's mobility framework.[1]

ADA-accessible: Facilities that meet the requirements of the Americans with Disabilities Act, federal legislation passed in 1990 that protects against discrimination based on disability.

Active transportation: Using a human-scale and often human-powered means of travel to get from one place to another; includes walking, bicycling, using a mobility assistive or adaptive device such as a wheelchair or walker, using micromobility devices, and using electric-assist devices such as e-bikes and e-foot scooters.

Bicycling or Cycling: Includes use of various forms of bicycles and tricycles, both those propelled solely by human power and electric-assisted bicycles/tricycles.[2]

Connectivity: A measure of how well facilities are linked together to form a convenient network that enables everyday trip purposes. In general, this means that the facilities follow the most direct path between origin and destination points.

Context: Refers to the environmental, economic, and social features that influence livability and travel characteristics. Context characteristics provide insight into the activities, functions, and performance that can be influenced by roadway design—for example, is an area more rural with long distances between homes and services or more urban with a variety of uses and destinations closer together?[3]

E-bikes: Also known as pedal-assist or electric-assisted bicycles, e-bikes are defined in Washington state law as Class 1, 2, or 3, depending on how much assistance they provide (RCW 46.04.169).

Facility: In this document the term facility generally refers to transportation-related structures such as bike lanes, sidewalks, trails, roads, and/or operational tools such as traffic signals, crosswalk markings, accessible pedestrian signals, bike boxes, street lighting, and the like.

Level of traffic stress (LTS): A quantitative evaluation of road segments and crossings based on posted speed, the number of vehicle travel lanes, traffic volume, and if there is a bike lane (for bicyclist LTS). LTS is calculated on a scale of 1 (lowest level, generally suitable for people of all ages and abilities to use) to 4 (highest level, will be used only out of necessity).

Micromobility: Small wheeled devices that may have an electric motor. Includes skateboards, foot scooters, hoverboards, and patented devices such as Solowheels and Segways. Micromobility use is not yet tracked separately, and typical data counters do not distinguish between device types. Research on the use of these devices is so new that it is not included in the discussion of benefits and other issues in this plan; their use for transportation primarily emerged in 2018-2019.[4]

Network: A system of links (roadway segments), nodes (intersections or crossings), and modal connection points that describe a transportation system.

1 WSDOT Performance Framework. A useful discussion of the concept of accessibility: Litman, Todd. 2021. Evaluating Accessibility for Transport Planning: Measuring People's Ability to Reach Desired Services and Activities. Victoria Transport Policy Institute.

2 Washington state law defines bicycles as two-wheeled or three-wheeled devices (RCW46.04.071). This plan is not intended to restrict the definition of cycling based on the number of wheels on the device.

3 Context also informs roadway design, including the selection of design controls, target speed, modal priority, and other design decisions. For more information, see Chapter 1102 of the WSDOT Design Manual.

4 FHWA. 2021. Micromobility: A Travel Mode Innovation.

Pedestrian: As defined under Washington state law, "Any person afoot or using a wheelchair (manual or motorized) or means of conveyance (other than a bicycle) propelled by human power, such as skates or a skateboard" (RCW 46.04.400).

Performance program: WSDOT system of tracking and reporting on how the agency is meeting specific state and federal goals for transportation system management.[5]

Population center: Cities, towns, and census-designated places.

Rolling: Used throughout the plan as a term inclusive of people cycling, using wheelchairs and other wheeled mobility assistance devices, and using micromobility devices.

Route directness index: A measure of the out-of-direction travel required for someone walking or rolling to reach their destination; calculated as a ratio that compares the straight-line (as the crow flies) distance between two points to the actual distance imposed by the roadway network. The lowest RDI is 1 because a trip between those points can be made directly along an existing roadway.

State highway system: Includes all state routes, interstates, and U.S. highways, including ramps (RCW chapter 47.17 provides a list of state highway routes).

State route: For the purposes of this plan the terms "state route" and "state highway" have the same meaning.

Trails and shared-use paths: A public way constructed primarily for and open to people walking, bicycling, or rolling (and in some locations, riding horses); does not include sidewalks. For certain purposes under Washington state law, a trail/path can also include a widened highway shoulder where that has been made part of a trails plan (RCW47.30.005).

Trips: Agencies use the term "trip" to mean a single event where a person goes from an origin to a destination. A trip may or may not include intermediate stops. Trips can be taken using any transportation mode, including walking, cycling, public transportation, or private vehicle use, among others.

Walking: Includes walking; running where that shows up in counts or survey data (such as run commuters); and people with disabilities using assistive mobility devices.

Other technical terms used in this plan are defined where they first appear in the document, as needed.

5 The Performance program information can be found on the WSDOT Accountability webpage.

Chapter 1: CHARTING A PATH FORWARD

INTRODUCTION: WE NEED A COMPASS

What people now label "active transportation" is the original transportation: people moving themselves. The term "right of way" in common law refers to the legally protected right of the individual to make their way over a piece of land, which they did long before the advent of the internal combustion engine. Today that movement might involve a wheelchair or skateboard, electric-assist bicycle or service animal, a stroll on a sidewalk or a hand-cranked tricycle. Even when people drive a car or ride a bus, every trip a person makes begins and ends in a human-scale space of some kind. People move along roads that today are paved, but once were traditional travelways of the land's first human inhabitants going in search of resources, social contact, and trade. The purposes, importance, and fundamental role of active transportation have persisted over the centuries no matter what label people apply.

Active transportation use takes place within all the complexity of today's society, as well as within existing facilities. Land use decisions, economics, and many other institutional and societal forces determine many critical factors: whether it is easy or convenient for children to walk or bike to school, whether it is possible to buy food close to home or only many miles away, whether plans for climate change resiliency will fully support these cleanest and greenest forms of transportation, whether transit service is available to extend one's total journey, and whether the sidewalks on the way to that bus stop are accessible and maintained or nonexistent, among many such questions.

This plan does not address all of the many tools needed to establish walking, rolling, and cycling as fully available and accessible forms of transportation. It focuses primarily on engineering questions—what makes a good network—and whether such facilities are available on state routes. The analysis centers on population centers, noting the importance of continuing examination of state routes in more rural areas as an extension of the methods discussed here. As Chapter 1 discusses, this planning effort provides a new beginning to the full range of questions that will need to be addressed in future updates on equity, education, statutes and ordinances that discourage rather than support active transportation, and other topics.

The obligation now before Washingtonians is to build and maintain a transportation system that serves every person and makes a positive difference for the most pressing challenges the people of this state and nation face, from climate change to the harmful legacy of racism. While this plan is fairly technical and written to conform to requirements of state and federal law, it begins with this understanding.

The Washington State Active Transportation Plan, 2020 and Beyond, provides a foundation for the development and evolution of the statewide active transportation network. As decision makers at every level of government confront budget realities, information on how to identify and prioritize active transportation needs is more critical than ever.

The state and its residents face many challenges including rising costs for health care and housing; land use decisions that result in disconnected active transportation networks; and economic shifts that hit individual pocketbooks hard and cause cities and towns to reinvent themselves. In the year 2021, the state and nation are still dealing with the additional burdens from a pandemic. The good news is that investments in making walking, biking, and rolling connections can help address many of these challenges while creating much-needed jobs.[6]

"Active transportation" includes walking or running; the use of a mobility assistive device such as a wheelchair or power scooter; cycling; and the use of small personal devices such as foot scooters or skateboards. This definition includes both traditional and electric-assist bicycles and other devices. The plan uses the terms "walking and rolling" or "walking, rolling, and bicycling" to refer to the entire range of active transportation.

Washington offers many beautiful places to walk and roll, from town centers and neighborhoods to trails through varied landscapes. But a trip is challenging or even impossible if, for example:

- The sidewalk ends halfway to the bus stop or other destination.
- There is no bike lane.
- There is no curb cut for a wheelchair user or accessible signal and directional cues for someone who is blind.
- Facility design does not factor in the needs of someone who might be hauling a bike trailer, pushing a double stroller, or using some other set-up wider or longer than designers assumed.
- No one swept the leaves or plowed the snow.
- Streets are wide, busy, and there are no breaks in traffic, or motorists will not stop and yield to people who need to cross.

Recent studies[7] have found that accessible active transportation provides many benefits to individuals and communities, including:

- Low-cost and flexible access to services and opportunities.
- Enhanced quality of life.
- More livable streets and roads.
- Improved personal and community health.
- Increased capacity on roads due to less driving.
- Reduced greenhouse gas emissions and other transportation-related pollutants.
- Improved connections to other modes such as transit, ferries, and trains.

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[6] USDOT. N.d. Active Transportation: Relationship to Public Health. Rails to Trails Conservancy. 2019. Active Transportation Transforms America: The Case for Increased Public Investment in Walking and Biking Connectivity. Recreation and Conservation Office. 2020. Economic, Environmental, & Social Benefits of Recreational Trails in Washington State. Recreation and Conservation Office. 2020. Health Benefits of Contact with Nature. A study of the American Recovery and Reinvestment Act found that active transportation projects created 17 jobs per $1 million investment—more than any other type of transportation project. Dowell, Paula, and Lisa Petraglia. 2012. Mining Recovery Act Data for Opportunities to Improve the State of Practice for Overall Economic Impact Analysis of Transportation Investments. NCHRP 08-36, Task 103.

[7] Rails to Trails Conservancy. 2019. Active Transportation Transforms America: The Case for Increased Public Investment in Walking and Biking Connectivity. Litman, Todd. 2020. Evaluating Active Transport Benefits and Costs. Victoria Transportation Policy Institute. Trust for Public Lands. 2016. Methodology for assessing the benefits of active transportation projects.

- Reduced "chauffeuring" burdens, particularly for parents.
- Reliable options when other modes of transportation fail.[8]

For all these benefits, people must be able to find their way. In the transportation context, it's tempting to refer to a plan as a roadmap. Travelers using a defined road network use a road map. Travelers charting new territory – such as the incomplete and, in places, nonexistent statewide active transportation network – rely on a compass. With a compass, they explore unknown terrain and create a path for others to use in the future.

This plan will serve as our compass.

PLAN CONTENTS AND ORGANIZATION

The 2020 Washington State Active Transportation Plan replaces the 2008 Bicycle Transportation and Pedestrian Walkways Plan. Since 2008, much has changed in the world of transportation and within the Washington State Department of Transportation. The agency has an Active Transportation Division created in 2017 that will lead the implementation of the plan's recommendations. The agency has also adopted a performance program and this plan offers metrics to help prioritize investment decisions as and when funding is available.

This plan focused on state facilities assessment to provide information that has not been available in the past. A number of comments received during the plan development and review of the draft highlighted topics such as education, encouragement, driver training, implications of new technologies such as autonomous vehicles, and other elements of the overall transportation system. In future phases these and other topics related to active transportation will be addressed.

Decisions based on types of funding ask, "What kinds of things can we pay for with the funds we have?" As a statewide needs assessment, this plan starts by asking, "What are the priorities based on the facts on the ground?" The funding questions then become, "Is there a source of funds to address that need? How long will it take?"

8 Weinberger, Hannah. 2019. New tsunami evacuation maps show the fastest way to escape the Big One on foot. Oct. 18. Crosscut. Wang, Haizhong, Alireza Mostafizi, Lori A. Cramer, Dan Cox, and Hyoungsu Park. 2016. An agent-based model of a multimodal near-field tsunami evacuation: Decision-making and life safety. Transportation Research Part C: Emerging Technologies. Vol. 64. Walker, Alyssa. 2018. What's the best way to evacuate Los Angeles? Curbed LA.

PLAN PURPOSE

The purposes of this plan are to fulfill planning requirements[9] intended to address the needs of the public, WSDOT, and federal, tribal, regional, and local partners by

- Assessing the statewide needs of active transportation users who walk, run, use a mobility assistive device such as a wheelchair, cycle (whether on two wheels or three), or use a small personal device such as a foot scooter or skateboard.
- Defining the state's interest in the statewide active transportation network as: identifying and supporting how active transportation contributes to the state's transportation, health, environmental, economic, and land use goals.
- Meeting the transportation needs of people who cannot or do not drive.
- Contributing to the safety and mobility of the traveling public, as per RCW 47.26.300, RCW 47.30.020, and RCW 47.01.078.
- Reducing traffic congestion, greenhouse gas emissions, and energy use by shifting uses from driving to active transportation, as per RCW 47.26.300.
- Meeting performance goals and complying with reporting requirements.
- Acknowledging and addressing the effects of infrastructure decisions on safety and mobility in places with deeper health and transportation inequities, including redlined neighborhoods, tribal lands, and places where more people rely on active transportation and/or transit access to meet everyday travel needs.
- Offering recommendations for the statewide active transportation network, which includes:
    - State highways that allow active transportation use.
    - Infrastructure located on, connected to, or serving as an alternate route to state highways.
    - City streets and sidewalks.
    - County roads.
    - Trails on public lands.
- Connections to transit, ferry terminals, passenger rail, and airports.
- Focusing on multimodal network connectivity and use of level of traffic stress measures to describe state highways. These recommended practices enable evaluation, prioritization, and measurement of change over time. The application of these principles accomplishes two long-term interrelated goals:
    - Completing a statewide active transportation network across jurisdictional boundaries.
    - Reducing the level of traffic stress on the active transportation network to make it possible for more people to use active transportation safely.
- Providing information that decision makers can use in making policy and investment recommendations. For example, local and regional efforts have created portions of what could become a statewide active transportation network of trails and bikeways, but this network has gaps. Closing these gaps by leveraging past investments in trails can create safer connections in and between communities and support local economies.

[9] Appendix H, Planning and Reporting, provides more details on state and federal requirements.

WHY WE NEED TO PLAN FOR ACTIVE TRANSPORTATION

People who engaged with WSDOT staff during the plan's development said they want to move through their neighborhoods and travel safely wherever they need to go, and they want to be able to use whichever mode of travel best meets their needs. Yet the complex transportation system created over decades does not fully provide this freedom and independence for active transportation users, especially those who are subject to greater burdens or barriers created by policy, design, and other factors.

As illustrated in Figure 1-1, every trip that any person makes begins and ends at active transportation spaces (represented by the circles). People expect these spaces to connect seamlessly to other modes. This is not currently the case because not all connections accommodate every person.

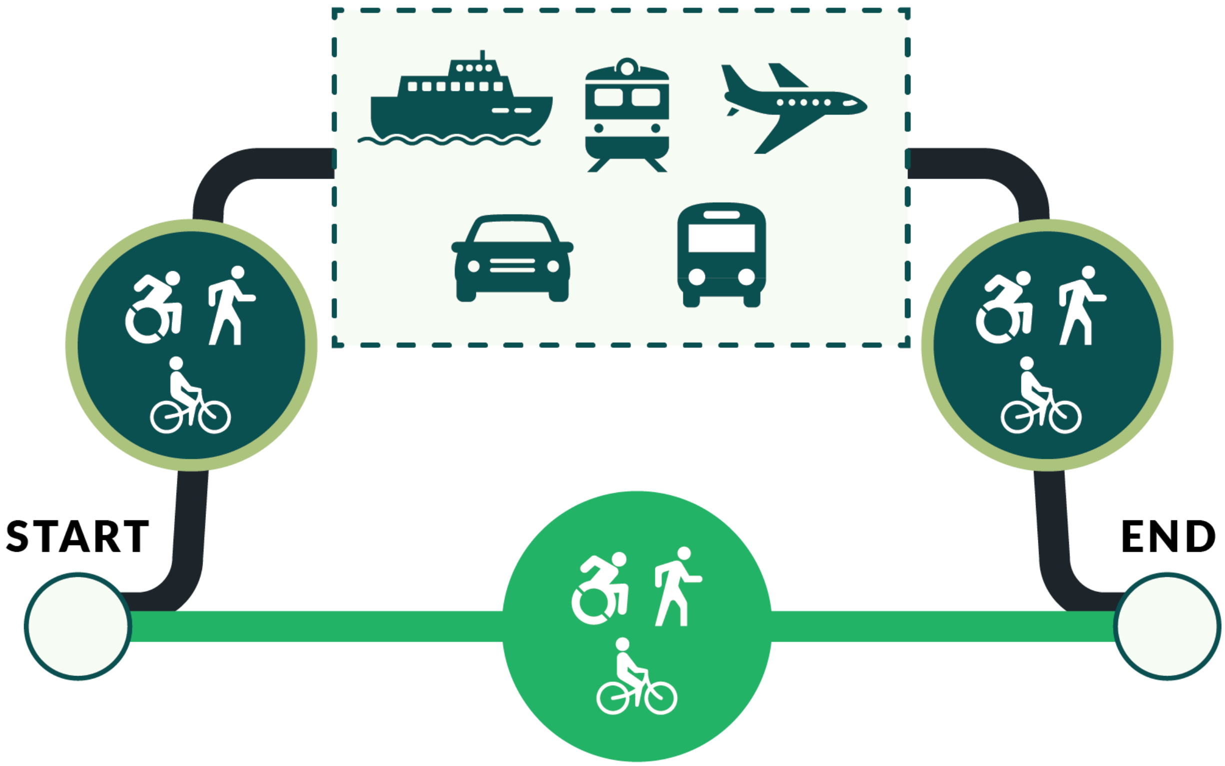

Figure 1-1: Active transportation modes can be used from start to finish for a given trip, or as the first and last segments of a trip involving other modes of transportation. This graphic illustrates an ideal with no gaps or barriers, which is often not the reality for an individual.

BENEFITS OF MEASURING MULTIMODAL NETWORK CONNECTIVITY

According to the Federal Highway Administration's Guidebook for Measuring Multimodal Connectivity measuring connectivity positions a transportation agency to:

- Enhance access to jobs, training, schools, and economic centers.
- Accelerate project delivery by capturing efficiencies in economies of scale, project sequencing, construction phasing, financing, and community involvement.
- Increase accountability of efforts to expand mobility options and system efficiency.
- Prioritize infrastructure investments that fill gaps, address barriers in the transportation network, and increase safety for all users.
- Partner with the private sector to provide innovative multimodal transportation services, and capture opportunities relating to shared-use mobility and automated and connected technology.

THE PLANNING PROCESS

The project team (listed in Appendix A, Acknowledgements) met with WSDOT staff and external partners in every WSDOT region to hear what core elements the plan should address to improve network connectivity and quality. WSDOT staff emphasized the need for decision-making tools to enable them to assess design alternatives, place individual project locations into a larger context, and support working with local jurisdictions.

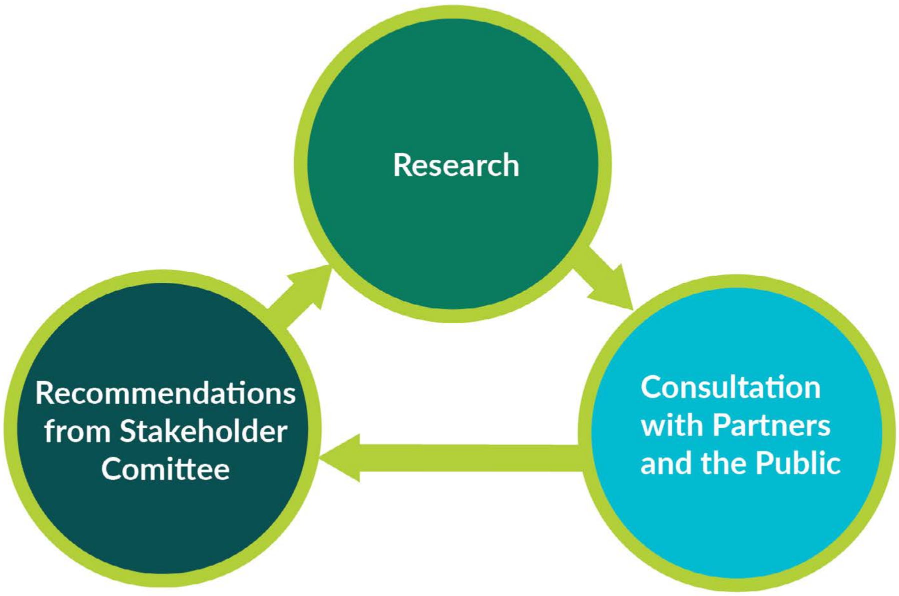

Figure 1-2: Research, consultation with partners and the public, and recommendations from the stakeholder steering committee constantly inform each other.

The project team developed this plan through:

- Extensive research to document the many benefits of active transportation including improved physical and mental health, economic vitality, access to opportunity, environmental benefits, and more. Chapter 2 provides more information.
- Extensive research that led to the adoption and refinement of level of traffic stress as an objective and quantitative approach to characterize state right of way for active transportation use. Chapter 3 and Appendix D, Methods of Analysis, provide more information.
- Community engagement from thousands of people across the state that aided identification of barriers to active transportation use and goals for the plan. Chapter 2 and Appendix C, Outreach and Engagement provide more information.
- Guidance from the stakeholder steering committee that recommended the plan's goals of networks, safety, opportunity, participation, and partnership. These goals are interrelated and interdependent and acknowledge that partnerships are essential to creation of complete networks that support safety, opportunity, and participation. Appendix A, Acknowledgements, lists members of the committee and project team.
- Participation of hundreds of WSDOT staff and agency partners that provided technical information and ensured consistency with other planning efforts.

ACTIVE TRANSPORTATION PLAN GOALS

Meeting the goals for active transportation requires working through a set of actions like those that created today's complete networks for driving: Build it and they will come. When they do, the increase in walking and rolling use provides safety, mobility, and equity benefits for all.

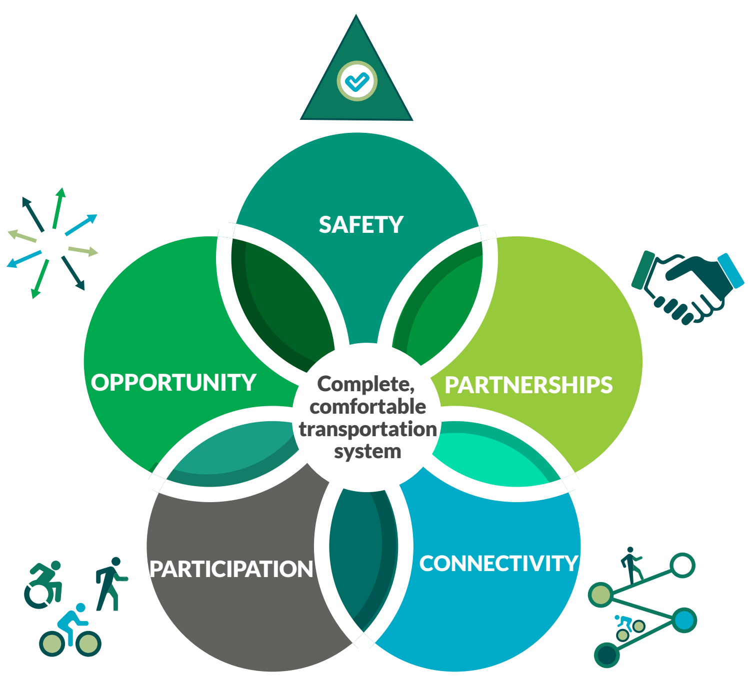

Figure 1-3: Connectivity, Partnerships, Safety, Opportunity, Participation are Active Transportation Plan goals that result in complete, comfortable connections for all.

The plan's goals are:

- Connectivity: Create and connect comfortable and efficient walking and rolling networks so people can reach their destinations and other forms of transportation and have everyday access to physical activity.
- Safety: Eliminate deaths and serious injuries of people walking and rolling.
- Opportunity: Eliminate disparities in access to safe, healthy, active transportation connections for people and communities most dependent on walking, bicycling, and transit.
- Participation: Increase the percentage of everyday trips made by walking or bicycling.
- Partnership: Collaborate and coordinate with public, tribal, nonprofit, and private partners to complete and improve the network across boundaries.

***Active transportation in the future:** The integrated transportation system of the future provides safe, welcoming, and connected networks that invite and enable everyone to walk and roll where they need to go.*

GUIDING PRINCIPLES AND THEMES

The plan's stakeholder steering committee included representatives from a variety of organizations, perspectives, and lived experience. This committee's discussions highlighted principles and themes that reinforced those identified through research and community engagement. These are equally important and mutually reinforcing:

- Comfortable connections make all the difference.
- Consider benefits for people of all ages and abilities.
- Good roads work for everyone.
- Partnerships are essential.
- The Safe System Approach works.
- Equity requires action.
- Transportation dramatically affects health.
- A multimodal system provides resiliency.
- We can build the future.

These topics are addressed and supported through the performance program, which is summarized below and detailed in Chapter 2 and Appendix B: Guiding Themes.

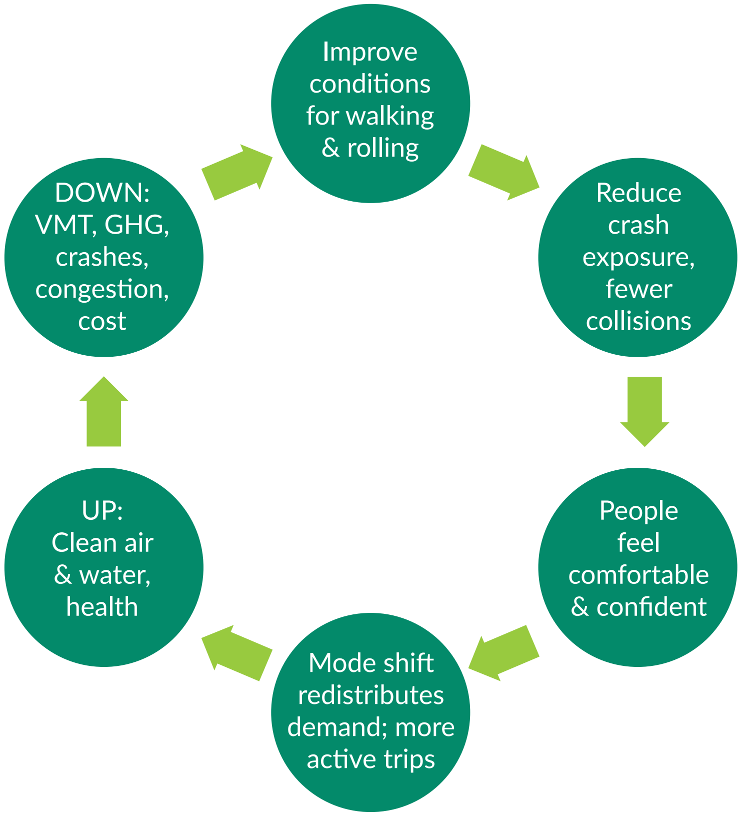

Figure 1-4: A positive feedback loop results from improving conditions for walking and rolling. Facility design and operational improvements reduce crash exposure, leading to fewer collisions. People feel comfortable and confident, mode shift redistributes demand, and more active trips result. Benefits include cleaner air and water, improved health, and reduced VMT (vehicle miles travelled), GHG (greenhouse gases), crashes, congestion, and cost. These benefits in turn improve conditions for walking and rolling. This graphic focuses on facility improvements; it does not address every element or program that improves conditions, such as increased education.

PERFORMANCE PROGRAM

This plan is consistent with WSDOT's performance program that provides analysis and reporting to the public and to decisionmakers.[10] The steps to improving performance for active transportation are:

1. Improve the facilities so that,
2. Participation increases so that,
3. Society benefits from the effects of increased active transportation use.

Metrics concerning network connectivity and level of traffic stress on facilities apply to state-owned infrastructure specifically. Over time with data added for local facilities adjacent to state routes, WSDOT and its partners can develop a more complete picture of network connectivity and usability.

10 WSDOT Accountability describes WSDOT's performance reporting and provides links.

EQUITY

Equity emerged as a critical framework for active transportation throughout research, engagement, and analysis. Regardless of social, economic, or demographic differences, all people need access to transportation options. Conversations with tribal partners, the state's commissions that represent racial or ethnic/cultural groups, disability justice organizations, and others; crash data; and a variety of public comments received on the draft document reinforced racial equity and ADA accessibility concerns.

Inequities in available transportation infrastructure connecting people to jobs, housing, food access, and other essential services have their roots in a history of residential segregation. This included policies such as "redlining" that restricted investment in areas where people of color and those with other marginalized identities could buy homes. Those same areas have historically suffered from a lack of investment in public safety infrastructure. The long-term effects include a lack of sidewalks, crosswalks, lighting, and bicycling paths in certain neighborhoods.[11]

In some cases, transportation projects physically divided these neighborhoods with highways or arterials—roads with higher posted speeds and higher traffic volumes, often not designed with facilities for walking or bicycling. People living there experience higher rates of exposure to particulates, vehicle emissions, and other transportation-related pollutants.[12] In these mostly low-income areas, fewer people own private vehicles, so they rely more on public and active transportation.[13]

"Work to ensure that all people have access to their daily needs with dignity and independence, regardless of their ability or income and without discrimination based on race or other identity."
—Washington Transportation Plan 2040 and Beyond

Lack of access to safe transportation denies people the ability to fully participate in community life; meet basic needs such as travel to jobs, food, and health care; and reach opportunities for work, education, and community service. The key equity issues showing up in active transportation in both Washington data and national studies concern fatal and serious traffic crashes; lack of infrastructure, especially ADA-accessible facilities; and long distances between housing, jobs, and resources.[14] Not all of these can be addressed through transportation agency work alone, but transportation changes are essential as part of the solutions. Appendix B, Guiding Principles and Themes, and context presented in Chapter 2 expand on this.

"Data show the need to direct prevention efforts to communities with poverty rates higher than the state average as well as vulnerable and marginalized populations, such as older adults, individuals with disabilities, people of color, and youth. This will help us improve safety and public health, and decrease the burden on individuals, communities, and the state's economy."
— Target Zero 2019

11 Rothstein, Richard. 2017. The Color of Law: A Forgotten History of How Our Government Segregated America. Bullard, Robert D., Glenn Johnson, and Angel Torres, eds. 2004. Highway Robbery: Transportation Racism and New Routes to Equity. Avila, Eric. 2014. The Folklore of the Freeway: Race and Revolt in the Modernist City. Gibbs K, Slater SJ, Nicholson N, et al. (2012.) "Income Disparities in Street Features that Encourage Walking." Bridging the Gap Program, University of Illinois at Chicago. Smart Growth America. 2019 and 2021. Dangerous by Design. Brinkman, Jeffrey, and Jeffrey Lin. 2019. Freeway Revolts! Federal Reserve Bank of Philadelphia, Working Papers.

12 Washington State Dept. of Health. Washington Environmental Health Disparities Map.

13 Washington State Dept. of Health. Washington Tracking Network.

14 Safe Routes to School National Partnership. 2015. At the Intersection of Active Transportation and Equity. Lee, Richard J., Ipek N. Sener, and S. Nathan Jones. 2015. Understanding the role of equity in active transportation planning in the United States. Transport Reviews 37:2. PolicyLink. 2009. Healthy, Equitable Transportation Policy: Recommendations and Research.

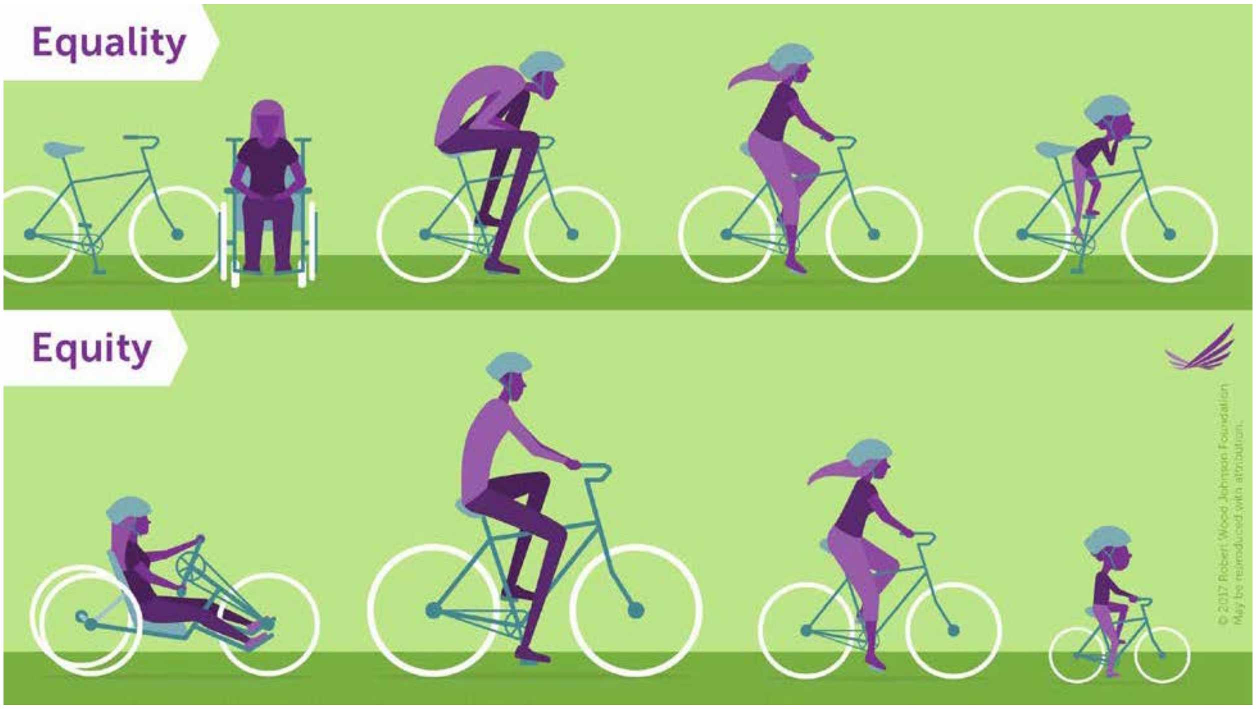

Figure 1-5: The Robert Wood Johnson Foundation created this graphic to illustrate the difference between “equality”—everyone treated the same—and “equity”—recognizing and addressing differences to meet individual needs. Used with permission.

Figure 1-6 briefly highlights an approach to equity developed for this plan to help identify disparities and gaps in performance associated with each of the plan’s goals by considering metrics in terms of equity checks. Addressing equity helps address safety performance, health disparities, connectivity, and partnerships. Chapter 5 describes details of performance metrics. Chapter 6 describes the strategies that will move the state toward accomplishment of these goals along with examples of specific actions, and concludes this plan with recommendations and next steps.

GOAL	PERFORMANCE METRICS	EQUITY CHECKS
Connectivity: Create and connect comfortable and efficient walking and rolling networks so people can reach their destinations and other forms of transportation and have everyday access to physical activity.	Network completeness: Facility length, reductions in gaps measured as improvements in level of traffic stress on state routes and at crossings, miles of trails/multi-use paths Network quality: Level of traffic stress	Do certain populations have access to fewer places or fewer miles reachable by high-comfort, low-stress facilities accessible to all abilities?

GOAL	PERFORMANCE METRICS	EQUITY CHECKS
Safety: Eliminate deaths and serious injuries of people walking and rolling.	Total number of people killed or seriously injured in driver crashes with active transportation users Lane miles with speed limits based on principles of injury minimization	Are certain populations at a higher risk for deaths and serious injuries while walking or rolling? Are higher-speed roadways disproportionately located in places with higher percentages of people who meet equity criteria?
Opportunity: Eliminate disparities in access to safe, healthy active transportation connections for people and communities most dependent on walking, bicycling and transit.	ADA-accessible facilities Network performance metrics in historically disadvantaged communities Greenhouse gas emissions avoided by walking/bicycling miles Funding program awards	Are certain populations more exposed to transportation pollutants/emissions? Is WSDOT applying investments to address disparities?
Participation: Increase the percentage of everyday trips made by walking or bicycling.[15]	Percentage of trips by walking/ bicycling Percentage of adults meeting physical activity recommendations Percentage of children walking/biking to school Ferry walk-on/bike trips Transit access by active transportation users	Do certain populations make a smaller percentage of everyday trips using active transportation? Do we understand why, and whether this is due to issues we can seek to address together?
Partnership: Collaborate and coordinate with public, tribal, nonprofit, and private partners to complete and improve the network across boundaries.	Percentage of jurisdictions with an active transportation plan Percentage of population covered by such plans Percentage of total lane miles covered by such plans	Are places with greater transportation disadvantages more or less likely to have an active transportation plan? Are we providing information and guidance for places from very rural to very urban?

Figure 1-6: Goals associated with performance measures and equity checks to help determine whether performance is improving, particularly where needs are higher. Some metrics and equity checks will require development of additional information sources. Equity checks will be further refined based on requirements of the Healthy Environment for All (HEAL) Act passed by the legislature in 2021.

15 Reductions in vehicle miles traveled could be the result of increased active transportation use. VMT reduction may also result from a shift to teleworking, as 2020's traffic counts illustrated, and other factors beyond the scope of this plan. The plan's metrics are selected to focus on active transportation specifically.

MOVING FORWARD TOGETHER

Implementing this plan and building with its tools will enable WSDOT and partners to make progress toward a bold vision: **A network that works as well for people walking or rolling as it does for people using motor vehicles.**

Washington state won't get there overnight—and we won't get there at all if we don't begin. The saying about planting trees applies equally well to building trails or closing gaps in a network. "The best time to plant a tree (or build a trail or improve the network) is 20 years ago. The second-best time is now."

Let us move forward together now, compass in hand.

Chapter 2
ACTIVE TRANSPORTATION IN WASHINGTON STATE

INTRODUCTION: INTEREST, OPPORTUNITIES, ISSUES

As WSDOT staff conducted extensive outreach across the state, both interest in increased active transportation use and issues that create barriers to such use emerged. Public comments reinforced findings in state and national data. While people are already walking and bicycling for a variety of purposes, they said they want:

- Walking and biking to be safe from fatal/serious injury crashes.
- Children to be able to walk, bike, and roll to school.
- Drivers to slow down where people walk and bike.
- To be able to cross the state highway walking or bicycling.
- More sidewalks, bike lanes and separated trails.
- Issues of transportation equity to be addressed.

The most common topics across all input channels were safety and the need for facilities. The state cannot attain its Target Zero goals without addressing pedestrian and bicyclist serious injuries and fatalities. For the years 2015-2017, 20 percent of all traffic deaths and 20 percent of all traffic serious injuries were people walking and biking. In 2017 the state reached the highest number of pedestrian deaths in more than 30 years, then reached another high in 2020. Past efforts have not succeeded in eliminating or even reducing the annual number of traffic deaths and serious injuries for people who walk and bike. In addition, given patterns in the locations of serious injury and fatal crashes, the state cannot attain its Target Zero goals without addressing the disproportionate numbers of such crashes in places that are home to higher percentages of lower-vincome households and/or Black, Indigenous and people of color. The high percentage of deaths on roads with posted speeds of 30 mph or more (86 percent of all pedestrian and bicyclist fatalities 2010-2019) points to the importance of speed management, one of the strategies discussed in Chapter 4.

WSDOT applies a variety of measures of active transportation use, none of which provide a complete picture. This plan's analysis, described in Chapter 3, examines the presence or absence of adequate facilities that will make use more inviting and address critical safety issues. Where investment in such facilities has been measured, as with Safe Routes to School projects, results show increased walking and bicycling rates and reductions in serious crashes.

Active transportation provides a number of benefits described in this chapter. Increasing walking and bicycling in the state contributes both to transportation goals and other goals such as economic vitality as well as environmental, individual, and community health.

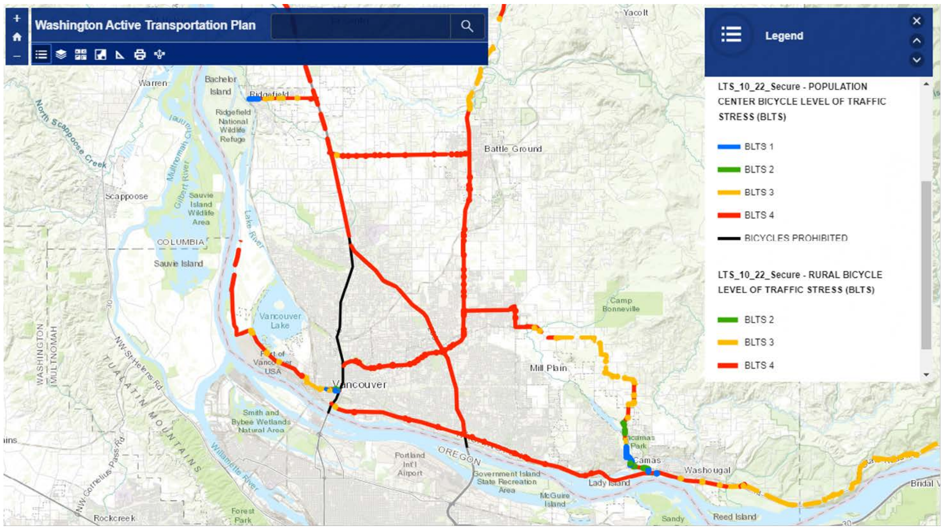

Figure 2-1: An example of the level of traffic stress analysis shared with the public in an online open house and presentations. Note that this map references rural bicycle level of traffic stress, which was explored at the time of the open house but was later removed from the analysis. Chapter 3 and Appendix D, Methods of Analysis, describe the final methodologies used in detail.

WHAT PEOPLE IN WASHINGTON SAY ABOUT ACTIVE TRANSPORTATION

WSDOT staff estimate that engagement efforts reached upwards of 80,000 people across the state through a variety of approaches. This chapter briefly summarizes what WSDOT heard, with more details on the outreach activities in Appendix C, Outreach and Engagement.

The goals and priorities outlined in this plan are based on what Washingtonians told the agency, which reinforced findings from state and national research. Repeatedly, adults, youth, and children; people of different racial groups and economic status; and people in every part of the state told the project team they want safe places to walk, bike, and roll. They want to be able to get across and along state highways to get to their destinations. Below is a list of themes people expressed most often in order of their frequency in questionnaire responses and open-ended comments:

1. Safety and eliminating fatal/serious injury crashes need to be priorities.
2. Make it easier for children to be able to walk, bike, and roll to school.
3. Drivers are going too fast on the state highway where we need/want to walk and bike.
4. We need more and safer places to get across the state highway.
5. We need/want more sidewalks and separated trails. Fill the gaps between existing sidewalks, bike lanes, shared-use paths and trail systems.
6. Inequitable availability and access need to be addressed; some places have far better facilities than others.
7. Existing facilities for walking, bicycling, or riding small devices need maintenance.
8. We need better connections to transit service.
9. We want bold action and timelines for performance to move the plan into implementation.

Robust community engagement for this plan centered around three milestones. The first round of engagement in early/mid 2019 included informing a broad spectrum of organizations that the process was getting under way and asking them to spread the word, as well as identify issues and priorities. Engagement in fall 2019 included an online open house, webinars, and customized outreach in an effort to reach people who do not typically voice their opinions to government.

The final phase for the chapters published as Part 1 (Chapters 1-4 in this document) included a review of the draft plan by the public in winter 2020-21. Those chapters were finalized and published in May 2021. Additional chapters on performance metrics and strategies were based on both the initial engagement and comments received on Part 1. Those chapters then went through the same process of public comment in fall 2021. This document consolidates the two parts into one final document.

"Essentially every intersection involving a state highway is stressful to use because they have been designed for auto traffic. This seems like a no-brainer." — Online open house comment on the usefulness of analyzing level of traffic stress

The outreach efforts revolved around the core concepts of:

- Engaging early with a stakeholder committee to advise WSDOT on outreach and plan development.
- Listening.
- Inviting people to engage using a variety of electronic and in-person options.
- Involving the Cooper Jones Active Transportation Safety Council in discussion of core concepts and goals.
- Using public input to direct, build, and refine the plan.
- Connecting with partners at all levels of government.
- Keeping WSDOT employees informed, with opportunities to engage in developing an actionable work plan.
- Getting the word out about research-based best practices in active transportation and the purpose of the plan.

Figure 2-2: An example of the flyers distributed by WSDOT directly and through partnering organizations to invite people to take a questionnaire and sign up for e-mail newsletters.

Figure 2-3: WSDOT staff used email, social media, web pages, questionnaires, and presentations to reach people across the state.

The purpose of WSDOT outreach was to understand community priorities and goals for Washington's multimodal and multi-functional transportation system. Specifically, this effort was about giving Washington residents the chance to say:

- What active transportation in their communities is like now.
- What changes they need to be able to walk, bike, or roll for transportation.
- Where the most important pedestrian, bicyclist, and wheeled mobility connections are and should be in the future.

Based on the total number of social media impressions, email distribution, questionnaire responses, event participation, and e-news sign-ups, WSDOT estimates that 80,000 people or more were made aware of the planning process and/or participated in some way.[18]

[18] This estimate incorporates the assumption that some of the social media impressions duplicate other forms of participation. WSDOT has no way of identifying how many people participated in more than one opportunity or how many of the organizations on the outreach contact list forwarded emails to reach more than the numbers represented here. Trackable points of contact and impressions total 252,529.

Throughout the planning efforts, a statewide Active Transportation Plan Stakeholder Committee provided input and guidance. This group included members of the public, nonprofits, staff from key state agencies, the governor's office, metropolitan and regional transportation planning organizations, and tribal governments (listed in Appendix A, Acknowledgements). The stakeholder committee met regularly to give a public and a statewide perspective to the work. WSDOT staff also held in-depth discussions with the Cooper Jones Active Transportation Safety Council of the Washington Traffic Safety Commission on the analytic methods, goals, and performance metrics. Direction from the stakeholder committee and the results of the outreach provided input for the planning process, assessment, performance metrics, goals, policy topics, and strategies outlined throughout this plan.

A final draft of the first chapters in this plan was provided for public review in early 2021. This resulted in 637 comments. Most comments received—89 percent—were supportive or asked that the plan go further and do more. Only 2 percent were not supportive. Some implied that the plan was too long and yet 46 percent of commenters asked for more information. The most common topics the comments covered concerned trails, safety, data limitations, equity, climate change, and health. Some comments on those chapters fed into development of chapters 5 and 6 of the plan, in particular those having to do with WSDOT policies and practices for managing driver speeds in population centers, maintenance, safety, crossing improvements, and cooperation with local governments. Those chapters went out for public review in fall 2021. This resulted in another 290 comments with themes similar to those received on the earlier chapters. Comments included questions and suggestions on specific performance metrics that helped WSDOT staff fine-tune those sections and others about the importance of moving quickly into implementation with actionable steps and specific timelines.

BENEFITS OF BICYCLING AND WALKING

This section provides a high-level summary of the ways that walking and bicycling provide health, environmental, and financial benefits for the individual who walks or bikes and for the community. Some of the community benefits result when people use walking and biking in place of motor vehicle travel, thus reducing vehicle miles traveled.

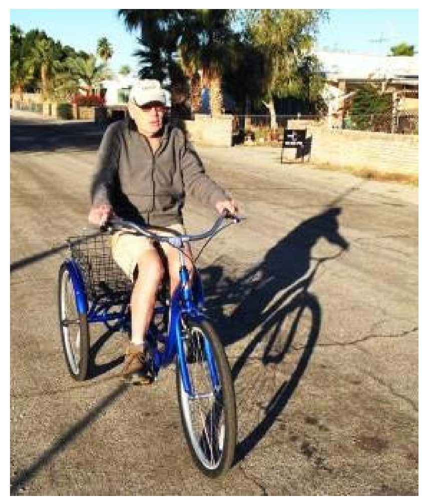

Figure 2-4: Active transportation provides options for those who have given up driving, choose not to drive, or not drive. Photo by Louise McGrody, courtesy of Washington Bikes.

Health benefits

Study after study finds that walking and bicycling can improve physical and mental health.[19] These benefits do not require becoming a super-athlete; the Centers for Disease Control and Prevention reports that *any* increase in physical activity can provide health benefits.[20] Bicycling with an electric-assist bicycle has also been proven to provide physical and health benefits.[21] Personal health benefits translate into cost savings for society when they reduce the high costs of preventable chronic diseases. The lists below show the health benefits from regular physical activity, such as walking and biking.

19 Washington State Recreation and Conservation Office, 2019. Economic and Health Benefits of Walking, Hiking and Bicycling on Recreational Trails in Washington State. America Walks, 2017. Health Benefits of Walking. P. Oja et al. April 2011. Health benefits of cycling: A systematic review. Scandinavian Journal of Medicine and Science in Sports 21(4):496-509DOI: 10.1111/j.1600-0838.2011.01299.x. Celis-Morales, Carlos A., et al. Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study. British Medical Journal. 2017; 357 doi: https://doi.org/10.1136/bmj.j1456

20 US Department of Health and Human Service. 2018. Physical Activity Guidelines for Americans.

21 Jessica E. Bourne et al. 2018. Health benefits of electrically-assisted cycling: a systematic review. International Journal of Behavioral Nutrition and Physical Activity 15. https://doi.org/10.1186/s12966-018-0751-8

Children and adolescents

- Cardiorespiratory fitness.
- Muscular strength.
- Stronger bones.
- Improved powers of concentration.[22]
- Enhanced social skills.[23]

Adults

- Lower risk of early death.
- Lower risk of heart disease and stroke.
- Lower risk of high blood pressure and adverse blood lipid profile.
- Lower risk of type 2 diabetes.
- Lower risk of colon and breast cancer.
- Lower risk of metabolic syndrome.
- Cardiorespiratory fitness.
- Muscular strength.
- Lower risk of arthritis, asthma, and a host of other conditions.
- Prevention of falls.
- Reduced depression.
- Improved sleep.
- Better cognitive function (for older adults).[24]

"I am very supportive of this idea (level of traffic stress analysis). By and large, while driving might be stressful, it generally does not keep people from doing it. In comparison, people are more often discouraged from using active modes due to stress. This affects personal outcomes such as health (from inactivity) and economics."
— Online open house comment

22 Vinther, Dann. 2012. Children who walk to school concentrate better. ScienceNordic.

23 Herrador-Colmenero, M., et al. 2017. Children who commute to school unaccompanied have greater autonomy and perception of safety, ACTA Paediatrica.

24 US Dept. of Health and Human Services. 2015. Step It Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities.

Although most people do not think of it as a health factor, the transportation system has major effects on the risk of disease and injury. In essence, transportation policy is health policy. A study of walkability and health outcomes in King County found that walkable neighborhoods result in more walking, improved health, and lower emission of pollutants.[25] This relationship between having good places to walk and more walking as a result is why the Centers for Disease Control and Prevention recommend changes to the transportation system to make it easy and safe to get physical activity as a part of everyday routines.[26] Switching trips from driving to walking or biking can also result in a reduction of environmental noise, and more walkable neighborhoods are associated with an increase in positive social interactions.[27]

Health disparities have greater impacts on Washingtonians in some places and from certain demographic groups.[28] As discussed below under Equity in Transportation, availability of the facilities for safe biking and walking also vary by neighborhood. Residents of walkable communities are twice as likely to meet physical activity guidelines compared to those who do not live in walkable neighborhoods. The lack of opportunities for everyday physical activity deepens the inequities for both health and transportation.

When bicycling or walking replace driving trips, it reduces vehicle-related air and water pollution. This offers health benefits to everyone, especially people with asthma and other respiratory conditions and those living closest to major roadways.[29] A final health benefit stems from this switch: Reductions in all crashes, including the most serious ones, due to fewer vehicle miles traveled saves lives.[30]

Environmental benefits

The switch from use of a car or truck to walking or biking results in benefits to the environment. One of the most significant is reduced pollution and greenhouse gas emissions. In 2017, motor vehicles, boats, planes, and trains caused the biggest single share of the greenhouse gases in Washington (44.6 percent). Personal cars and trucks made up over half of that.[31] A typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year.[32] Particles shed from vehicle tires affect water quality for our state's fisheries and ecosystems, regardless of whether the vehicle runs on electricity, gas, or diesel.[33] Every motor vehicle trip replaced with a walk or bicycle trip brings down these numbers.[34]

25 Frank, L., et al. 2006. Many pathways from land use to health: Associations between neighborhood walkability and active transportation, body mass index, and air quality, Journal of the American Planning Association, 72, 75-8.

26 Community Prevention Services Task Force (CPSTF). 2016. Physical Activity: Built Environment Approaches Combining Transportation System Interventions with Land Use and Environmental Design. The Community Guide.

27 Leyden, Kevin M. 2003. Social Capital and the Built Environment: The Importance of Walkable Neighborhoods. Am J Public Health. 2003 September; 93(9): 1546–1551. doi: 10.2105/ajph.93.9.1546.

28 University of Washington Department of Environmental & Occupational Health Sciences. Washington Environmental Health Disparities Map: Comparing environmental health risk factors across communities. 2019.

29 Friedman, M., et al., 2001. Impact of Changes in Transportation and Commuting Behaviors During the 1996 Summer Olympic Games in Atlanta on Air Quality and Childhood Asthma, Journal of the American Medical Association, 285(7):897.

30 The Highway Safety Manual published by AASHTO lists reductions in vehicle miles traveled as a proven safety countermeasure.

31 Washington State Department of Ecology, 2019. 2017 greenhouse gas data.

32 EPA. N.d. Greenhouse Gas Emissions from a Typical Passenger Vehicle.

33 Root, Tik. 2019. Tires: The plastic polluter you never thought about. National Geographic. Cabotaje, Angela. 2020. What Are Microplastics and Why Are They a Problem?. UW Medicine. Rice, Jeff. 2020. Could tire Discovery Go Beyond Impacts on Coho? Puget Sound Institute. Tian, Zhenyu, et al., 2021. A ubiquitous tire rubber–derived chemical induces acute mortality in coho salmon. Science 08 Jan 2021: Vol. 371, Issue 6525, pp. 185-189. DOI: 10.1126/science.abd6951.

34 European Cyclists' Federation, 2011. Cycle More Often 2 Cool Down the Planet! Quantifying CO savings of cycling.

Figure 2-5 shows a summary of the estimated 2015 light duty vehicle emissions (CO_2) averted due to bicycle miles traveled (BMT) and pedestrian miles traveled (PMT). A direct offset of one active transportation mile for one vehicle mile was assumed. The results show an estimated 0.08 million metric tons (MMT) not created due to bicycle travel and 0.34 MMT not created due to pedestrian travel. Combined, a total of 0.42 MMT of CO_2 was avoided, which serves as the baseline measure for CO_2 emissions averted due to travel by active modes. The initial goal is to increase the amount of CO_2 avoided to 1 MMT annually.

Variable	Bicycle Travel	Pedestrian Travel	Total Active Transportation	Vehicle Travel	Total
Annual miles traveled (millions) [35]	2222	889	3,111	54,445[36]	55,556
Emissions caused (million metric tons, MMT)	0	0	0	21.42[37]	21.42
Emissions averted (MMT)	0.08	0.33	0.42	NA	100%

Figure 2-5: Summary of estimated 2015 emissions (CO2) avoided for VMT due to bicycle and pedestrian travel assuming a direct mile-for-mile offset. If all the trips had been made by motor vehicle the total GHGs produced would have been 21.86 MMT. Source: Air Quality & Climate, WSDOT, 2019; Office of Strategic Assessment and Performance Analysis (OSAPA), WSDOT, 2018; PSRC MOVES analysis, 2016, via WSDOT.

Reducing vehicle miles driven by switching to active transportation provides safety and health benefits that are larger than a switch to lower-emission motor vehicles. For example, electric vehicles provide emissions benefits over internal-combustion engines, yet other environmental concerns remain such as the shedding of tire particles and brake dust that may affect water quality. In addition, vehicle electrification on its own does not reduce the potential for a crash to occur.[38] A shift towards more active transportation has the potential to reduce the state's dependence on fossil fuels while benefiting air and water quality. Reductions in overall transportation emissions will help the state meet its goal of reducing greenhouse gas emissions to 45 percent below the rate of emissions from 2005 (RCW 70A.45.050). Meeting those goals is an indication that Washingtonians are doing their part to try to avert the escalation of climate change and associated disasters such as wildfires, superstorms, and sea level rise.

Economic benefits

Bicycling programs and active transportation facilities such as sidewalks have been shown to deliver economic benefit to society, including increased retail sales and property values. This economic return provides tax revenues to local and state government.[39] In addition to drawing business activity, walkable places support workforce recruitment and retention in smaller towns as well as in larger cities.[40]

35 Bicyclist and pedestrian miles traveled are preliminary estimates. Plan implementation next steps will include an update of these performance metrics.

36 Annual Mileage & Travel Information, WSDOT, 2015.

37 Washington State Department of Ecology. 2018. Washington State Greenhouse Gas Emissions Inventory: 1990-2015. Report to the Legislature.

38 J. Woodcock et al., 2009. Public health benefits of strategies to reduce greenhouse-gas emissions: Urban land transport. The Lancet. DOI: https://doi.org/10.1016/S0140-6736(09)61714-1.

39 League of American Bicyclists. 2018. Benchmarking Report on Bicycling and Walking in the United States.

40 Kennan, Hallie, and Chris Busch. 2016. How sustainable cities can drive business growth. GreenBiz. EPA. 2015. How Small Towns and Cities Can Use Local Assets to Rebuild their Economies: Lessons from Successful Places. Center for Rural Policy and Development. 2015. Addressing the coming workforce squeeze.

Outdoor recreation is big business in Washington, supporting more direct and indirect employment than aerospace. Active transportation provides an essential foundation for this economic activity; bicycle riders spend a total of over $3.1 billion annually.[41] As the fourth most frequently chosen recreational activity, bicycling represents a substantial number of people getting outdoors and their spending generates economic activity across the state. Bike tourists spend more on average for each day of travel than automobile travelers.[42] Downtown associations and tourism destination organizations promote walkable, inviting business districts. These attract people to shop, dine, and spend the night, making active transportation investments a support for every type of traveler.

The economic benefits of walking and biking return to individual people as well as to society. Often overlooked is the fact that many people do not or cannot drive for transportation. As of 2018 approximately 21.4 percent of Washington's residents did not hold a driver's license; this percentage will continue to rise as the proportion of older people increases in the population.[43] People with disabilities are less likely to own a vehicle or to use it if they have one.[44] The reality for many people is that they cannot afford a reliable working vehicle. The state Department of Health maintains maps showing the percentage of households that do not own a personal vehicle; as of 2017 the figure was nearly 191,000 households, found in every county.[45] These factors all make access to active and public transportation essential for Washingtonians to get to work, education, and services.

People who walk and bicycle save money on automobile fuel, parking, and vehicle maintenance, and potentially on insurance as they reduce miles driven. The American Automobile Association releases an annual estimate of the cost of operating a vehicle. In 2019 this figure reached its highest cost since AAA began tracking expenses in 1950, to $9,561.[46] If use of active transportation and other modes such as transit enable a household to do without a vehicle, that is the equivalent of getting a raise of nearly $10,000.

A new technology is helping some people make the switch: Electric-assist bicycles cost less than a typical vehicle[47] and provide a boost to get up hills and cover more miles. They make it easier to use a bicycle for everyday trips, including hauling children or groceries, for people who might not have considered biking in the past. A national study of electric-bike owners found that 25 percent of respondents had physical limitations that made a regular bicycle too difficult to use, and owners ride farther than they would have on a non-assisted bike.[48] Electric-assist bikes offered through bikeshare systems are not available everywhere in the state, but where bikeshare exists it can make these bikes available without the up-front cost of direct purchase.

41 Outdoor recreation 264,000 jobs; aerospace 237,000 jobs. Recreation and Conservation Office. 2020. Economic Analysis of Outdoor Recreation in Washington State, 2020 update.

42 Trask, Blake. 2015. New Economic Analysis: Bicycling Means Business in Washington. Washington Bikes, Jan. 8.

43 This includes people who do not drive for a variety of reasons: financial; legal; religious; disability; age; physical, medical, or mental conditions that limit their ability to operate a vehicle; or by choice. Washington state population as of 2018: 7,524,000. Total number of licensed drivers: 5,909,967.

44 Brumbaugh, Stephen. 2018. Travel Patterns of American Adults with Disabilities. U.S. Department of Transportation, Bureau of Transportation Statistics.

45 Washington State Department of Health. Washington Tracking Network.

46 Sheldon, Andrew. 2020. It Now Costs More Than Ever to Own a Car. Your AAA Daily.

47 An electric-assist bicycle costs roughly 1/10 the price of the lowest-cost new electric vehicle as of November 2020 ($3,000 vs $30,000).

48 MacArthur, John, and Christopher Cherry. 2018. A North American Survey of Electric Bicycle Owners. Transportation Research and Education Center, Portland State University.

Investments in active transportation facilities costs much less to build and maintain than increasing road space for people moving in cars, SUVs, and pickup trucks.[49] According to a study requested by the American Association of State Highway and Transportation Officials, active transportation projects also create more jobs than any other type of transportation infrastructure, at a return of 17:1.[50] Smaller than a major project such as a freeway interchange, these active transportation projects may also offer greater potential for smaller firms to win bids, expanding opportunities for disadvantaged business enterprises.

For the approximate cost of one Seattle-area freeway interchange, approximately 300 miles of trail could be constructed.[51]

Mobility, accessibility, and congestion relief benefits

Supporting mode shift provides long-lasting benefits in managing highway capacity. Increases in highway capacity lead to increased driving, a documented phenomenon known as "induced demand." In other words, with more lanes apparently available, more people choose to travel by car. As a result, vehicle miles traveled increase in exact proportion with lane mileage, and any congestion relief vanishes. In some cases, this leads to worse commute times than before the expansion project.[52]

Active transportation connections that close gaps and encourage mode shift make use of existing space-efficient facilities to leverage past investments. This frees up existing motor vehicle lane space for those who still need to drive, an effect some have labeled "traffic evaporation".[53] "The 2019 "Seattle Squeeze" was created by massive construction projects including the I-5 tunnel, viaduct removal, and downtown street projects. Extensive publicity reminded people they could bike, take transit, telework, or travel at another time of day. The results illustrated that reductions in trips by car during the peak hours have a dramatic effect on congestion.[54] The massive shift to teleworking created by the COVID-19 pandemic made that even easier to recognize.[55]

49 For comparison, cost estimates in Chapter 4 show that for the approximate cost of one Seattle freeway interchange ~300 miles of trail could be constructed. Chapter 4 and Appendix F, Cost Estimation Background, provide more specific information on methodology and cost calculations.

50 Dowell, Paula, and Lisa Petraglia. NCHRP 08-36, Task 103. 2012. Mining Recovery Act Data for Opportunities to Improve the State of Practice for Overall Economic Impact Analysis of Transportation Investments.

51 This is based on WSDOT's planning level cost estimate for an interchange that is fully directional for all GP and HOV movements. The trail estimate assumes a cost of $315 million for 300 miles based on the same approach to cost estimates described in Chapter 4 and Appendix F.

52 Hymel, Kent. 2019. If you build it, they will drive: Measuring induced demand for vehicle travel in urban areas. Transport Policy Vol. 76. This chapter's section on crash data discuss the increased crash exposure associated with increased VMT.

53 European Commission Directorate-General for the Environment. Reclaiming city streets for people: Chaos or quality of life?.

54 Gutman, David. 2019. 'The cars just disappeared': What happened to the 90,000 cars a day the viaduct carried before it closed? Seattle Times. Jan. 19. A spectrum of "quick-build" design options enables the creation of bike lanes with varying degrees of separation that can often be created to expand multimodal capacity far more quickly than adding vehicle lanes. Andersen, Michael. No, Protected Bike Lanes Do Not Need to Cost $1 Million Per Mile. People for Bikes.

55 Tomer, Adie, and Lara Fishbane. 2020. Coronavirus has shown us a world without traffic. Can we sustain it? Brookings Institute. Schlosser, Kurt. 2021. 2020 traffic scorecard shows how Seattle commute congestion disappeared during COVID lockdowns. Geekwire, March 8. WSDOT. COVID-19 Multimodal Transportation System Performance Dashboard.

Road congestion is often thought of as directly related to commuting but it also has other causes that active transportation can help address. WSDOT oversees a program of funding awards for Safe Routes to Schools projects. These contribute to overall mobility, not just for the families with children in school. Depending on the school district, anywhere from 10 to 30 percent of traffic congestion during morning and afternoon peak periods comes from parents dropping off and picking up their children at school.[56] According to the 2019 Washington State Student Travel Survey, 39.7 percent of children in kindergarten through eighth grade are driven to school in a family vehicle.[57] Providing good walk/bike routes to school would enable parents to reduce or eliminate at least some of these trips, thus easing motor vehicle traffic at the busiest times of day and providing those children with the health benefits of increased physical activity.

Viable connections for people who walk or bike to reach transit, ferries, and trains are necessary for an effective multimodal transportation system. Active transportation access increases the usability of other modes, and vice versa. Ferries or transit can carry people over the longest leg of their trip, and active transportation facilities can allow people to walk or bike instead of driving the first and last mile. Increased active transportation use can reduce vehicle congestion and need for parking; 10 to 12 bicycles can be parked in the space required for one motor vehicle.

“Accessibility” in transportation includes being able to get access to all the things needed for the essentials of life, whereas “mobility” often measures the idea of moving people faster and farther. Evaluating walking and bicycling access to destinations and to other forms of transportation provides understanding about how well the transportation system meets people’s needs. WSDOT has defined performance measures concerning this type of accessibility as part of its mobility performance framework; this plan adds detail for active transportation mobility and accessibility.

“Accessibility” in transportation is also used to refer to fully ADA-accessible connections. Where this plan specifically discusses that meaning of the word it will specify that.

56 Nancy G. La Vigne. 2007. Traffic Congestion Around Schools. U.S. Department of Justice, Office of Community Oriented Policing Services. Safe Routes to School Partnership. 2008. Safe Routes to School: Steps to a Greener Future. Centers for Disease Control and Prevention.

57 These statistics were collected before the COVID-19 pandemic affected school transportation in 2020.

ACTIVE TRANSPORTATION USE: WHO, WHERE, AND HOW MUCH

The answers to the questions of who, where, and how much people walk and bike for transportation are complex. The state of the art for understanding these travel modes is not as good as it is for motor vehicle travel but WSDOT's work and abilities are expanding. For this plan, WSDOT identified national, state, and site-specific data sources. This section describes findings, sources, and limitations.

Data reported here do not reflect any shifts in transportation usage habits created by the COVID-19 pandemic. All data sources have limitations that are noted below.

National numbers

Sources of walk and bike participation survey data include the U.S. Bureau of Labor Statistics, the National Household Travel Survey (NHTS), the U.S. Census, and the American Community Survey (ACS). The most recent national information available comes from the 2017 National Household Travel Survey, which includes trips for all purposes: travel to work, school, recreation, and personal or family trips.

About half (47 percent) of all trips taken in the U.S. are less than 3 miles long and could be completed in a 15-20-minute bike ride,[58] yet the vast majority of short trips are made by automobile.

In the U.S. people make about 11 percent of all trips by walking and 1 percent by biking, according to the 2017 NHTS. Nationally, the number of walking trips as a percentage of all trips is on the rise, but the percentage of walking to work trips is decreasing. The percentage of biking trips is relatively stable, but an increasing percentage of workers are bicycling to work.

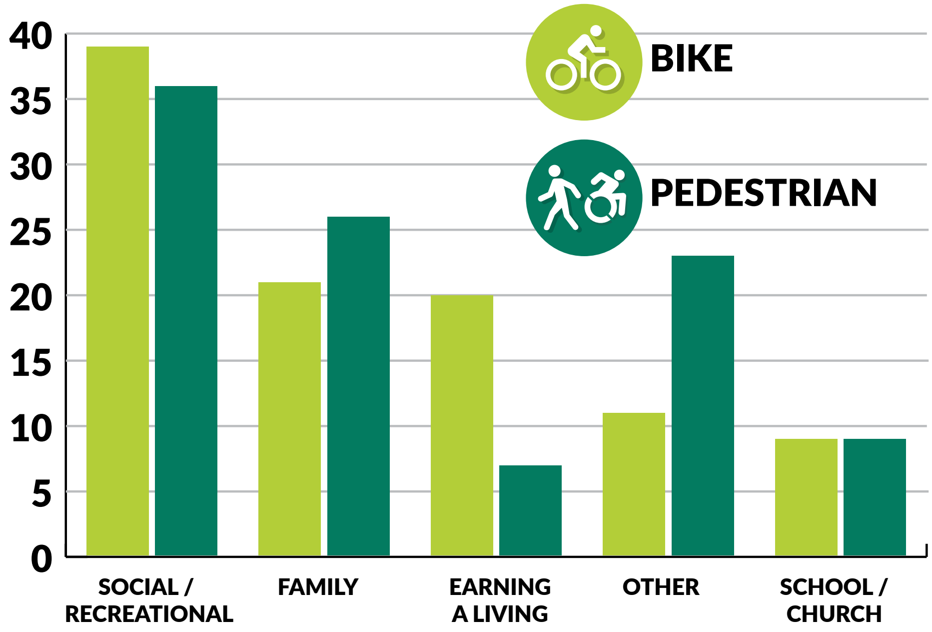

Figure 2-6: Graph illustrating pedestrian and bicyclist trip purposes found in 2017 NHTS data.

[58] U.S. Department of Transportation, Federal Highway Administration, March 2018. 2017 National Household Travel Survey.

The 2017 NHTS reports the following U.S. **bicycle trip purposes:**

- Social/recreational (39%)
- Family (21%)
- Earn a Living (20%)
- Other (11%)
- School/Church (9%)

The 2017 NHTS reports the following U.S. **pedestrian trip purposes**:

- Social/recreational (36%)
- Family (26%)
- Earn a Living (7%)
- Other (23%)
- School/church (9%)

Additional noteworthy national trends include:

- An increasing number of bicycling and walking trips by women.
- A decrease in percentage of trips made by children and youth.
- An increase in walking trips by seniors.
- An increase in bicycling trips from people with an income of less than $25,000 per year but a decrease in walking and transit trips.
- A decrease in the percentage of walking and bicycling trips by Black, Indigenous, people of color.[59]

[59] U.S. Department of Transportation, Federal Highway Administration, March 2018. 2017 National Household Travel Survey.

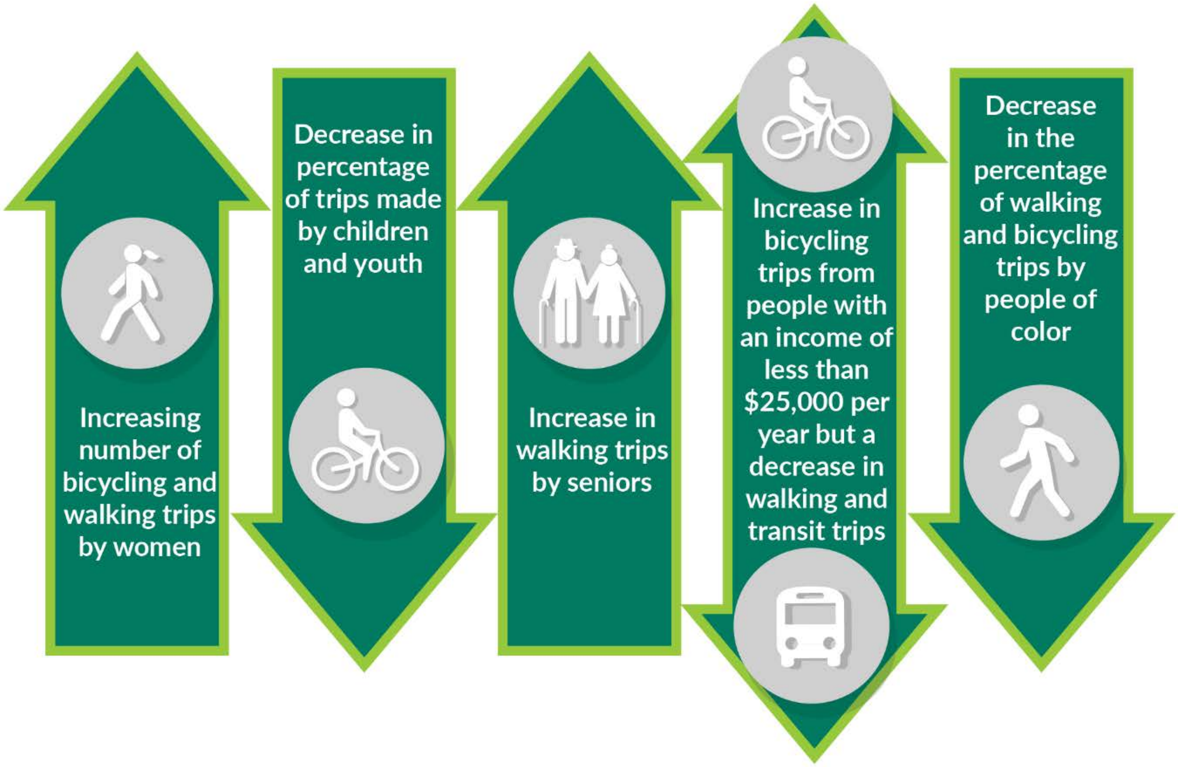

Figure 2-7: Graphic illustrating national trends in bicycle use as of 2017. Increases in bicycling and walking by women, increases in walking by seniors, increases in bicycling by people with incomes under $25,000/year. Decreases in children/youth and people of color walking or bicycling; decreases in walking and transit people with incomes under $25,000/year.

According to a 2015 study by the U.S. Bureau of Labor Statistics, 30.4 percent of Americans walk as exercise and about 3 percent ride a bicycle.[60] A more recent nationwide survey conducted in 2018 by People for Bikes found that 32 percent of Americans had ridden a bike at least once in the previous year.[61]

Data limitations

The National Household Travel Survey, U.S. Census, and American Community Survey only count the means of transportation used for the longest portion of the trip versus including each of the trip segments. These reports would count a trip where the person takes a short walk or bike ride to a transit stop as a transit trip, not a walk or bike trip.

Commuting represents less than 20 percent of the total trips people make. The other 80 percent are for purposes such as getting groceries, going to the doctor, socializing, or getting children to and from school. Commute trip data tends to bias towards trips taken by men and may not accurately capture work related trips taken by women, low income and BIPOC populations, especially those who make multi-purpose trips.

60 U.S. Department of Health and Human Services, 2015. Step It Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities.

61 People for Bikes. 2018. U.S. Bicycling Participation Report.

Commute-oriented surveys typically capture trips specific to the time period in which people take the survey. They would not identify walk or bike commute trips that would usually be part of a person's transportation use if the survey is taken during an unusual time, such as a time when the respondent is working from home or on vacation. The ACS data has a high margin of error outside of big cities. More accurate statewide estimates require large-scale, costly surveys. National surveys provide a source of information, but limited sample size means they do not provide good local or regional estimates below the state level. Lastly, it is important to remember that not all people will take a survey, which can result in a bias toward information about some subsets of the population, but not others.[62]

Active transportation in Washington

In Washington an estimated 12 percent of all trips, 9 percent of commute trips, and 1 percent of all miles traveled were made on foot or by bicycle, according to data from the 2017 National Household Travel Survey. That reflects an average increase of 4.29 percent per year (4.36 percent for walking trips and 3.75 percent for biking trips) from 2009. The state's population during this same period grew by only 1.15 percent per year on average, indicating that a larger percentage of Washingtonians are walking and biking to meet their transportation and recreational needs.[63] When ranked against other states, Washington ranks ninth for the percent of commuters walking or biking to work. In addition, while not counted as a separate trip, approximately 85 percent of public transportation users in Washington reported walking or bicycling to access transit.

> Walking and bicycling use in Washington are growing at a rate larger than the state's population increase. This means a larger percentage of Washingtonians are walking and biking to meet their transportation and recreational needs.

Counts of people walking and biking

As discussed in Chapter 3, usage counts do not provide a complete understanding of the demand for active transportation facilities, although they can be used to measure change over time. WSDOT uses two methods to collect bicyclist and pedestrian physical counts: permanent counters and short-duration counts.

WSDOT has 80 permanent pedestrian and bicyclist counters located on trails, city streets, and state routes around the state. Their purpose is to collect data 24 hours a day, seven days a week. The permanent count program uses these to identify long-term patterns in active transportation trips. This allows for the following variables to be considered:

- Surrounding land uses.
- Local weather patterns.
- Roadway geometry.
- Bicyclist/pedestrian facility types in these locations.

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62 Factors that can affect whose experiences are represented in survey results include nonresponse bias (differences between respondents and nonrespondents) and coverage bias (households left out due to the data collection methods used, such as using phone surveys of people with landline phones and leaving out non-telephone household and cell-phone-only households). Research by the Census Bureau indicated survey nonresponse can be linked to demographic characteristics such as race and ethnicity (Griffin, Deborah. N.d. Measuring Survey Nonresponse by Race and Ethnicity. U.S. Census Bureau).

63 Rates of walking and bicycling continue to increase throughout Washington. WSDOT Gray Notebook 71, Sept. 2018.

Short-duration counts may be conducted using automated equipment, typically as a pre/post project evaluation, or through manually observed and tabulated counts conducted over the course of several blocks of time on several days. The short-duration, manual-count program enlists volunteers at a much larger number of locations than the permanent counter sites; they conduct two-hour counts from 7 a.m. to 9 a.m. and from 4 p.m. to 6 p.m. on weekdays in the fall.

Count data are typically site-specific but WSDOT can use them to make estimates for the region or the state. WSDOT funded the development of a guide for best practices in conducting counts that came out in 2017 and used recommendations from the guide to make the estimates below based on the results of short-duration manual counts taken at 212 locations and permanent count data from 61 locations around the state.[64]

Based on the permanent counter data and short-duration manual counts, Washingtonians took approximately 20.5 million bicycling trips and 52.3 million walking trips (including use of mobility assistive devices) in 2018.

Figure 2-8: In 2018 Washingtonians took approximately 20.5 million bicycling trips and 52.3 million walking trips.

In 2018, the manual count volunteers tallied a total of 19,783 bicyclists, 37,966 pedestrians, and 781 other people (in-line skaters, babies in strollers, etc.) at 212 different sites (trails, city streets, and state routes) across 44 cities in Washington.

Appendix E, Usage Counts provides a more complete explanation of the methods used to extrapolate from data sources to develop the statewide estimates.

64 Collecting Network-wide Bicycle and Pedestrian Data: A Guidebook for When and Where to Count. WSDOT, 2017.

Data limitations

Manual short-duration counts rely on volunteers who may interpret directions and report results differently from one another. Permanent counters must be maintained; their batteries expire, they may be vandalized, and sometimes data is lost in the time it takes to make repairs and recalibrate.

A more complete state estimate requires much larger samples, which would cost more than available funding currently allows. Additional techniques and data sources would more fully capture when and where people walk and roll. WSDOT is evaluating sources such as smartphone apps people use to record walking, running, and bicycling, as well as other crowd-sourced data sets. Public comments on the draft plan included multiple mentions of the need for more active transportation data.

How WSDOT uses count data

Potential or latent demand refers to active transportation use that would occur if facilities were available that people could and would use. This latent demand can be estimated by determining how many places are sited relatively near each other that people could walk or bike to within a short time.[65]

> Latent demand is use that would occur if facilities were available. In other words, you don't have to count the number of people swimming across the river to justify building a bridge.

Perhaps the most important use of the walk and bike count data when it is more complete will be to determine potential crash exposure. As the count data increases or decreases it can be compared to crash data increases or decreases. State and national crash data are reported in terms of vehicle miles traveled (VMT) to calculate potential crash exposure for people driving. Because agencies do not yet have calculations for pedestrian miles traveled or bicyclist miles traveled, they report those crashes in terms of total population (per capita measures). Crash risk is thus reported differently between these various modes of transportation and cannot be directly compared. More accurate volume estimation would improve understanding of crash exposure.

Count data can also be used to track changes in walk and bike trips over time. Typically, site-specific information about where people walk/bike is used for basic active transportation planning and to prioritize projects. This is usually done by counting the number of people walking and biking to estimate "demand"—meaning actual observed usage.

Data limitations

WSDOT and other transportation agencies have historically focused on actual counts for decision making. That method does not account for barriers or places where there is a lack of infrastructure; for example, the sidewalk ends and the only option is to walk in the travel lane so fewer people use that sidewalk. It also does not account for the level of traffic stress in a place that discourages people who would otherwise use active transportation. In other words, focusing on counts of people already moving through a place does not account for the people who would be there if adequate facilities were provided.

65 Litman, Todd. 2013. Accounting for Latent Travel Demand.

Counting people who already use active transportation only provides a partial picture. This plan includes action steps to move WSDOT toward more evaluation of latent demand to understand where people could shift to walking or bicycling.

Survey of city and county count programs

In addition to the statewide count programs, local jurisdictions collect active transportation counts. WSDOT sent a survey to cities and counties in Washington asking about their count programs. The purpose of the survey was to see if the local jurisdiction data could be combined with WSDOT data to expand understanding of walking and biking trips. About half of the 116 responses indicated that they conduct regular active transportation counts; some expressed interest in obtaining permanent counters in the future. Most conduct counts on an as-needed basis according to project scopes, funding opportunities, or by request from residents. Appendix E, Usage Counts provides a complete summary of the survey results and other information on counts.

"Too many parents drive their kids to school because too many parents drive their kids to school, so now it's too many + 1."

– High school student, Major Taylor Project, Tacoma

School trips: How children are getting to and from school

Regular physical activity for Washington's children serves as a goal for both the Office of the Superintendent of Public Instruction and for the State Department of Health. Each school day, over 1.1 million students across Washington travel to and from their elementary, middle, and high school. Of those in elementary and middle schools, about 11 percent walked and 1 percent biked to school, according to results of the 2019 Washington State Student Travel Survey conducted by WSDOT and the Department of Health.[66] That represents a decrease of about 50 percent from the 2016 survey, which indicated that 17 percent of children walked, and 1.4 percent biked to school. It is not clear if the shift is due to general reductions in walking to school or survey collection differences.

In 2019, higher rates of walking and biking were found among elementary and middle school children if they attended a school:

- Within 1 mile of their home: 38 percent.
- In an urban area: 12.7 percent.
- Serving a relatively lower income population: 15 percent.
- Serving a lower percentage of Black, Indigenous, or people of color students: 12.6 percent.

Figure 2-9: Children walking on a sidewalk. Source: Pedestrian and Bicycle Information Center.

66 Longitudinal Analyses of Washington State Student Travel Surveys (trb.org).

When parents were asked why their children did not walk or bike to or from school, the highest ranked responses were 1) child is too young, 2) lack of sidewalks/pathways, 3) amount/speed of traffic, and 4) unsafe road crossings.

People with disabilities and the elderly

Not all disabled people are older and not all older people have a disability. They are discussed together here because there is some overlap in these populations in their transportation barriers and needs.

Approximately 23.5 percent of adults in Washington have some level of disability, and another 20 percent will have temporary mobility challenges at any given time.[67] People with disabilities are less likely to own or have access to vehicles than people without disabilities, and less likely to drive even if they have vehicles.[68]

As the population grows older, a certain percentage will acquire a disability, and the senses and reflexes needed for safe driving decline with age. AARP reports that drivers age 70 and older are expected to outlive their driving years—men by seven years and women by 10. By 2030 the number of Washingtonians age 70+ will grow by nearly 481,000, to approximately 1.287 million people across the state, or over 15 percent of the total population. Comfortable active transportation and access to transit can help maintain transportation independence for many of them.

Figure 2-10: The ten-year average is higher than the 2019 figure. 2010-2019, 86 percent of pedestrian and bicyclist fatalities occurred on roads with a posted speed over 25 miles per hour.

The Americans with Disabilities Act requires transportation facilities to be accessible, and WSDOT has an ADA Transition Plan approved by FHWA.[69] To make facilities ADA-accessible requires completing active transportation networks with elements such as curb cuts or ramps for wheelchair users, accessible pedestrian signals for those who are blind or have low eyesight, and trail access suitable for adaptive cycling equipment, which is usually wider than a typical two-wheeled bike. ADA accessibility might also mean allowing longer crosswalk timing at a traffic signal or other operational changes.

These kinds of complete connections improve those facilities for everyone using them, regardless of disability. A trailhead that allows a wider adaptive bike or trike also works well for someone riding a cargo or family bike or carrying large bags on a rack. Curb cuts similarly benefit everyone, not only wheelchair users; workers delivering with heavy carts, a traveler pulling a suitcase, and people pushing strollers all benefit as well.[70]

67 Centers for Disease Control and Prevention. Disability & Health U.S. State Profile Data for Washington (Adults 18+ years of age).

68 Brumbaugh, Stephen. 2018. Travel Patterns of American Adults with Disabilities. U.S. Department of Transportation, Bureau of Transportation Statistics.

69 WSDOT. 2018. WSDOT ADA / 504 Transition Plan for Public Rights of Way and Ferries.

70 The Curb-Cut Effect. Angela Glover Blackwell, 2017. Stanford Social Innovation Review.

WALKING AND BIKING TRAFFIC CRASHES

"The Target Zero plan represents a bold vision: zero deaths and serious injuries on Washington's roadways by 2030."

—Target Zero 2019

Target Zero

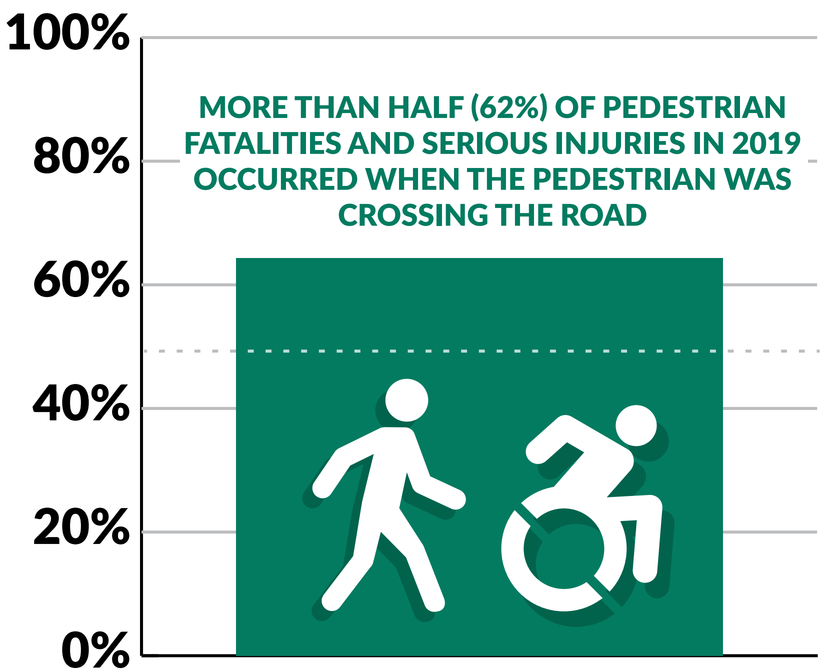

Figure 2-11: More than half (62 percent) of pedestrian fatalities and serious injuries 2010-2019 occurred when the pedestrian was crossing the road.

The 2019 update to the Strategic Highway Safety Plan, known as Target Zero, lays out the major strategies that all transportation agencies must address to achieve the state's goal of zero traffic deaths. Some of the key strategies identified in Target Zero for serious and fatal crashes involving people walking or rolling include:[71]

Speed: Most pedestrian and bicyclist fatalities (83 percent) occurred on roads with a posted speed over 25 miles per hour in 2019. For 2010-2019 the figure is 86 percent. Higher driving speed at impact results in more deaths and serious injuries. The section "Understanding speed and safety" at the end of this chapter provides additional information.

Crossings: A majority (62 percent) of pedestrian fatalities and serious injuries 2010–2019 occurred when the pedestrian was crossing the road. Crossings that are appropriately located, designed for context, and ADA-accessible are not available at all crossing locations, meaning people may have to cross in conditions that increase crash risk.

[71] Washington Traffic Safety Commission. 2019. Target Zero. Crash statistics in this section were reported in the Active Transportation Annual Safety Report in WSDOT Gray Notebook No. 78, June 2020.

Lack of separated infrastructure and incomplete networks: Providing appropriately designed, functional, and complete pedestrian networks may reduce the potential for active transportation crashes. WSDOT and other agencies do not yet have complete data, and crash reports do not always include information on what types of facilities were present or missing. Comparison of places with and without complete networks provides evidence that having continuous connections and separated facilities reduces crashes; providing separated bicycle facilities in cities reduces potential for crashes of every mode. [72]

Roadway design and operations affect the context in which people make decisions about how, when, and where to walk and bike. Sustainable or systematic safety approaches recognize that humans are fallible; that humans are physically vulnerable and the human body's tolerance to impact forces should be a guiding tool; that road safety is a shared responsibility among all who use the road system—including those who design, build, and operate the road system, not solely those using it; and that a "safe and forgiving road system" provides redundancy in the system so that when one part fails other parts will still provide protection to the road user.[73]

These protective factors are reflected in the core principles for facilities developed in a Safe System Approach, identified in the Target Zero plan as a Priority Level One strategy:[74]

- Speed control and separation.
- Functional harmony.
- Predictability and simplicity.
- Forgiveness and restrictiveness.

A self-enforcing road, also called a "self-explaining roadway," is a roadway that is planned and designed to encourage drivers to select operating speeds consistent with the posted speed limit.[75]

Strategies as described in the 2019 Target Zero Plan

Speed control and separation. Create environments that help drivers select injury minimization speeds more or less "automatically" based on the design of the facility. This reduces reliance on law enforcement for maintenance of appropriate speeds. Where lower speeds are not possible, this principle encourages greater separation between vulnerable users and vehicular traffic. Where permitted speed limits are higher, more separation is called for so vulnerable road users are not in spaces right next to high-speed traffic.

72 Wesley E. Marshall and Nicholas N. Ferenchak. 2019. Why cities with high bicycling rates are safer for all road users. Journal of Transport & Health Vol. 13. Kat Eschner. 2019. Protected bike lanes make the roads safer—even if you're in a car. Popular Science.

73 Towards Zero Foundation. The Safe System Approach.

74 Dumbaugh, Eric, Louis Merlin, Kari Signor, Wes Kumfer, Seth LaJeunesse, and Daniel Carter. Implementing Safe Systems in the United States: Guiding Principles and Lessons from International Practice. 2019. Collaborative Sciences Center for Road Safety, University of North Carolina, Chapel Hill.

75 FHWA. 2018. Self-Enforcing Roadways: A Guidance Report.

Functional harmony. Design road characteristics to be consistent with the needs of the expected road user groups and adjacent land-use context. Include appropriately spaced crossing opportunities with treatments such as markings and signals where needed.

Predictability and simplicity. Make it easier for everyone to understand how to appropriately use the roadway and interact with other users. People make fewer mistakes when they know what to expect, understand what is expected of them, and when their decisions are simple. Infrastructure and traffic control devices, such as crosswalk beacons, contribute significantly to this principle.

Forgiveness and restrictiveness. Design, operate, and use the roadway so that a simple mistake does not result in serious injury (forgiveness), and road characteristics are designed to prevent the user from making decisions that increase the likelihood of mistakes (restrictiveness). In this way, the road environment is influencing human behavior to reduce crash exposure.

Taken together the strategies and objectives outlined in this plan supports collaborative efforts by WSDOT and its partners to achieve the state's Target Zero goal, working toward implementation of a Safe System Approach. The hierarchy of controls for traffic safety shown here illustrates the foundation of this approach: emphasizing the most broadly effective measures that eliminate exposure to potential crashes and thus prevent far more injuries and deaths than relying on personal protective equipment as a last line of defense.

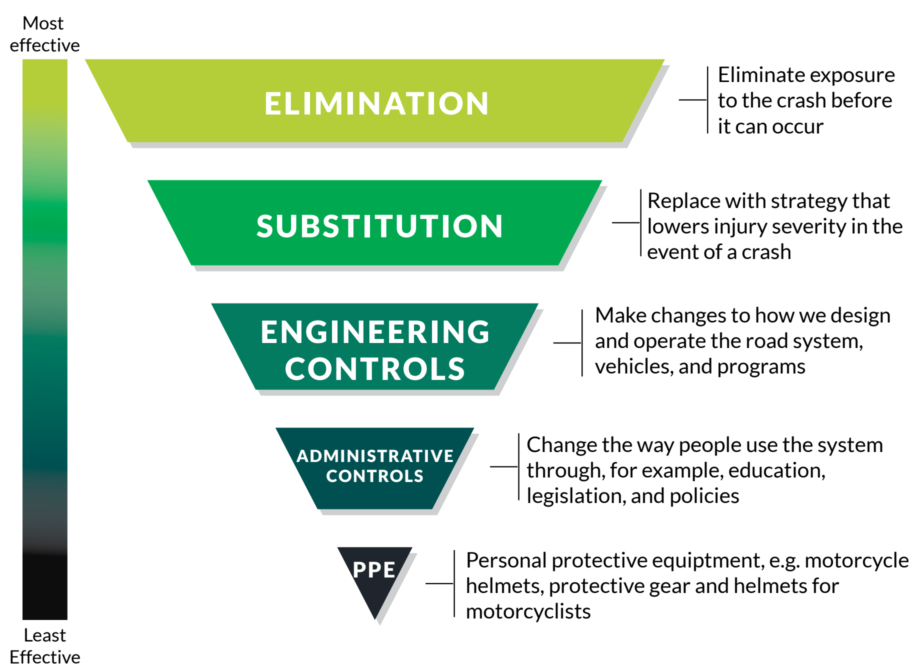

Figure 2-12: Hierarchy of Controls for Traffic Safety, adapted from Hierarchy of Controls (National Institute for Occupational Safety and Health, 2017). Transportation system examples added to original graphic.

"Drivers come zooming down the hill when someone needs to cross —they need to drive slower."

— Mountlake Terrace Girl Scout; the group conducted a walking safety audit, presented their findings to the City Council, and held a pop-up traffic safety event at the library that WSDOT staff participated in during plan outreach.

Traffic deaths

While all motor vehicle/walk/bike crashes create trauma, the focus of this plan is on those causing fatal and serious injuries. The trend for traffic deaths involving people walking and biking on Washington roadways increased over the last 10 years (2010-2019). A comparison of traffic fatalities involving pedestrians—including people in wheelchairs and those using other small rideable devices such as skateboards and scooters—shows a 62.5 percent increase from 64 in 2010 to 104 in 2019. The number of bicyclist fatalities has fluctuated over the years. Overall, the trend line indicates a 61.4 percent increase between 2010 and 2019. Population growth in Washington during the same period was only 11.86 percent; population growth alone cannot explain the steady increase in fatalities.

Increases in serious injuries and deaths of people walking or rolling over the past decade cannot simply be attributed to population growth—they have increased far more than that figure.

Figure 2-13: A "ghost bike" is placed as a memorial at a location where a driver struck and killed someone on a bicycle. Ghost bike and memorial at the site of Sher Kung's 2014 death in Seattle. Seattle Bike Blog image used by permission.

The 2008 Washington State Bicycle Facilities and Pedestrian Walkways Plan set the goal of decreasing deaths and serious injuries of people walking or rolling by 5 percent each year. The figures below show the gap between what actually happened as the number of deaths increased and what would have happened if that goal had been met each year. (WSDOT cannot identify a specific explanation for the drop in 2013.) If this benchmark of 5 percent reduction per year had been achieved, 439 people would not have died prematurely and 1,059 people would not have been seriously injured as a result of a driver hitting them.

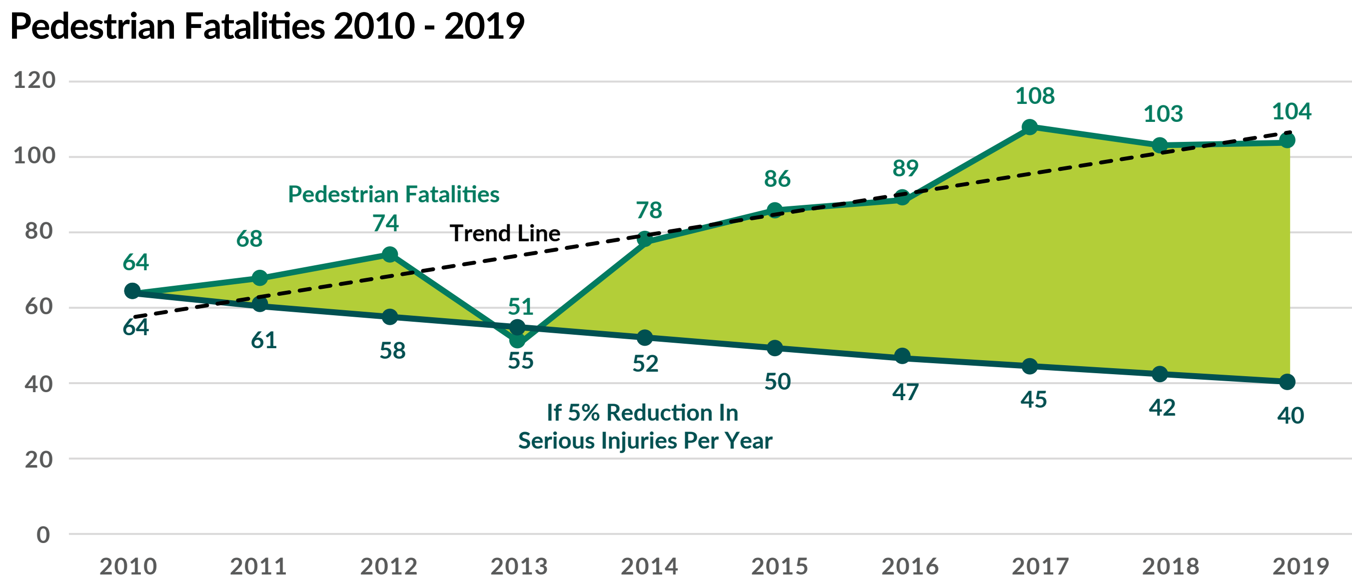

Figure 2-14: Graph of pedestrian fatalities 2010-2019 comparing actual deaths to lives that would have been spared if the state had met the goal of 5 percent reduction per year in the 2008 plan.

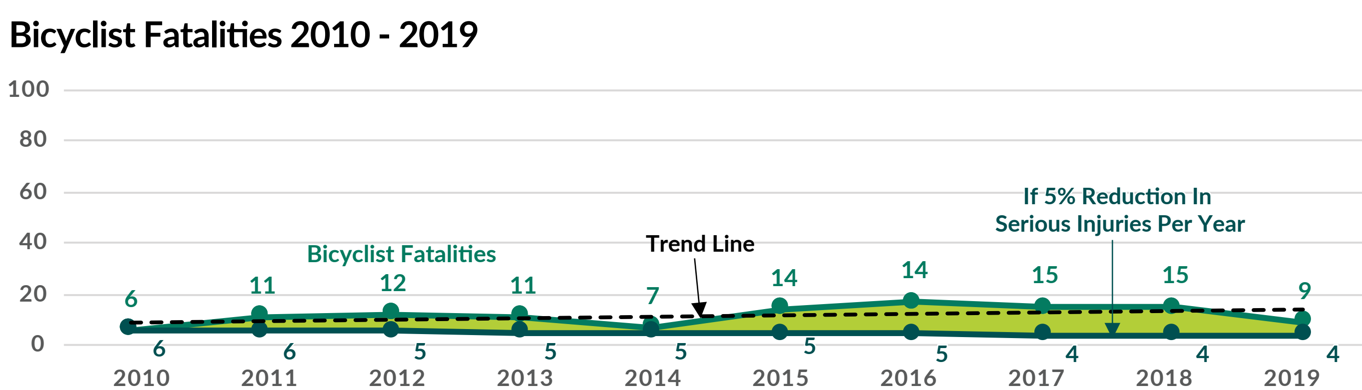

Figure 2-15: Graph of bicyclist fatalities 2010-2019 comparing actual deaths to lives that would have been spared if the state had met the goal of 5 percent reduction per year in the 2008 plan.

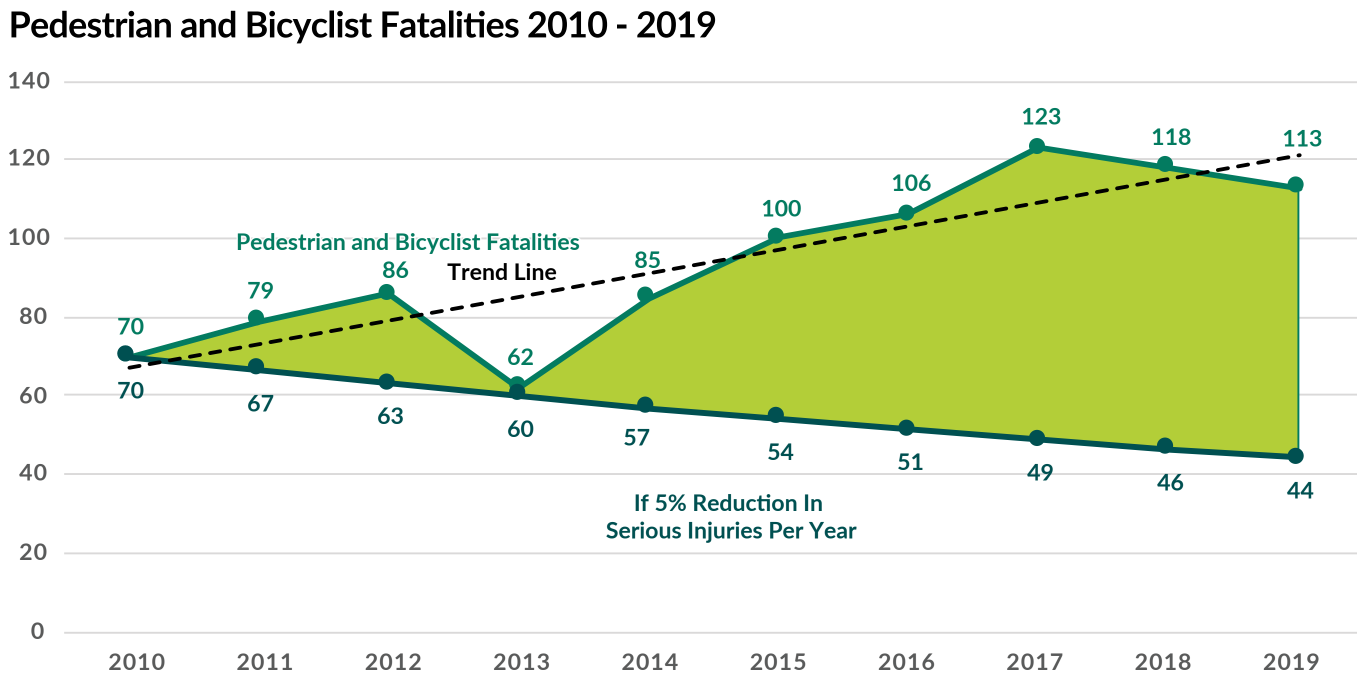

Figure 2-16: Graph of combined pedestrian and bicyclist fatalities 2010-2019 comparing actual deaths to lives that would have been spared if the state had met the goal of 5 percent reduction per year in the 2008 plan.

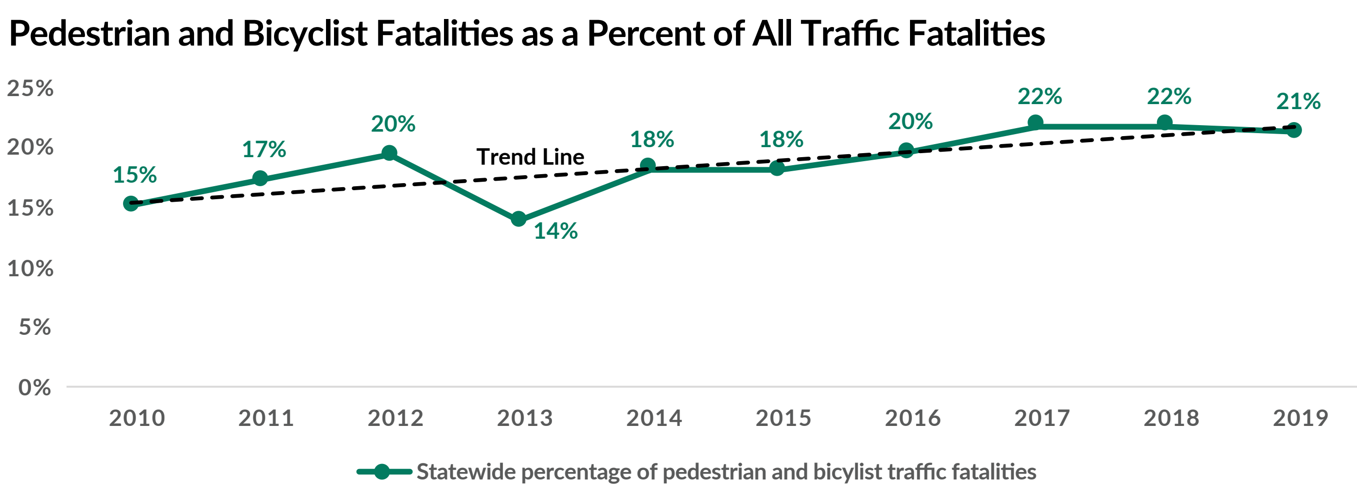

Figure 2-17: Graph of 2010-2019 pedestrian and bicyclist fatalities as a percentage of all traffic fatalities, rising from 15 percent in 2010 to 21 percent in 2019.

Serious injuries

The trend for traffic-related serious injuries to people walking and biking increased slightly over the 10-year period 2010-2019. The number of serious injuries in 2010 (408) compared to the number in 2019 (464) shows an increase of 13.7 percent; population growth in Washington state during the same period was only 11.86 percent. The number of serious injuries has gone up and down over the years, similar to the fatality pattern above.

Crashes involving people who walk and bike represented 21 percent of all fatal and serious injury traffic crashes in 2019, even though walking and biking for transportation only represents about 12 percent of all trips.

When state or national agencies report "suspected serious injuries" they are referring to specific definitions updated in 2019.[76] Crash reports sometimes use the term "suspected" serious injury because at the scene the police officer initially documents the injury severity; later medical assessment may identify a different level of injury.

For the purposes of this document, we use the term "serious injury." For the person involved, an injury that does not meet the reporting guidelines may still be serious and/or life-altering. Whether or not a person is seriously injured or dies when the driver strikes them is also affected by other factors such as whether they're in a wheelchair, their age, and other variables.[77]

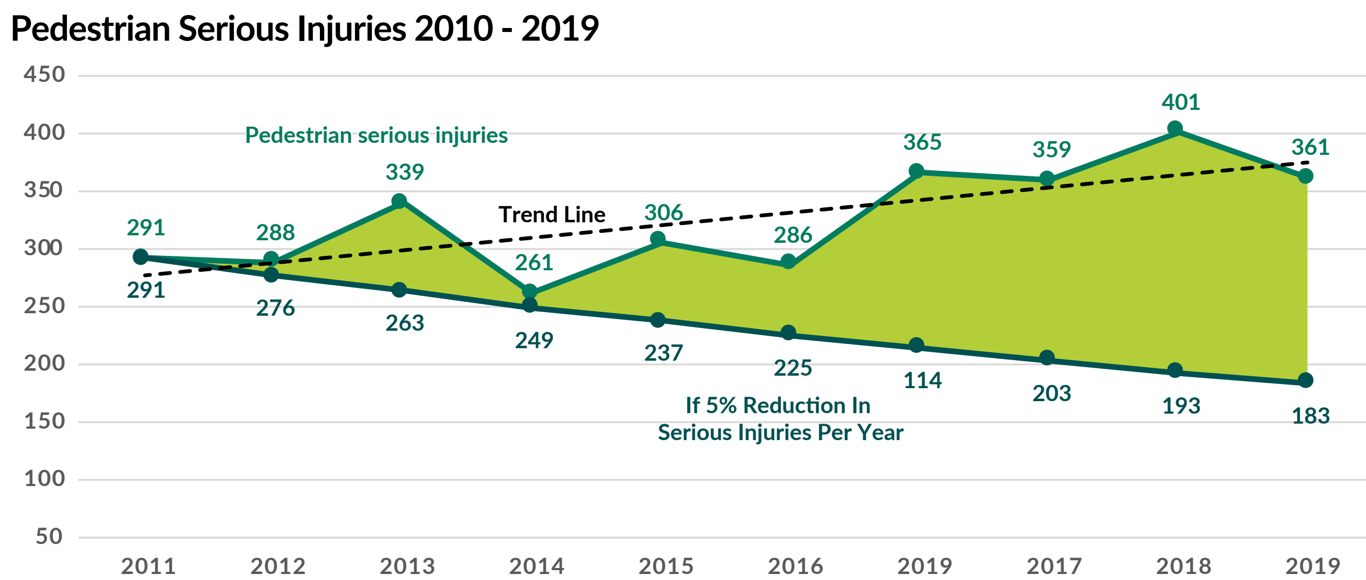

Figure 2-18: 2010-2019 pedestrian serious injuries, comparing actual figures to the 5 percent reduction goal from the 2008 plan. Actual injuries exceeded the reduction goal, rising from 291 in 2010 to 361 in 2019.

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[76] USDOT. Serious Injury Reporting. A suspected serious injury is defined in the Model Minimum Uniform Crash Criteria Guideline, 4th Edition, as any injury other than fatal that results in one or more of the following: severe laceration resulting in exposure of underlying tissues/muscle/organs or resulting in significant loss of blood; broken or distorted extremity (arm or leg); crush injuries; suspected skull, chest, or abdominal injury other than bruises or minor lacerations; significant burns (second and third degree burns over 10% or more of the body); unconsciousness when taken from the crash scene; paralysis.

[77] A national study found that wheelchair users have a 36 percent greater chance of dying when a driver strikes them. Kraemer, John D., and Connor S. Benton. 2015. Disparities in road crash mortality among pedestrians using wheelchairs in the USA: results of a capture–recapture analysis. British Medical Journal Open, Vol. 5, Issue 11. doi: 10.1136/bmjopen-2015-008396

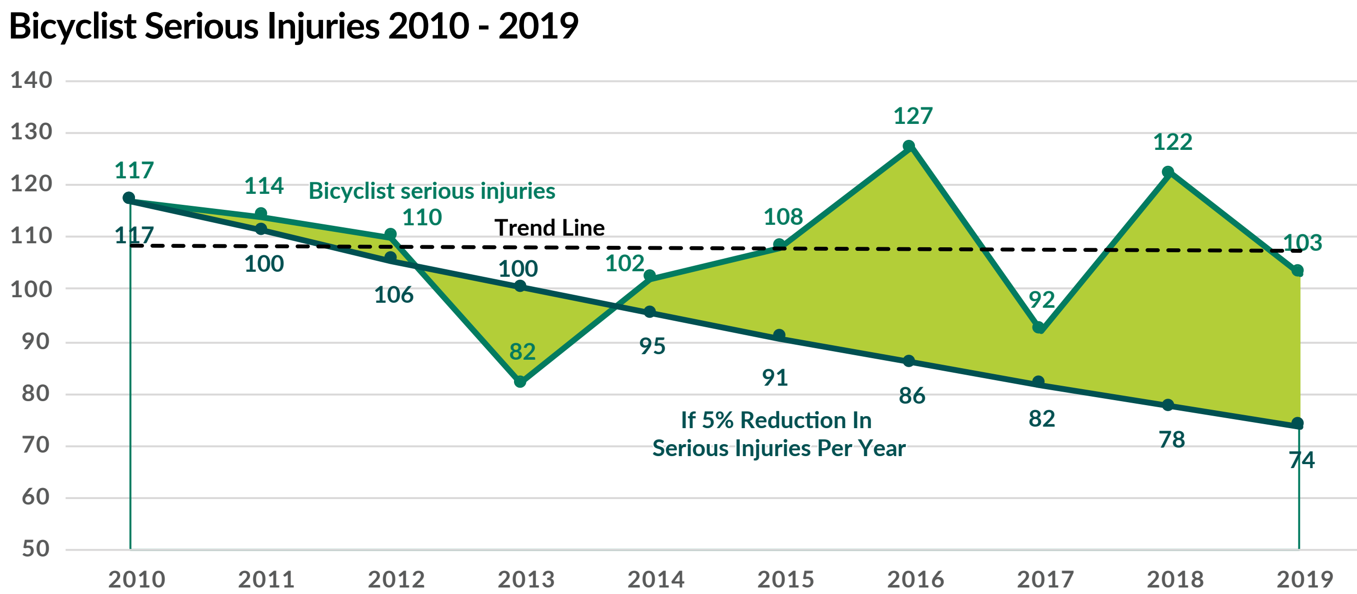

Figure 2-19: 2010-2019 bicyclist serious injuries, comparing actual figures to the 5 percent reduction goal from the 2008 plan. The total number of serious injuries vary year to year; in every year except 2013 actual injuries exceeded the reduction goal.

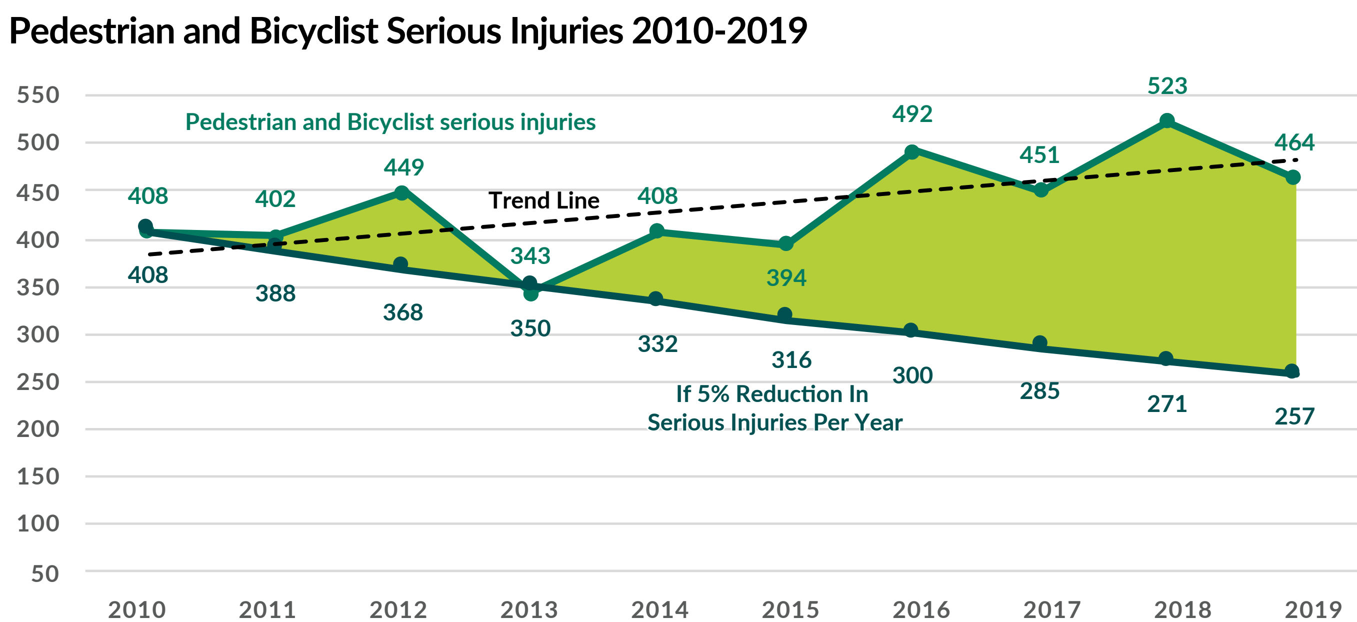

Figure 2-20: 2010-2019 pedestrian and bicyclist serious injuries, comparing actual figures to the 5 percent reduction goal from the 2008 plan. The trend of an increase in total serious injuries continues to climb.

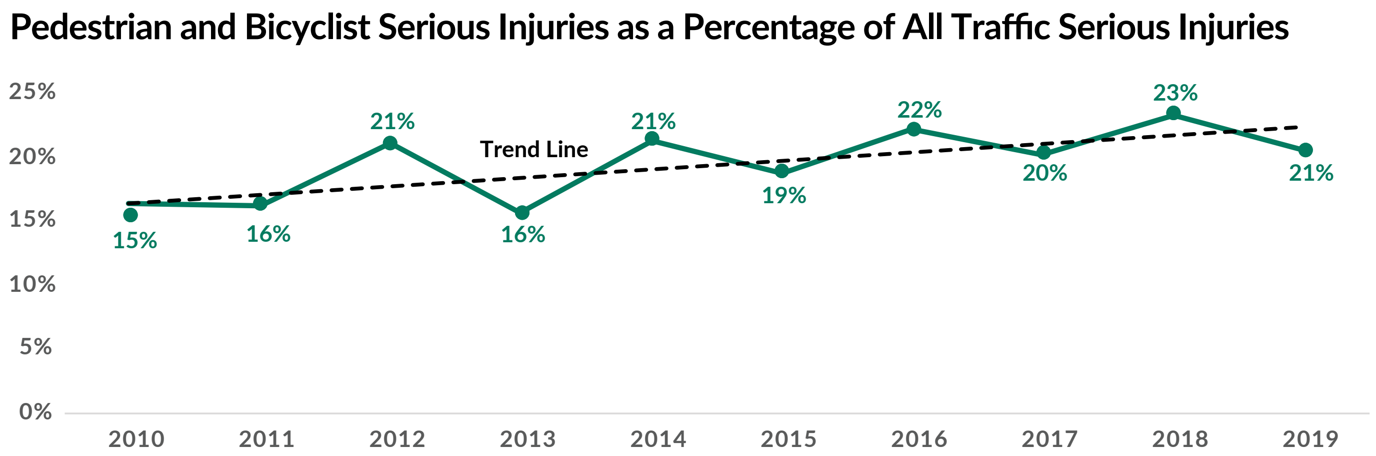

Figure 2-21: 2010-2019 pedestrian and bicyclist serious injuries as a percentage of all traffic serious injuries, rising from 15 percent in 2010 to 21 percent in 2019.

Societal value of life

While the loss of a human life is incalculable to those who have lost a loved one, there is also a substantial cost to society. To inform policy decisions, it can be instructive to assign a monetary value to human life and health. Understanding the societal value helps decision makers consider the importance of improvements that will prevent crashes.

The 110 pedestrian and bicycle fatal crashes and 464 serious injury crashes that occurred in Washington in 2019 had a societal value of $1.965 billion.

The USDOT provides guidance for calculating the value of lives saved and injuries prevented.[78] The calculation represents what people would be willing to pay for safety improvements (reductions in risk) that would prevent a death, known as the Value of a Statistical Life (VSL). Using this methodology, the 110 pedestrian and bicycle fatal crashes and 464 serious injury crashes that occurred in Washington in 2019 had a societal value of $1.965 billion.

Data limitations

Crash data in this plan rely on police reports of traffic collisions that involve a motorist and someone defined as a pedestrian or bicyclist. WSDOT's Crash Data and Reporting Branch analyzes the raw data and adds additional safety and engineering information to the crash record to enable analysis of contributing factors. However, this leaves out a number of categories: crashes between two active transportation users, crashes that take place away from a public roadway and do not involve a police report, and single-user crashes such as a bicyclist colliding with a bollard on a trail, among others. [79] Traffic fatality statistics thus undercount people killed by crashes. The National Safety Council estimates that parking lot deaths alone may amount to nearly 3,000 crash deaths per year nationwide.[80]

78 USDOT. Revised Departmental Guidance on Valuation of a Statistical Life in Economic Analysis.

79 NHTSA. 2012. Not-in-Traffic Surveillance: Fatality and Injury Statistics in Nontraffic Crashes, 2008 to 2011.

80 CBS News. 2016. Why hundreds are killed in crashes in parking lots and garages every year.

Studies done in other countries reveal that these crash types result in significant injuries and loss of life. A study of Swedish hospital data enabled analysis of contributing factors when a bicyclist crashes with no motorist involvement. Crash injuries of people walking or bicycling with no one else involved were as common as driver/driver collisions. In bicyclist serious injuries, operations and maintenance were major factors along with design.[81] Another study found that three times as many people were injured walking in icy conditions in Sweden as compared with driving crashes, and the cost of those injuries far exceeded the cost of snow clearance.[82]

The Cooper Jones Active Transportation Safety Council is charged with identifying data gaps and making recommendations to the legislature about how these can be addressed. The Washington Traffic Safety Commission provides a grant to the Department of Health to monitor emergency room visits related to active transportation, including injuries not involving motor vehicles. A grant has also been provided to the Office of Financial Management to link and compare emergency room visits to police-reported crashes, providing a much more accurate depiction of injury burden. Future updates to this plan may be able to address additional crash types through these and other efforts.

Using crash data to measure safety performance leaves out other factors that affect whether someone feels safe or is safe from potential harm for reasons beyond roadway design, such as being targeted for harassment because of their race, gender, or other characteristics. This plan rests on the federal performance measure directly related to crashes for now, recognizing that the broader definition of safety plays an essential role that needs to be addressed.

Crash locations and demographics

Locations

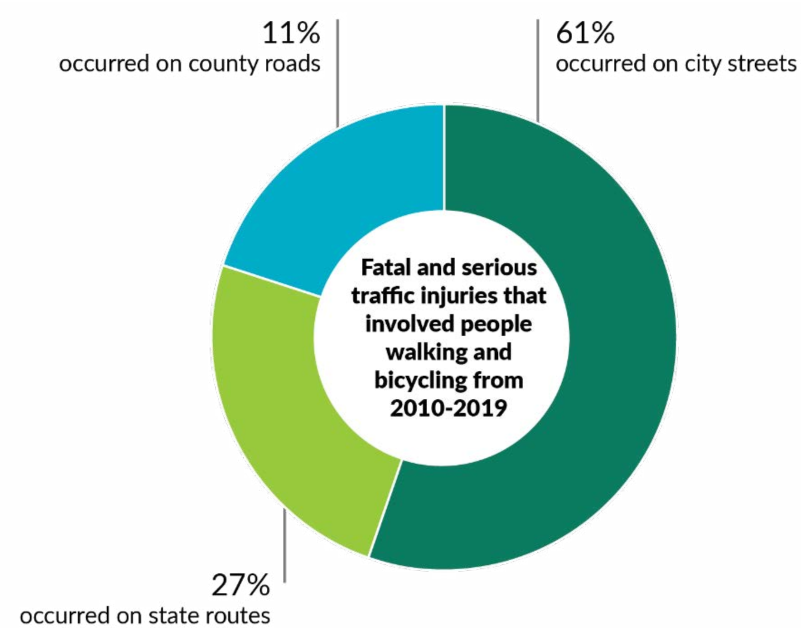

Figure 2-22: Locations of fatal and serious-injury crashes involving people walking or bicycling 2010-2019.

81 Statistics shared at the Transportation Research Board Annual Meeting, bicyclist/pedestrian research subcommittee, 2019. Relevant papers: Värnild, A., Larm, P. & Tillgren, P. (2019). Incidence of seriously injured road users in a Swedish region, 2003–2014, from the perspective of a national road safety policy. *BMC Public Health* 19, 1576 (2019). https://doi.org/10.1186/s12889-019-7937-0. A. Värnild, P. Tillgren, P. Larm. (2020). What types of injuries did seriously injured pedestrians and cyclists receive in a Swedish urban region in the time period 2003–2017 when Vision Zero was implemented? Public Health 181, pp. 59-64. https://doi.org/10.1016/j.puhe.2019.11.019.

82 Schmitt, Angie. (2018). Why Sweden Clears Snow-Covered Walkways Before Roads. Streetsblog USA, Jan. 24.

The highest number of crashes occur on city streets: Even though city streets make up only about 21 percent of the miles of road in Washington, 61 percent of fatal and serious traffic injuries that involved people walking and bicycling from 2010-2019 occurred on city streets. Twenty-seven percent of these crashes occurred on state routes, which make up about 9 percent of miles of road. Eleven percent occurred on county roads which make up about 49 percent of miles of road. The higher incidence for city streets reflects the shorter distances between destinations in populated areas, which leads to greater use of active transportation. It is also a measure of exposure in that more populated areas have larger concentrations of pedestrians, bicyclists, and motorists.[83]

State routes in population centers experience an over-representation of fatalities and serious injuries compared with state routes in rural areas. Of the 27 percent of serious injuries/fatalities that occurred on a state route between 2010 and 2019, 83 percent were in population centers (cities, towns, and census-designated places). Only about 24 percent of all state route center-line lane miles (1,658 miles) go through a population center. Most of the fatalities on state routes—97 percent—occurred on state routes with a posted speed of 30 mph or greater. Only about 6 percent of state route lane miles in population centers have a posted speed of 25 mph or less.

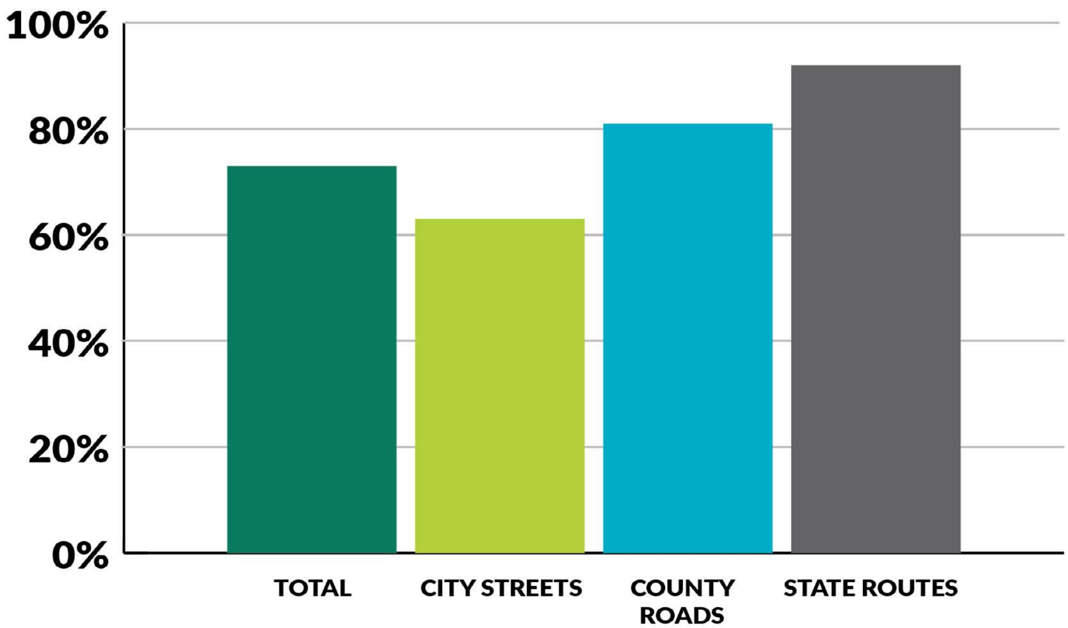

Figure 2-23: Percent of fatal and serious injury crashes by jurisdiction where the posted speed is above 30 mph, 2010-2019. City streets, 63 percent; county roads, 81 percent; state routes, 92 percent. Cities have a much higher percentage of lower speed roads than counties or the state system, so proportionally the city percentage is quite high.

Demographic characteristics of people killed or injured

WSDOT examines demographic information based on available data for people who are killed or seriously injured. This analysis is important for exploring patterns in crashes so the agency and partners can develop strategies to reduce crash potential in Washington. Available information does not always permit conclusions about why certain groups experience crashes out of proportion to their number in the general population.

83 About 21 percent of centerline miles are Forest Service roads, private roads, roads in state parks, etc. and the percentages above do not add to 100 percent. If we only count city, county, and state road types, state routes make up 11 percent, city streets 27 percent, and county roads 62 percent.

Age

In proportion to their representation in the population, people in their 20s are more likely to be killed or seriously injured while walking or bicycling. This demographic made up 14 percent of the total population but was involved in 18 percent of all pedestrian and bicyclist fatal and serious injury crashes.

Compared to other age groups, children/youth and older people were less likely to be killed or seriously injured when walking or bicycling over the past decade. Children ages 19 and younger comprised 25 percent of the total Washington population but made up 18.6 percent of pedestrian or bicyclist fatalities and serious injuries. People 65 years and older are also underrepresented; they made up 15 percent of the total population and were involved in 13.6 percent of fatal and serious injury pedestrian and bicyclist crashes. This finding in Washington runs counter to national trends; teens and older people are overrepresented in traffic fatalities nationwide.

Gender

As currently collected, data on gender assumes a binary distribution so WSDOT reports it that way. More men than women were involved in pedestrian and bicyclist related fatal and serious injury crashes. Between 2010 and 2019 about 67 percent of them were men and 33 percent were women. This parallels the figures for motor vehicle crashes.[84]

WSDOT does not have state-level data on mode use by gender. At the national level, commute to work data and the National Household Travel Survey both show that women are underrepresented among people who bicycle relative to their proportion in the population, but not among people who walk.[85] Given that the numbers of pedestrian crashes are much higher than those of bicyclists, this seems to suggest that men are overrepresented in pedestrian serious injuries and fatalities.

Income levels in crash locations

Traffic crash data do not include the income level of someone killed or injured in a crash. WSDOT therefore examines demographic characteristics around crash locations to identify possible equity concerns tied to differences between neighborhoods.

This analysis by place serves as a proxy for the crash exposure of people who live in that area. One study found that for the majority of pedestrians and bicyclists injured or killed in traffic crashes, the crash occurred less than a mile and a half from their home, which reflects past studies about where drivers crash.[86] Researchers have found relationships between low-income neighborhoods and crashes; lower-income neighborhoods tend to have less infrastructure dedicated to walking and bicycling and more people who do not own a personal vehicle.[87] People living in poverty also include an over-representation of other vulnerable groups, such as people who are older or disabled who are more likely to experience severe or fatal trauma in a crash.

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84 Insurance Institute for Highway Safety. 2018. Fatality Facts 2018.

85 League of American Bicyclists, 2018. Benchmarking Report on Bicycling and Walking in the United States: Demographics of Active Transportation.

86 Barbara Haas et al. 2015. Close to home: An analysis of the relationship between location of residence and location of injury. Journal of Trauma and Acute Care Surgery. J Trauma Acute Care Surg. 2015 Apr; 78(4): 860–865.doi: 10.1097/TA.0000000000000595

87 Patrick Morency, Lise Gauvin, Céline Plante, Michel Fournier, and Catherine Morency. 2012. Neighborhood Social Inequalities in Road Traffic Injuries: The Influence of Traffic Volume and Road Design. American Journal of Public Health 102, 1112_1119, https://doi.org/10.2105/AJPH.2011.300528

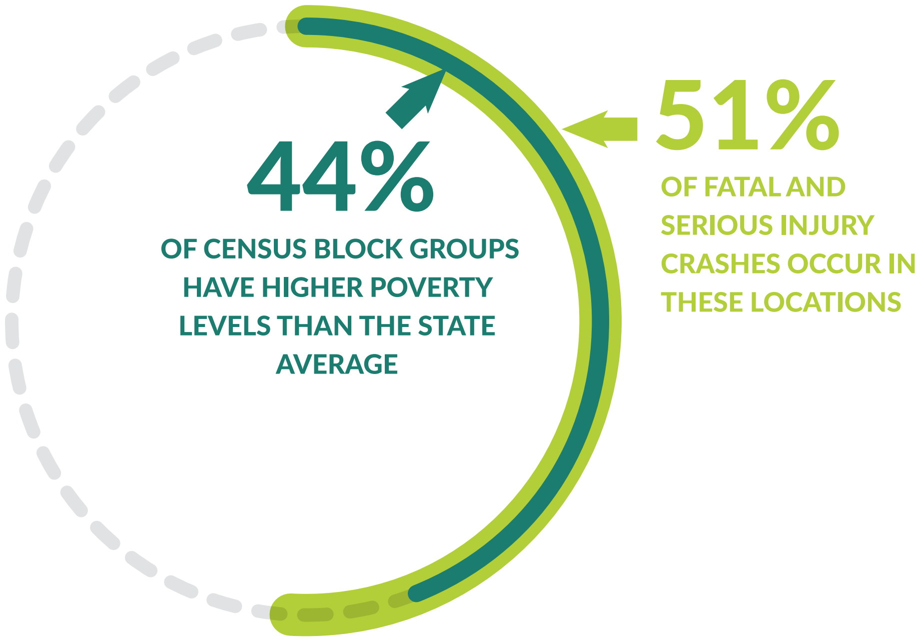

Figure 2-24: 44 percent of census block groups have poverty rates higher than the state average; 51 percent of fatal and serious injury crashes occur in these locations.

For population studies, the state is divided into census block groups (a geographic unit typically between 600-3,000 people). In Washington, about 44 percent of census block groups have higher poverty levels than the state average. About 51 percent of fatal and serious injury crashes occur in these locations, meaning that people are seriously injured or killed in crashes in these neighborhoods in disproportionate numbers.

Race and ethnicity in crash locations

About 33 percent of fatal and serious injuries occurred in census blocks where the percentage of the population that is Black, Indigenous, and/or people of color was greater than the state average. This is out of proportion to the representation of these races/ethnicities; those census blocks only represent 24 percent of all census blocks.

From 2013 to 2017, American Indian or Alaska Native people represented 2 percent of the total population yet accounted for 6 percent of active transportation traffic fatalities in Washington. This matches a national trend.[88] In contrast, white people are underrepresented; 2013-2017 they represent 81 percent of the population but 74 percent of pedestrian- or bicyclist-related traffic fatalities.[89] National studies have found racial bias in driver yielding behavior; no Washington-specific data are available.[90]

88 Schmitt, Angie. 2019. Native American Pedestrians Have Highest Death Rate. Streetsblog USA. Kathryn S. Quick and Guillermo E. Narváez. 2019. Understanding Roadway Safety in American Indian Reservations: Perceptions and Management of Risk by Community, Tribal Governments, and Other Safety Leaders. Roadway Safety Institute.

89 WSDOT. 2018. Active Transportation Safety Report. Gray Notebook 69.

90 Goddard, Tara, Kimberly Barsamian Kahn, and Arlie Adkins. 2015. Racial bias in driver yielding behavior at crosswalks. Transportation Research Part F: Traffic Psychology and Behaviour, Vol. 33, August, pp. 1-6. Kahn, Kimberly. 2017. Racial Bias in Drivers' Yielding Behavior at Crosswalks: Understanding the Effect. National Institute for Transportation and Communities.

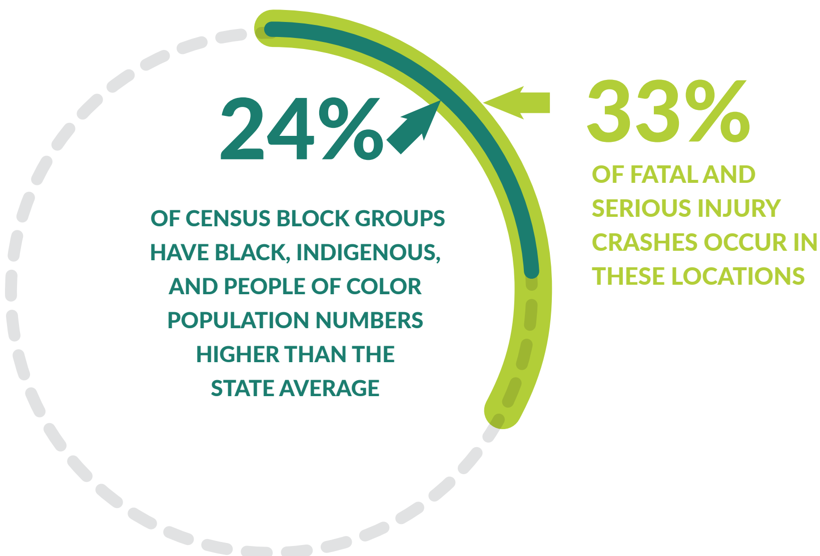

Figure 2-25: 24 percent of census block groups have Black, Indigenous, and people of color population numbers higher than the state average; 33 percent of fatal and serious injury crashes occur in these locations.

Disability

Whether or not a crash victim has a disability is not usually reported in the Police Traffic Collision Report, but it does have a field to record if the person was using a wheelchair. Between 2010 and 2019 a total of 69, or 1.7 percent, of pedestrian suspected serious and fatal injuries involved a person in a wheelchair. About a third of them died. There is no way to analyze the reports to identify other patterns that may exist for people who have low or no eyesight, hearing loss, or any other type of disability. The only national study of its kind looking at disability data found that wheelchair users have a 36 percent greater chance of dying in a crash.[91]

TAKEAWAYS FROM CHAPTER 2

The people of Washington are interested in active transportation and want more reasonably safe options that provide opportunities to get to their destinations. Many data gaps exist, especially as they relate to the numbers of people walking and biking, who is walking/biking and where. This information is needed to better understand changes over time and crash trends associated with walking and biking. The number of pedestrian and bicyclist fatal and serious injury crashes is increasing. Fatal and serious injury collisions are more likely to occur on higher speed roads in population centers. They are also overrepresented in census blocks where there are higher percentages of Black, Indigenous and people of color as well as those with higher poverty levels than the state average compared to other census blocks. Lastly, additional walking and biking infrastructure investments will yield many benefits—not least of all, serving the needs of the people of Washington.

91 Kraemer, John D., and Connor S. Benton. 2015. Disparities in road crash mortality among pedestrians using wheelchairs in the USA: results of a capture–recapture analysis. British Medical Journal Open, Vol. 5, Issue 11. doi: 10.1136/bmjopen-2015-008396. The study also found that in 75 percent of these crashes, there was no indication that the driver made an attempt to brake or otherwise avoid the collision.

UNDERSTANDING SPEED AND SAFETY

Kinetic Energy = ½ mv². This equation, taught in high school physics class, suggests the importance of driving velocity (speed) on crash outcomes of an impact. Clearly a more massive vehicle is going to make things worse too. Many factors are involved in any given crash in terms of how much of that energy transfers to the body of a pedestrian or bicyclist, but the exponent on velocity shows how critical speed is to the discussion. Even a small increase in speed creates a much harder hit. Reduce the driver's speed and the effect is to reduce the amount of energy they carry into that equation. This plan discusses the use of speed management to reduce both the number of crashes that occur and their severity for everyone involved—in particular, for those most vulnerable to the impact because they are not protected by a vehicle around them.

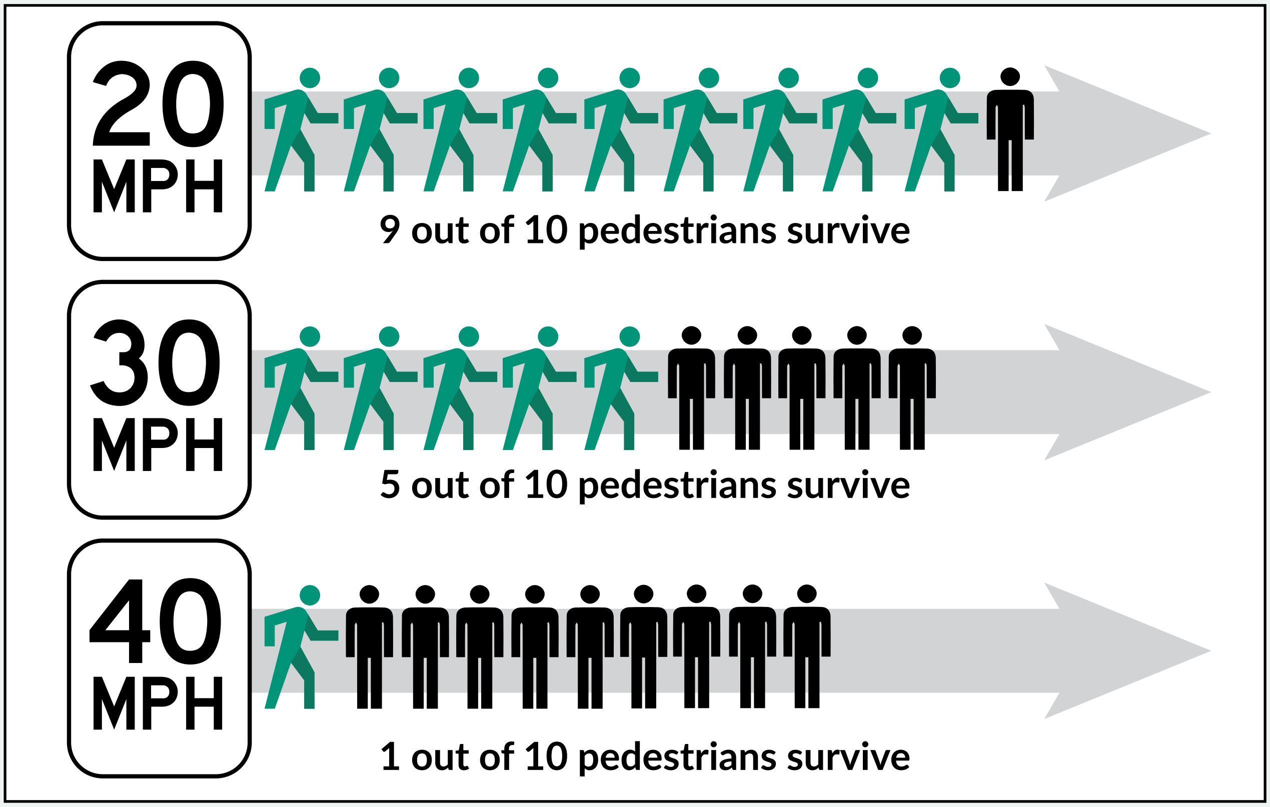

Figure 2-26: When hit by a motorist at 20 mph a pedestrian has a 90 percent chance of survival versus only a 10 percent chance at 40 mph. Target Zero 2019

In addition to the increased impact potential for higher speeds, other factors come into play. At higher speeds motorists are less able to react in time and avoid crashes. Their field of vision narrows as speed increases. This means they are less able to see people entering the street to cross, as one example of how this increases the chances that they will hit someone.

Figure 2-27: A driver's visual field narrows as driving speed increases. A mistake at 40 mph has significantly greater consequences than one at 25 mph. Image: NACTO.

Adding to the question of whether a driver sees someone at all, stopping the vehicle involves both human reaction time and the time required for the physical action of the brakes. The graph below illustrates that combination. At 45 mph the combined reaction time and braking distance is around 10 car lengths. At 60 mph stopping distance is more than a football field (300 feet) in length.

Posted speed: The maximum legal speed as posted on a street, road, or highway using regulatory signs.

Operating speed: The average speed at which most drivers travel in a given roadway segment, regardless of posted speed, under free flow conditions.

Target speed: The intended speed for a roadway segment regardless of current posted or design speed. Speed management measures may be applied to reduce operating speed to the target speed.

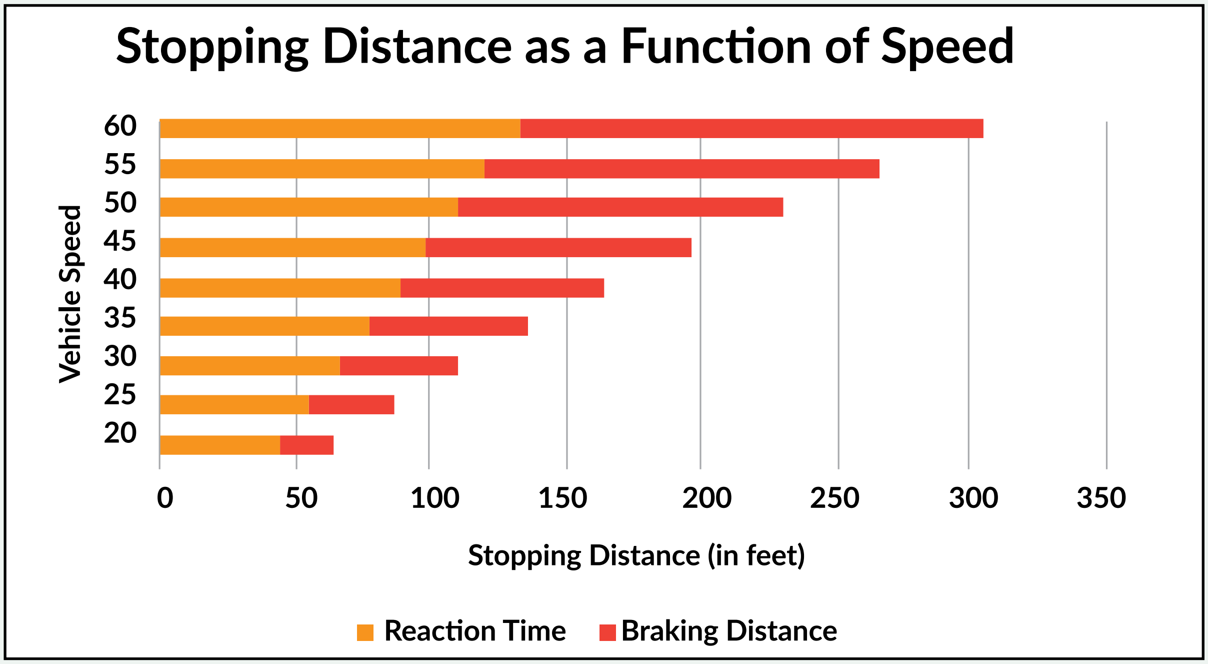

Figure 2-28: Total stopping distance primarily depends on driving speed (vehicle mass may also be a factor). When conflicts between motorists and pedestrians or bicyclists occur, the distance it takes for the driver to stop the vehicle is a critical factor in the outcome. In this chart the total stopping distance includes both reaction time (shown in orange) and braking distance (shown in red).[92]

Speed is also a factor for people trying to cross roadways. Research shows that pedestrians underestimate driving speeds[93] and usually make crossing decisions based on how far away a vehicle is rather than how fast the driver is going.[94] Although the literature did not capture underestimation issues for bicyclists, it is likely that they are also prone to similar misjudgments of vehicle speed. Seattle has reported a 22 percent reduction in crashes as a result of their work to lower vehicle speeds to 25 mph by lowering the speed limit and adding additional speed limit signs.[95]

Study after study points to driving speed as a critical factor in the ongoing increase in traffic deaths, particularly for those walking or rolling.[96] Where driving speeds cannot or should not be reduced, providing separated facilities reduces the chance of a deadly outcome.

92 Chart based on data from University of Pennsylvania School of Engineering. Vehicle Stopping Distance and Time. Philadelphia, PA.

93 Papić, Zoran, Andrijana Jović, Milan Simeunović, Nenad Saulić, Milan Lazarević. 2020. Underestimation tendencies of vehicle speed by pedestrians when crossing unmarked roadway. Accident Analysis & Prevention, Volume 143, DOI: https://doi.org/10.1016/j.aap.2020.105586.

94 Yannis, G., E. Papadimitriou & A. Theofilatos. 2013. Pedestrian gap acceptance for mid-block street crossing. Transportation Planning and Technology, 36:5, 450-462, DOI: 10.1080/03081060.2013.818274

95 Seattle Department of Transportation. Seattle Speed Limit Case Studies Report. July 2020.

96 Governors Highway Safety Association. 2021. Pedestrian Traffic Fatalities by State: 2020 Preliminary Data. Governors Highway Safety Association. 2019. Speeding Away from Zero: Rethinking a Forgotten Traffic Safety Challenge. National Transportation Safety Board. 2017). Reducing Speeding-Related Crashes Involving Passenger Vehicles. Safety Study NTSB/SS-17/01. Washington DC. National Safety Council. 2021. Motor Vehicle Deaths in 2020 Estimated to be Highest in 13 Years, Despite Dramatic Drops in Miles Driven. Insurance Institute for Highway Safety. 2018. Study highlights rising pedestrian deaths, points toward solutions. Hussain, Q., Feng, H., Grzebieta, R., Brijs, T., Olivier, J., 2019. The relationship between impact speed and the probability of pedestrian fatality during a vehicle-pedestrian crash: A systematic review and meta-analysis. Accid. Anal. Prev. 129, 241–249. Sam D. Doecke, Craig N. Kloeden, Jeffrey K. Dutschke and Matthew R. J. Baldock. 2018. Safe speed limits for a safe system: The relationship between speed limit and fatal crash rate for different crash types. Traffic Injury Prevention, 19:4, 404-408, DOI: 10.1080/15389588.2017.1422601.

Chapter 3
UNDERSTANDING THE SYSTEM, NETWORKS, AND NEEDS

INTRODUCTION

Part A of this chapter describes how WSDOT analyzed active transportation connections on the state system as a core element of this plan. Part B looks at existing facilities and statewide needs for tracking and monitoring active transportation assets.

WSDOT set out to understand and describe travel needs for active transportation. For this plan, active transportation travel need has been defined generally as the need to travel in a given direction in order to reach various destinations by walking, biking, or rolling. This contrasts with defining a specific purpose for active transportation such as commuting or even getting exercise. While a given roadway might align with an active transportation travel need, it may not be the best option to serve that need depending on design, context, traffic volumes, and other variables.

WSDOT's analysis in this plan focuses on state routes and the role they play in the overall network. In the past, WSDOT has not analyzed state highways for how well they serve the needs of people walking and bicycling across jurisdictions. Local jurisdictions generally do not plan for changes to state routes they do not manage; WSDOT policy is to review local plans when a state route passes through a local jurisdiction. Additionally, a project team only evaluates the locations they are working on, not the broader context of walk/bike connectivity. Yet the design and operations of state highways affect whether the local networks work well for people walking and rolling on, near, and across those roads. This plan begins the process of bringing the pieces together to understand the entire network. The intent for the future is to work closely with WSDOT's partners for more in-depth planning.

WSDOT chose level of traffic stress (LTS, developed by the Mineta Transportation Institute and discussed below under New Methods for Making Decisions) as the best measure available to describe current bicycle and pedestrian network quality and identify gaps and issues to address in the future. Many agencies across the United States have adopted and adapted level of traffic stress methods to describe the quality, safety, and comfort of a network based on characteristics that the agency can measure objectively. State departments of transportation applying some form of LTS analysis include Colorado and Oregon, among others. Several jurisdictions in Washington already apply some version of this approach including Spokane, Seattle, and Bellevue. Other jurisdictions have developed area bike maps that seek to capture elements of LTS, including maps for Skagit County and the Wenatchee Valley.

This plan does not identify specific changes or designs by location. WSDOT will address that work through the regular process of corridor studies and plans, project scoping and development, and everyday activities such as scheduled maintenance (Figure 3-1 provides a simplified illustration of the many planning and project development processes). The information from this plan should be factored into all these processes and more as WSDOT coordinates with local, regional, and other state agencies.

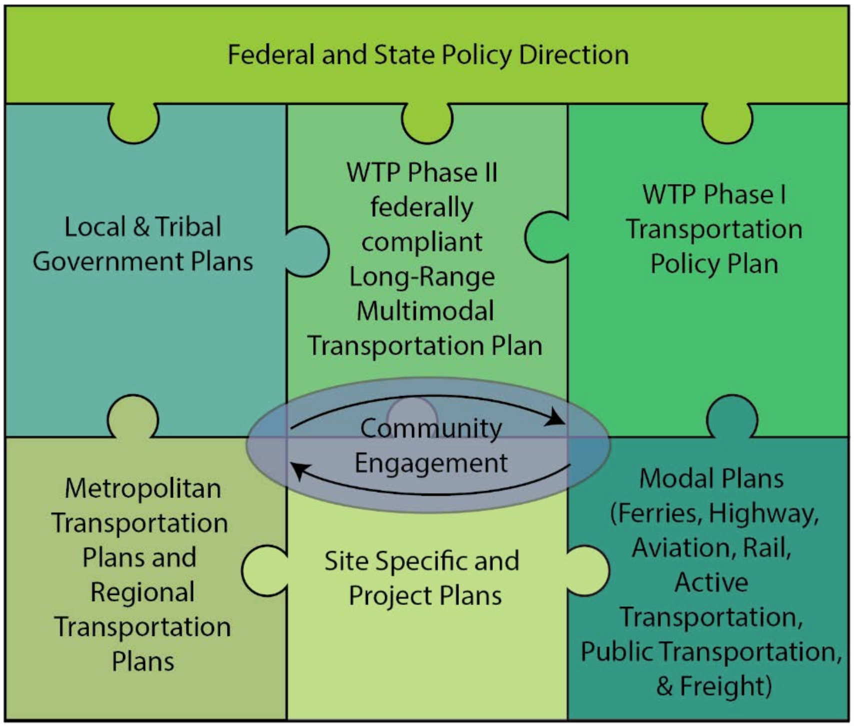

Figure 3-1: Public input is very important for local, regional, and statewide planning that affects active transportation. Project development is also based on state and national guidance documents and the practical solutions process. "WTP" refers to the Washington Transportation Plan.

PARTNERSHIPS TO FIND SOLUTIONS THAT COMPLETE THE NETWORK

In 2009, Island County identified a conceptual trail alignment adjacent to state routes 20 and 525 on Whidbey Island. This "Whidbey Isle Trail" extends from Deception Pass to the Clinton Ferry Terminal. The concept guided development of trail segments serving the population centers of Coupeville and Freeland. Those segments built in partnership with WSDOT offer low traffic stress active travel options along the corridor.

In 2018, Island County identified additional segments associated with the conceptual alignment in their Non-Motorized Trails Plan. One segment, the Goldie Street to Hoffman Road project, was approved for funding. This segment idea came about through conversations between staff from Island County and Naval Air Station Whidbey Island. The Navy was interested in helping the county locate trail opportunities that allowed sailors to bike to work and people to see some of the impressive naval aircraft monuments at the north end of Oak Harbor.

Further discussion with the City of Oak Harbor identified a potential alignment along State Route 20 that would serve low-income communities connecting to services, residents looking for recreational facilities, and visitors to Whidbey Island. A fourth partner, WSDOT, would provide most of the needed right of way.

When agencies work together, they can generate innovative ideas and overcome barriers that a single agency would not be equipped to address. WSDOT recognizes that many state network solutions do not start with the state agency. Often, local partners are best suited to the job of identifying creative ways to use the state system for everyone's benefit.

Cost-effective and efficient practical solutions require consultation with partner agencies and alignment with local plans and projects. After developing and testing the LTS method on state routes, WSDOT conducted an additional test with local data from two non-WSDOT planning contexts. The contexts included one that is more urban (City of Seattle) and one that is more rural (Walla Walla Valley region). WSDOT did this to learn how this approach can be extended in the future to help identify the best possible connections through a corridor that includes a state route. Understanding how the pieces fit together, with every agency working on a shared plan, will enable the right partners to make the right improvements in the right places. Appendix D, Methods of Analysis, provides more detail on LTS and describes this supplemental analysis.

The project team needed to determine whether WSDOT's analytical approach worked to identify the main issues. WSDOT staff asked for input from local agency partners and the public regarding the principles and approaches the agency was developing. Outreach and engagement (described in more detail in Chapter 2 and Appendix C, Outreach and Engagement) allowed members of the public to provide information on changes that would make it possible for them to increase their walking, rolling, and bicycling. The barriers and issues they identified align with the approach WSDOT has taken in this plan to identify needed improvements. The online open house available to the public September through December 2019 included an early draft of the results of the analysis and offered an opportunity for feedback.

The following sections in Chapter 3 provide an overview of new methods for analyzing the state highway network for active transportation. Technical details about the methods used appear in the appendices.

PART A: A NEW DIRECTION FOR DATA-BASED DECISION MAKING

Counting vehicles (also known as user demand) is a well-tested decision-making tool for assessing the needs of motorists. However, the same type of approach cannot be applied to active transportation decision making at present. User demand ignores the real question of whether it is possible or desirable for people to be there at all. In a transportation system primarily built for high-speed auto travel, counts of people walking and biking will not indicate true levels of desire and need.

> In a transportation system primarily built for high-speed auto travel, counts of people walking and biking today will not indicate need. Past planning practices have often not addressed travel need adequately for active transportation for a variety of reasons. Planning and providing safer and more direct connections will help address expectations with respect to both current and potential demand.

Incomplete connections prevent active travelers from reaching the places they need to go, so user counts remain low even when the need for travel is high. Therefore, in making decisions about where to locate active transportation changes, a focus on safe and direct connections will have the greatest effect on both existing and future demand.

Active transportation today is in approximately the same state as motoring was around 1910, before good roads had been built everywhere. In fact, bicyclists launched the Good Roads Movement in the United States to advocate for improved roads between cities back when those roads were dirt or gravel.[97] Going back further in time, roads themselves often followed paths created as the continent's first inhabitants sought water, food, and other resources.[98] Many roads in a sense thus reflect walking as the original transportation mode.

Measuring demand by counts often drives decisions concerning changes to the system, but those changes tend to further accommodate drivers since it is vehicles rather than people being counted. Where active transportation networks were also constructed, they were often less complete and followed roadway networks rather than considering distances and the physical effort needed of those on foot or riding bicycles. Evidence of that mismatch can be spotted along state highways where dirt trails show how people attempt to make connections on their own, rather than walking along roadways that might double or triple their trip distance, as Figure 3-2 illustrates.

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97 James Longhurst. 2015. Bike Battles: A History of Sharing the American Road. Weingroff, Richard F. Federal Aid Road Act of 1916: Building the Foundation. FHWA.

98 Kurlansky, Mark. 2003. *Salt: A World History.*

Figure 3-2: Desire line trails. User-made trails reduce the distance pedestrians must take between destinations. This path connects to a large freeway interchange in Olympia, WA. Both sides of the interchange offer housing, services, and employment centers. Trails such as this may be very useful to those with the ability to follow them, but they are neither approved routes nor accessible to all users.

To assess how well the active transportation network is performing, WSDOT started by measuring whether a mobility opportunity exists for active travelers by looking at the facilities and connections present (see New Methods for Making Decisions, below). This kind of measurement is generally less applicable for motorists, as the road network already provides relatively convenient door-to-door connections everywhere in the state.

The level of traffic stress methods developed for this plan provide decision-making tools that enable the agency to consider walking and bicycling at each phase of project work. WSDOT can apply the information in all aspects from planning and budgeting, through scoping and design, to maintenance and operations. The approach represents a major step forward in understanding what makes facilities work well in support of comfortable active transportation connections.

Focusing active transportation network development in population centers

A 2009 WSDOT study identified 180 communities of all sizes throughout Washington where a state route runs through the center of town and serves as its Main Street. In total, over 600 miles of state highway were operating as “Main Street highways” in incorporated areas.[99] They provide access to centers for shopping, entertainment, and other needs, and at the same time serve regional mobility needs for people passing through.

99 WSDOT, 2009. State Highways as Main Streets: A Study of Community Design and Visioning.

CENSUS-DESIGNATED PLACES

Census-designated places (CDP) are named communities that are unincorporated. Their boundaries are not defined by law, but they are used by the Census Bureau to identify the community's location. Many CDPs look a lot like towns or cities. Like towns and cities, they may be large or very small and they may be as old as the state or relatively new communities. A CDP may also have a clear downtown or center, or a more sprawling or suburban form. When it comes to active transportation one thing is clear: Towns, cities, and CDPs are all places where people live, work, go to school, catch a bus, find entertainment, and buy their groceries.

A great deal of growth has occurred outside of incorporated areas over the past 11 years. Considering population centers rather than just incorporated cities and towns provides an important update to the Main Street highway approach to identify communities that may function similarly to towns and cities. WSDOT defined a population center as a city, town, or census-designated place and used the boundaries of those population centers to identify locations on the state system for this plan. Figure 3-3 identifies these locations around the state. Current and potential walking and bicycling needs in these locations resemble those on roadway segments identified as Main Street highways. Focusing on all population centers from large metropolitan areas like Spokane to smaller communities like Lebam where state highways are found enables WSDOT's active transportation analysis tools to include the locations where people live, work, shop, and go to school.

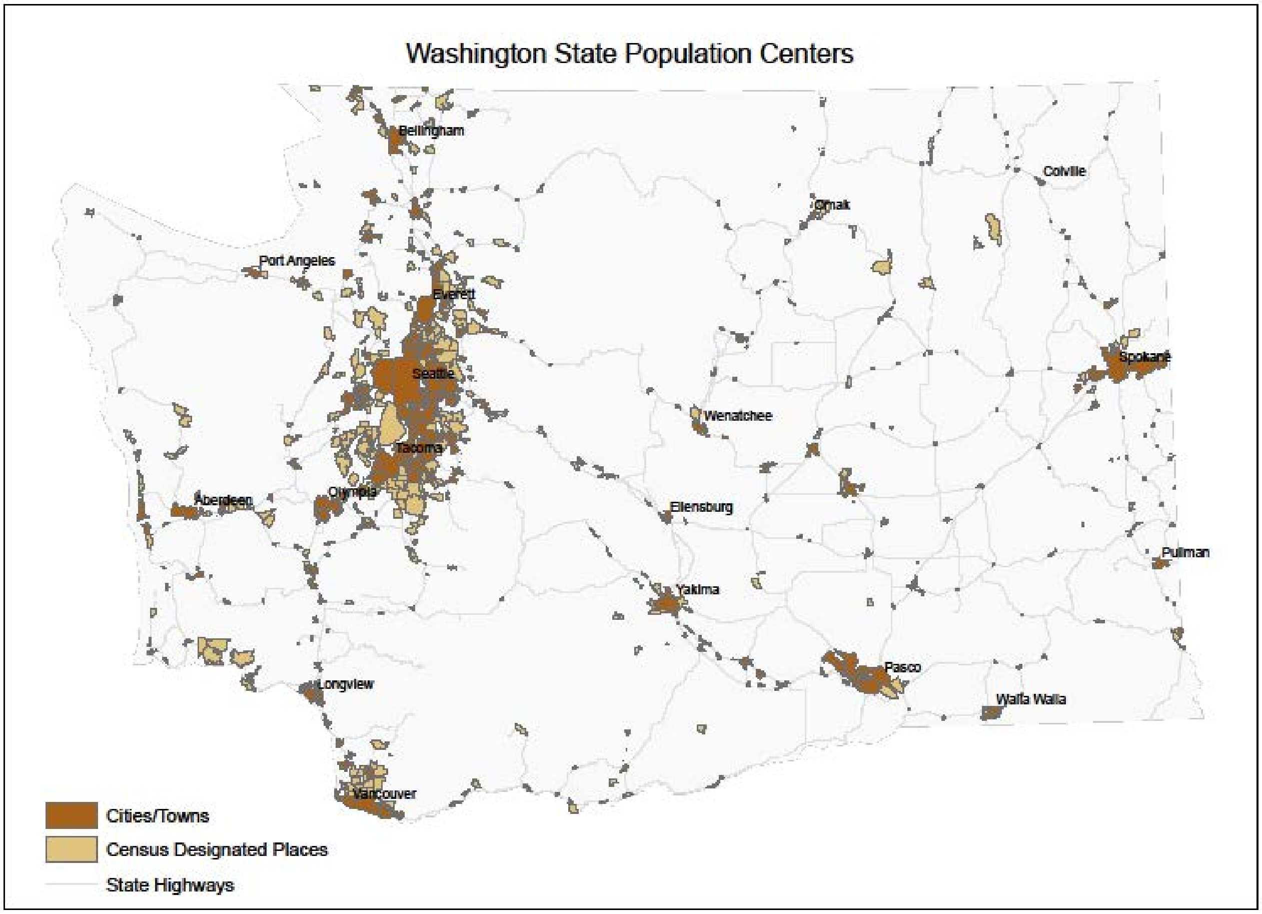


Figure 3-3: Washington has 628 population centers: 281 incorporated communities and 347 census-designated places. 1,685 miles of state highways pass through 505 of those population centers (Sources: HPMS 2017; 2010 census; 2020 city/town data).

Analyzing level of traffic stress

WSDOT's level of traffic stress methodology examines roadway characteristics to assess conditions for walking and bicycling along and across state highways. It provides a quantitative assessment of several variables that affect safety and mobility of people using active transportation:

- Posted speed limit.
- Number of motor vehicles present.
- Number of travel lanes.
- Presence and width of bike lanes.
- Presence and width of shoulders.
- Sidewalks.
- Separation from motor vehicle travel lanes.
- Types of land use near the roadway.
- Roadway crossings and intersections.

WSDOT applied a new data-driven method for evaluating state right of way for active transportation use: level of traffic stress. Where LTS is high (LTS 3 or 4), highway locations are identified as gaps in the active transportation network. Gaps are further evaluated with criteria for safety, equity, and potential demand to identify locations where a future change would make the biggest difference for these factors.

LTS analysis helps WSDOT determine if a state roadway is suitable for active travel. LTS can be measured separately for bicyclists (BLTS) and pedestrians (PLTS). It uses available roadway characteristics data, such as posted speed and number of travel lanes, to give the roadway segment an LTS score. Figures 3-4 and 3-5 illustrate the concept.

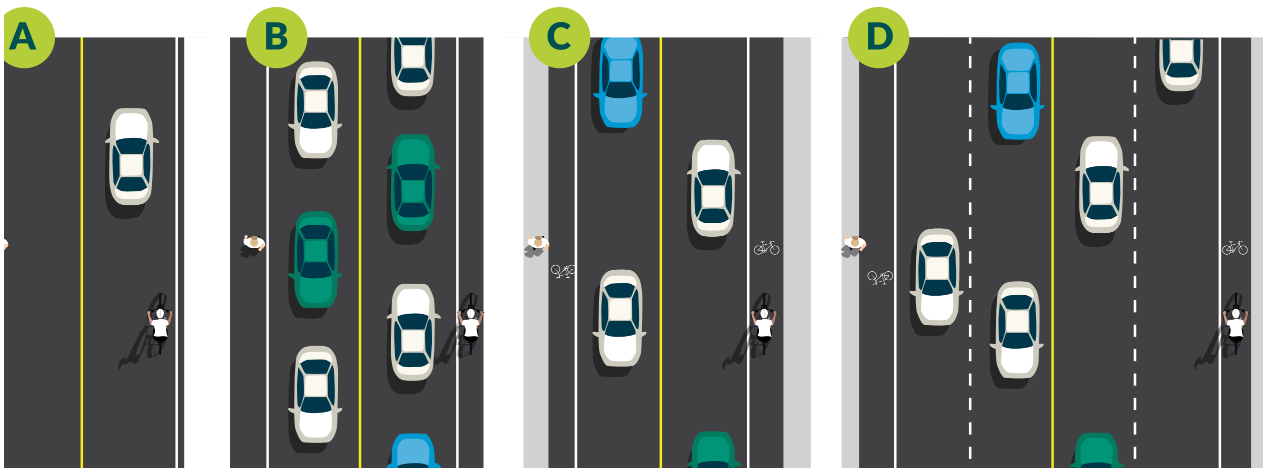


Figure 3-4: Linear roadway characteristics and level of traffic stress (LTS). A number of roadway characteristics can be used in LTS measurement such as driving speed, number of travel lanes, the amount of traffic present, and whether there are shoulders, bike lanes, or sidewalks. In practice, some characteristics are harder to measure versus others. Panel A shows a simple roadway and a low volume of traffic, but there is no dedicated space for people walking or biking. Also, roads like this often post higher speeds. Panel B shows a simple roadway, but a high volume of traffic. In this scenario there are road shoulders that offer some separation from traffic for people walking or biking. Panel C adds sidewalks and bike lanes that offer separation from traffic. Panel D shows a multilane roadway and a high volume of traffic. Although there are sidewalks and bike lanes in this scenario, the extra lanes increase overall roadway complexity and traffic stress.

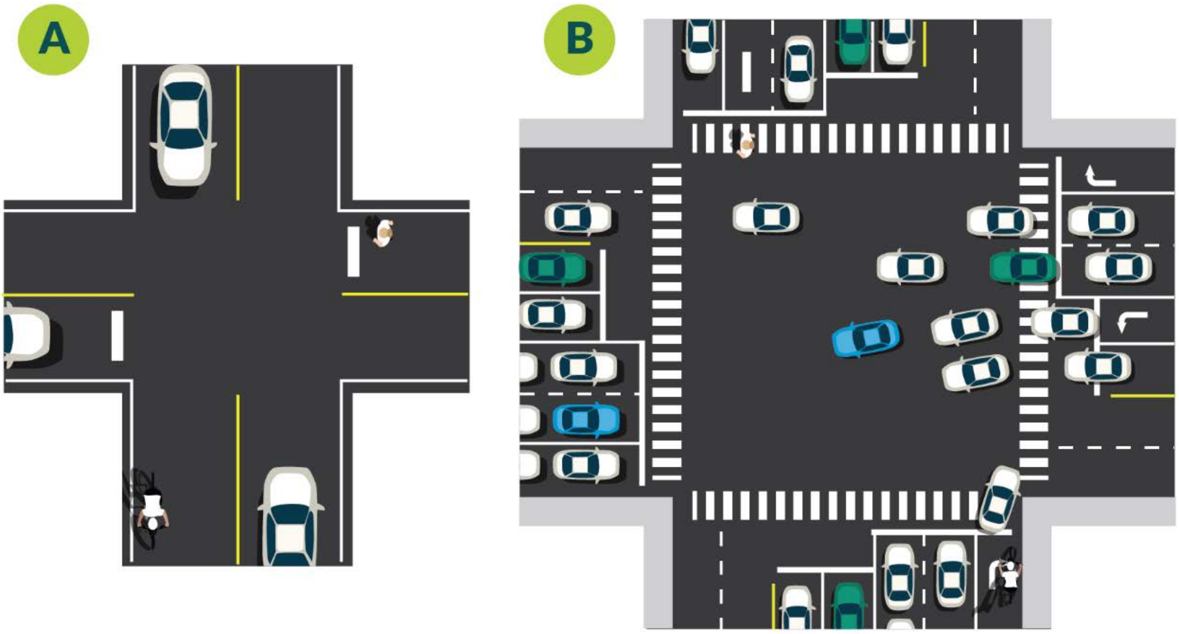


Figure 3-5: Intersection characteristics and level of traffic stress (LTS). A number of intersection characteristics can inform LTS measurement including driving speed, number of travel lanes, the amount of traffic present, and whether there are shoulders, bike lanes, or sidewalks. Crossing improvements such as marked crosswalks, flashing beacons and signals are additional elements that influence an intersection's LTS. In practice, some characteristics are harder to measure versus others. Panel A shows a simple intersection and no separation between drivers and active travelers. Depending on the traffic volume, driving speed and turning frequency, the location might be higher or lower stress. Panel B shows an intersection that is common in urban areas. Such an intersection is managed by traffic signals, which helps to lower traffic stress, but the bicycle rider is operating in heavy traffic and the pedestrian has a very long crossing distance. Both active travelers have to watch for right turning traffic.

WSDOT keeps data on the state roadway network, but some of the data are incomplete or exist in formats that make them difficult to evaluate together with other data. For example, the agency currently has limited sidewalk data, making it difficult to use. Appendix D, Methods of Analysis, provides more detailed information.

The review of state highway conditions for walking and biking included a four-step process:

1. **LTS scoring:** Compute an LTS score for all state roadways and intersections.
2. **Gap designation:** Designate highway segments/intersections with the highest LTS scores as gaps. The other segments/intersections are also important but not flagged as gaps for the purposes of this review.
3. **Gap evaluation:** Score each gap using safety, equity, and demand information about the location to aid in future decision making.
4. **Outreach:** Get input from cities, counties, and other transportation partners on the evaluation results to begin aligning results with local and regional plans.

LTS scoring

People experience more travel stress when a roadway has many drivers operating motor vehicles at high speeds on multiple lanes of traffic. Even though stress is subjective, it is associated with quantifiable roadway characteristics that can be reliably measured. The combination of roadway characteristics that make up LTS also describe exposure to the potential for a crash. Importantly, the kinds of roadways that receive a higher LTS score based on their characteristics are also those that have more pedestrian and bicyclist serious injuries and deaths. Figure 3-6 illustrates this concept.

For population centers in Washington, LTS is measured on a four-point scale ranging from LTS 1, which provides the lowest stress and is often considered suitable for all ages and abilities, to LTS 4, the highest stress locations that most people walking or bicycling will avoid unless absolutely necessary. This is especially true when the active transportation user must use the vehicle lane or the edge of the road. Appendix D, Methods of Analysis, provides more details on LTS methodology.

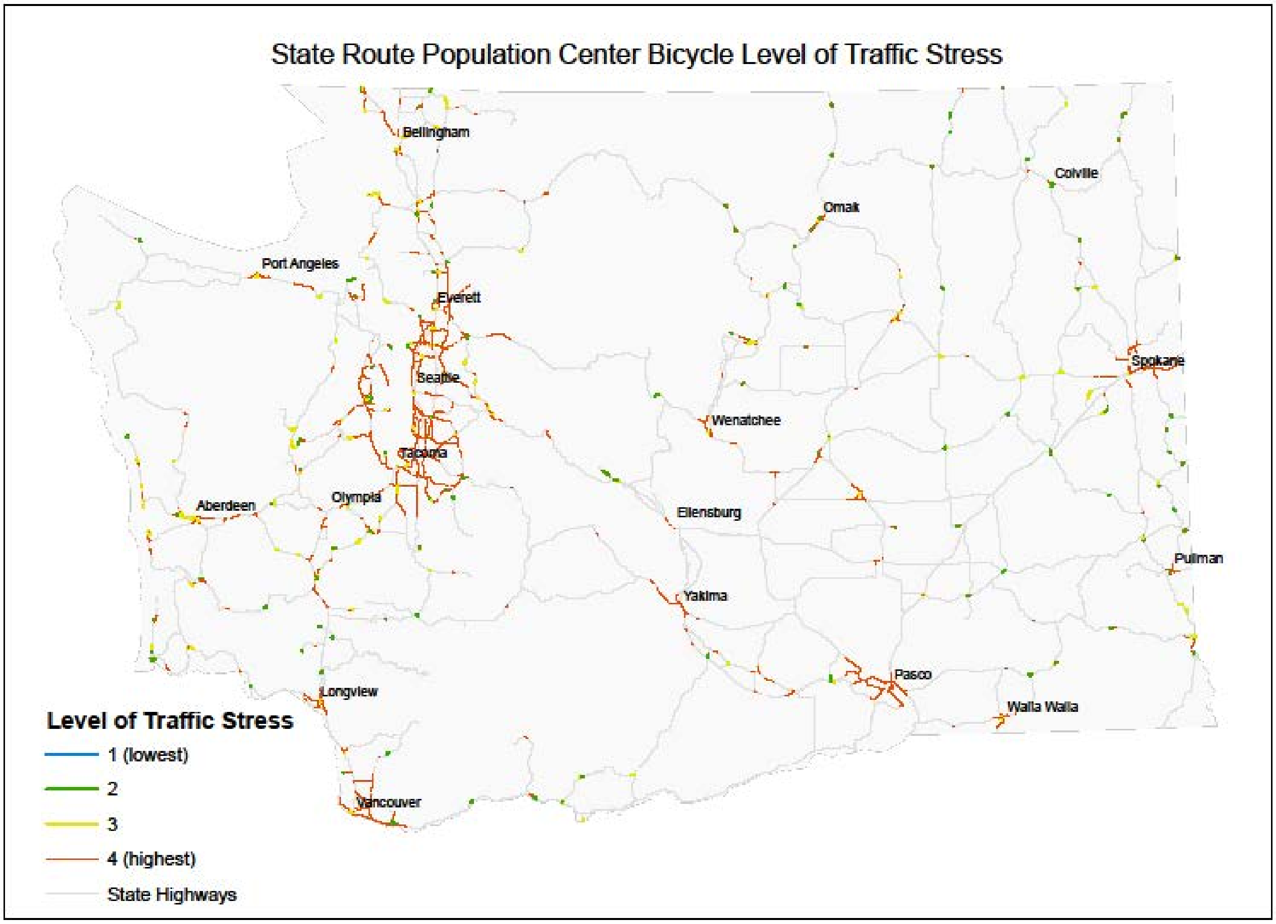


Figure 3-6: Level of traffic stress (LTS) in population centers and rural high-speed routes. Four LTS levels were established. The highest stress, LTS 4, was primarily found near the state's largest cities. More rural population centers, which are much more widely distributed across the state, show a range of LTS values reflecting a diversity of speeds and roadway characteristics found in the various communities.

The scoring approach for this plan builds on adaptations to the original LTS methodology developed by the Oregon Department of Transportation to address differences between urban and rural contexts and revised the determination of LTS 3 and 4 with respect to posted speed limits.[100] In addition, a new element in WSDOT's LTS analysis is the separate analyses of rural highways and those in population centers.

100 Oregon Department of Transportation Analysis Procedures Manual, Chapter 14.5. Appendix D, Methods of Analysis, provides further discussion.

The idea of LTS can be applied to roads that serve people who bicycle (BLTS) and people who walk or roll as pedestrians (PLTS); Figures 3-7 through 3-10 provide more information. While WSDOT has bike lane data as of 2014 for state highways, sidewalk data was still being developed at the time of this analysis and therefore needed to be considered outside of the LTS process. Sidewalks managed by local jurisdictions also exist along state routes. Future incorporation of WSDOT and local data on sidewalks will improve the analysis. For purposes of this plan, WSDOT staff developed an approximation of the miles of state routes with adjacent sidewalk without assessing sidewalk condition or ADA accessibility; Chapter 4 and Appendix F, Cost Estimation Background, provide more information.

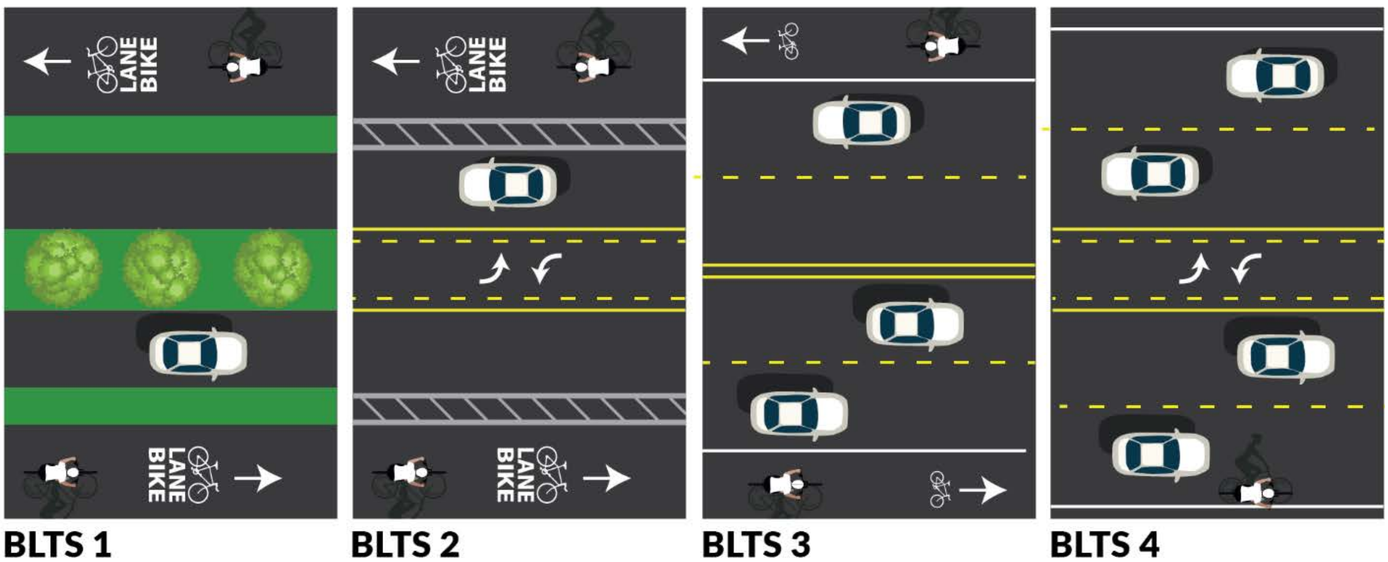
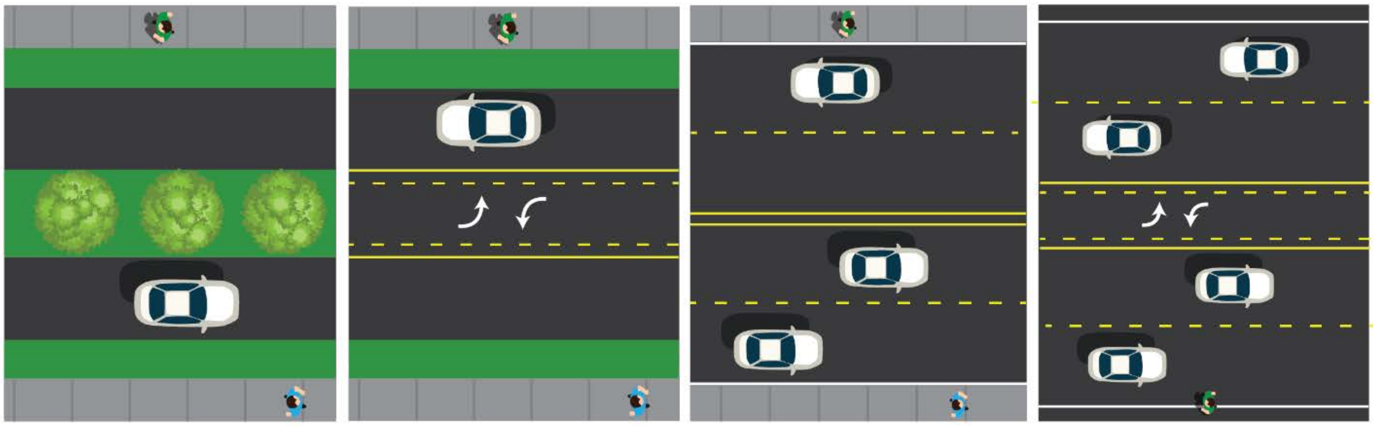


Figure 3-7: Bicycle level of traffic stress (BLTS) is illustrated by associating user types with examples of types of facilities that they feel comfortable using. The BLTS 1 scenario shows facilities that are likely to appeal to 100 percent of people who want to ride a bicycle. For BLTS 2 the facilities include buffered bike lanes which offer more separation than standard bike lines, but no physical barrier. 81% of bicycle riders would use this facility. For BLTS 3 standard bike lanes are provided and about 12 percent of riders would use this facility. Only about 1 percent of riders would use BLTS 4 facilities where no separated space is offered.

Figure 3-8: Pedestrian level of traffic stress. Like Bicycle LTS, PLTS can apply to trips along and across motor vehicle lanes. These photos illustrate an example of a PLTS 4 situation on Aurora Avenue in Seattle. Crossing is legal here, which the curb ramps highlight, but with a posted speed of 40 mph, high traffic volumes, four travel lanes, and three special purpose lanes, it would be a challenging crossing for any adult. Marked crossings with pedestrian signal phases are available two blocks north or one block south of this location, but these options add to a pedestrian's trip distance, which could be a factor for some people.



PLTS 1 **PLTS 2** **PLTS 3** **PLTS 4**

Figure 3-9: Pedestrian level of traffic stress (PLTS) is illustrated by associating user types with examples of types of facilities that they feel comfortable using. In the PLTS 1 scenario the facilities are presumed to appeal to anyone wants to walk. For PLTS 2 the facilities are presumed to appeal to a high percentage of people who want to walk. For PLTS 3 the facilities are likely to appeal to many people who want to walk, but separation from traffic is lower and there are more potential challenges, especially when it comes to crossing considerations (although these are not illustrated). For PLTS 4 the facilities are unlikely to appeal to very many people who want to walk. There is minimal separation from traffic and there are more potential challenges associated with a complex and wide roadway, especially when it comes to crossing considerations.

Characteristics	LTS 1	LTS 2	LTS 3	LTS 4
Stress	minimal/none	low	moderate	high
Required attentiveness (to traffic)	minimal/none	low	moderate	high
Unsupervised Suitability	all ages and abilities	8 years and up	adult	adult
Accessibility	all ages and abilities	possible limitations for wheeled mobility device	likely limitations for wheeled mobility device	presents barrier to wheeled mobility device use
Traffic conditions	low speeds and volumes if facilities are near traffic	moderate speeds and volumes	higher speeds and volumes	highest speeds and volumes, typically multilane roadways

Figure 3-10: Characteristics associated with level of traffic stress (LTS).

WSDOT initially applied the LTS approach to high-speed rural roads as well as population centers, but the metrics were adjusted for this context where fewer people are likely to walk or bike. As originally developed, this methodology assumed people who walk and bike on rural highways, such as bicycle tourists and backpacking travelers, will have more skills to handle traffic stress than those in a population center, such as children in town walking to school. To clarify LTS for these different contexts, it was labelled differently. Where traffic volumes were lower, the designation "high-speed low volume" was used. Someone biking or walking on that highway may not encounter as many drivers as in an urban area, but those drivers will be moving fast and shoulder space may or may not be available. The designation High Speed 3 and High Speed 4 were used to identify where traffic volumes were higher, with the idea being that these would be identified as gaps. As it turns out LTS is not as well suited to the high-speed context. While a roadway designated as high-speed low volume might be acceptable to some active travelers, some people walk and bike on higher-stress rural roads by necessity rather than choice. And where a roadway is high-speed high volume, there may be little desire for people to use the facility even where shoulders are wide so identifying them as a gap to be fixed does not make sense. Given the complexities of the high-speed context the planning team also relied on input from cities, counties, and other transportation partners. WSDOT asked its partners to point out where the LTS as defined by the data should be higher. As noted in the beginning of this chapter, partner agencies may not be accustomed to planning for needs on WSDOT's system. For this reason, the discussion will continue concerning where high-speed routes in more rural areas require more attention for active travel. Considerations regarding planning for the high-speed context are discussed in further detail in chapter 4.

Figure 3-11: Walking along high-speed routes by necessity.

Gap designation

WSDOT divided its network into roadway segments of 3 miles or less for purposes of assigning an LTS and identifying a segment as a gap. If a portion of a segment fell into the highest category (LTS 3 or LTS 4), that segment was defined as a gap in the network. The gaps also included places with a physical barrier, or where state law does not allow walking or biking.

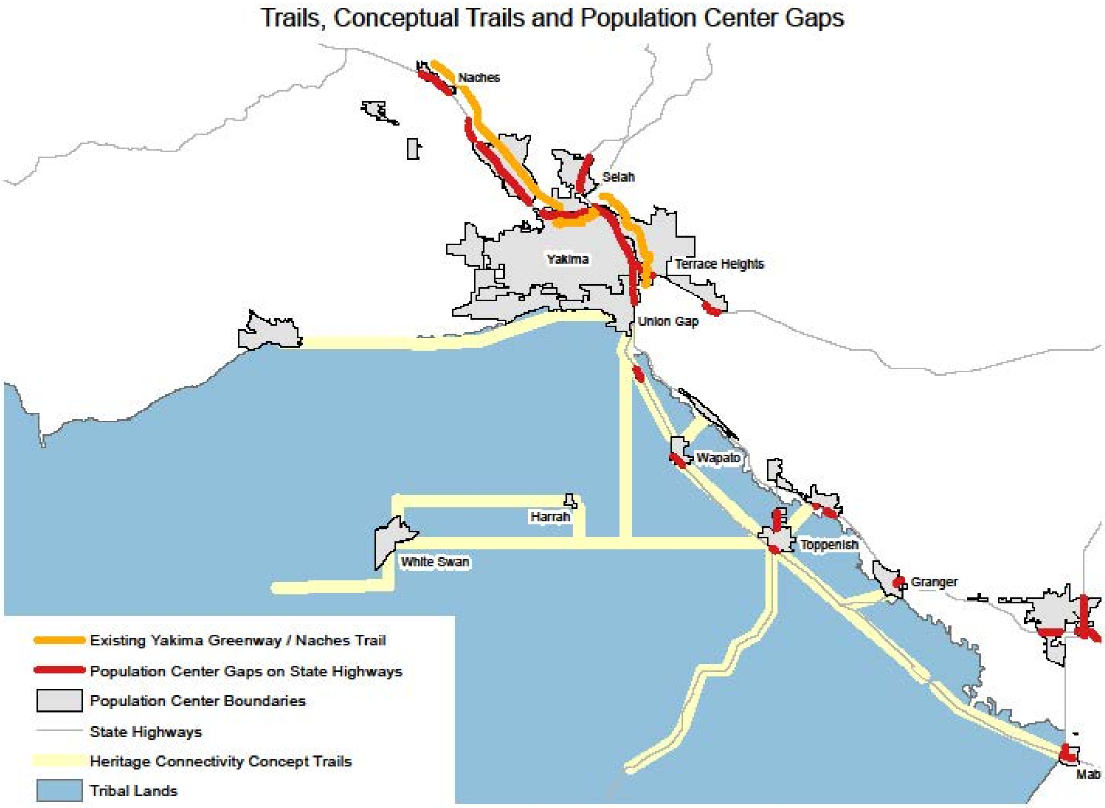


Figure 3-12: This map depicts the Yakama Heritage Connectivity Trails plan that connects communities such as Yakima, Toppenish, White Swan and Mabton. In addition to highlighting historical tribal travel routes, this conceptual trail network is focused on improving active travel opportunities along high-stress roadways where serious injuries and deaths have occurred. Much of the network is aligned with state routes where level of traffic stress analysis identifies existing gaps in the network.

The following three figures (3-13-3-15) illustrate the three gap types identified: intersection, segment, and ramp.

Figure 3-13: Intersection gaps. This image shows an intersection gap on State Route 28. The speed limit here is 50 mph on a stretch of highway with residences on both sides. People biking or walking must use what available shoulder exists. In this case, what appears to be a shoulder the bicycle rider is using is actually a right-hand turn lane. Here we also see the rider facing traffic. People riding bicycles may act in ways that feel safe to them; in this situation, the rider might be concerned about crossing high-speed traffic lanes to ride on the other side. Acting more like a pedestrian who is advised to walk against traffic, this person may feel this option is safer. Image source: Google Maps.

Figure 3-14: Segment gaps. Segment gaps were found throughout the state, with some of the most challenging for bicyclists found in larger cities. State Route 104 has multiple lanes, high traffic volumes, and relatively high-speed traffic. The roadway lacks dedicated space for people on bikes; the best solution may or may not be on the state highway in locations like this. This segment has a sidewalk on one side, so it could still pose a challenge for some pedestrians depending on which side of the road they are on at the beginning or end of their journey. Image source: Google Maps.

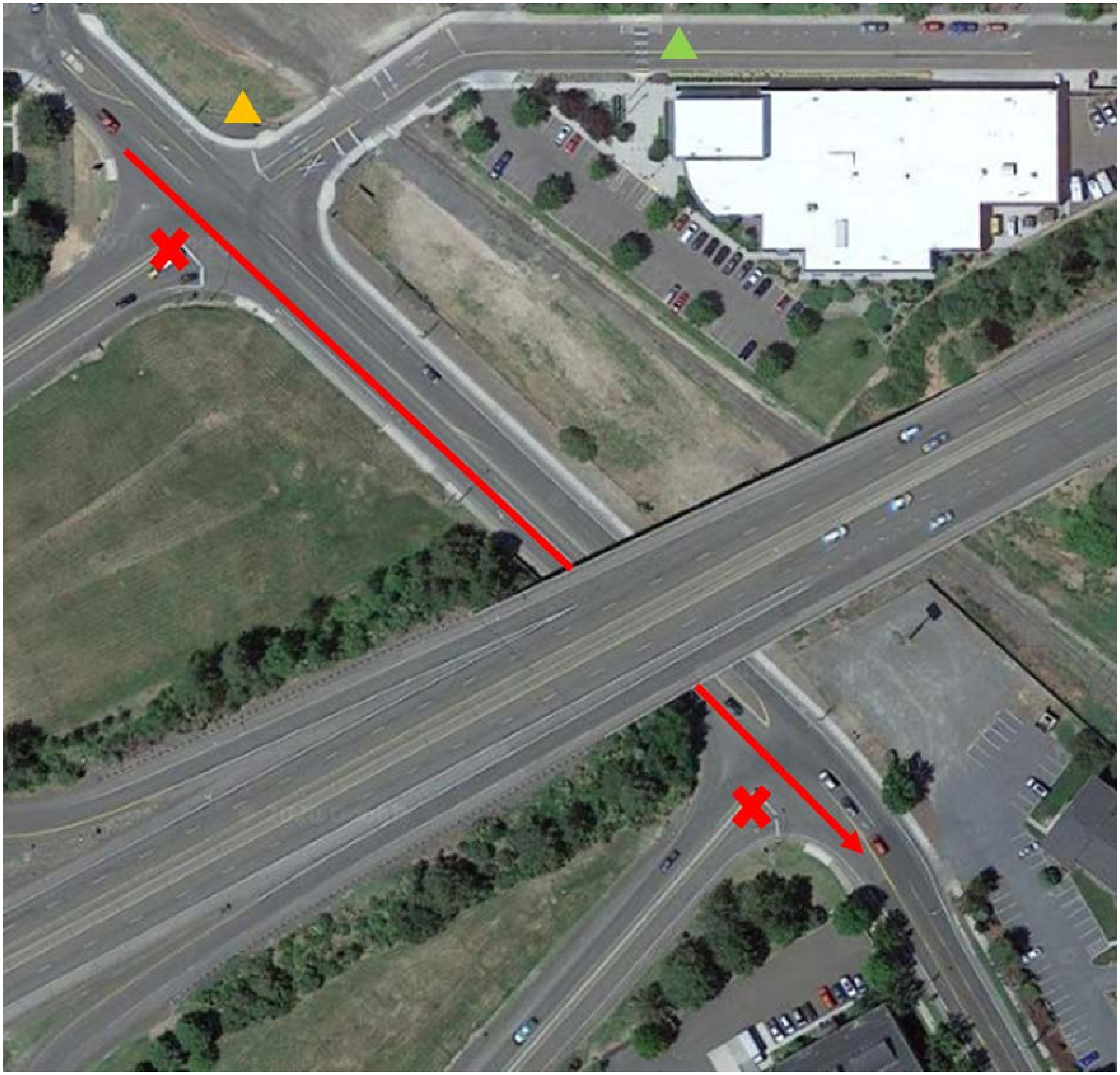


Figure 3-15: Ramp gaps in Walla Walla. This image shows the intersection of on and off ramps (red x's) with a local roadway. Note that many residences sit just beyond the upper left corner of this image. The roadway has sidewalk and bike lanes on both sides, but on the side with the red arrow, it lacks marked crosswalks and other crossing aids where the pedestrian route and bike lanes cross the highway ramps. In addition, the intersections are wide, built for freight, and designed to allow drivers to enter and exit at high speeds. In this context, the sidewalk on the other side of the local road allows a pedestrian to avoid the ramp conflicts, but that route still lacks a marked crossing (orange triangle) on the pedestrian path. The green triangle shows where a marked crossing is available. Image source: Google Maps.

These gaps represent places where travel needs exist and the state highways do not provide comfortable or complete walking and biking facilities. As WSDOT works with partners to meet the travel need for movement along or across the state highway, this need could be met either by improving the highway or by connecting to or improving a nearby local segment. The example in Figure 3-16 illustrates the connection between network gaps and travel need.

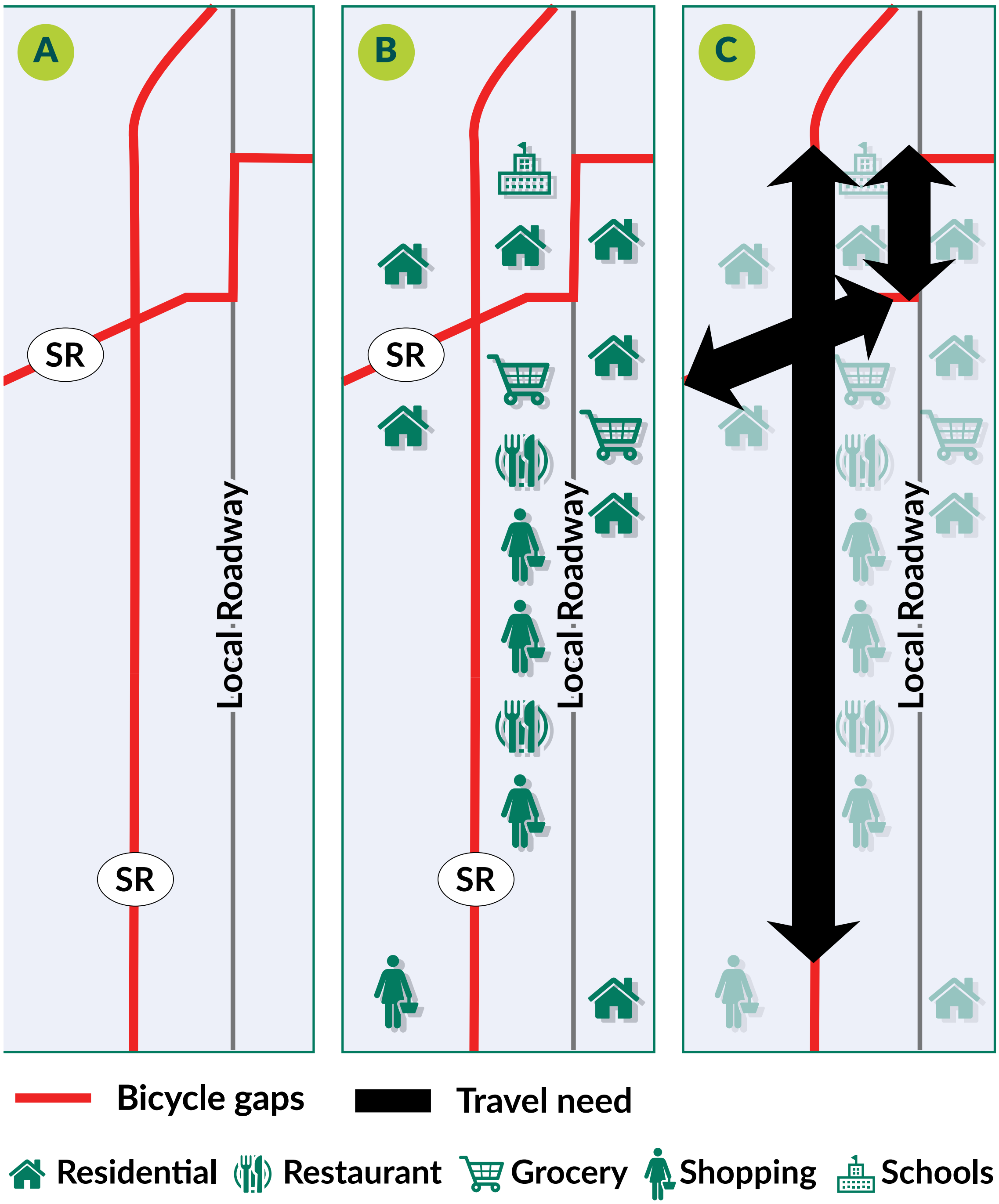


Figure 3-16: Analyzing active travel gaps in terms of travel need. A high LTS indicates gaps on a given segment of highway and suggest a potential travel need that should be considered. The figure considers gaps on two highways that pass through a city. Panel A shows a portion of an interstate and a state route, along with a parallel local road. Both highways are shown as having gaps with respect to bicycling (red lines). Panel B indicates many destinations exist along these highways including residences, restaurants, grocery stores, shopping, and schools. Panel C shows that the gaps really represent north-south and east-east travel needs. Those travel needs might be addressed on the highway itself, but this may not represent the best candidate for bicycle improvements. The local road where all the destinations are located could be a better candidate for improvements that close this gap.

Gap evaluation

State roadways designed primarily for motor vehicle traffic understandably have many gaps for active travel users—far too many to fix all at once, even if funding were available. This plan provides information to help WSDOT and partners address the gaps over time with funds from state or federal sources, or in combination with other projects (state or local) constructed at the gap locations.

Transportation funding sources tend to be tied to a variety of policy goals. Therefore, it is useful to know the details about the gaps and land use around them to understand which places present the most potential for meeting transportation policy goals if the travel need is met. Those details were part of the gap assessment. The assessment criteria chosen for this plan relate to the location's measures of safety, equity, and potential demand. Specific assessment criteria (discussed in more detail in Appendix D, Methods of Analysis) are listed below. Demographic characteristics included in the equity analysis are measured at the census block level and compared with state averages.

Safety

- History of driver crashes with bicyclists or pedestrians that result in death or serious Injury.
- Systemic safety - based on roadway characteristics that contribute to crash potential.
- Connections to and between destinations (including intermodal links and trails).

Equity

- Places with relatively high numbers of people living in poverty.
- Places with relatively high numbers of Black, Indigenous, and other people of color.
- Places with relatively high numbers of people with a disability.

Potential Demand

- Potential demand based on population density, density of jobs, proximity to schools, bus stops/ intermodal connections, and other destinations.

Having this information helps indicate where increased active transportation connectivity could make the biggest difference in improving safety, mobility, accessibility, and equity. Appendix D, Methods of Analysis, provides more details regarding the gap assessment as well as technical definitions for evaluation criteria.

Demand revisited

As discussed in Chapter 2 and above in this chapter, measuring existing user demand is not an effective way to identify active transportation need. The concept of potential demand, in contrast, shows where improvements are likely to generate more active travel trips. Potential demand refers to the number of people who would start walking or biking, or do more of it, if conditions were right. A high-quality sidewalk that starts in the middle of nowhere and connects to nothing will not be likely to attract many users. People walk more where they can reach more stores, restaurants, health providers, recreation facilities, employment opportunities, and other goods and services within walking distances.

Statewide data sources do not adequately capture walking and biking activity. Additionally, the number of people walking and biking at a location is tied to how useful the location is to their trip and how safe people feel when they are there, which relates directly to whether facilities are available and accessible. Current usage in most locations is thus not the best measure of need for active transportation.

Figure 3-17 shows the results of WSDOT's active travel demand analysis. The analysis considered several measures of potential demand including the ease of access to destinations for people walking and biking, population, employment, presence of colleges, commercial activity, and presence of intermodal connections. Appendix D, Methods of Analysis, provides details on the destination-based demand analysis.

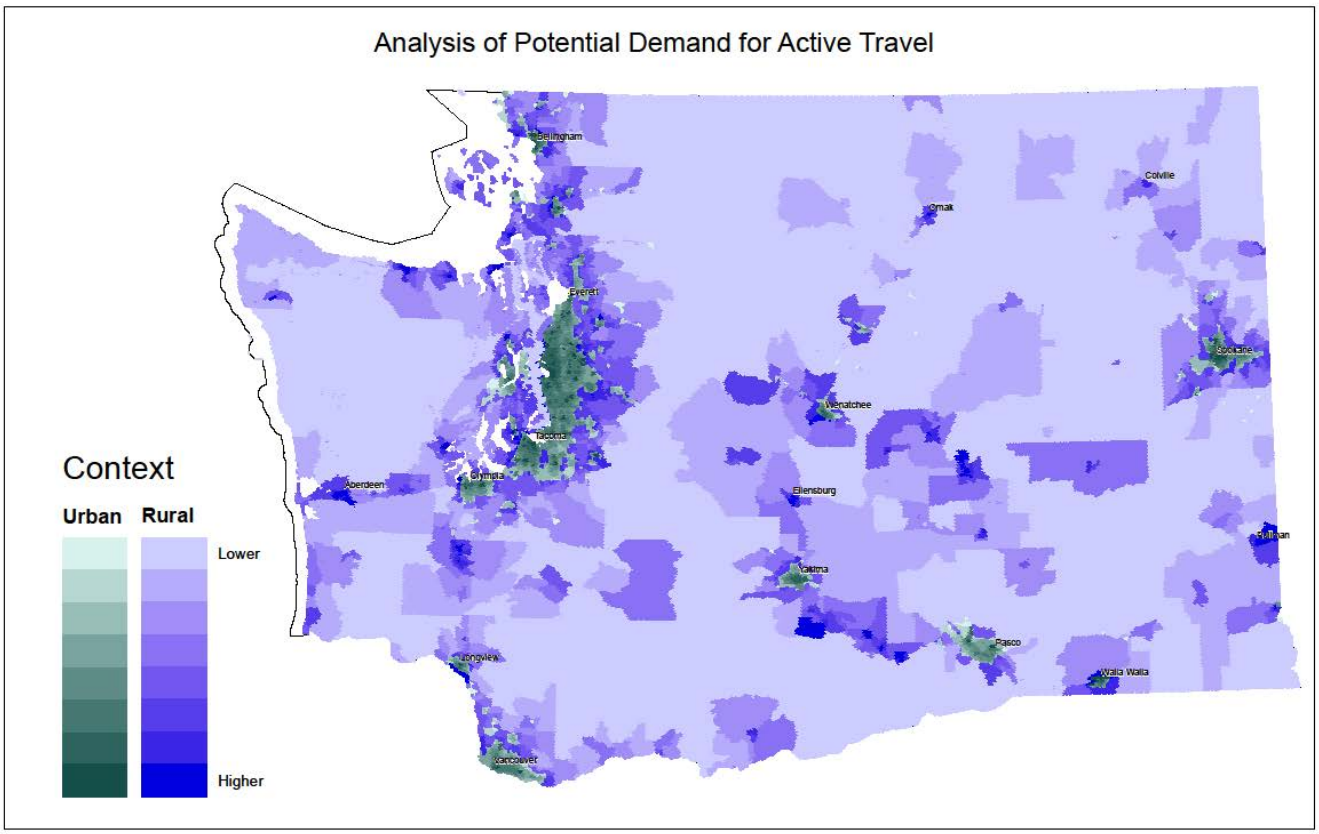


Figure 3-17: Demand analysis map. This map shows where potential demand for walking and biking is greater (more color) versus locations where people are less likely to use active travel regularly. The urban scale (green) compared areas that are more densely populated. More intense green can be seen in the vicinity of the largest cities such as Seattle and Spokane. More rural locations (purple) were compared to other rural locations. More intense purple is found in Aberdeen and Clarkston, for example, than in Republic or Neah Bay.

Recognizing the effects that bigger cities have on density of destinations, the demand analysis accounted for urbanization. More precisely, heavily populated metropolitan planning areas were compared with each other on one scale and all other areas were compared on the other scale. Figure 3-18 shows the metropolitan planning areas on a map.

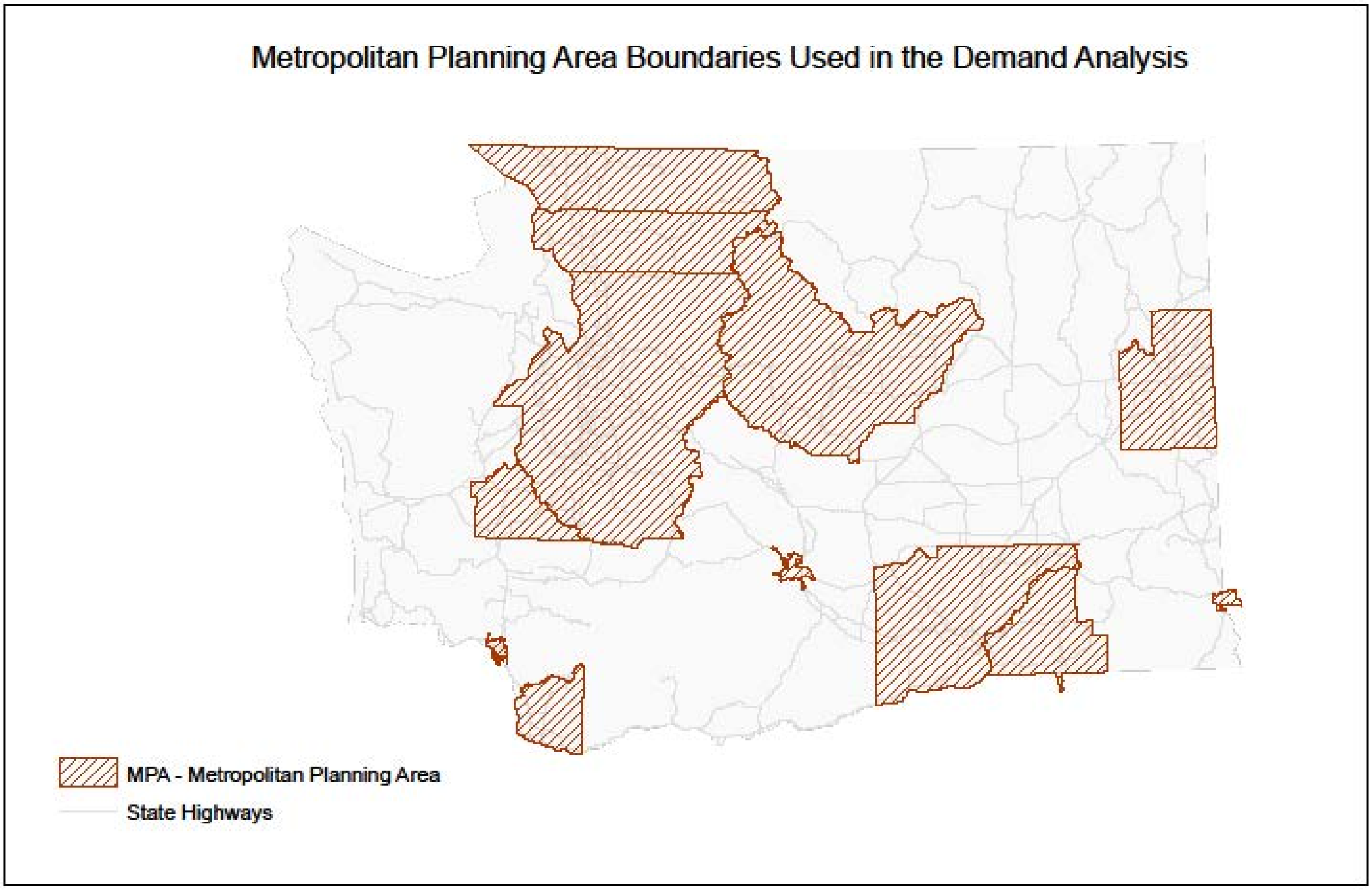


Figure 3-18: Metropolitan planning area boundaries used in demand analysis. For purposes of evaluating demand, heavily populated metropolitan planning areas were compared with each other on one scale and all other areas were compared on another scale.

Short trips for utility purposes represent one type of potential demand. Long-distance bike connections generate another kind of demand by serving as tourism attractors. The route itself provides the destination—the longer the better to attract national and international travelers seeking a new experience. Bike tourists seek separated trails and/or bicycle-friendly roads with lower traffic volume and speed, as well as paved, well-marked shoulders.[101]

Many parts of Washington offer this opportunity. Network links in rural areas provide vital connections among communities and destinations. In many parts of the state, the highway provides the most direct route (sometimes the only route), usually with the least amount of climbing required to get up a hill or mountain.

The demand calculation included in the evaluation criteria does not address network connectivity or total trail mileage directly as a potential generator of increased participation. In presenting the concept of a statewide bikeways network linking a combination of trails and highway segments discussed below, this plan points out the opportunities to grow bike tourism while also providing connections for everyday transportation.

101 American Trails. Attracting Bike Tourists to Your Trail: Lessons from the Canalway. In *Bicyclists Bring Business: A Guide for Attracting Bicycle Tourists To New York's Canal Communities*.

Outreach: Input from transportation partners

WSDOT staff shared the results of the data review of walk and bike conditions on state highways with cities, counties, and other transportation partners. WSDOT asked partners to provide input about the results produced using the available road data. In particular, jurisdictions could compare the analysis with their plans and proposed future projects to lay the groundwork for understanding the broader network needs and opportunities. WSDOT is committed to continued collaboration with local, regional, and tribal partners as active transportation projects evolve.

Data limitations and future assessments

Currently, WSDOT lacks a centralized database to collect walk and bike data on infrastructure such as sidewalks and trails. Additionally, while many cities and counties have their own GIS data, no standard data definitions exist, which makes it difficult to share information. Different jurisdictions may store data in different formats. For example, sidewalk information might be stored within a spreadsheet in one location and within a web map elsewhere.

Currently WSDOT collects some basic information about pedestrian and bicycle infrastructure. The following network-level information is available for all state roadways:

- Location and width of roadway shoulders.
- Location of permanent bicycle and pedestrian counters.
- Location of traffic signals.
- Location of crossing information.

The following network-level information is partially available:

- Location and width of bike lanes.
- Location of sidewalk or walkway.
- Width of sidewalk or walkway.
- Compliance of infrastructure with the ADA.

During the development of this plan, WSDOT completed a detailed assessment of its infrastructure data collection. The assessment identified missing data that, if collected, can be used to develop a more robust and detailed understanding of WSDOT's walk and bike infrastructure. It also identified the need to develop recommendations for data collection methods, storage, and frequency of updates as a future action for implementation and updates of this plan.

Identified data gaps include:

- Side path/trail data including location, name, managing agency, surface type, width, and access points.
- On-street bike facilities in addition to shoulders: standard bike lanes, width, buffer or protection, including those implemented by local jurisdictions.
- Curb ramps.
- Crosswalks and other pedestrian crossing treatments.
- Rumble strips.

- Sidewalks including width, surface material and compliance with ADA standards
    - Traffic operations signal elements such as presence and condition of accessible pedestrian signals and bicyclist detection.
    - Right-of-way data.

In addition to the feature attributes recommended here, WSDOT could choose to collect additional data attributes in future that would assist in more fully characterizing the condition of active transportation assets (for example, crosswalk striping material, curb ramp orientation, signal timing).[102]

Highway crossing availability

WSDOT examined the extent to which state highways act as barriers to active transportation. In addition to evaluating traffic stress on the state network WSDOT undertook a multimodal connectivity study using a new set of route analysis methods released in 2021.[103] Preliminary results from this study have been incorporated into this plan. The study calculated a Route Directness Index (RDI) that shows how far out of their way a person would need to travel in order to cross a state highway.

With grant support from FHWA, WSDOT is developing an informational tool to inform future decision-making by measuring highway crossing availability. This tool evaluates the extent to which state highways act as a barrier to people who are trying to get to and from destinations on either side of a highway. Combined with level of traffic stress, this new analysis will help identify where crossings might benefit from enhancement, or where new crossings might need to be developed in the future.

For planning purposes, the standard approach is to consider that most people are willing to walk around one-half mile or bike about 3 miles on a given trip, and they are only willing to travel short distances out of their way to cross a roadway.[104] Focusing on population centers where destinations such as residences, schools, jobs, and services are located, WSDOT applied LTS and RDI data together to identify areas for consideration of new or improved crossings for pedestrians and bicyclists. Achieving a desired maximum distance between low-stress crossings in population centers could be achieved by:

- Improving the quality of existing crossings.
- Working with partners to establish shorter routes to existing crossings.

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102 Additional guidance and recommendation on collection practices and data attributes can be found in FHWA 2017 Model inventory of Roadway Elements MIRE 2.0.

103 FHWA. 2018. Guidebook for Measuring Multimodal Connectivity. Federal Highway Administration, USDOT. 2021. Measuring Multimodal Network Connectivity Pilot Grant Program Final Report

104 Broach, J.P. 2016. Travel Mode Choice Framework Incorporating Realistic Bike and Walk Routes. Portland State University. The Federal Transit Administration defines a pedestrian radius of one-half mile and bicycling radius of three miles around stops and stations when determining eligibility of improvements for FTA Funding. Federal Transit Administration. 2011. Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law. Federal Highways Administration. 2008. Pedestrian Safety Guide for Transit Agencies, Chapter 4, Typical Walking Distance to Transit, states travel in terms of time: "Most people are willing to walk for five to ten minutes, or approximately ¼- to ½-mile to a transit stop".

- Building new crossings.

Improving the availability of low-stress crossings that are well integrated into connected active transportation networks will increase the opportunity for people to choose walking and biking modes. It would also improve the efficiency of those modes for people who have no other choice. Figure 3-19 illustrates the concept of using RDI and LTS together when considering active travel.

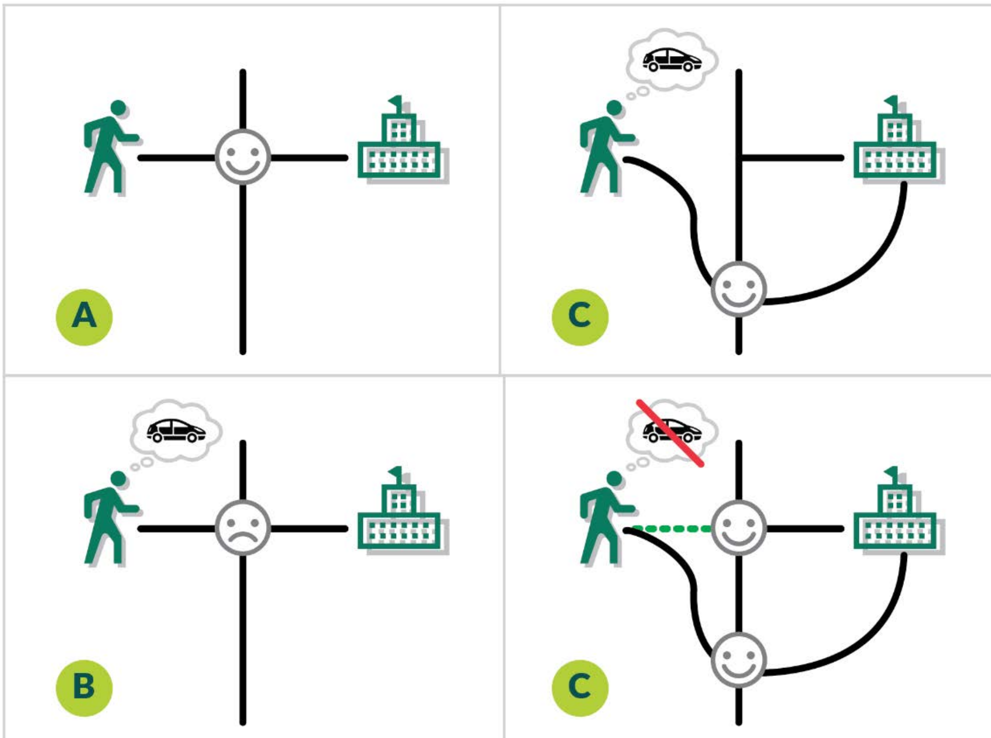

Figure 3-19: Combining route directness and LTS. This set of illustrations considers both how direct a pedestrian's trip is to their destination (straight versus a winding path) as well as how stressful a crossing is on their route (symbolized by a smiling or frowning face). Illustration A offers the best scenario as it shows a direct route for the person walking between where they are and their destination, and a smiley face indicates that the crossing is low stress. Illustration B also offers a direct route, but the crossing is high stress. In C the route requires out-of-direction travel. In D, a local network link has been constructed to an existing low stress crossing. Scenarios B and C depicts the pedestrian considering whether to drive instead. Assuming driving is an option, the person would be more likely to use a car when both distances and traffic stress are greater.

Illustrating highway crossing availability challenges

The town of Granger provides a real-world example of where limited highway crossing opportunities create challenges for people walking or rolling. With a population of just less than 4,000, this small town is divided by SR 223 into northwest and southeast sections. Most of the town destinations, including the schools, are located on the northwest side of SR 223. There are two intersections (3rd Street or Bailey Avenue) where the highway can be crossed, both of which lack marked crosswalks or other treatments. A railroad line forms a second barrier that renders the Bailey Avenue crossing unavailable for people on the southeast side of the highway (Figure 3-20). In addition, SR 223 is designated as a T-2 on the Freight and Goods Transportation System and carries approximately 4.4 million tons of freight per year.

Development is occurring on the southeast side, including low-income housing near the railroad tracks. Children traveling to school from the low-income housing or others who wish to reach the town are relatively close as the crow flies, but they must walk down to 3rd Street in order to reach town legally. 3rd Street is a high traffic stress crossing that requires significant out of direction travel when the school is the destination. Sometimes children from the southeast side make the trip via 3rd Street. Often however, they follow a more direct route by illegally walking along the railroad tracks that pass under the highway.

Potential solutions for the intersection at 3rd Street could lower its LTS. Addressing the crossing availability issue is more complicated. Are there enough intersections to serve the southeast side? Is there a way over the highway? Is there room for both a rail line and safe trail option under the highway? Addressing the availability of relatively direct highway crossings for active travelers is not easy. The best solutions that consider all modes are not always obvious.

Figure 3-20: Illustrating highway crossing availability challenges. The map of Granger shows a town divided by State Route 223- Most of the destinations, including schools, are on the northwest side of the SR 223- There is housing on the southeast side of the highway. The red arrow shows the only highway intersection available to people on the southeast side. The black dashed line shows a rail line. Children are often observed walking along the rail line to reach town, as the route is more direct and does not involve finding a gap in highway traffic.

PART B: STATE ROUTES AND FACILITIES

This discussion focuses on what WSDOT learned examining facilities on state routes. Many of the highways that WSDOT manages may not be appropriate for most of the state's population to use for active transportation.

Existing network

Roadways and how they link to where people live

Looking at roadways as individual lines on a map, the existing network of state highways is more than 7,000 center line miles. This number includes rural highways between towns; urban highways located that function as principal arterials; main streets of a city or town; and lower speed highways located in unincorporated populated areas that resemble a town. Furthermore, many highways are divided, with spurs, loops, and other elements which complicate systemic analysis. For purposes of this plan, the highway lanes that go in one direction, somewhat less than 7,000 miles, were used to define gaps.

About 180 miles of state route are prohibited to bicycle riders and more than 1,100 miles are prohibited to pedestrians. In addition, 4,300 of about 7,000 miles of roadway open to bicycle riders provide shoulders of 4 feet or more. State highways provide 127 miles of bike lanes (counting each roadside independently) and WSDOT manages about 38 miles of paved trail. Many more trail miles have been built within WSDOT rights of way, with facilities managed by partner agencies.

State highways in some locations have little to no roadway shoulder. Roadway shoulders provide space for people on bicycles out of the general travel lane. On many highways pedestrians may also use roadway shoulders, though shoulders are considered an extension of the roadway and are not typically considered pedestrian facilities.[105] About 4,300 miles of highway shoulders are equal to or greater than 4 feet in width and are open for use by people biking; another 2,500 miles are legally open for bicycling but have shoulders less than 4 feet in width (Figure 3-21 and Figure 3-22). While shoulders less than 4 feet wide may provide some benefit to people who bike, WSDOT has established a 4-foot roadway shoulder in current design standards as the minimum needed for accommodation of bicycle riders—wider where guardrails or barriers encroach on the clear space for riding.

37 percent of state route miles, or ***2,502 miles,*** have shoulders less than the WSDOT Design Manual minimum standard of ***4 feet.***

105 WSDOT Design Manual, Chapter 1510.

Roadway Posted Speed (mph)	State Highway Miles	Less than 4 ft shoulder
25	108	79
30	120	89
35	367	237
40	267	144
45	328	164
50+	5787	1789

Figure 3-21: State highway miles of shoulder less than four feet wide.

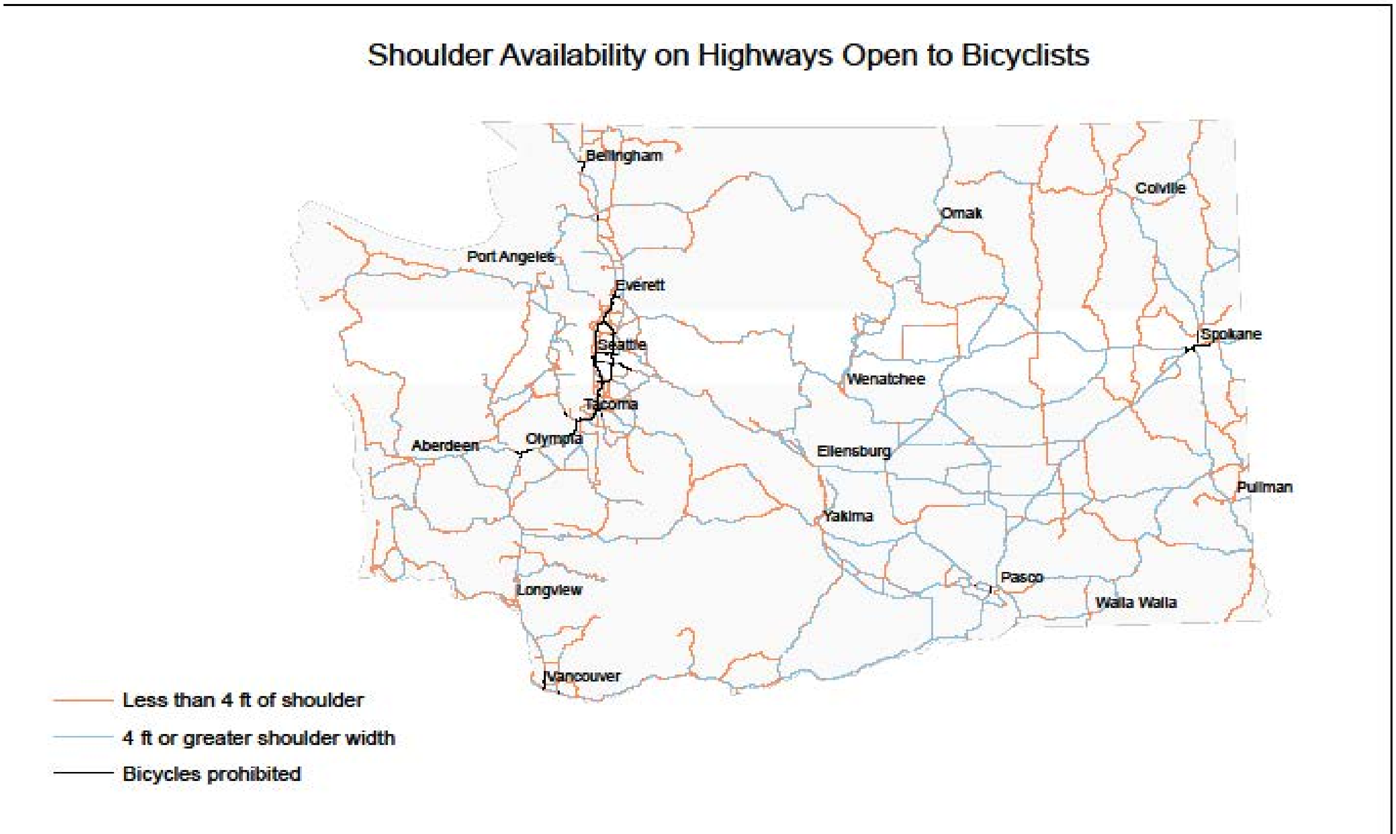

Figure 3-22: Map illustrating highways where bicycling is permitted, but less than 4-foot shoulders are provided (pink) as opposed to locations where shoulder widths are 4 feet or greater (green). Roads with less than 4-foot shoulders are widely distributed across the state and make up about 37 percent of those roads that can be used by bicyclists.

Bicycling is prohibited on about 180 miles of state highways and pedestrians are prohibited on many more. For bicyclists, these prohibitions are generally only on stretches of limited-access highways through major cities. Examples would be I-5 through Seattle or I-90 through Spokane. Pedestrians are prohibited from using most limited-access highways, which is more than 1,100 miles of the 7,000 total miles of state highways. Figure 3-24 illustrates bicyclist and pedestrian restrictions.

Figure 3-23: Image showing a section of limited access highway open to bicyclists, but not pedestrians. Source: Google Street View.

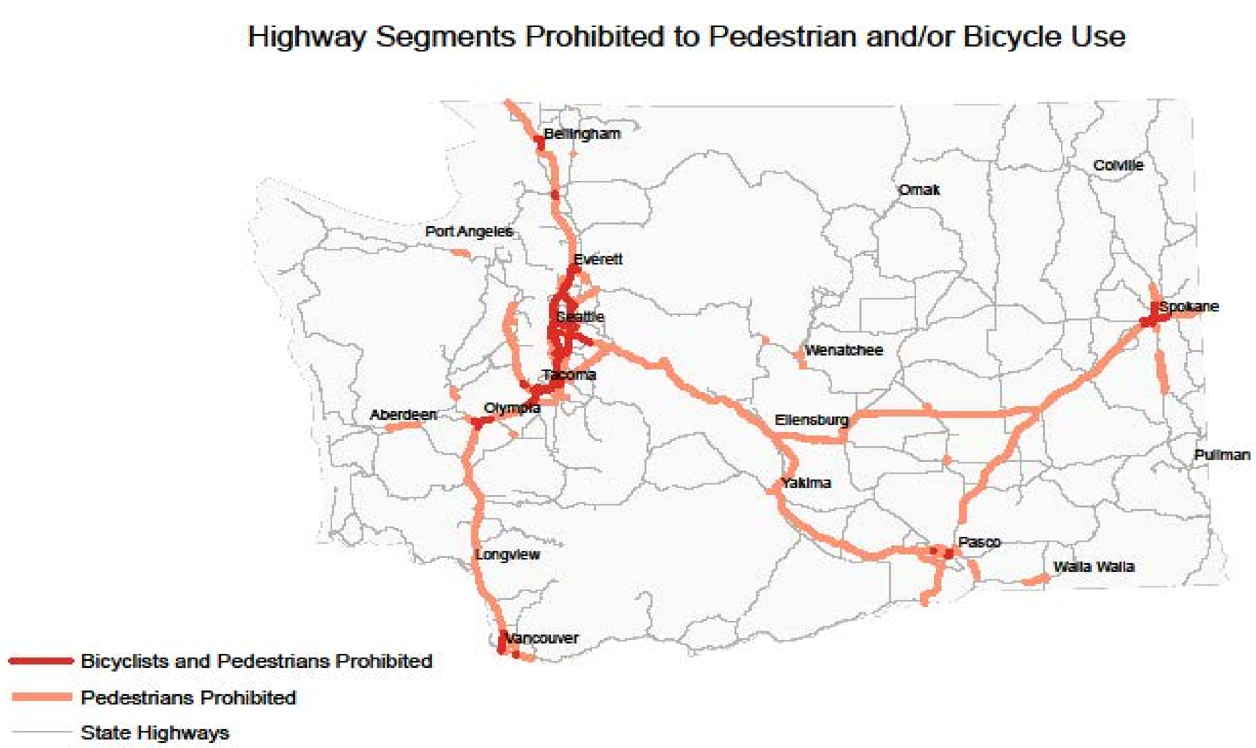

Figure 3-24: Bicyclists and pedestrians are prohibited from using some portions of limited access highways. Pedestrians are usually restricted from most limited-access highways, which make up more than 1,100 miles. Considering both directions of travel, bicyclists are restricted from using about 180 miles of limited-access routes. In some cases, a bicyclist restriction is only imposed for a single travel direction.

Wayfinding signage and other traffic operations tools

The tools available for figuring out where someone is going today are very sophisticated. A cell phone with a data plan can show a person how to get to almost any destination. However, not everyone has continuous access to the Internet, cell phone batteries go dead, and those who develop mapping applications may not always optimize their tools for walking and biking. Wayfinding signage is a 24-hour solution for helping active travelers navigate the safest and most efficient routes for their mode of travel. WSDOT has not used extensive wayfinding focused on active transportation users in the past. However, a new roundabout and associated trail in Anacortes provides a good example of signage application (Figure 3-25). In addition to helping active travelers choose the lowest stress routes on state facilities, WSDOT worked with partner agencies to ensure wayfinding was coordinated between state and local networks.

Many traffic operations tools facilitate walking and biking. Paint alone cues most drivers to stay in their lanes and reminds them to stop where crosswalks are marked. Paint is not protection, but when well-maintained and used correctly it can improve safety and identify dedicated space for active travelers. It is most effective when supported by other infrastructure that does afford protection or separation. For example, a signal can have one phase with the WALK signal on and no left turn permitted for drivers, and a separate phase with DON'T WALK and driver left turns permitted; this provides separation in time. As another example, restrictions on drivers making right turns on red after stopping can help to reduce conflicts between turning drivers and pedestrians or bicyclists. A combination of paint and technology improves mobility for people on bicycles in the form of bicycle detection at traffic signals (Figure 3-26). Other traffic operations tools include a leading pedestrian interval, which allows pedestrians to get a head start at some crossings, and bike boxes that provide a high-visibility staging area for bicyclists to wait at red lights.

Figure 3-25: WSDOT provided comprehensive wayfinding signage associated with a new roundabout at Sharpe's Corner in Anacortes. The signage helps active travelers choose the lowest traffic stress routes to several town centers at this critical junction. WSDOT worked with partner agencies to place signage on both local and state facilities, providing a seamless transition for people walking and biking.

Tools for managing traffic operations such as signage and pavement markings, in conjunction with protective infrastructure, play a key role in developing safe, connected, and efficient networks for walking and biking. Some examples of tools WSDOT and other jurisdictions use include bicycle detection systems and bike boxes at signalized intersections.

Figure 3-26: Traffic signal detection for bicyclists. The bicycle rider stencil helps riders position their bikes in the intersection so they are detected by the traffic signal and given an opportunity to cross. This detector is located at Reservation Road and SR 20 in Skagit County.

Bike lanes, trails, and connecting elements

State routes have approximately 127 miles of bicycle lanes (counting both sides of the road independently) out of about 1,685 miles of highway that are associated with population centers.

WSDOT identified over 1,600 miles of existing trail that serve active transportation needs. Most of these are not managed by WSDOT. Agencies around the state shared plans for many additional miles of trail that would serve active transportation.

WSDOT manages about 38 miles of multi-use trail. Many additional trail miles have been constructed in WSDOT rights of way, but are owned, maintained, and operated by partner agencies. WSDOT trails include ones that provide regionally significant transportation connections, such as the SR 520 bridge trail and the I-90/Mountains to Sound Greenway Trail.

Figure 3-27: Bicyclist and walkers crossing Lake Washington on the SR 520 Trail.

WSDOT also manages trails or segments that connect to local and regional networks. Often WSDOT's role in trail management involves maintaining trail-related bridges that are within the agency's rights of way.

Figure 3-28: The Children of the Sun Trail in north Spokane along State Route 395, constructed as part of a Connecting Washington project. Source: TrailLink.

An example that illustrates a connected network involving multiple jurisdictions and partners is the Children of the Sun Trail in Spokane along US 395 (owned by WSDOT), which connects to the Spokane River Centennial Trail (owned by Washington State Parks, maintained in a partnership that includes State Parks, Spokane County, and various cities, supported by the efforts of the nonprofit Friends of the Centennial Trail). The trail is planned to connect to the Ben Burr Trail (City of Spokane) on the east end of downtown Spokane, at the Riverpoint Campus near the newly constructed pedestrian/bicyclist University District Bridge. Bike lanes on city streets connect to these trails as well. These trails collectively create facilities that could also become part of a future U.S. Bicycle Route (discussed below).

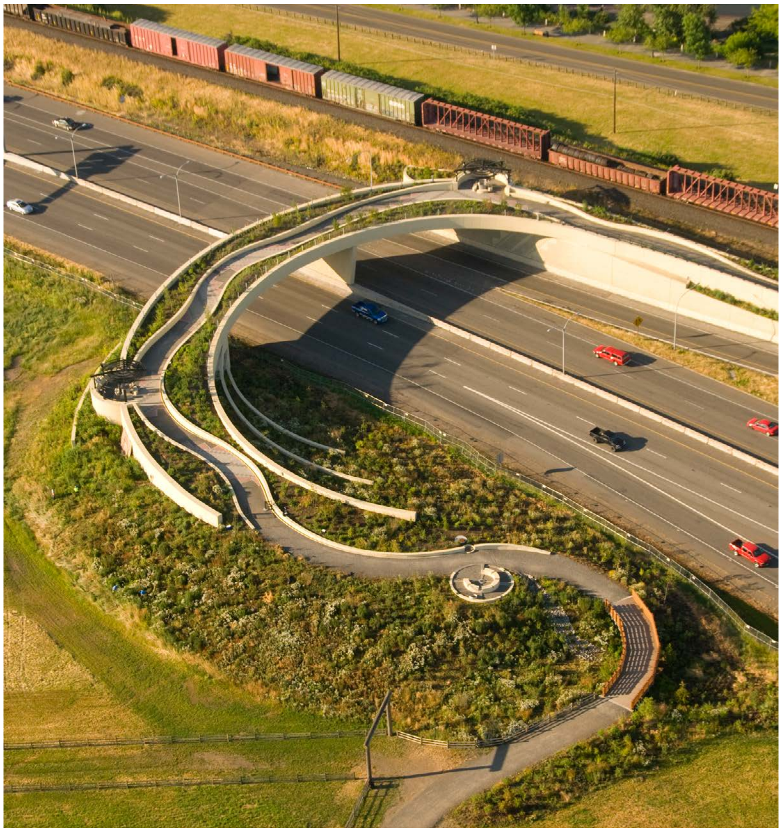

Figure 3-29: Pedestrian Land Bridge over SR 14 in Vancouver, WA. Trails through this area served as the key passage to the Columbia River for many Native American tribes. The construction of SR 14 and the railroad severed the connection for many years until the Vancouver Land Bridge restored the link. Source: KPFF Consulting Engineers.

Separated pedestrian and bicyclist bridges provide important connecting elements. Like multi-use trails, these bridges represent facilities with the lowest LTS on the state system. WSDOT owns and manages 113 structures that do not necessarily facilitate travel on state highways but are associated with them. Some of these facilities can provide an iconic connection, such as the Vancouver Land Bridge over SR 14. The Land Bridge provides a safe crossing of the highway as part of the local network of sidewalks, bike lanes, and trails connecting the waterfront and downtown and fills a gap created by construction of the highway and rail line.

WSDOT owns and operates 113 active-transportation bridges that are separated from motor vehicle traffic. Bridges and tunnels are generally not the first choice for highway crossings, but provide a critical link in some locations.

Figure 3-30: Pedestrian bridge near Union.

Separated active transportation bridges or tunnels are usually not the first solution WSDOT considers to enable active transportation users to cross state highways. Research shows that people generally prefer to cross at ground level, and many ground-level crossings can be improved for the cost of a single bridge or underpass. Some research also suggests that providing a separated bridge give drivers the signal that they do not need to be aware of pedestrians who may still be crossing at ground level and can signal drivers to increase their speed above the posted limit.[106]

Where these structures have been constructed, WSDOT recognizes the need to maximize their value by working with partner agencies to improve routes that include them. In some cases, it can be hard to find where bridges connect with the adjacent street network. Wayfinding signage and visibility improvements could be low-cost strategies to increase use of current investments and help people to feel less isolated when using them. The highway crossing availability study's route directness data (discussed above), when finalized, will help the agency evaluate the need for other such structures in the future.

Figure 3-31: Three WSDOT-owned pedestrian crossings, spaced about 600 feet apart, are found between Woodland Park and the Woodland Park Zoo in Seattle.

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106 Institute for Transportation & Development Policy. 2019. [Pedestrian Bridges Make Cities Less Walkable. Why Do Cities Keep Building Them?]

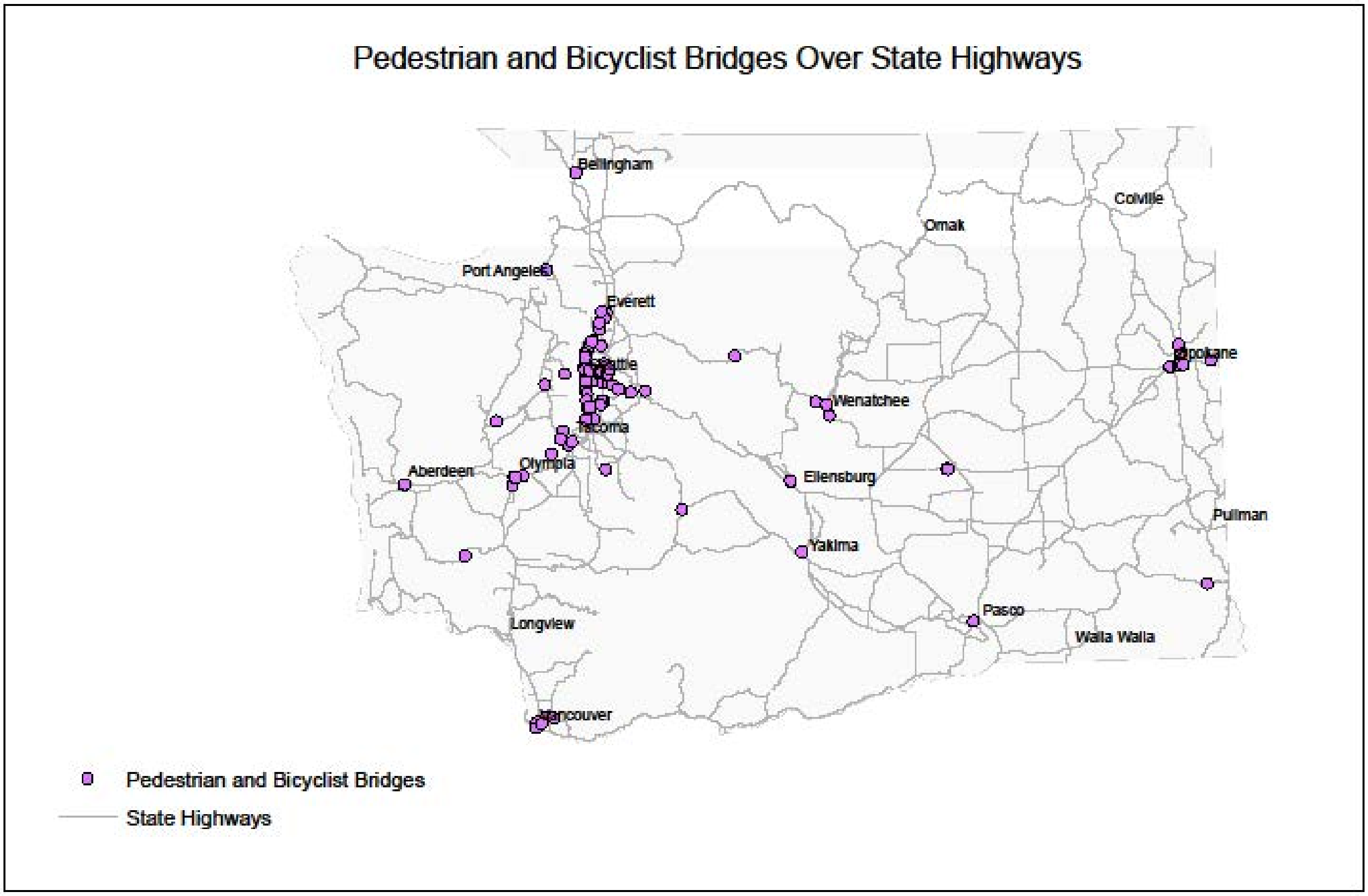

Figure 3-32: Locations of separated pedestrian/bicyclist bridges owned and managed by WSDOT.

Figure 3-32 shows the locations of separated active transportation bridges throughout the state and Figure 3-33 provides examples that represent different functions these structures serve. Most of these bridges are in-town connectors and many offer key links across major highways. Without them, walking and bicycling trips would be much less convenient and require people to interact with much more motor vehicle traffic or go farther out of their way to find a safe crossing.

Crossing Type	Number out of 114	Examples
Over water, rail, terrain or other	23	Children of the Sun Trail (near Francis Ave.), Spokane Fairweather Creek, 28th St, Medina
Over traffic	91	South Custer Road, Spokane Vancouver Land Bridge, Vancouver G Street Off-Ramp to 101 Bridge Sidewalk, Aberdeen
Major active transportation trail	46	Palouse to Cascades Trail, Thorpe Main Street Lowell River Trail Access, Everett Children of the Sun, East Farwell Road, Mead

Crossing Type	Number out of 114	Examples
In-town connector	68	South Regal Street, Spokane 132nd Street, Burien Mainstreet, Monitor
Intermodal connector	5	I-405 Southbound Flyer Stop, Kirkland Sea-Tac Airport Light Rail Station, SeaTac I-5 Mountlake Terrace Transit Center, Mountlake Terrace
Parallels highway (not trail related)	6	I-90 Bridge, Moses Lake Ebey Island/U.S. 2 Eastbound Bridge, Snohomish County
Other	19	Chinook Pass, Pacific Crest Trail, Yakima County Blue Heron Resort, Union Alpoa Creek Bridge, Clarkston

Figure 3-33: WSDOT owns and operates many bridges across the state. Some bridges provide pedestrian and bicyclist access alongside motor vehicles, while others are separated structures. This table lists examples of separated structures.

United States Bicycle Route System

The U.S. Bicycle Route System (USBRS) is a national network of numbered and signed bicycle routes developed in consultation with regional stakeholders and approved by state DOTs and the American Association of Highway Transportation Officials. In contrast to a bicycle trail or other dedicated facility, a bicycle route designation is a wayfinding tool. Considerations for selecting US Bicycle Routes include linking riders to services and population centers, minimizing traffic exposure wherever possible, and emphasizing the scenic or historic value of a potential route. While USBR designation does not require specific infrastructure, routes generally make use of the best available bicycling facilities, which may include off-road paths, bicycle lanes, low-traffic roads and highway shoulders. Like a state highway, a USBR identifies a cross-state route, but someone may use it for a short local trip. The routing specifics of a given USBR can be changed over time to take advantage of new facilities. The Adventure Cycling Association makes use of designated USBRs in its long-distance bike touring maps so USBRs serve as invitations to bike travel and touring visitors, particularly for small towns and rural areas.

Four USBR system routes have been designated in Washington, with a combined length of 734 miles. Many other potential routes have been identified, which if designated would form an extensive network across the state. USBRs make use of the best available existing facilities including trails and local roads as well as highway shoulders.

To identify a USBR, local bike advocates volunteer to suggest and test routes and compile the recommendation. Designation of a USBR requires support from the jurisdictions responsible for segments of the route. WSDOT staff prepare and submit the route for national recognition. The highway numbering committee run by the American Association of State Highway and Transportation Officials (AASHTO) reviews and approves proposed routes. This process is like the one used to designate state highway and interstate numbers or scenic byways.

Four USBRs have already been designated in the state. Washington received national and international recognition when USBR 10 became the first route to be designated on the West Coast.[107] USBR 10, 468 miles long, runs between Newport and Anacortes, primarily along SR 20, but using local roads as well. The other three, USBRs 87, 95 and 97, are north/south routes located in Whatcom, Island and Skagit counties. Together, they cover another 266 miles.

Figure 3-34 and Appendix I shows existing and proposed USBRs for Washington. Work is under way to identify the turn-by-turn specifics of USBRs shown here as conceptual corridors. Portions of the conceptual routes identified align with the western segment and terminus of the "Great American Rail-Trail", a project of the Rails-to-Trails Conservancy (Figure 3-35). The conservancy is promoting a cross-country rail-trail of over 3,700 miles from Washington, DC, to Washington. In Washington, it would include the Palouse to Cascades Trail, Olympic Discovery Trail, a planned Sound to Olympics Trail across Kitsap County, and other connections needed to reach from the Idaho border to the Pacific Ocean.

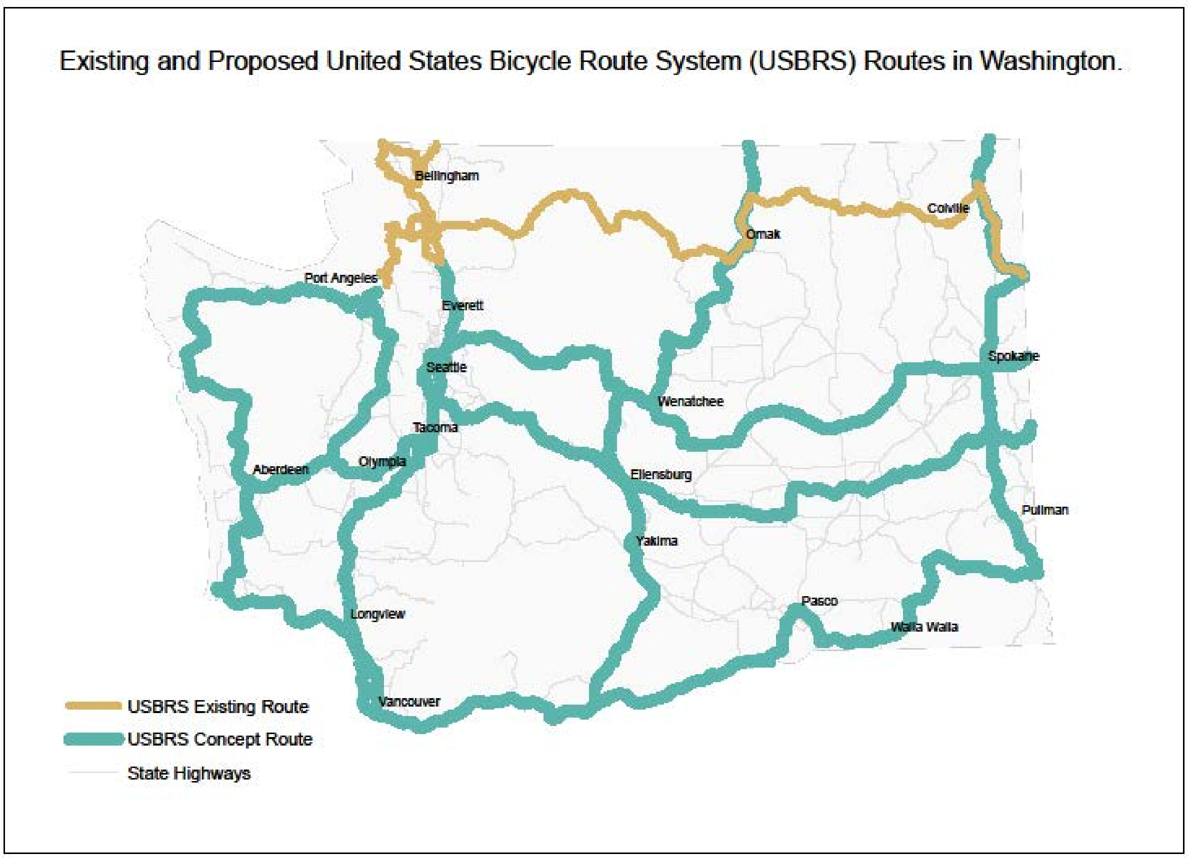

Figure 3-34: Map of existing Washington USBRS routes (in yellow) and conceptual corridors (in teal). Appendix I provides labelled routes and concepts. The conceptual map may be updated over time as opportunities are identified that fit within USBRS requirements.

[107] McGrody, Louise. 2014. Washington state's First U.S. Bicycle Route Designated. Washington Bikes.

Figure 3-35: Western limit of the Great American Rail Trail. This cross-country trail project aligns with a proposed USBR route and uses several existing trail corridors. Source: Rails-to-Trails Conservancy.

Significant trails and networks in Washington

Washington has more than 1,600 miles of existing trails, including ones of regional or statewide significance. These include regional "super" trails that may carry heavy commuter use during peak periods and/or serve as destination attractions for bike tourism. Significant trails serve both local needs and long-distance travel. This function resembles how people use state highways, which may be used by someone driving across the state or by someone getting on at one interchange and off at the next. Local trail networks and other comfortable bike/walk connections expand the value of the regional trails by making it possible to travel door-to-door on a low-stress system, the same way that local streets connect to state highways.

Investments to close the gaps in these trail networks would leverage the investments of the past and enhance their value. As the total number of connected trail miles increases the attractiveness of the trail network, and hence the asset to tourism, also increases. These long-term investments take time to pay off. As the proverb goes, the best time to plant a tree was 20 years ago. Second best time to plant a tree: Today.

The same is true for trail development; the Burke-Gilman Trail, for example, would not carry so much traffic today if people had not worked on it and its connections piece by piece. When WSDOT added the SR 520 bridge trail, analysis of data from counters showed an increase in ridership. This represented more than just a shift from other facilities; the new connection invited new riders.[108]

[108] WSDOT. SR 520 Regional Trail improves connectivity and shows evidence of latent demand for active transportation. WSDOT Gray Notebook 71, Sept. 2018

Figure 3-36 shows where trails exist today and where proposed or conceptual segments would connect them and increase their usefulness.[109] The Recreation and Conservation Office's statewide trails plan also includes the goal of linking trails with transportation.[110] The development of this conceptual map parallels that of the U.S. Bicycle Route System by starting with the state highway map. Representation of a conceptual trail does not indicate any specific route—the statewide map serves as a starting point for discussion among jurisdictions and stakeholders about the potential for future trail development.

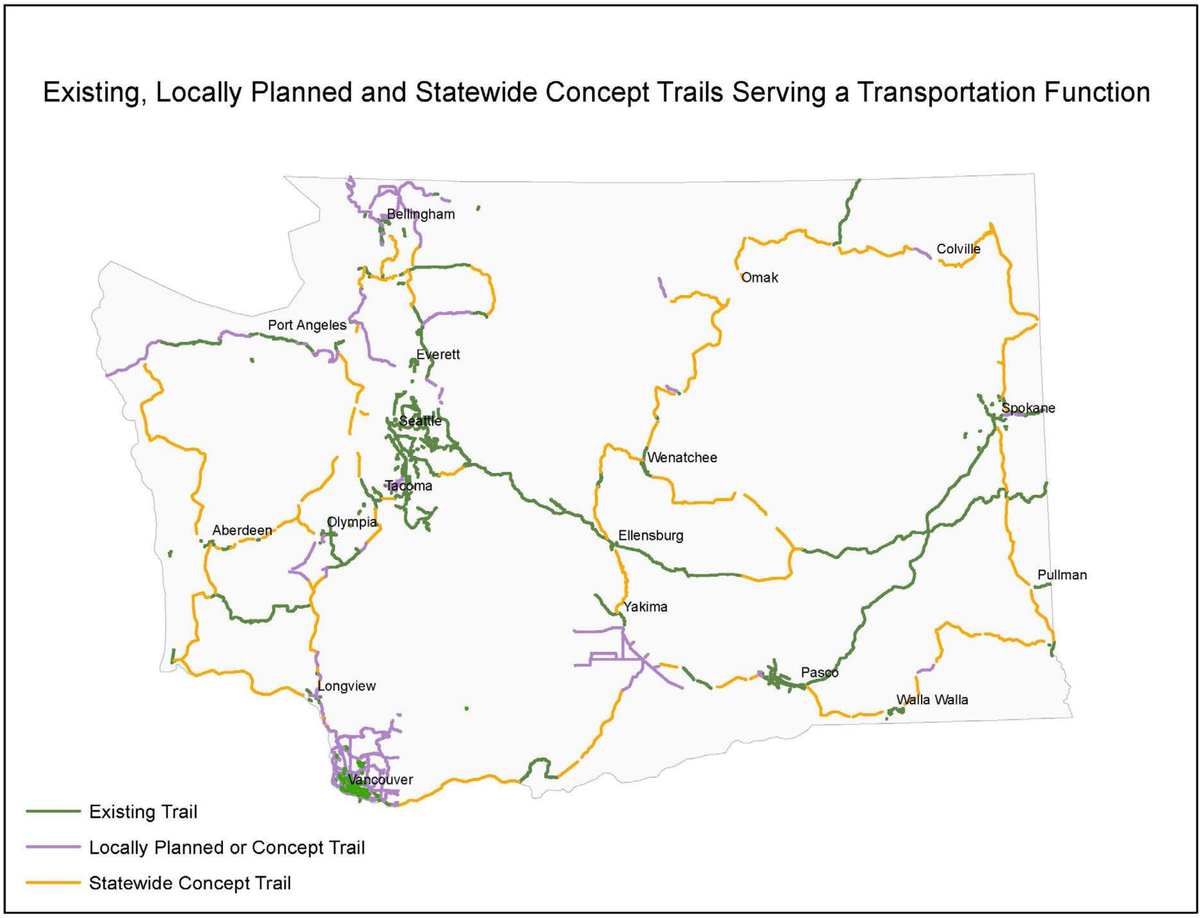

Figure 3-36: Existing, locally planned, and statewide concept trails serving a transportation function. This map shows many of the existing trails across the state that could generally be considered to serve a transportation need, as opposed to only a recreational one. Several trails are only partially improved, and others may be planned that are not represented. The map also shows local agency planned and/or conceptual trails and a system of statewide conceptual trail linkages. The statewide conceptual trails would link between existing trails and/or trails proposed by local agencies. The statewide conceptual trail system uses the currently proposed United States Bicycle Route System corridors to suggest where a system of statewide trails might be added.

Conceptual statewide connector trails were identified as links between existing and proposed trails from other agencies. WSDOT used proposed United States Bicycle Route System alignments (discussed previously) to identify routes for statewide links. Many smaller existing segments across the state connect people within communities to local destinations. These small trails often begin to link up and some may eventually become part of longer, regional trail networks.

109 The map is based on best available data at the time the plan was initially drafted. Omission of a trail here does not indicate anything about its planning status.

110 Washington State Recreation and Conservation Office. Washington State Trails Plan. 2018.

Modal connections

A well-designed multimodal system creates places where people can make both long and short trips without driving. This approach adds capacity to the existing system, allowing more flexibility to meet demand. It also provides transportation independence for those who cannot or do not drive.

This plan recognizes the need for well-planned modal connections. People who walk and bike often make connections with transit modes such as buses, ferries, and trains. In some locations, safe rolling or walking access to stations or landings can be challenging and may discourage this type of multimodal trip.

To serve shorter parts of the longer multimodal trip the "first and last mile" connections are important. People must have convenient, efficient, and comfortable access to locations where they can make use of other modes. Many modal connections on the state network have sidewalks, but dedicated bicycle lanes, trails, and pedestrian crossings are less common. Other elements such as lighting, street trees, and covered transit stops with a place to rest can enhance the quality of these connections even further.

Most WSDOT modal plans include strategies to improve bicyclist and pedestrian connections. The Washington State Rail Plan includes strategies to improve first and last mile connections. Of the 26 rail stations in Washington, 20 have sidewalk connections but only six have bike lanes that allow people to access the stations. Amtrak Cascades trains have 10 spots on each train that people can pay to reserve for their bicycle. These spots regularly sell out, an indicator of the popularity of bike/train trips.[111]

The Washington State Ferries (2040) Long Range Plan update released in 2019 calls for support of opportunities to incorporate improved bike and pedestrian infrastructure in terminal improvement projects. It also highlights the need for partnerships with local agencies in ferry communities to improve connections for bicyclists and pedestrians. For the 10 ferry routes in the system, the plan projected an average ridership increase of 45 percent for passengers versus 21 percent for drivers with vehicles. The plan calls for significantly increased growth in walk-on and bicycling passengers as the most space-efficient fares they carry.[112]

The Washington State Public Transportation Plan, Human Services Transportation Plan, and state transportation demand management plan include recommendations to improve quality and ADA accessibility of first and last mile pedestrian connections as a key strategy.[113] Research published in 2020 noted the value of improvements at transit stops both in reducing demand for paratransit use and in appealing to other riders.[114]

111 WSDOT. 2019 Washington State Rail Plan. This statement was true pre-COVID19.

112 WSDOT. 2019. Washington State Ferries 2040 Long Range Plan.

113 Expanding Travel Options: Faster, Smarter and More Affordable, A 2019-2023 Strategic Plan. Washington State Commute Trip Reduction Board. 2018. Washington State Public Transportation Plan, WSDOT, 2016.

114 Bartholomew, Keith, and Arlie Adkins. 2020. Bus Stops Improvements Along Utah Corridor Increase Ridership and ADA Accessibility. National Institute for Transportation and Communities.

The data compiled for this plan shows 1,733 public transit stops on state routes in population centers.[115] At these locations the active transportation needs are both for people to cross the road safely and to move along it to reach the stop. Figure 3-37 shows an enhanced highway crossing associated with a bus stop on SR 11 in Bellingham. Figure 3-38 shows communities in the Tri-Cities area and the concentration of transit stops within those communities. The figure shows how locations identified as walking and biking gaps on state highways through this plan's analysis are closely associated with transit stops.

Airports may also be destinations for people who use active transportation; for example, private pilots may travel with a folding bicycle they use upon landing to reach a local restaurant or hotel. The ways that Washington state plans relate to and inform each other is outlined in Appendix G, Plans.

Figure 3-37: Enhanced crossing serving transit stops. This crossing of SR 11 in Bellingham provides a safe crossing opportunity for people accessing the transit stops on either side or other destinations nearby.

115 WSDOT. Fixed-route transit stops for the State of Washington.

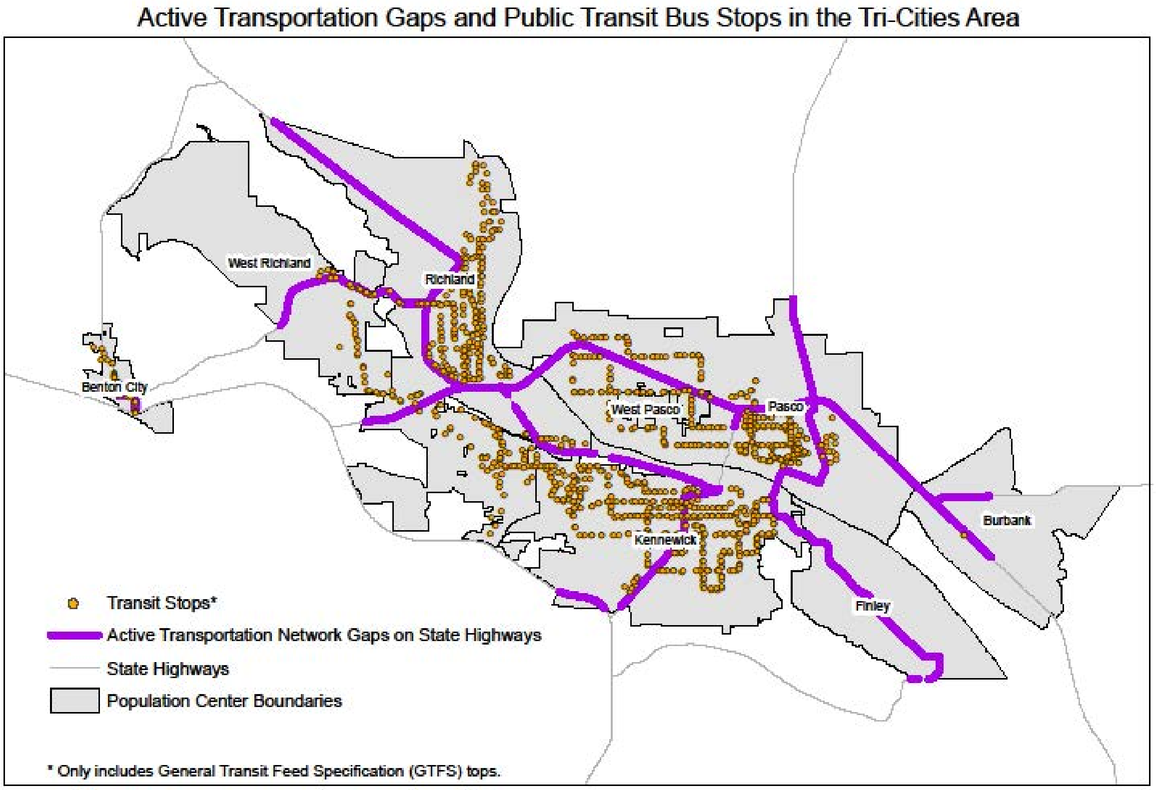

Figure 3-38: Public transit bus stops in the Tri-Cities area. This map shows the boundaries of population centers and active transportation gaps associated with state routes through those locations. Most public transit stops serve locations where people live, work, and go to school. Reviewing this type of analysis helps planners identify overlapping active transportation and transit needs. [116]

To identify access to multimodal travel opportunities, WSDOT included connection points to other modes when analyzing the transportation system. Improving sidewalks, bike lanes, or trails and shared-use paths leading to these locations adds to their value and increases the potential and range for multimodal trips.

TRACKING AND MONITORING STATEWIDE NEEDS

Facilities inventory

WSDOT, like other transportation agencies and jurisdictions in the state, has only partial information on the facilities they own and manage that provide space for walking and rolling. This information is critical for understanding and stewarding the quality and completeness of the network for all users.

As discussed in Chapter 2, WSDOT and other agencies also lack complete data on current usage. Where active transportation congestion exists—on a crowded downtown sidewalk or busy trail, for example—that information is not yet captured and defined as a rationale for network expansion.

Currently no system exists that brings data together from all jurisdictions to fully describe the active transportation network. It was beyond the scope of this plan to address this data limitation. Given the legacies of past decisions and land use changes around state routes, this plan and the underlying methods focus on factors that contribute to travel conditions for active transportation use on the state network and whether

116 Figure 3-38 includes only General Transit Feed Specification (GTFS) bus stops. It does not include school bus stops and other providers not included in the GTFS data source.

those conditions meet travel needs. The approach taken aligns with what Washingtonians told WSDOT would contribute to increased use of walking and bicycling for transportation: complete, comfortable connections to get where they need to go. This plan also applies the newest approaches recommended by the Federal Highway Administration.[117]

The first question to answer was, what data is available through WSDOT or other authoritative sources to answer these questions.

Walk and bike facility types

Chapters 1515 and 1520 of the WSDOT Design Manual describe bicycle facilities and trails in detail. The AASHTO Guide for the Development of Bicycle Facilities and the NACTO Urban Bikeways Design Guide serve as additional design resources. Chapter 1510 of the WSDOT Design Manual provides guidance on pedestrian design, including guidance for ADA accessibility. The AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities and the NACTO Urban Streets Design Guide serve as design resources.

> To understand the statewide need for making connections and providing mobility opportunities WSDOT examined available data for sidewalks, shared-use paths or trails, protected bike lanes, buffered bike lanes, "conventional" bike lanes, shoulder bikeways, intersections, and crossings, including ramp crossings.

Appendix F, Cost Estimation Background, defines in detail the bicyclist and pedestrian infrastructure types commonly used on state highways or in the WSDOT right of way. For purposes of understanding the need to provide mobility opportunities across the state, WSDOT considered sidewalks, shared-use paths or trails, protected bike lanes, buffered bike lanes, "conventional" bike lanes (indicated with a single stripe of paint), shoulder bikeways, intersections, and crossings, including ramp crossings.

With regards to sidewalks, they may be present on WSDOT right of way but managed by the jurisdiction through which that state route passes. Traffic signal operations on state routes within city limits in these larger jurisdictions are also the city's responsibility.[118] These factors mean the primary analysis of facilities does not yet include all relevant data concerning sidewalks along state routes.

[117] FHWA. 2018. Guidebook for Measuring Multimodal Connectivity.

[118] Under RCW 47.24.020, this population cut-off for responsibility will increase at specific points, meaning that WSDOT will acquire new sidewalk responsibilities, as follows: 2023, 30,000; 2028, 32,500; 2033, 35,000. For more information on sidewalk responsibilities, the Municipal Research and Services Center Sidewalk Construction, Maintenance, and Repair has a page with links to relevant statutes.

The development of this plan, inquiries into sidewalk data availability, and data limitations have highlighted the need for further discussions about sidewalk roles and responsibilities. An agreement between WSDOT and the Association of Washington Cities concerning maintenance is due to be updated.

Asset management

Asset management is the strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their life cycle. Good asset management practices provide the greatest return to taxpayers; maintenance and preservation extend the useful life of transportation facilities at lower cost than building new facilities. Federal law now requires WSDOT to produce a Transportation Asset Management Plan (TAMP), and the agency has begun the work of identifying definitions and objectives for its assets.[119]

WSDOT does not maintain an asset management plan specific to active transportation. Creation of the active transportation plan has clarified the value of more comprehensive basic information about pedestrian and bicyclist infrastructure on the state system.

The TAMP does not currently track active transportation infrastructure as a separate category. Highway shoulders, for example, are not evaluated for whether their condition is appropriate for bicycling. The TAMP does call for the following:

- Develop and manage an inventory and condition assessment of assets.
- Define and establish state of good repair standards for each asset.
- Establish maintenance performance measures.
- Develop strategies to achieve the lowest life-cycle cost for investments.

Every jurisdiction with responsibility for sidewalks is required to have an ADA transition plan. In May 2018, the Federal Highway Administration approved WSDOT's ADA Transition Plan, which calls specifically for collection of complete and accurate data on assets related to accessibility. In developing its transition plan, WSDOT inventoried pedestrian facilities on state right of way between 2009 and 2012. ADA features include accessible pedestrian signals, crosswalks, bridge end ramps, curb ramps, detectable warning surfaces, driveways, edge protection, handrails, rest areas, pedestrian bridges, shared use pathways, walkways, islands, ADA parking areas, rail crossings, sidewalks, stairways, and ferries. An updated inventory would enable WSDOT to use the information to program improvements that provide accessible active transportation.

119 WSDOT. Statewide Asset Management Plan.

The creation of this Active Transportation Plan has helped WSDOT staff understand the need for additional basic information about pedestrian and bicyclist infrastructure on the state network. This planning process identified several data gaps. When WSDOT and partners collectively address these, the agency can update the overall analysis.

Best practices in bicyclist and pedestrian infrastructure data collection

Any asset management practice is only as strong as the supporting data. While comprehensive information about other transportation modes is typically collected, detailed and complete collection of bicyclist and pedestrian infrastructure data at the state level is an emerging practice. Recent advances in remote and automated data collection promise to make this data collection easier and potentially decrease cost over time.

WSDOT can collect bicyclist and pedestrian asset data at either the network level or the project level. Figure 3-39 provides a comparison of the two data levels.

Method Characteristics	Network-level Method	Project Level Method
Attributes	Presence or absence of infrastructure and Type of infrastructure	Type of infrastructure and details (ex., slopes and quality information)
Collection Method	LiDAR surveys, aerial surveys	Field data collection, plan data and drawings
Storage Method	Data can be stored spatially (e.g., GIS mapping) or in a database	Hard copy or digital drawings
Update Frequency	May be updated during periodic or regular maintenance	Typically not updated
Data Use	Used in planning, analysis, reporting	Used for project construction, or historical reference
Data Cost	Low to High	Low

Figure 3-39: Active transportation data collection.

As WSDOT continues to transition towards a multimodal transportation focus, the collection of network-level data for all modes should become more common. A successful data collection effort should consider:

- Data collection methods.
- Data storage mechanisms.
- Potential data stewards and partnerships.
- Variety of current potential uses and future data uses.
- Data validation and quality control.
- Ongoing data maintenance and funding.
- Attributes collected and common data definitions.
- Data licensing and data sharing considerations.

TAKEAWAYS FROM CHAPTER 3

The process of developing and testing this approach provided information for WSDOT about needed improvements to data collection and management and the challenges inherent in maintaining this analysis over time. As the agency makes improvements, it will need to be able to update the baseline evaluation to provide a clearer picture of conditions on state highways.

The analysis described in Chapter 3 serves as a snapshot in time of WSDOT right of way with respect to active transportation based on an objective and quantitative evaluation method. It can serve as the basis for rational selection of projects and programming to provide mobility for people and goods, as directed in RCW 47.05.010. In using this analysis as the basis for estimation of costs to lower level of traffic stress in population centers, WSDOT learned additional lessons described in Chapter 4.

Chapter 4:
COST ESTIMATES FOR STATEWIDE NEEDS AND OPPORTUNITIES

INTRODUCTION

The assessment of needs on state routes is grounded in the principle that active transportation should be a safe and comfortable option for travel within population centers to reduce traffic congestion created by motor vehicle use for short trips. State routes present barriers to walking and bicycling in many population centers around the state. Establishing a safe, complete connection may involve a change on the state right of way and/or identification of a preferred route on the local network.

A level of traffic stress (LTS) 1 indicates facilities and/or roadway designs generally suitable for people of all ages and abilities. Applying the principles of safety, equity, demand, and the methodology described in Chapter 3 focused the needs assessment on state routes with LTS 3 or 4 within population centers.

Working toward a future complete and connected active transportation network will require close coordination among partner agencies and jurisdictions. The goal is a set of shared priorities that align efforts across boundaries for cost-effective implementation.

By undertaking an assessment of state right of way, WSDOT has created information to support its role as a partner. Context-specific changes can then be developed in consultation with communities and residents as local and regional plans are updated to incorporate needs on state routes, filling a critical gap in past plans. WSDOT region offices can use the information in corridor studies, planning studies, and site-specific project planning and design as they coordinate with other agencies. A similar need for collaboration and a guiding principle of making improvements “to reduce unintended gaps in condition, nonmotorized systems, ADA accessibility, and environmental mitigation” were identified in a 2019 report to the legislature’s Joint Transportation Committees in an assessment of city transportation funding needs.[120]

[120] Berk Consulting. June 2019. Assessment of City Transportation Funding Needs. Report prepared for the Joint Transportation Committee.

In evaluating needs this analysis does not assume that future connections to meet identified needs would be completed on state right of way. Where a gap exists due to lack of facilities or the level of traffic stress, the preferred or most feasible solution may be on a nearby local route.

This plan provides broad estimates at a statewide level for what it would take to arrive at level of traffic stress 1 or 2 on state routes or associated local routes in population centers. In addition, it identifies funding needs for local active transportation projects and the opportunity for a bikeway network connecting regional trail networks and U.S. Bicycle Routes into a statewide system.

The assessment of needs on state routes is grounded in the principle that active transportation should be a safe and comfortable option for travel within population centers to reduce traffic congestion created by motor vehicle use for short trips. State routes serve as arterials or present barriers to walking and bicycling in many of these population centers around the state.

Population center improvements to reduce level of traffic stress where it is currently too high to support safety and mobility needs will include:

- Speed management to lower the operating speed of some roads to reduce the speed differential between people walking, biking, and driving, which reduces crashes and improves outcomes for all road users.
- Completion of connected linear facilities with designated space for active travelers that is separated to the extent necessary based on adjacent road characteristics (higher speeds and traffic volumes need more separation).
- Provision of adequate crossing opportunities (protected to the extent needed based on road characteristics) with a frequency based on pedestrian need to cross (proximity to destinations, route directness).
- Identification of existing or future connections on local routes that serve a state interest by providing a lower-stress and reasonably direct route once they are connected and wayfinding is provided on and off the state right of way; these may serve as the preferred alternative to making changes on the state route in some locations.

Building on this plan's analytical tools to identify the most cost-effective strategies will enable the agency to incorporate active transportation planning and design more fully. Where multiple needs and issues can be addressed during work on a project or programmed activity, this will result in less disruption to the traveling public and the state's ecosystems at the same time it facilitates increased active transportation use that frees up road capacity.

Active transportation improvements may be funded locally as well as through federal, state, and private or nonprofit sources. Sources of transportation revenue vary by level of jurisdiction. A bike lane, trail, or sidewalk could be paid for by a mix of local sales tax, real estate excise tax, federal income tax (in the form of federal grants), property tax, and other sources in addition to the motor vehicle fuel tax that people commonly think of as funding transportation. No state in the US funds 100 percent of its streets, roads, highways, trails, and sidewalks from fuel taxes.[121]

[121] How Are Your State's Roads Funded?. 2019. Tax Foundation. .

MILEAGE BASIS AND SUMMARY OF ESTIMATED COSTS

Washington has a total of around 81,000 center-lane miles of public roads. As discussed in Chapter 3 and Appendix D, Methods of Analysis, WSDOT used data from the 2017 Highway Performance Monitoring System (HPMS)[122] and examined 6,977 center line miles of state highway.[123] To estimate active transportation need and cost the agency divided the miles into two categories:

- Population centers: Cities, towns, and census-designated places.
  - Total center-lane mileage: 1,685.
  - Gaps in population centers have associated cost estimates below.
- High-speed rural routes: Everything else.
  - Total center-lane mileage: 5,292.
  - No cost estimate was associated with these segments; planning factors and data needs are discussed in Appendix D, Methods of Analysis.

The need categories considered included infrastructure focused on population centers, and the planning and engineering support needed for future alignment of local plans with state analysis, data collection, analysis and evaluation, and technical assistance and training.

Transit, ferry, train, and airplane riders are often also active transportation network users. Very few transit users other than those using paratransit will be picked up in front of their residence and dropped off at their destination. The FHWA indicates most people are willing to walk 1/4 to 1/2 mile to/from a transit stop and those on bicycles may travel farther to make a connection, given the greater time efficiency of cycling.[124] To support multimodal safety and mobility this analysis includes consideration of the 1,733 public transportation bus stops located on state highways.[125] Transit centers, ferry landings, train stations, and airports were included as destinations; most are within population centers and/or have transit stops associated with their location.

Summary of Needs and Estimates: The total estimated cost to address gaps in population centers identified through this analysis appears below. Infrastructure needs consider existing gaps based on best available data. WSDOT anticipates that new development along state highways and population growth might create additional needs not captured here, and that refinement of facilities data will result in adjustments to the baseline in the future.

122 WSDOT. Highway Performance Monitoring System.

123 The analysis uses highway miles marked in HPMS as "increasing direction", referring to the direction of milepost numbering.

124 Federal Transit Administration. 2011. Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law. Federal Highways Administration. 2008. Pedestrian Safety Guide for Transit Agencies, Chapter 4, Typical Walking Distance to Transit.

125 Only stops included in the General Transit Feed Specification (GTFS) dataset were included. Some communities have transit stops on the state system that are not captured by this data and this source does not capture school bus stops. School districts work with WSDOT for placement of signage to indicate the presence of a school bus stop on a state route.

The findings of the analysis—that state routes in many locations need improvements to be suitable for walking and bicycling—are not a surprise since state highways were not originally designed or constructed for the purpose of providing safe active transportation connections. Given rapid growth along and around highways, hundreds of miles of state routes now function as primary community streets with associated needs for design suitable to local short trips. State law directs WSDOT to "balance system safety and convenience…to accommodate all users of the transportation system".[126]

In some locations an expenditure for one type of treatment could reduce or eliminate the need for another type of treatment. These estimates do not reflect that possibility because it will require site-specific planning and design to determine that. Nor do they incorporate the potential for cost savings if WSDOT were able to address gaps with changes incorporated into routine activities such as resurfacing.

Tables below present cost estimates in four main categories. The first two, Infrastructure/Traffic Systems and Bikeways and Trails Network, are presented as totals with no timeframe specified for implementation. The second two are presented as ongoing needs with amounts per biennium.

Identification of a gap associated with state right of way does not mean the analysis specifies which agency or jurisdiction might receive funding to close a gap in the future. Regardless of which agency is ultimately responsible once an appropriate solution is identified, every gap has an associated cost incorporated here.

Costs represent rough estimates for the purposes of this plan based on an average toolkit of treatments for each level of traffic stress given the roadway characteristics.[127] Appendix F, Cost Estimation Background, presents detail on cost calculations.

Infrastructure/Traffic Systems: Needs based on gap analysis of current conditions in population centers. Presented as total not related to a given timeframe for implementation.

- Speed management for safety.
- Separated pedestrian and bicyclist facilities.
- Crossing, intersection, and ramp treatments.
- Bridge retrofit/improvements.

Bikeways and Trails Network: Opportunity to complete and connect trails to leverage past investments in trails.[128] This is presented as a total and not related to a given timeframe for implementation.

- Washington Bikeways Network connecting U.S. Bicycle Routes with regional trail networks, route identification and signage.

Local Needs: Ongoing needs identified as local priorities on the local network; needs on state routes within cities and counties are included in the infrastructure/traffic systems category above. Presented as amount per biennium.

126 RCW 47.01.078

127 Bushell, Max A., Bryan W. Poole, Charles V. Zegeer, Daniel A. Rodriguez. 2013. Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public

128 Value of existing trail mileage calculated at average cost per mile on the same basis used for network completion estimate in this plan yields $1.7 billion. Appendix F, Cost Estimation Background, provides details and sources.

- Grant programs backlog and future projects identified by jurisdictions.

Maintenance/Operating Support: Operating needs that support the ability to align WSDOT and local plans, incorporate information from the gap analysis into WSDOT processes and procedures, and maintain facilities. Presented as amount per biennium.

- Maintenance: Calculated as 4 percent of capital identified above distributed over 20 years.[129]
- Engineering and partnership development to support infrastructure work: Decision analysis tool, pedestrian/bicyclist count data collection and analysis, accessible active transportation network analysis and asset management data, capacity to apply innovation and adaptation in work of WSDOT and partners.

Infrastructure Program or Project Category	Total Identified Need
Speed management for safety	$283 million
Separated pedestrian and bicyclist facilities	$1,828 million
Crossing treatments	$1,208 million
Bridge retrofit/improvements for active transportation	$1,980 million
Total	$5,299 million

Figure 4-1: Needs based on gap analysis of current conditions in population centers. Presented as total not related to a given time-frame for implementation.

Bikeways and Trails Network Program or Project Category	Total Estimated Cost
Washington Bikeways Network, U.S. Bicycle Routes, regional trail networks	$2,620 million
Bikeways and Trails Network signage and wayfinding	$4-5 million
Total	$2,625 million

Figure 4-2: Opportunity to complete planned local and regional trails, finish designation of U.S. Bicycle Routes, develop trails or shoulder improvements to create connections between trail networks, and provide signage and wayfinding. Presented as total not related to a given timeframe for implementation.

Local Network Program or Project Category	Per Biennium
Local projects funded through active transportation grant programs	$200 million

Figure 4-3: Ongoing needs identified as local priorities. Presented as amount per biennium based on continuing increases in applications to Safe Routes to School and Pedestrian/Bicycle Program grant calls for projects.

Maintenance/Operating Support Program or Project Category	Per Biennium
Maintenance	$32.65 million
Engineering support, data analysis and tools	$1.04 million

Figure 4-4: Operating needs that support the ability to address the results of the gap analysis, align WSDOT and local plans, and maintain facilities. Presented as amount per biennium.

[129] WSDOT continued to refine this figure while the draft version of this document was out for public review and comment. Appendix F provides details on how figures were calculated. Active transportation maintenance has not been separately budgeted for existing facilities and WSDOT has identified a large maintenance backlog on the highway system in general.

Infrastructure needs can be thought of as a set of interdependent choices and options. The strategies described below will serve to bring level of traffic stress down—in some places if used alone, in other places much more effectively if used in combination.

Figure 4-5 illustrates how WSDOT refined its focus based on the initial analysis to arrive at a statewide set of roadway segments and crossings most in need of changes. If funding becomes available to make changes, these gap locations could be further prioritized by applying criteria WSDOT has defined for safety, equity, and demand, as described in Chapter 3 under Gap Evaluation and in Appendix D, Methods of Analysis.

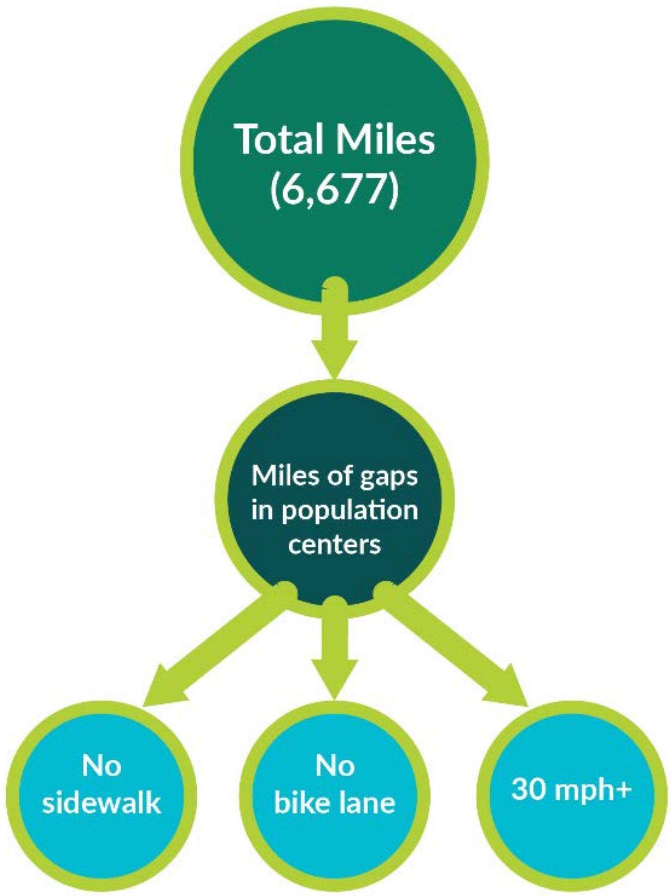

Figure 4-5: Generalized graphic showing state highway miles evaluated (based on HPMS, 2017) for needs assessment. Of the 6,677 miles considered, need was estimated from the subset of those miles that exist in population centers. Depending on the category of need examined, population centers were further subdivided into the portions where no sidewalk had been identified, where no bike lanes exist, or where speeds were 30 mph or greater.

INFRASTRUCTURE NEEDS

WSDOT applied parameters described below to the level of traffic stress analysis to define and constrain the number of miles for which estimated costs were calculated in each category. Appendix F, Cost Estimation Background, provides additional information on the basis for cost per mile. WSDOT drew on FHWA cost estimation guidelines for a toolkit of potential treatments depending on LTS rating and roadway characteristics.[130]

The needs assessment is grounded in data about the characteristics of locations where fatal and serious injury crashes occur disproportionately. These data point to clear priorities: speed management in population centers, crossings, and separated facilities.

Majority of bicylist and pedestrian fatalities and serious injuries on state highways are in population centers
Bicyclist and pedestrian fatalities and serious injuries on state highways; 2010 through 2020

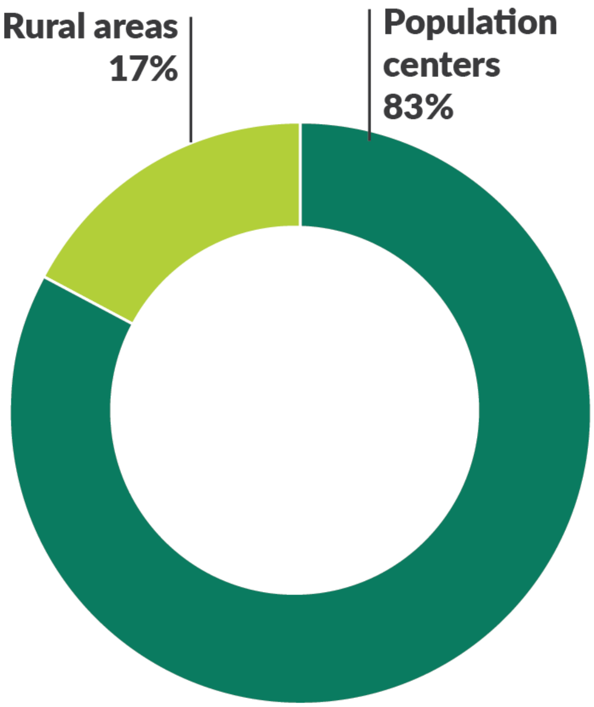

Figure 4-6: This chart divides state highways into two categories, population centers and rural areas, to illustrate where serious injuries and fatalities occur.

130 Bushell, Max A., Bryan W. Poole, Charles V. Zegeer, Daniel A. Rodriguez. 2013. Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public. Prepared for the FHWA by the UNC Highway Safety Research Center.

Speed management for safety

2010–2019, 86 percent of pedestrian and bicyclist fatalities in Washington occurred on roads with posted speeds of 30 mph or higher—only 14 percent on roads posted at 25 mph or less.

Speed management is a systematic approach needed to attain zero fatal and serious injury crashes, particularly those involving people who walk and bike; these approaches also reduce potential harm for all roadway users. Speed is one of the most important physical variables determining whether the active traveler will survive when a motorist strikes them with a vehicle.[131] Washington's 2019 update to the Target Zero plan identifies speed management design practices as a recommended strategy.[132]

Land use changes create new and evolving conditions that may render formerly successful solutions less suitable. Redesign for an appropriate speed limit is especially important where higher-speed roadways coincide with urban-type land uses and contexts with greater numbers of people bicycling and walking, such as where housing and services have developed on either side of a state route.

As context changes, design engineering and traffic management interventions become necessary to support safer target speeds. These changes include road reconfigurations and other measures to cue drivers to operate at appropriate speeds for the conditions.[133] The cost estimate is based on making changes on 849 miles of state highways in population centers where posted speed is 30 mph or more. Treatments would be intended to change the road to support driver compliance with a posted speed below 30 mph. Costs will depend on the mix of treatments used and the current posted speed. Reductions from higher speeds require a broader mix of treatments and incremental change over time to achieve the appropriate speed.

A self-enforcing road, also called a "self-explaining roadway," is a roadway that is planned and designed to encourage drivers to select operating speeds consistent with the posted speed limit.[134]

131 AAA Foundation. 2011. Impact Speed and a Pedestrian's Risk of Severe Injury or Death. "Understanding speed and safety" at the end of Chapter 2 provides more information.

132 Washington Traffic Safety Commission. 2019. Target Zero: Washington state Strategic Highway Safety Plan; pp. 127, 137.

133 Dumbaugh, Eric, Louis Merlin, Kari Signor, Wes Kumfer, Seth LaJeunesse, and Daniel Carter. Implementing Safe Systems in the United States: Guiding Principles and Lessons from International Practice. 2019. Collaborative Sciences Center for Road Safety, University of North Carolina, Chapel Hill. FHWA. 2018. Self-Enforcing Roadways: A Guidance Report.

134 FHWA. 2018. Self-Enforcing Roadways: A Guidance Report.

FITTING HIGHWAY SPEEDS TO CONTEXT VS. MAINTAINING SPEEDS WITH SEPARATED FACILITIES FOR ACTIVE TRAVEL

When considering ways to accommodate safe and accessible active travel on a system historically designed for moving motorists, the project team identified two key strategies to consider. The first is to lower the operating speed and provide active transportation facilities appropriate to that lowered speed. The second is to build safe active transportation facilities that work well for those moving along and across higher-speed facilities. Undertaking either strategy to change roadways built over decades will require supportive policy, funding, and commitment.

In population centers the potential demand for walking and biking by a variety of users is high. In such places, the choice to maintain high-speed facilities (strategy 1) creates a need for active travel infrastructure that offers significant separation or barrier protection from motor vehicle traffic. Intersections on state routes in particular present the dual need to offer safe crossing opportunities and address intersections that are often too wide or complex for some users to cross in a timely fashion. Another issue involves availability of crossing opportunities at intersections and possibly mid-block locations. Where driving speeds are high, active transportation users need an acceptable way to cross high-speed routes that does not require undue out-of-direction travel.

The second strategy, matching the operating speed to the population center context, may offer advantages in terms of cost, safety for all roadway users, and increased walking and biking activity. The cost of active transportation infrastructure where speeds are lower is usually less than in corridors where separated facilities are constructed. On a 25 mph road, conventional bike lanes and lower-cost crossing facilities are sometimes possible. Costs vary, however. Reducing a 50 mph roadway to 25 mph for example, would require more infrastructure and traffic control changes than going from 35 to 25 (Figure 4-7 provides examples of roadway characteristics).

Figure 4-7: Posting a lower speed limit is only a partial solution for achieving a lower speed. Roadway characteristics need to change as well. It may be more costly to design for a lower operating speed when the roadway at the intersection is functioning at 50 mph with five lanes (Lakeview, right image) than on a roadway at an intersection that is posted at 30 mph with three lanes (Quilcene, left image). Image source: Google.

Even where substantial speed changes are considered, the full suite of roadway and operational changes may cost less than the separated facility treatments needed on high-speed roadways. An added benefit of the speed-lowering strategy is increased safety for both active travelers and drivers. High-speed routes that pass through population centers encounter more intersections and activity, making conflict more likely for all users.

Total statewide need was calculated by multiplying the number of miles of state highway in population centers with LTS 3 or 4 by the average cost of speed management improvements per mile (details in Appendix F, Cost Estimation Background).

Some locations identified as LTS 1 or 2 based in part on posted speed may have higher actual operating speeds and thus might also require speed management measures. Such locations were not identified through the analysis process but could be identified through a routine safety audit. Treatments that might be applied in Separated Pedestrian and Bicyclist Facilities and Crossing Treatments, discussed below, also provide speed management benefits.

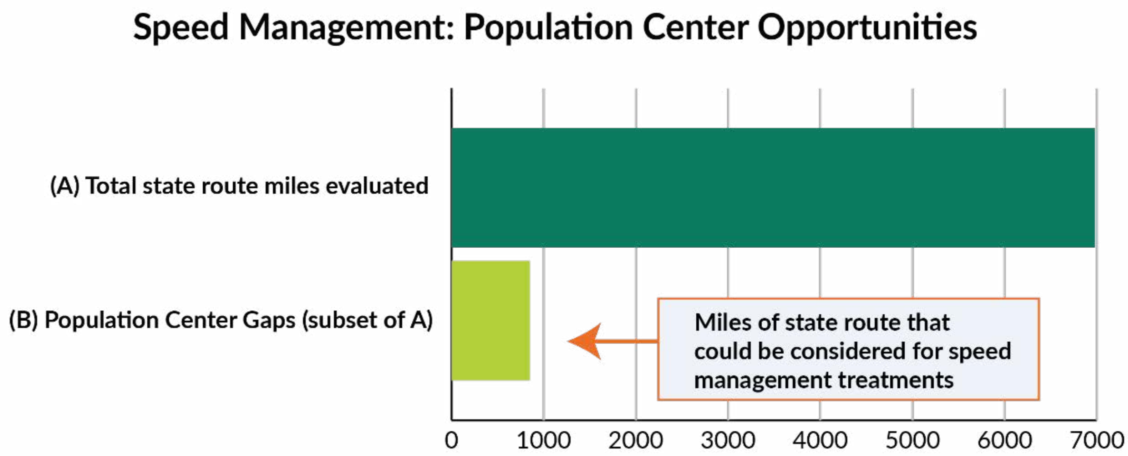

Figure 4-8: Total state route miles evaluated, subset of total showing active transportation gaps within population center boundaries, and subset of gap miles where posted speed is 30 miles per hour or greater. The latter would be candidates for speed management treatments.

Miles Of Highway With Speed Management Needs	Average Cost Per Mile	Total Statewide Need (rounded)
849	$333,480	$283,000,000

Figure 4-9: Total statewide speed management for safety needs. Total Statewide Need was calculated by multiplying miles of state highway bicycle gaps in population centers by the average cost of speed management improvements per mile. The gaps were obtained from the Network Analysis methodology as it applied to the bicycle network since complete data on sidewalk presence was not available and on-street bicycle facilities are in closer proximity to general-purpose travel lanes than sidewalks.

Separated pedestrian and bicyclist facilities

Providing dedicated, separated space for people bicycling and walking significantly reduces the likelihood of fatal or serious injury crashes and as noted above is especially important where driver speeds are high. The higher the speed the greater the separation needed for sidewalks, bicycle lanes, and crossing facilities.

From 2010 to 2019, 27 percent of fatal and serious injuries involving people walking and bicycling occurred on state routes. Even though state routes represent only about 10 percent of total lane miles in Washington they were the sites of 45 percent of all pedestrian and bicyclist deaths.[135]

This plan considers sidewalks as the primary pedestrian facility. Separated paths are also effective treatments that can support all forms of active transportation given sufficient width of the path and available right of way. In some cases, the best solution is to partner with local agencies to find alternatives to state highways for pedestrian facilities, while still providing relatively direct access to destinations. In those cases, wayfinding signage on both networks would likely be part of the treatment.

135 WSDOT Gray Notebook 78, June 2020.

Note that for crossing facilities "separation" most often refers to separation in time coupled with a designated crossing space; drivers stop while people cross. It can also refer to a grade-separated crossing such as a pedestrian bridge; this is a much more expensive facility type. Crossing treatments are discussed in more detail below.

Pedestrian facilities

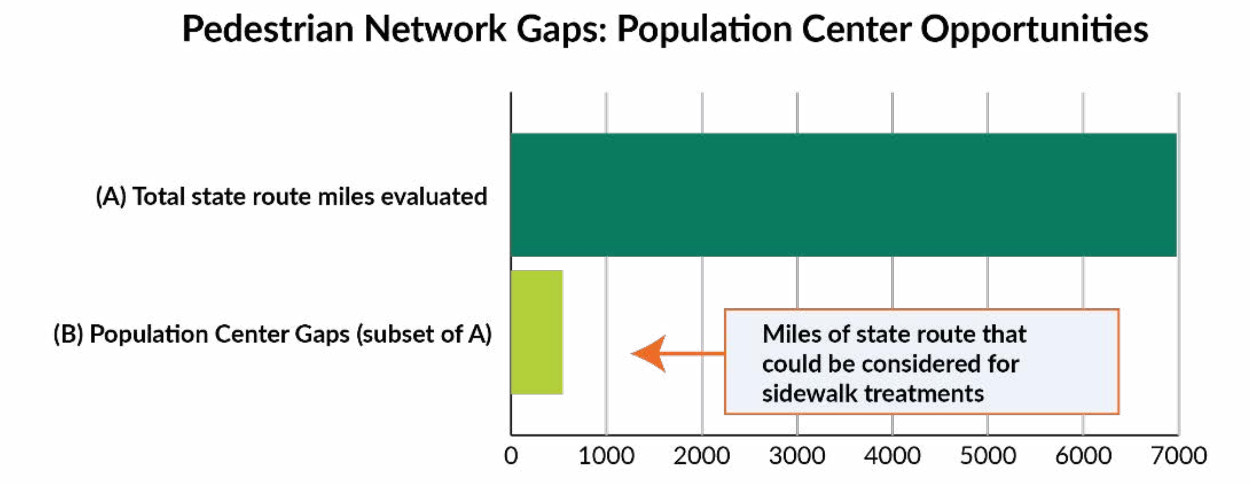

Figure 4-10: Total state route miles evaluated, subset of total showing active transportation gaps within population center boundaries, and subset of gap miles that were estimated to not have sidewalks. The latter would be candidates for pedestrian linear treatments such as sidewalks or separated paths.

Estimation of pedestrian need was based on known roadway characteristics that were used to identify gaps, and an estimate of the amount of sidewalk present. Of the 6,977 miles of highway considered, WSDOT identified 861 miles of potential population center gaps in the pedestrian network. The gaps excluded fully controlled, limited access highways where pedestrians are generally prohibited.

Existing sidewalk adjustment: In general, sidewalks are considered to address pedestrian network gaps, though sidewalk width and the presence of buffers are factors in full determination of level of traffic stress. At the time the overall gap analysis was conducted, existing sidewalk data for all state highways was not easily available. To address this lack of data, WSDOT undertook a preliminary visual scan of satellite imagery to evaluate the presence or absence of sidewalks along state routes. Based on this effort, the agency was able to estimate that 38 percent of the 861 miles of state highway within population centers have sidewalks on at least one side. This figure likely overestimates the presence of ADA-accessible sidewalks and will be adjusted based on ongoing/future data collection efforts and coordination with local agencies. The gap estimate was adjusted to exclude the existing sidewalk, reducing it to 542 miles. Appendix C, Cost Estimation Background, provides more information on the agency's efforts to collect basic data and adjust for the presence of existing sidewalks. It was not possible to evaluate condition or ADA accessibility of sidewalks.

Miles of Pedestrian Gaps in Population Centers	Average Cost Per Mile (Both Sides of Roadway)	Total Statewide Need (rounded)
542	$2,321,585	$1,258,000,000

Figure 4-11: Total statewide need was found by multiplying miles of state highway pedestrian gaps in population centers by the average cost of sidewalk improvements per mile. Appendix C, Cost Estimation Background, provides details.

Bicyclist facilities

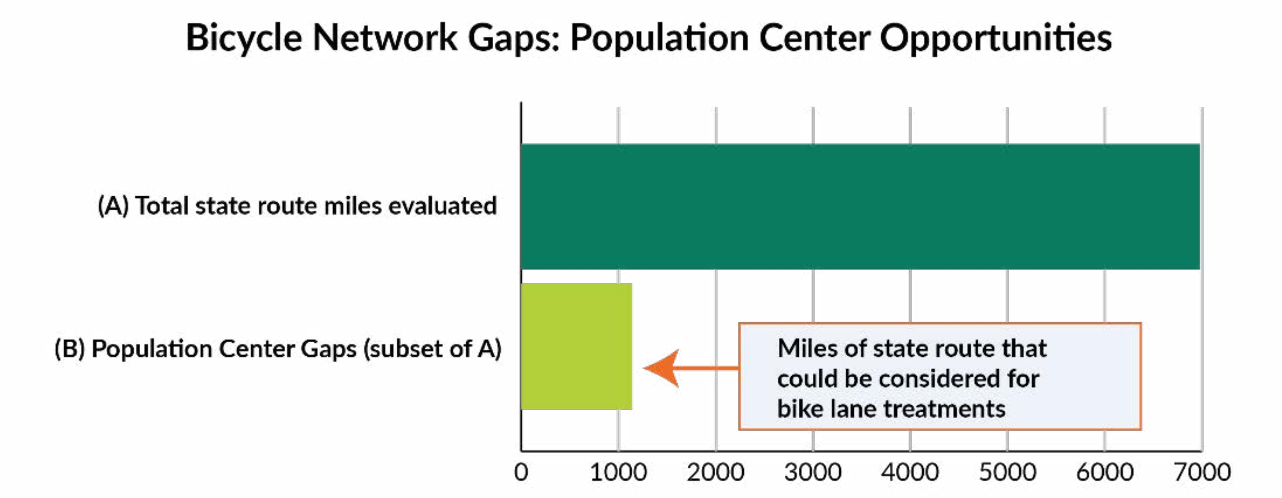

Figure 4-12: Total state route miles evaluated, subset of total showing active transportation gaps within population center boundaries, and subset of gap miles without bike lanes. The latter would be candidates for bicycle linear treatments such as various types of bike lanes or separated paths.

For people riding bicycles, WSDOT identified 1,152 miles of population center gaps, which exclude highway segments prohibited to bicyclists.[136] Excluding highways that currently provide bike lanes leaves 1,142 miles of bicyclist gaps. Existing bike lanes may not reflect the most recent design standards, but any needed design changes would be addressed as part of maintenance and preservation of a given facility.

This plan considers bike lanes that offer various degrees of separation and protection as the primary bicyclist facility. Separated paths are also effective treatments and can support connectivity for all active transportation users, given sufficient path width. In some cases, the best solution is to partner with local agencies to find alternatives to state highways for bicyclist facilities, while still providing relatively direct access to destinations. In those cases, wayfinding signage on both networks would likely be part of the treatment.

The specific change that provides a safer and more complete facility depends on local plans and conditions, available right of way, availability of parallel lower-stress facilities, and other variables. This plan's analysis is intended to become part of the practical solutions approach to arrive at the best treatments for the partners, budget, and other constraints in a location.

136 WSDOT. Washington state highway segments closed to bicyclists.

Standard bike lanes are relatively low-cost and could be added during regular preservation activities, usually with little to no additional cost for materials. Such improvements would still require some funding, given the need for design work and community engagement that are beyond the scope of routine preservation work.

Cost estimates were based on a range of bike lane needs from standard lanes to barrier-protected or grade-separated facilities, with toolkits of treatments based on roadway characteristics. Appendix F, Cost Estimation Background, provides additional detail on the cost basis used for estimates.

Miles of Bicyclist Gaps in Population Centers	Average Cost Per Mile (Both Sides of Roadway)	Total Statewide Need (rounded)
1,142	$499,145	$570,000,000

Figure 4-13: Total statewide need was found by multiplying miles of state highway bicyclist gaps in population centers by the average cost of bike lane improvements per mile. Excluding intersections, the primary bicyclist linear facility is some form of designated bike lane.

Combined linear facilities need

Looking at linear facilities for pedestrians and bicyclists together, the total estimated cost is about $1,828 million ($1.828 billion). If funding were made available to address these needs, funds would be used to develop a site-specific mix of treatments for each segment based on alignment with local active transportation plans. Where possible, WSDOT and partners could utilize opportunities to leverage cost savings by combining this work with other programs and projects. In some locations it may not be necessary to provide changes on both sides, for example in a location where a sidewalk on one side of the road and adequate crossing treatments together meet pedestrian travel needs. The best solution in a given location might include a mix of state route changes and improvements on local roadways to tie the overall active transportation network together for greatest gains in safety and mobility.

Crossing treatments

Roadway crossing designs, where they are located, and how frequently they are provided are key considerations for active transportation. The right crossing treatment or intersection design and operation can help active travelers be more conspicuous to motorists and encourage safer driving speeds and turning behaviors. Well-placed, and more frequent, crossing opportunities encourage active travelers to use the treatments provided.

From 2010-2019, 62 percent of fatal and serious injury crashes involving pedestrians occurred when they were crossing a roadway. During the same period, 55 percent of bicyclist fatal and serious injury crashes were intersection-related.

One important crossing consideration is connecting people to other modes of transportation. As of 2019 there are 1,733 bus stops on state routes in population centers. People of all ages and abilities need to be able to cross the highway safely to reach transit stops and other destinations.

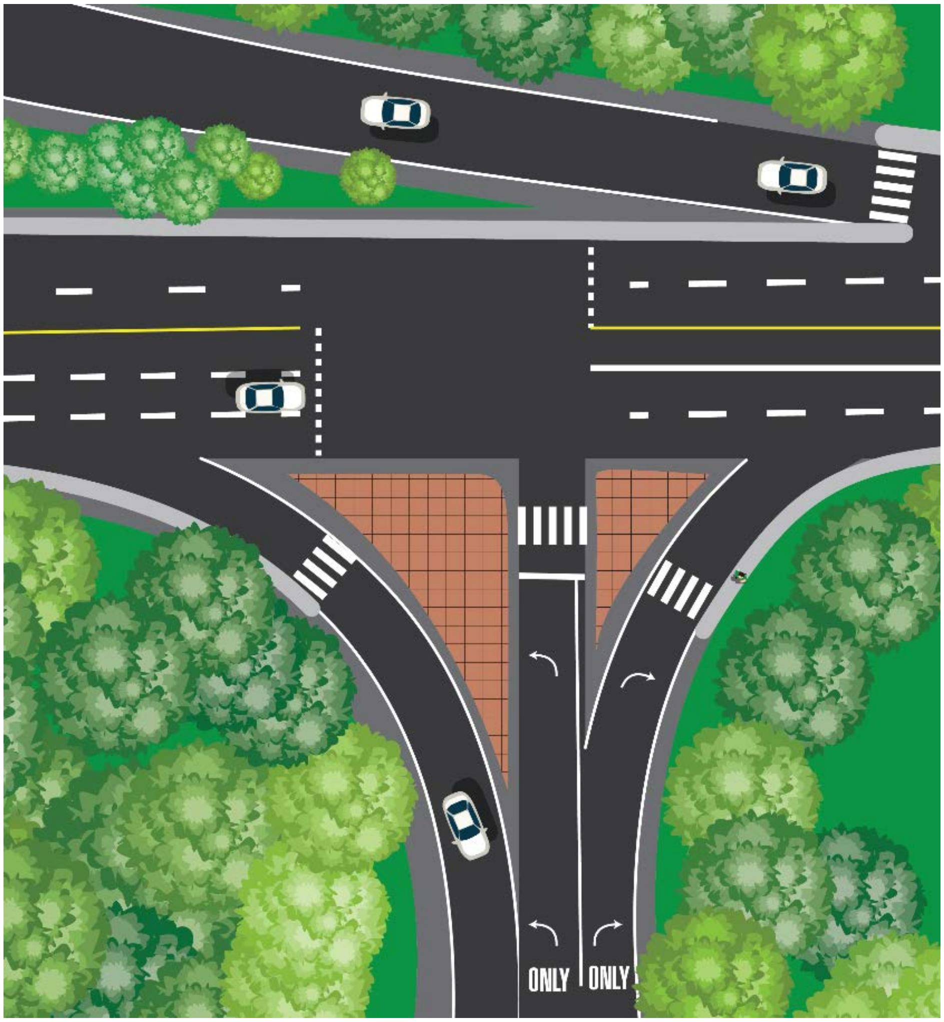

Figure 4-14: Typical ramp intersection with a local roadway. In general, ramp intersections are associated with roadway characteristics that produce a high level of traffic stress. In this scenario, pedestrians are provided with sidewalks and marked crosswalks; however, those features are not always present. Even with such features, additional crossing enhancements may be needed where traffic volumes and speeds are high. Note in this scenario there are no bike lanes present and the turn radii onto and off the ramps allows drivers to maintain a high rate of speed as they merge, creating a difficult situation for bicyclists.

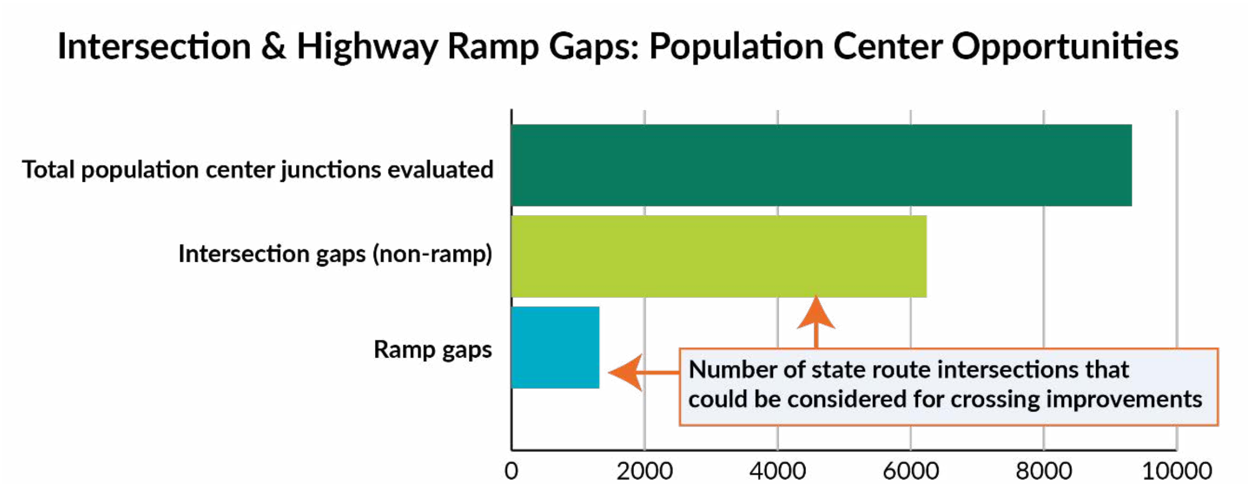

Figure 4-15: Total intersections evaluated on state routes and the subset of those intersections where active transportation gaps were identified within population center boundaries. Intersections in this graphic include both standard and ramp intersections.

STATE ROUTE CROSSING AND INTERSECTION TYPES

Signalized intersection: Traffic signals control the intersection and crossing opportunity and are likely to have more use than nearby unsignalized crossings. Available data do not indicate whether intersection designs and signals are optimized for pedestrian or bicyclist crossings or require pushing a call button to trigger the WALK signal.

Unsignalized intersection: No traffic signal. Unless expressly prohibited, all intersections in Washington are legal crossings for pedestrians and bicyclists whether or not they have a marked crosswalk or signal (RCW 46.61.235). More recently, curb ramps have been added to crossings which reinforce the pedestrian's right to cross, even though these intersections may not offer other crossing improvements.

Ramp junction: Where a highway on-ramp or off-ramp meets another state highway or a local street or road.

Through the network analysis and level of traffic stress ratings 7,564 intersections in population centers were identified as gaps for active travel on state highways. (The highway crossing analysis based on route directness described in Chapter 3 is new information and was not factored into this plan's calculations.)

Of the 7,564 intersections, 1,323 were identified as state highway ramps. A single ramp is associated with more than one point of intersection, including where limited-access highways connect to a ramp and where the ramp connects to another roadway. In characterizing intersection needs for active travelers, WSDOT made the decision to exclude those intersections where ramps merge with limited access highways (the gore area) and most ramp-ramp intersections.

With support from FHWA, in 2018 WSDOT developed an action plan for pedestrian safety at crossings. It describes types of countermeasures appropriate to roadway and traffic characteristics and provided a basis for information included in cost estimates for this category of need.[137]

6,241 non-ramp intersections were identified within population centers. Intersection cost estimates were made for each gap with a toolkit of treatments based on roadway characteristics (details in Appendix F, Cost Estimation Background).

[137] WSDOT. 2018. Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations.

Intersection and Ramp Gaps	Average Cost	Total Statewide Need (rounded)
Number of Unsignalized Intersection Gaps	Average Cost Per Intersection	
4,752	$212,480	$1,010,000,000
Number of Signalized Intersection Gaps	Average Cost Per Intersection	Total Statewide Need
1,201	$38,573	$46,000,000
Number of Unsignalized Ramp Gaps	Average Cost Per Intersection	Total Statewide Need
1,206	$125,768	$46,326,10152
Total Intersection Gaps	Average Cost Per Intersection	Total Statewide Need
7,159	$168,698	$1,208,000,000

Figure 4-16: Intersection facility needs for bicyclists and pedestrians in population centers. Total statewide need was found by multiplying the numbers of state highway intersection gaps in population centers by the average cost of intersection changes (Appendix F, Cost Estimation Background, provides details).

Overall, it appears that evaluation based on equity criteria places appropriate emphasis on larger population centers (where the potential to address safety and demand is high), without overlooking the many places where people with transportation (and other) disadvantages are located throughout the state.

High-speed rural segment gaps

Regardless of the lack of facilities, some people who walk or bicycle for transportation will need to travel along high-speed rural state routes, while others such as bike tourists often choose certain high-speed rural routes that offer relatively lower traffic volumes. Shoulders serve multiple needs for the traveling public, most of which benefit motorists, but bicyclists are permitted on all sections of highway that do not restrict their access and WSDOT's Design Manual reflects shoulder use by bicyclists. Public input during plan development noted the importance of rural highway segments that may provide the only available connection. Comments received on Chapters 5 and 6 encouraged WSDOT to develop metrics and strategies for these locations in addition to those for gaps in population centers; this topic will be addressed in the implementation plan and future updates to this plan.

Key questions for WSDOT and partners to consider in evaluating high-speed state routes and alternatives on local roads:

- Is this a designated U.S. Bicycle Route or part of a regional bike plan?
- In terms of active travel, who are the users of the route?
- Is the route the only facility that addresses the travel need?
- Which roadways have characteristics that do more to serve the safety and comfort of active transportation users?

Figure 4-17 outlines safety considerations for shoulder use by active travelers. Discussion of future analysis required to identify high-speed rural segments in need of treatments appears in Appendix D, Methods of Analysis. The opportunity outlined under Statewide Bikeways and Trails Network, below, would address need in some locations.

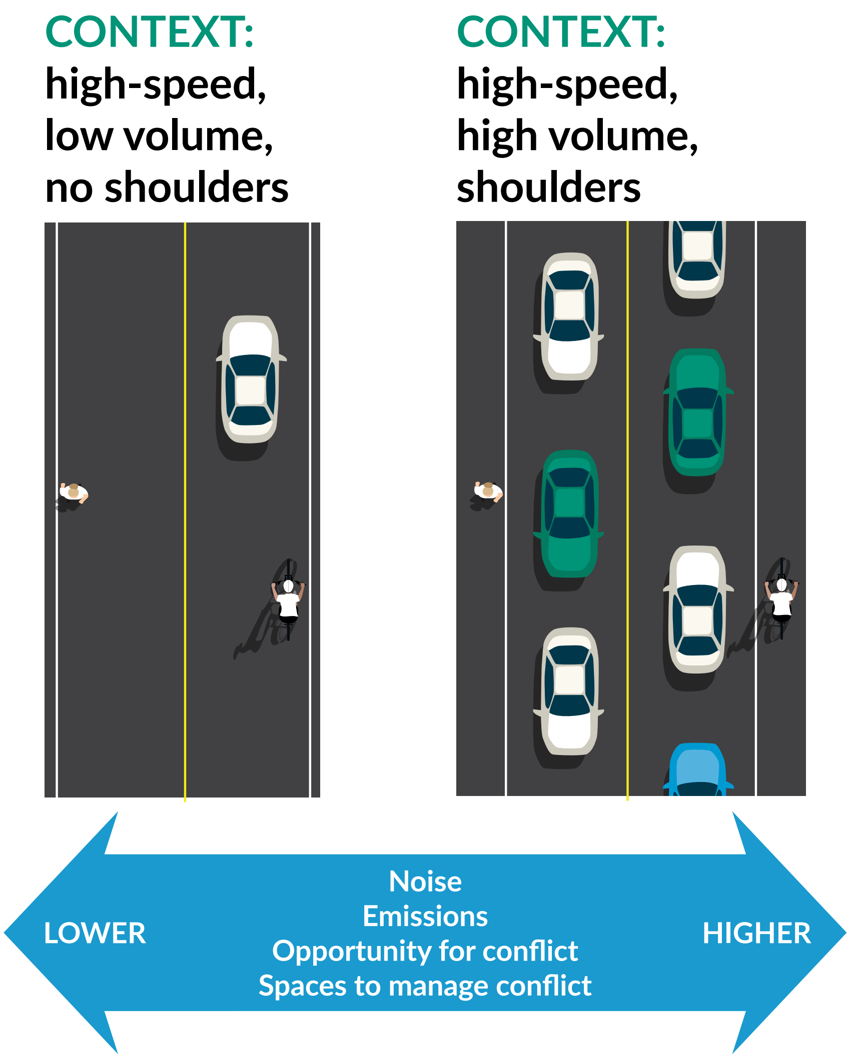

Figure 4-17: Considerations for understanding shoulder use for active transportation in two high-speed, rural highway contexts. On the left is a low volume road with no shoulders where drivers need to adjust their position to provide space for active travelers. The low volume context reduces an active traveler's exposure to noise, vehicle emissions and opportunity for conflict, but when a conflict does occur the space available for roadway users to manage it is low. On the right is a high-volume road with shoulder space. Here noise and emissions reduce the opportunity for active travelers to have a healthy and appealing trip. The shoulders provide space for managing potential conflict; however, the number of vehicles increases the opportunity for conflict.

Local comprehensive plans, trail plans, and active transportation plans need to address these questions to develop preferred local network connections. To address the needs of active transportation users, particular effort needs to be made to engage people without access to a vehicle and to align WSDOT plans with local and regional active transportation network plans.

Bridge retrofit/improvements for active transportation

Most of the more than 3,200 bridges on state highways in Washington were constructed primarily to serve motor vehicle drivers and therefore present challenges for active transportation use. Sidewalks, when present, may only exist on one side of the road and/or they may be too narrow to accommodate people using assistive devices such as wheelchairs or mobility scooters. Bike lanes are uncommon on many bridges and shoulders may be narrow to nonexistent as well. Bridge structures present pinch points in the network, where active travelers have no exit in the event a driver encroaches on the shoulder. In some cases, the only option is to share a lane with those driving motor vehicles at high speeds.

Bridges have a lifespan of 70+ years. A bridge constructed without adequate pedestrian and bicyclist facilities affects more than two human generations of use.

WSDOT staff examined bridges in population centers and on rural highways for this analysis. Costs were not generated for the high-speed rural highway context or for locations prohibited to pedestrians or bicyclists. Similar to linear gaps, multiple considerations affect which bridges would be addressed first (Appendix D, Methods of Analysis, discusses high-speed rural segment gaps).

The WSDOT Design Manual calls for a four-foot minimum shoulder width, with wider shoulders where guardrail or barriers affect the usable space. Where conditions will not allow for that space, speed management strategies (see above) would reduce the level of traffic stress and provide more time for drivers to see and respond to the presence of active transportation users.

Out of the 3,269 bridges on WSDOT state routes that span 20 feet or more, 680 are associated with pedestrian and/or bicyclist linear gaps in population centers. WSDOT considered retrofits and separated structures in arriving at the basis for a cost estimate (details in Appendix F, Cost Estimation Background).

Feet of Bridge Needing Improvements	Cost	Statewide Need (rounded)
Bike improvements	Cost Per Linear Foot and Width Needed	*Bike Only* Statewide Need (rounded)
20,427	$1,200 x 10ft	$245,000,000
Pedestrian improvements	Cost Per Linear Foot and Width Needed	*Pedestrian Only* Statewide Need (rounded)
1,603	$1,200 x 10ft	$19,200,000
Both *pedestrian and bike* improvements	Cost Per Linear Foot and Width Needed	*Bike/Pedestrian* Statewide Need (rounded)
102,105	$1,200 x 14ft	$1,720,000,000
Total feet of bridge needing active transportation improvements	Cost Per Square Footage of Bridge Needed	Total Statewide Need (rounded)
124,135	$15,950	$1,980,000,000

Figure 4-18: Bridge retrofit and/or improvement need. Total statewide need was found by multiplying the feet of bridge needing improvement by the estimated cost associated with building a separated pedestrian/bicyclist bridge, as the average cost of retrofits to add active transportation facilities to various types of existing bridge structures was higher than the average cost of a separated bridge. Where the added facility would serve both bicyclists and pedestrians the assumed width was 14 feet. 10 feet was used as the width when only a single mode was identified as lacking facilities.

Opportunity: Washington bikeways and trails network

As described in Chapter 3, Washington has 864 miles of designated USBRS and 2,340 miles of planned USBRS for a total of 3,204 miles. The state also has more than 1,600 miles of trails, including regional "super trails" that carry commuter traffic as well as bike travelers.

Connecting regional trail networks

In coordination with the Recreation and Conservation Office and their data sources, WSDOT identified over 1,600 miles of shared-use paths and other separated pedestrian/bicyclist facilities that can serve a transportation function around the state. These existing trails represent decades of investments and are a $1.7 billion asset.[138] To leverage these existing assets this section provides an estimate of costs to connect trails to each other and/or to other designated active travel routes such as the U.S. Bicycle Route System.

The statewide bikeways network conceptual plan links existing and planned trail segments and U.S. Bicycle Route designations. This utilizes the definition of "trail" or "path" in RCW 47.30.005, which includes highway shoulders that may be improved for bicyclist use. This plan and future updates serve as a comprehensive plan for trails to meet the purposes of that statute.

[138] Value of existing mileage calculated at average cost per mile on the same basis used for network completion estimate. Appendix F, Cost Estimation Background, provides details.

The concept provides estimates for multi-use trail facilities that are paved and available for all ages and user abilities.

The cost for multi-use trails varies depending on a number of factors, including availability of right of way, the presence of critical areas, and crossings. The agency used an average standard cost estimate for 85 percent of trail needs and a high cost estimate for the remaining 15 percent where urban areas or proximity to wetlands would make trail construction more expensive. [139]

For around the average cost of one urban freeway interchange per biennium, Washington could have a statewide trail network in a couple of decades, leveraging the estimated $1.7 billion value of past trail investments. [140]

Trail Mileage	Cost Per Mile	Statewide Cost Estimate
Locally Proposed Trail Mileage	Cost Per Mile	Statewide Estimate
819	$1,052,000	$862,000,000
Existing, But Primitive Trail Mileage	Cost Per Mile	Statewide Estimate
464	$1,052,000	$488,000,000
Statewide Connector Trail Mileage	Cost Per Mile	Statewide Estimate
1,209	$1,052,000	$1,270,000,000
Total Trail Mileage	Cost Per Mile	Total Statewide Trail Estimate
2,492	$1,052,000	$2,620,000,000

Figure 4-19: Total statewide route cost estimate was found by multiplying planned and conceptual miles of paved multi-use trail by an estimated cost per mile. The estimated cost of $1.052 million per mile included a high estimate for 15 percent of the trail mileage and standard estimate for the remaining 85 percent.[141]

Wayfinding and signage

Wayfinding signage and pavement markings indicate preferred routes and distances to destinations. In addition, their use can provide a low-cost interim solution while longer-term infrastructure changes are made on more direct network linkages where indicated. Signage placement can also alert drivers to the likely presence of active transportation users.

WSDOT does not have a complete inventory of or dedicated budget for signage specific to wayfinding for active transportation users. Examples of signage needs specific to active transportation include locations where a local trail offers an alternate route; locations where it would be prudent to advise bike travelers they are approaching a narrow bridge or tunnel that lacks a shoulder; and bridges in population centers that do not have a sidewalk or other appropriate ADA-accessible pedestrian space or an alternate route.

139 Bushell, Max A., Bryan W. Poole, Charles V. Zegeer, Daniel A. Rodriguez. 2013. Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public. Prepared for the FHWA by the UNC Highway Safety Research Center. This estimate used "Multi-Use Trail – Paved" category.

140 Comparison based on WSDOT Fully directional interchange for all general-purpose and HOV movements: $302.98M in Puget Sound, $201.32M in Vancouver, $199.97M in Spokane. These figures have not been adjusted for inflation and site-specific variables affect the cost of any given mile of trail or highway.

141 Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public. This estimate used "Multi-Use Trail – Paved" category.

Figure 4-20: SR 101 along Lake Crescent where shoulders are not available and logging truck activity is relatively high. The posted speed on this section of highway has been reduced to 35 mph due to roadway space constraints. User-activated warning beacons are provided for bicyclists to alert drivers to their presence on the route, however the button may not be accessible to all users. The flashing signal will remain on for one hour, which is long enough for a person pedaling at 12 mph to pass through the area.

Figure 4-21: Bicycle wayfinding signage at Sharpe's Corner in Anacortes.

In addition to general applicability in any bicyclist and pedestrian improvement strategy, a specific need has been identified to implement signage and wayfinding for the United States Bicycle Route System (USBRS) in Washington. The mapping effort to create a USBR designation identifies the best available route through an area, and providing signage is similar to a local jurisdiction putting up bike route signage. Wayfinding signage would identify these formally designated routes on state highways and highlight biking connections with local active transportation networks. This parallels highway signage for drivers, with indication of business loops and exits to local roads and destinations.

The USBR 10 Wayfinding Pilot Project under way in Skagit County in 2020 serves as the basis for estimates of the cost to purchase and install wayfinding signage.

Figure 4-22: A dynamic warning system on State Route 150 along Lake Chelan. The system will alert drivers to the presence of bicyclists ahead. When a bicyclist passes the detector the flashing beacon activates automatically. This system addresses sight line issues and has the added benefit of ADA compliance.[142]

[142] In a Memorandum, July 11, 2019, Western Federal Lands Highway Division (Matt Hinshaw, Highway Safety Engineer) referenced two separate studies that are evaluating these kinds of systems that are either in place or proposed at the Colorado National Monument in Colorado, Mackenzie Pass Scenic Bikeway in Oregon, Cascade Lakes Highway in Oregon, and Bonners Ferry in Idaho. The studies are (1) Relph, David Edward. 2018, Dynamic Warning Systems to Alert Motorists to the Presence of Bicyclists. (2) Rebecca Gleason, 2016 A Study on Dynamic Bicycle Detection and Warning Devices, Western Transportation Institute, Montana State University.

USBRS Route Mileage	Cost Per Mile	Statewide Route Need (rounded)
Designated USBRS Route Mileage	Cost Per Mile	Existing Statewide Route Need (rounded)
864	$1,400	$1,210,000
Planned USBRS Route Mileage	Cost Per Mile	Planned Statewide Route Need (rounded)
2,340	$1,400	$3,280,000
Total USBRS Mileage	Cost Per Mile	Total Statewide Route Need (rounded)
3,204	$1,400	$4,490,000

Figure 4-23: United States Bicycle Route System (USBRS) wayfinding signage program. Total statewide route need was found by multiplying existing and planned miles of USBRS by the estimated cost per mile to place signage in both directions, similar to placement of highway route signage.

Addressing local needs

In an effort to address active transportation needs on local networks, the needs assessment incorporates local, regional, and tribal plans by reference. An inventory of these plans will be included as an appendix in Part 2 of this plan. Not all jurisdictions have a plan updated within the past five years; some jurisdictions do not have any specific active transportation network plan; some elements of active transportation planning may be incorporated into a parks district, recreation, port district, or other plan type not listed. In the future as more jurisdictions conduct planning with local engagement, aligning WSDOT activities with local and regional efforts will streamline future updates to the local needs assessment element of this plan.

The Pedestrian and Bicycle Program (PBP) and Safe Routes to School (SRTS) program provide funding for active transportation projects to local agencies, schools, tribes, Office of Superintendent of Public Instruction, WSDOT region offices, and eligible nonprofit organizations. The improvements developed through this funding are associated with reductions in serious injuries and fatalities where they have been constructed.[143]

In 2005 when the programs launched, jurisdictions submitted a total of 125 project applications asking for $31,229,810. Less than a quarter of the requested funding ($7,019,536) was allocated and a third (40) of those projects were ultimately funded. Since that time the number of applications has risen, and the funding requests have increased sharply as project costs have gone up.

Available funding has grown more slowly than the requests. For the 2019-21 biennium, jurisdictions submitted 255 applications requesting a total of $187,394,435—a new highwater mark in the amount requested. 22 percent of requested funding ($41,766,723) was made available in that cycle, and about 21 percent of the projects (53) were funded. For the 2021-23 biennium jurisdictions submitted 232 applications requesting a total of $190 million, the highest amount requested to date.

143 WSDOT compares crash data from three years before and after a project is constructed to evaluate effects on safety.

WSDOT anticipates growing need based on the project backlog, the increasing level of requests in each successive biennium, projected population increases, and future plan updates by jurisdictions that have not applied in the past.

As a reasonable cost approximation, this plan includes projected level of need as indicated by applications to the Safe Routes to School and Pedestrian/Bicyclist Program funding programs administered by WSDOT in recent funding cycles. This approach underestimates total need by an unknown factor. Local jurisdictions have indicated to WSDOT that they do not always apply to these funding programs because they are highly competitive, with only around 20 percent of applications receiving funding in the past two rounds. Even when jurisdictions do apply, they may only put forward their top one or two projects among the many high-priority projects they have identified. In the 2021-23 call for projects, 85 cities applied out of 281 incorporated municipalities; 15 of 39 counties; and four of 29 federally recognized tribal governments (some city or county applications may be undertaken in partnership with tribal governments).

Parent drop-off and pick-up is responsible for an estimated 10-30 percent of morning/afternoon congestion, so projects that help students walk or bike address congestion at the same time. [144]

These projects that do get identified through this mechanism are not necessarily associated with a plan aimed at providing a complete network; that varies by jurisdiction. It is likely that other needs exist beyond those identified through grant applications. A report on city transportation funding needs prepared for the Joint Transportation Committee identified topics that parallel the findings in this plan. That report presented broad categories of need such as preservation, deferred maintenance, and capital investment, and did not provide a cost estimate specific to active transportation elements of local systems.[145]

"Many opportunities exist to connect levels of government and jurisdictional boundaries to achieve more efficient and effective use of resources…. Partner to develop a highly connected, safe, and accessible nonmotorized system…. funding efforts should collaborate to accelerate development of an integrated network of nonmotorized facilities." [146] —Assessment of City Transportation Funding Needs prepared for the Joint Transportation Committee

Local Network Program or Project Category	Per Biennium
Local projects funded through active transportation grant programs	$200 million

Figure 4-24: Ongoing needs identified as local priorities. Presented as amount per biennium based on continuing increases in applications to Safe Routes to School and Pedestrian/Bicycle Program grant calls for projects, based on a backlog of 985 projects requesting $552,917,487 identified and not funded in past cycles and the amount requested for the 2021-23 biennium of $190 million.

[144] Traffic Congestion Around Schools. Nancy G. La Vigne. 2007. U.S. Department of Justice, Office of Community Oriented Policing Services. Safe Routes to School: Steps to a Greener Future. Safe Routes to School Partnership, 2008. Centers for Disease Control and Prevention.

[145] Berk Consulting. June 2019. Assessment of City Transportation Funding Needs. Report prepared for the Joint Transportation Committee.

[146] Berk Consulting. June 2019. Assessment of City Transportation Funding Needs.

MAINTENANCE AND OPERATING SUPPORT NEEDS

Active transportation use is evolving and expanding. Incorporating new understanding from the tools developed in this plan and other sources will require capacity beyond what is currently available within WSDOT. Local jurisdictions turn to WSDOT for information, guidance, and training specific to the Washington context. The needs described below respond to capacity constraints in engineering support as well as regular maintenance.

Maintenance

To serve as good stewards of the public's facilities and to comply fully with the Americans with Disabilities Act, active transportation assets must be stewarded similar to other assets owned and managed by WSDOT. Maintenance needs for active transportation include repair of physical facilities, pavement markings and signage, sweeping, snow/ice and debris removal, and environmental factors such as vegetation and weather-related changes.

Broken pavement, potholes, upheaved trail surfaces, and snow and ice can contribute to falling and loss of control for the person walking or biking. A 2012 survey by the National Highway Traffic Safety Administration found that 24 percent of pedestrian respondents reported being injured as a result of tripping on an uneven sidewalk.[147] The Washington State Appeals Court issued a ruling that bicycling is defined as "ordinary travel" and jurisdictions have a responsibility to maintain streets for bicycling to the same standards that apply for other traffic.[148]

Facility maintenance also has mobility implications. Debris and vegetation growth can limit usable sidewalk, multi-use path, bicycle lane, and road shoulder spaces. Where line of sight is reduced, the active transportation user may avoid a particular crossing if they do not feel drivers can see them. This outcome reduces a road user's mobility and accessibility to a given location. Where WSDOT provides maintenance of active transportation facilities it does so out of existing budgets, which the agency deems insufficient for maintenance of all assets for all modes.

Operating/Support Program or Project Category	Per Biennium
Maintenance	$32.65 million
Engineering support, data analysis and tools	$1.04 million

Figure 4-25: Maintenance needs for active transportation facilities. Other estimates are based on 2021-23 labor pricing and current estimated costs for items such as data acquisition.

147 Schroeder, P, Wilbur M. (2013, October) 2012 National Survey of Bicyclist and Pedestrian Attitudes and Behavior, Volume 2: Findings Report. (Report No. DOT HS 811 841 B). Washington, DC: National Highway Traffic Safety Administration

148 Binion, Andrew. "Lawsuit from bicyclist against Port Orchard can go forward." 2016. Kitsap Sun, June 29. Chamberlain, Barb. 2016. We Are Traffic: Court Says Cities Must Maintain Streets for Bicyclists. Washington Bikes.

Decision analysis tool

This plan utilized new tools for data analysis that assign a level of traffic stress to state routes. High-stress locations (gaps) were associated with different contexts and with safety, equity, and demand data to better inform decision-making. Data tools were also developed that can help the agency determine the availability of highway crossing opportunities and whether people who walk and bike can make reasonably direct trips to reach destinations near where they live.

Work is under way to integrate these new tools into existing analytical frameworks and business practices of the agency. From a high-level perspective, WSDOT's operational model has three primary phases: planning, scoping, and project development. All of these phases are under the umbrella of the Practical Solutions process, where stakeholders at each stage help the agency achieve its goal of delivering the right project, at the right time, in the right place.

Planning, scoping, and project delivery are separated in time and operate at different scales with a number of associated processes and procedures. Consideration of active transportation data before scoping is particularly important given that budget decisions are generally made at this phase. The analysis techniques used in this plan are designed to provide active transportation data needs that can be considered at each phase and applied to current as well as future activities. They will provide information about the effects of projects on network connectivity, safety, mobility, and level of traffic stress.

In addition to initial integration of active transportation data into the agency's decision-making framework, the tools will need to be maintained as new data becomes available through efficient and timely data stewardship. New data would include new corridor plans, completed projects, a more complete inventory of existing assets such as sidewalks, new local agency plans and priorities, and even new research that might suggest needed adjustments to tool criteria. Data integration and ongoing stewardship will enable WSDOT to incorporate the multiple elements described in this chapter into programs and projects for the most cost-effective practical solutions approach.

Pedestrian and bicyclist count data collection and analysis

As discussed in Chapter 2, many decisions in the transportation system are based on traffic counts of motor vehicles, yet WSDOT and other jurisdictions have incomplete data concerning the millions of miles traveled each year walking or biking. At present, WSDOT has a limited number of permanent bicyclist/pedestrian counters and a short-duration manual count program. While useful for observing usage of specific trails and facilities, these counting resources are not sufficient to capture population center demand or provide the data needed to determine crash exposure rates the same way it is calculated for motorists.

Data obtained from the various collection tools can inform planning, design, operations, and maintenance; help to track change over time; and measure increases and decreases in crash exposure to support systemic safety prioritization. Estimates for this category include purchase, installation, and maintenance of permanent counters; purchase of crowd-sourced bicyclist and/or pedestrian data; and funding for a short duration/manual count program and data stewardship activities.

Accessibility and asset management data

Understanding existing active transportation assets, including ADA facilities, is critical to ongoing network analysis, performance measurement, prioritization, and cost-effective project development and program management. Active transportation and ADA asset data maintained by WSDOT is incomplete.

New tools and software will require evaluation and subsequent training and implementation if adopted. In addition to a data collection program, the data must be managed and stewarded so that it will be available for use in the decision analysis tool discussed above.

Innovation and adaptation

From new connected technologies to new types of small wheeled devices, the transportation world is adapting to rapid change. Design and operational practices for moving people in motor vehicles are well developed and continue to show innovation. For active transportation, many of the tools are relatively new, and neither WSDOT nor the agency's local partners are fully prepared to evaluate or incorporate innovations that can affect safety, mobility, accessibility, and equity.

New techniques and technologies will need to be evaluated for their direct and indirect effects. Examples include new sensor technologies for use in traffic signals, vehicle automation interaction with pedestrians and bicyclists, safety implications of personal delivery devices on sidewalks, and sidewalk width relative to newer power wheelchair designs, among many emerging issues. Technical guidance and training for WSDOT and its partners is essential to leverage the right opportunities and avoid or mitigate the implications of others that hold problems as well as promise.

This need focuses on innovation and new mobility with particular attention to the safety and mobility of the most vulnerable road users. Funding would support work in three key areas. The first is the need to identify opportunities and processes to incorporate active transportation elements effectively and efficiently in programs and projects. The second is the ongoing work of writing and revision of standards, guides, and other materials as well as dissemination of that information to partners through statewide training. The third need is to provide internal and external project development support for design and operational alternatives, supporting capacity development among WSDOT staff and partners as they apply the new tools and insights this plan provides.

Chapter 5:
MEASURING AND REPORTING PERFORMANCE AND PROGRESS

MEASURING PROGRESS

This chapter recommends performance metrics to assess how successful WSDOT and partners are at meeting the plan's goals. The metrics focus on improving facilities, increasing participation, and providing societal benefits. The infrastructure measures are mostly specific to WSDOT; the safety reporting is for all roadways and jurisdictions in Washington; and a number of factors beyond WSDOT's right of way contribute to the opportunity and equity measures. Partnership will be critical in moving forward.

Many public comments on this chapter and the next supported plan implementation and urged the establishment of specific timelines or deadlines for achieving metrics and goals. As discussed elsewhere, achievement of many goals is constrained by funding levels. As WSDOT prepares an implementation plan with its partners, some timelines may be established that can be used for future progress reports.

This chapter describes each of the performance metrics and includes references for the detailed materials contained in Chapter 2; Chapter 4; Appendix D, Methods of Analysis; and Appendix F, Cost Estimation Background. Appendix L describes the process used to select the metrics for the plan and how the baseline measures and goals were developed. It describes how WSDOT used newer or more refined data to adjust the basis for calculations described in Chapters 3 and 4 to arrive at the performance metrics in this chapter. Bringing the plan out in two separate phases for public comment led to these small differences; future reports will not have this situation.

The Stakeholder Steering Committee worked closely with WSDOT staff and the consultant team to review and recommend a variety of performance metrics. The metrics can be:

- measured at a granular geographic level, aggregated to larger geographies,
- applicable statewide, and
- used to track progress over time.

The metrics relate to:

- the state's transportation system policy goals,
- required state and federal performance metrics and reporting,
- the long-range statewide transportation plan (Washington Transportation Plan – Phase 2, Implementation),
- the statewide transportation policy plan (Washington Transportation Plan 2040 and Beyond),

- the Highway System Plan that WSDOT is developing in 2021-22, and
- other modal and topical agency plans.

WSDOT developed this plan's metrics and baseline figures based on the best available data. During plan implementation, WSDOT will continue to review updated data and revise calculations if the quality of the data improves. This work will inform future progress reports and aid in understanding the system.

The plan recommends measuring success for each metric based on when a specific percentage is met and not by when incremental changes are met. This approach was chosen due to the data limitations and the desire to be flexible when developing implementation plans with partners. As the plan moves into implementation it may become possible to develop more near-term projections for some metrics.

Figure 5-1: Conceptual framework showing the three main elements to contribute to the goals and objectives of this plan: infrastructure availability to improve the network, travel behavior that increases usage across modes, and effects (outcomes) that benefit the public. WSDOT selected performance metrics in each of these areas.

Equity Checks

The plan's performance metrics allow use of an equity analysis to identify and address needs and issues in communities where past transportation decisions created disproportionate burdens to historically underrepresented, marginalized, or disenfranchised populations. This analysis is consistent with FHWA environmental justice guidance and can focus attention on symptoms of past burdens such as the higher numbers of fatal and serious crashes, lower rates of vehicle ownership, and lack of infrastructure for walking and bicycling comfortably, as discussed in Chapter 2.

With the Washington State Legislature's 2021 passage of the HEAL Act, WSDOT will develop a definition of population characteristics that describe overburdened communities. When completed, those definitions will be used to develop and report equity checks as recommend in this plan. This chapter examines population characteristics chosen during this plan's development before that act passed.

Measuring and reporting on differences in access, usage, outcomes, and other metrics will inform WSDOT, decision makers, and the general public. More details about specific metrics and their calculations appear under each goal area. It is important to note that the work to develop these metrics took place before the COVID-19 pandemic. Before/after comparisons will have to include caveats for variables that may never be clearly identified.

For population studies, the state is divided into census blocks (a geographic unit typically between 600-3,000 people). Equity checks will initially be calculated by comparing census blocks with higher proportions of people in poverty, disabled people, or Black, Indigenous, people of color with the statewide average for the same metric.

Some demographic data may be available at a finer level of detail by census tract. Data on percentage of households without a vehicle is already available as another potential check. If additional data on non-drivers in the state becomes available it would be relevant to estimate the reliance on active transportation by location. The Washington Tracking Network Information by Location data maintained by the state Department of Health provides information on these and other characteristics that can be examined at various levels of detail.

PERFORMANCE METRICS BY GOAL

Connectivity

Walking and bicycling facilities today resemble the early days of highway development when people could not always reach a destination without going far out of their way. As Chapter 2 and 3 discuss, the development of complete networks for driving disrupted walking and bicycling connections in many locations. The disconnection of accessible facilities had particularly deep effects on those who need them most.

Some metrics used to report on the transportation network's performance, such as vehicle travel times or wait times, do not include metrics for people walking or cycling. The state does not have active transportation trip data at the level of detail it does for driving trips. When agencies measure and report system performance solely in terms of the movements of people using motor vehicles, they do not present a complete picture of how well the system serves everyone's needs—current performance reporting covers only part of the transportation system, not all of it.

The number of vehicles on the road factors into many performance calculations. But today's active transportation networks themselves have to be completed and connected before usage could genuinely be evaluated as a measure of performance. This plan's emphasis on measuring elements of network completeness and quality acknowledges this reality: The system has to be exist before people using it can be counted.

Perhaps the biggest challenge for this plan to serve as a truly statewide needs assessment was created by the lack of a complete set of data concerning facilities in all jurisdictions. Many government agencies (federal, tribal, state, and local) and organizations (MPOs and RTPOs) do not have complete or current data for the condition of sidewalks, shared-use paths, and trails at the same level of detail as for roadway surfaces, yet these facilities are also assets to be preserved and maintained.

There is no complete statewide assessment for active transportation use that includes all jurisdictions. This plan recommends determining connectivity on and across state highways as a starting point. It is important to note that the performance of state highway connectivity may not always require changes to the state highway. As state and community plans come into alignment around shared priorities, network connectivity can also happen through improvements on state highways or local roads—whichever is more practical. Completing network connectivity, regardless of location, can be reflected in future performance reports. For now, all metrics in this plan related to miles of roadway and crossings are calculated only for state routes. The types of metrics described here are also appropriate for adoption by local and regional jurisdictions.

Action items for implementation of this plan will include development of more robust metrics around cross-jurisdictional connectivity and completeness. RTPOs/MPOs are a first point of contact to help fill the local data gaps, especially in smaller communities. Getting that information will result in refinement of the mileage identified as gaps. Between publication of the earlier chapters as Part 1 of the plan in May 2021 and final release of this completed plan in December 2021, some figures have already been updated.

RURAL CONNECTIVITY

Much of this plan's analysis and the associated metrics primarily focus on state highways within the boundaries of population centers, which include cities, towns, and census designated places (CDPs). Population centers may be more urban, such as the Wenatchee Valley, or more rural, such as Klickitat. This approach substantially expanded the number of miles with specific parameters for active transportation safety and operational performance needs, as discussed in Chapter 3.

This plan did not define a rural context as the basis for calculation of performance metrics. Chapter 3 discusses the need for further development of the level of traffic stress concept so that it can be applied appropriately on state routes outside of population centers. The conceptual statewide bikeways and trails network serves as the basis for a performance metric that is not bound to population centers (increasing miles of multiuse trails).

WSDOT recognizes that the definition of population center captures most but not all communities and locations with reliance on active transportation. To address this, this plan emphasizes the need for coordinated planning with WSDOT's many partners who can help highlight specific needs not fully discussed here. WSDOT is drafting guidance for developing low stress facilities to connect population centers that are within reasonable biking distances of each other. The idea may also apply to large developments that are just outside of population centers.

Implementation work will include a systemic approach to identify contexts where safety improvements for bicyclists may improve connectivity even if they do not result in a change of level of traffic stress. Systemic safety improvements are often implemented for motorists, such as rumble strips to reduce run-off-the-road crashes. Ideas that have been discussed for bicyclists include automated flashing warning signs that alert motorists to the presence of bicyclists where sightlines prevent drivers from seeing the rider ahead, and targeted shoulder improvements that provide extra space for riders where they are less visible to motorists.

Performance Metric	Calculation Measure	2019 Baseline	Goal
Bicyclist and Pedestrian level of traffic stress	Increase the total linear length (miles) of WSDOT-owned infrastructure or other connection identified as a parallel local facility with a bicyclist and pedestrian LTS rating of 1 or 2 in population centers	90 miles	100%
Miles of bicycle facilities	Increase the total centerline miles of bicyclist facilities on state highways or other connection identified as a parallel local facility in population centers	60 miles[149]	100%
Miles of pedestrian facilities	Increase the total centerline miles of pedestrian facilities on state highways or other connection identified as a parallel local facility in population centers	670 miles[150]	100%
Intersection crossings level of traffic stress	Increase the number of intersections on state highways in population centers that are LTS 1-2 and that meet WSDOT guidance for pedestrian crossing treatments	TBD	100%[151]
Ramp crossing level of traffic stress	Increase the number of highway ramps on state highways in population centers that are LTS 1-2 and that meet WSDOT guidance for pedestrian crossing treatments	TBD	100%[152]
Miles of multi-use paths/trails	Increase the total linear length (miles) of multi-use paths serving a transportation function and connecting population centers[153]	1,600 miles[154]	~4,100 miles[155]

Figure 5-2: Network performance metric baseline and goal estimates used in this table are preliminary, rounded to the nearest 10 and based on updates to estimates published May 2021 in Chapters 3 and 4. The metric is expressed in terms of the total miles on state routes in population centers identified as LTS 3 or 4. Mileage of high-speed roads open to pedestrians and bicyclists in population centers were not included in the cost estimations in Chapter 4 but are included here. The baseline data are from 2019 unless indicated otherwise.

149 WSDOT estimates the length of highway open to bicyclists in population centers to be 1,930 miles. Existing bike lanes may or may not result in a segment rating of LTS 1 or 2 depending on other roadway characteristics.

150 An estimated 37 percent of state highways in population centers have sidewalks. Data limitations as of this plan's analysis did not permit a complete inventory of sidewalks, as discussed in Chapter 3. WSDOT estimates the length of highway open to pedestrians in population centers to be 1,800 miles.

151 Estimated at 5,040 non-signalized intersections and 1,201 signalized intersections, which is an update from the estimate published in May 2021.

152 Estimated at 1,323 for both signalized and unsignalized ramp crossings.

153 Multi-use paths or trails serving a transportation function may include some trails defined as recreational, such as those owned and managed by Washington State Parks.

154 Based on data available May 2020; will be updated based on the trails database under development at RCO.

155 Based on conceptual map in Chapter 4; will be updated in consultation with partners.

Bicyclist and pedestrian level of traffic stress (LTS)

LTS is described more fully in Chapter 3 and Appendix D, Methods of Analysis. This plan rates level of traffic stress on state highways on a scale of 1 to 4. Level of traffic stress is higher for all roadway users when speeds, traffic volumes and number lanes increase. There is a greater potential for conflict between users of all modes on multilane, high-speed roads. Where roads function as the access ways to important destinations, and land uses make them an essential part of an active transportation network, there is a need to change the roadway characteristics in addition to providing appropriate facilities for walking and biking (discussed in the bicycle and pedestrian facilities performance metrics). The road characteristics that people report as being stressful or scary when walking or biking are the same as the road characteristics that are most closely linked to serious and fatal traffic crashes: speed, traffic volume, roadway width, and availability of facilities. If the adjacent road conditions create a high-stress environment people will avoid using them if they can, even when sidewalks and bike lanes are available.

The bicyclist and pedestrian LTS performance metric provide a quantitative evaluation of existing conditions, helps track the effects of changes in facilities or posted speed, and supports tracking work that maintains and preserves the quality of facilities rated as LTS 1 or 2. This metric tracks overall reduction in level of traffic stress independent of pedestrian and bicyclist facility implementation. There are 90 miles of LTS 1 or 2 highways open to pedestrian and bicyclist use in population centers. This was used as the baseline. The general goal would be to achieve an LTS 1 or 2 ranking for 100% of these roads. In some cases the goal would be achieved by using parallel local roadways.

A statewide analysis of level of traffic stress is at a different scale than a project-level analysis where more details about a location can refine the LTS determination. In addition to roadway changes, pedestrian and/or bicyclist specific facilities of the appropriate design can reduce LTS. At the project level, WSDOT will be looking at ways to optimize design of various elements to lower traffic stress including the use of speed management and/or road reconfigurations.

Miles of bicyclist facilities

The miles of bicyclist on-street facilities are considered for the entire length of state highways that are open to bicycling within population centers (currently estimated at 1,930 miles). Currently that includes 60 miles of signed/marked bike lane with a width greater than four feet.[156] The goal is to have appropriate bike facilities on 100 percent of state highway miles in population centers. The appropriate design will be determined by context and conditions where higher speeds, volumes, and lane numbers indicate the need for more enhanced facilities.

This goal could be met by making improvements to the state highway or by having designated bicycle facilities on the local system that provide a reasonable alternative route. Providing parallel off-system connections will be especially important for state highways with bicyclist LTS ratings of 3 or 4 with high traffic volumes where the geological features or built environment severely limit space. This work will require close partnerships between WSDOT and local agencies to identify the best and most practical means of completing off-system connections or, where necessary, using design and operations to provide both drivers and bicyclists with information about the potential for interaction. Compilation of an updated statewide trails database will enable more accurate identification of parallel facilities, as will data-sharing with local agency partners. The key question to ask is whether the facilities off the highway connect active travelers to destinations as readily as the highway does for drivers.

While people who bicycle use roadway shoulders and consider them a valuable asset, shoulders are not considered dedicated bicycle facilities and are excluded from the overall gap mileage calculation. Development of a metric related to shoulder width will be considered during implementation to enable tracking of incremental improvements.

Public comments on this metric noted the importance of considering facilities in locations outside population centers where the state highway is the only available connection. This goal will be updated to include those locations identified as critical network connections in future analysis; the metric for completion of trail connections between population centers provides another way to address this point. Location priorities will be established through implementation planning, with consideration for safety, equity, and potential demand based on destination densities along with local and regional plans.

156 The WSDOT Design Manual sets the minimum width for a conventional bike lane at five feet when adjacent to curb, or four feet when no curb is present. (Chapter 1520)

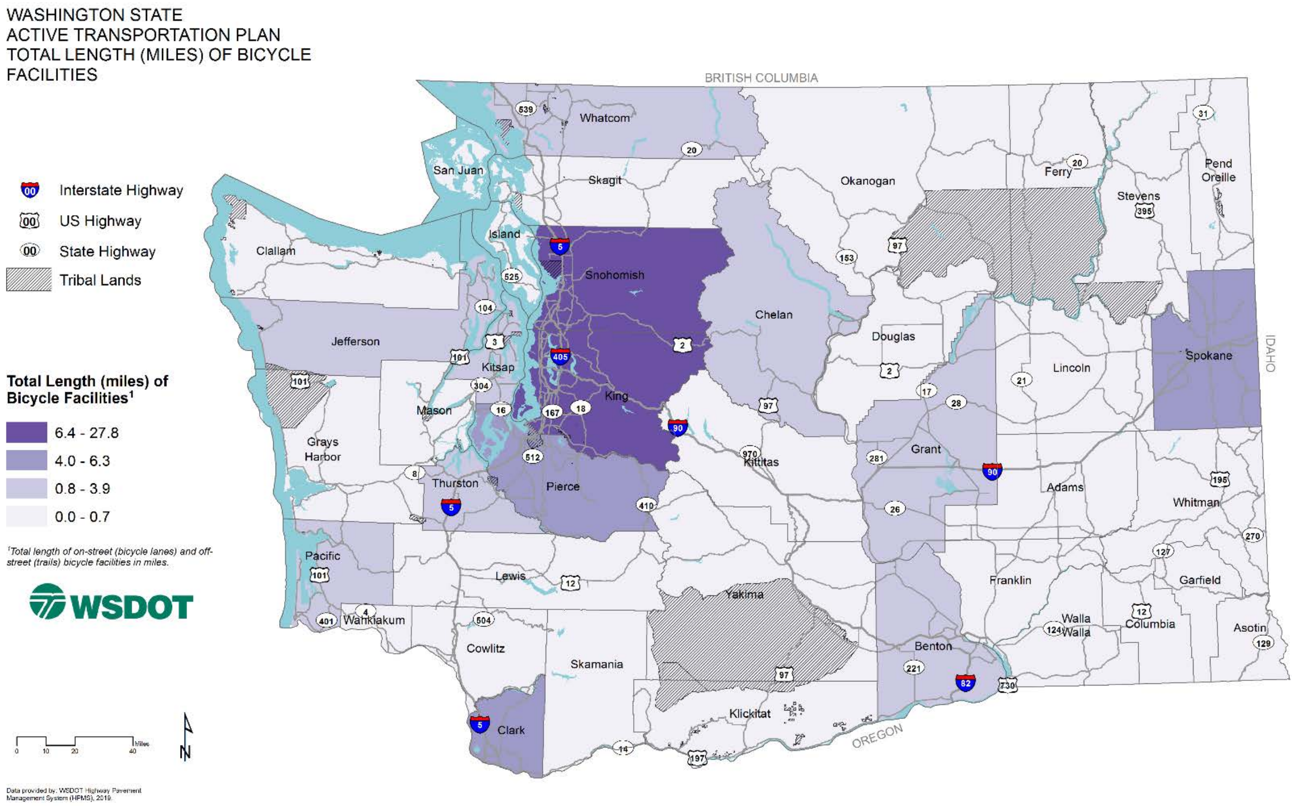

Figure 5-3: Total length in miles of on-street bicycle lanes and multi-use paths within WSDOT management. This graphic does not include additional miles of facilities on state right of way managed by local jurisdictions.

Miles of pedestrian facilities

This measure tracks the length of pedestrian facilities on state highways within population centers. Sidewalks are defined as having at least a five-foot-wide clear path for walking or using an adaptive mobility device. They are separated from the travel lane by a curb or a ditch/swale. At-grade facilities that are not separated from the travel way by a physical barrier are not included. The current estimate of miles of sidewalk in population centers open to pedestrian use is 670. The goal is to complete sidewalk on 100 percent of those roadways, which would increase that number to 1,800 miles.

WSDOT does not manage all sidewalks found on state right of way, which creates a limitation for calculation of this metric. Data-sharing with local partners will enable identification of existing sidewalks not included in the baseline.

This metric does not yet address whether existing sidewalk mileage is fully ADA-accessible. Public comment received on this chapter noted the importance of considering whether sidewalks are blocked by power poles, trash receptacles, and other obstructions. Current facilities may have obstructions or conditions requiring maintenance and preservation to bring them up to appropriate standards. A metric for ADA-accessible facilities is included under the Opportunity goal section below.

Additional work is needed to determine the level of sidewalk design needed to accommodate pedestrians on roads with different LTS rankings. On roadways where speeds, volumes and lane numbers are higher, the appropriate sidewalk design may include buffer space or even physical barriers.

Intersection and ramp crossing level of traffic stress

Providing well-designed and frequent crossing opportunities is an essential component of a complete active transportation network. This includes consideration for intersections and on/off ramps. There are 5,040 non-signalized and 1,201 signalized intersections in population centers. There are 1,206 unsignalized on/off ramp locations in population centers on WSDOT right of way and another 117 signalized ones.[157] Improvements need to be undertaken in accordance with WSDOT guidance regarding the right crossing treatments for all active transportation users for different road characteristics, vehicle volumes, and traffic speeds, as discussed in Chapter 3.[158] The goal of this performance metric is that 100 percent of intersection crossings and on/off ramps in population centers are LTS 1-2 and they meet the WSDOT guidance for pedestrian crossing treatments and bicycle facilities.

While included as a metric for connectivity, improved crossing treatments also contribute to lowering crash potential. After posted speed, included as a metric below under Safety, the next highest contributing factor for pedestrian fatalities and serious injuries 2010-2019 was “pedestrian crossing the road” at about 62 percent.

Length of multi-use paths

This measure tracks changes to the length of multi-use paths. The current total number of miles of multi-use paths managed by WSDOT is 38. Many additional trails exist in WSDOT rights of way that are managed by other jurisdictions. Considering all jurisdictions, about 1,600 total miles of existing trail would serve a transportation function. When primitive trails, locally proposed trails, and conceptual statewide connector trails are considered (as discussed in Chapter 3) a conceptual statewide network can be described that would total around 4,100 miles. The goal is to increase the existing total of 1,600 miles to 4,100 in order to form a continuous statewide system that will offer a transportation spine, similar to the highway system. This goal includes a combination of multi-use paths that can be used for transportation, both in WSDOT rights of way and off the state system. Trails off the state system will require coordination with agency partners and stakeholders to identify where they will be located. Such connections would serve local active transportation traffic where they pass through population centers and support longer travel between population centers.

Connectivity equity check

Certain places have fewer miles of high-comfort, low-stress facilities. Chapter 2 and Appendix B, Guiding Principles and Themes, provide background on some of the history and the resulting patterns in serious and fatal crash locations. The connectivity equity check will consider the percentage of bicyclist facilities, pedestrian facilities, and LTS gaps on state highways in census blocks with higher percentages of the demographic characteristics used to define equity criteria. These same calculations serve as metrics under the Opportunity goal as an evaluation of disparities in access to appropriate facilities.

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157 This metric includes 288 additional intersections and 117 ramps not counted in chapter 4. Appendix L provides additional details.

158 WSDOT. 2018. Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations.

Safety

The state's Strategic Highway Safety Plan, Target Zero, establishes **zero** as the only acceptable goal for the number of traffic deaths and serious injuries. The performance metrics below will keep track of how the changes proposed in this plan are working to get the numbers to zero. It encompasses traffic-related deaths and serious injuries to people walking and biking for transportation on all public roads as defined in 23 USC 101, not just state highways.

Chapter 2 provides a discussion of patterns in crash data. Two primary factors—posted speed and pedestrian crossings—rise to the top as critical issues. Metrics related to crossing opportunities are listed under Connectivity, above. Injury minimization speed limits are tracked here; they also contribute to the Connectivity goal by helping lower the LTS as the speed limit is lowered.

Performance Metric	Calculation Measure	2019 Baseline	Goal
Eliminate active transportation fatalities from traffic crashes	Decrease to zero the total number of active transportation users who are killed in traffic crashes involving a motorist with (1) pedestrians or (2) bicyclists on all roads in Washington state[159]	1) 107 pedestrian fatalities; 2) 9 bicyclist fatalities	0
Eliminate active transportation serious injuries from traffic crashes	Decrease to zero the total number of active transportation users seriously injured in traffic crashes involving a motorist with (1) pedestrians or (2) bicyclists on all roads in Washington state	1) 358 pedestrian serious injuries; 2) 103 bicyclist serious injuries	0
Eliminate active transportation fatal and serious injury traffic crashes involving people 65 years or older[160]	Decrease to zero the total number of active transportation user fatal and serious injury crashes involving people 65 years or older on all roads in Washington state	1) 28 fatalities 2) 54 serious injuries	0
Injury minimization speed limits	Increase the number of miles of state highway (that are not full limited access) in population centers that have a posted speed of 25mph or less.	90 miles with posted speed of 25 mph or less	1,930 miles

Figure 5-4: Safety performance metrics. Baseline data is for 2019 unless indicated otherwise.

159 As discussed in "Terms Used in this Plan" and Chapter 2, federal reporting uses the terms "pedestrian" and "bicyclist" with specific definitions. WSDOT's goal is inclusive of people using any form of active transportation; reporting will need to comply with federal requirements.

160 This performance metric is required under federal MAP-21 as the Older Driver and Pedestrian Special Rule (Title 23, USC, Section 148(g)(2)). As of 2021 WSDOT has been notified by FHWA that increases in the fatal and serious injury rate per capita for this age group 2013-2017 and 2015-2019 require strategies to address the increase. The federal rule only addresses pedestrians; WSDOT will also track this information for bicyclists 65 and older.

Eliminate deaths and serious injuries of people walking and rolling

The trend for traffic deaths involving people walking and biking on Washington roadways increased over the last ten years (2010-2019); Chapter 2 provides more detail. Referencing 2019, the baseline number of pedestrian fatalities is 107, and the baseline number of bicyclist fatalities is 9. The goal is to get to zero pedestrian and bicyclist fatalities.

The trend for traffic-related serious injuries to people walking and biking increased over the same ten-year time period (2010-2019). The baseline number of pedestrian serious injuries from 2019 is 358 and the baseline number of bicyclist serious injuries is 103. The goal is to get to zero pedestrian and bicyclist serious injuries.

Crashes involving people who walk and bike represented 22 percent of all fatal and serious injury traffic crashes in 2020, even though walking and biking for transportation only represents about 12 percent of all trips, according to the 2017 National Household Travel Survey (NHTS).[161]

In 2019, 16 percent of the state's population was 65 years or older, yet this age group suffered 26 percent of the traffic-related pedestrian deaths. This means that people in this age category were killed in traffic-related pedestrian crashes at a higher rate than their numbers in the general population, counter to the 2010-2019 data presented in chapter 2. Traffic-related serious injuries for pedestrians aged 65 years or older made up 15 percent. The goal is to reduce the numbers for both serious injuries and fatalities in this age group to zero.

Number of miles of state highway with an injury minimization speed

"Understanding Speed and Safety" at the end of Chapter 1 describes why traffic crashes at higher speeds result in more severe injuries, especially to vulnerable road users, and the importance of separated facilities.[162] In 2019, most pedestrian and bicyclist fatalities (83 percent) occurred on roads with a posted speed above 25mph. Over the last ten years, posted speeds have had the highest percentage correlation with vulnerable road user fatalities and serious injuries—by about 25 percent more than any other crash-related contributing circumstance or factor.[163]

This performance metric tracks posted speed on state highways in population centers that are not prohibited to bicyclists or pedestrians. In 2019, 90 miles of state highway in population centers had a posted speed of 25 mph or less. The goal is to increase that number to 1,930 miles, which is 100 percent of the state highway mileage in population centers where active transportation users are permitted. As discussed under the Connectivity metrics, identification of a suitable parallel facility away from the state route might serve to close a gap with a high level of traffic stress or a higher posted speed limit.

Safety equity check

The first safety equity check considers the percentage of fatalities by population race/ethnicity group as defined for the US Census. The percentages of American Indian/Alaska Native, Black and Hispanic population group fatalities are greater than the percentage of those groups in the total population.

161 FHWA NHTS Brief: Non-Motorized Travel

162 National Transportation Safety Board. (2017). Reducing Speeding-Related Crashes Involving Passenger Vehicles. Safety Study NTSB/SS-17/01. Washington DC.

163 WSDOT uses posted speed as a proxy for actual driver speed while being aware that speed studies generally find the operating speed to be higher than posted speeds when measured.

Population Race/Ethnicity Group	American Indian or Alaska Native	Asian or Pacific Islander	Black	Hispanic	Multiracial	Other/ Unknown	White Non-Hispanic
Pedestrian & bicyclist traffic fatalities by population group	31	43	27	81	7	8	367
Percent of pedestrian & bicyclist traffic fatalities	5%	8%	5%	14%	1%	1%	65%
Percent of race/ethnicity group in total population	2%	9%	4%	12%	5%	N/A	70%

Figure 5-5: Pedestrian and bicyclist fatalities 2010-2019 by population race/ethnicity group. Crash data by race/ethnicity group provided by the Washington Traffic Safety Commission. Population estimates are from the Washington State Office of Financial Management. Due to the nature of data on race and ethnicity it is possible some data regarding the race/ethnicity of the people who have died in pedestrian/traffic crashes is missing or inaccurate; WSDOT can only work from available data sources.

A second safety equity check considers fatal and serious injury crashes and census tracts with relatively higher scores on equity criteria. Chapter 2 provides a summary of baseline findings of fatal and serious injuries in census block groups with poverty rates and populations of color above the state average, 51 percent and 33 percent respectively. The goal is for zero fatalities and serious injuries in all population groups.

The third equity check on safety will consider how many miles of state highways in population centers with an injury minimization speed limit of 25mph or less pass through census blocks with higher percentages of low-income households (about 1,150 miles); Black, Indigenous, people of color (about 800 miles); and any other equity criteria identified in future. The goal is to eliminate disparities in the distribution of these faster roadways.

Opportunity

A functional transportation system provides access to safe, healthy, active transportation connections for all people. Coupled with the equity checks on other goals, the performance metrics below will keep track of how this plan improves equity for active transportation. They reflect the plan's focus on working with diverse populations who have been historically underrepresented, marginalized, and disenfranchised to enable and empower them to address active transportation disparities without displacing residents. The initial calculations focus on income and race; this will be updated to align with environmental justice criteria adopted under the HEAL Act.

Performance Metric	Calculation Measure	Baseline	Goal
Provide ADA-accessible active transportation facilities	Percentage of highway miles with ADA-accessible sidewalks in population centers[164]	TBD miles	100%
Eliminate transportation disparities for BIPOC people walking and bicycling	Increase the number of highway miles in population centers with pedestrian or bicyclist LTS 1 or 2 adjacent to or running through census blocks with a percentage of Black, Indigenous, people of color above the state average	TBD miles	600 miles
Eliminate transportation disparities for low-income people walking and bicycling	Increase the number of highway miles in population centers with pedestrian or bicyclist LTS 1 or 2 adjacent to or running through census blocks with a percentage of people living at or below 200% of the federal poverty above the state average	TBD miles	1,060 miles
Air pollution emissions prevented	Total greenhouse gas emissions in millions of metric tons (MMT) avoided by walking and biking	0.42 MMT prevented (2015)	1.05 MMT prevented
Increase participation in agency grantmaking by high-need communities	Percentage of applications received and funded for the Safe Routes to School (SRTS) and Pedestrian/Bicyclist Program (PBP) awards that score at or above the 75th percentile on equity criteria	SRTS applications in 2020: 38.4% PBP: 16.8%[165]	40% in each program[166]

Figure 5-6: Opportunity goal metrics. Plan implementation will include an update of the baseline performance metrics for miles of LTS 1 or 2 in high equity need census blocks and for ADA-accessible facilities.

Eliminate disparities

Metrics are expressed in terms of level of traffic stress on state highway miles in population centers. The baseline is calculated for those miles passing through or adjacent to census blocks with higher percentages of residents who are living at or below 200 percent of the federal poverty level or who are Black, Indigenous, people of color. In some locations both of these factors are present. These metrics are calculated independent of each other. The goal is to increase the number of LTS 1 or 2 miles in these places to 100 percent.

164 WSDOT and/or the local jurisdiction have obligations to meet ADA requirements. Responsibility for a specific location on a state route depends on a number of factors including the population size of incorporated cities/towns. Data not yet available to provide a complete and accurate baseline. ADA accessibility requirements also apply to cycling facilities; sidewalks are defined as the initial performance metric of concern, with additional information needed to define cycling accessibility elements that may need to be evaluated.

165 SRTS: 48 out of 125 applications scored in the top half of possible points for equity criteria. PBP: 18 out of 107 applications scored in the top half of possible points for equity criteria. Some applications scoring high on equity do not score high on other criteria such as safety or suitability of proposed changes for the problem identified.

166 The 40 percent goal meets the standards established in the HEAL Act.

Greenhouse gas emissions reduced by active transportation

Chapter 2 describes the environmental and health benefits resulting from trips made by walking and bicycling instead of in vehicles using fossil fuels. Greenhouse gas emissions are a global issue that involves the transportation sector, land use decisions, and energy production in general. As discussed in the Environmental Justice Task Force Report and a number of research studies, emissions are an equity issue due to health impacts created by proximity to major transportation corridors.[167]

Pedestrian miles traveled (PMT) and bicycle miles traveled (BMT) are a tangible way of estimating the reduction in greenhouse gases and associated pollutants and emissions that can be achieved through the use of active transportation. This metric is reported under the Opportunity goal because of the disproportionate exposure to vehicle emissions and other transportation-related pollutants in overburdened communities.[168]

This calculation uses the total estimated PMT and BMT to generate a measure of total emissions in millions of metric tons avoided from active travel. These avoided emissions from active travel were added to the estimate of vehicle emissions. The emissions for PMT and BMT were divided by this sum to calculate the percentage of emissions avoided as a result of walking and bicycling. WSDOT used a series of data sources to develop this measure:

- Statewide light duty (cars, vans, SUVs, motorcycles, and pickup trucks) vehicle miles traveled (VMT) estimates from WSDOT for 2015.[169]
- An emission factor of 364 grams per mile for light duty vehicles traveling at 25 miles per hour from Puget Sound Regional Council's (PSRC) 2015 MOVES analysis.[170]
- Total on-road gasoline greenhouse gas emissions from the Washington State GHG inventory produced by the Department of Ecology.

The total greenhouse gas emissions avoided by PMT and BMT are expressed in millions of metric tons (MMT).

Figure 5-7 shows a summary of the estimated 2015 light duty vehicle emissions (CO_2) averted due to bicycle miles traveled (BMT) and pedestrian miles traveled (PMT). A direct offset of one active transportation mile for one vehicle mile was assumed. The results show an estimated 0.08 million metric tons (MMT) not created due to bicycle travel and 0.34 MMT not created due to pedestrian travel. Combined, a total of 0.42 MMT of CO_2 was avoided, which serves as the baseline measure for CO_2 emissions averted due to travel by active modes.

167 Environmental Justice Task Force. 2020. Recommendations for Prioritizing EJ in Washington State Government.

168 Washington State Dept. of Health. Washington Environmental Health Disparities Map.

169 Annual Mileage & Travel Information, WSDOT, 2015.

170 This is based on the assumption that most pedestrian and bicycle travel is replacing in-town driving. The calculation assumes that one mile of PMT or BMT directly offsets one mile of VMT.

Variable	Bicycle Travel	Pedestrian Travel	Total Active Transportation	Light-duty Vehicle Travel	Total
Annual miles traveled (millions)[171]	2,222	889	3,111	54,445[172]	55,556
Emissions caused (million metric tons, MMT)	0	0	0	21.42[173]	21.42
Emissions averted (MMT)	0.08	0.33	0.42	NA	100%

Figure 5-7: Summary of estimated 2015 emissions (CO2) avoided for VMT due to bicycle and pedestrian travel assuming a direct mile-for-mile offset. If all the trips had been made by motor vehicle the total GHGs produced would have been 21.86 MMT. Source: Air Quality & Climate, WSDOT, 2019; Office of Strategic Assessment and Performance Analysis (OSAPA), WSDOT, 2018; PSRC MOVES analysis, 2016, via WSDOT.

The proposed goal is to increase the amount of CO_2 avoided to 1 MMT annually. This is based on the participation goal below that would increase all walking and biking trips by 150 percent. Larger increases in participation would create greater environmental benefits; public comments on this plan encouraged the state to make active transportation improvements an integral element of climate and resiliency efforts.

Active Transportation	2015 Baseline	Goal: 150% Increase	300% Increase	400% Increase
Percentage of Trips	12%	30%	49%	60%
Percentage of Miles Traveled	2%	5%	8%	10%
Emissions Averted (MMT)	0.4	1	1.6	2

Figure 5-8: Estimate of MMT emissions avoided with increases in active transportation use of 150 percent, 300 percent, and 400 percent. The table shows the corresponding changes to the percentage of trips and miles traveled by active transportation. The initial goal for this plan is a 150 percent increase.

Funding awards

WSDOT utilizes equity criteria in evaluating applications for the Pedestrian and Bicycle Program (PBP) and the Safe Routes to School (SRTS) programs. In evaluating applications for the 2021-23 funding cycle, the agency found that relatively few jurisdictions submitted proposals in locations that rank high on equity factors such as the percentage of children eligible for free or reduced-cost school meals. Increasing the number of such applications, and applications from communities that have not applied in the past, represents increased opportunity for the people who live in these communities.

171 Bicyclist and pedestrian miles traveled are preliminary estimates. Plan implementation next steps will include an update of these performance metrics.

172 Annual Mileage & Travel Information, WSDOT, 2015.

173 Washington State Department of Ecology. 2018. Washington State Greenhouse Gas Emissions Inventory: 1990-2015. Report to the Legislature.

Proposed changes in the process, such as greater outreach and support to local agencies that serve a higher proportion of people of color and low-income populations, are outlined in the December 1, 2021, PBP and SRTS status report to the legislature as directed in SSB 5165 enacted in 2021.

Opportunity equity check

Equity checks on the Opportunity goal will include evaluation of how WSDOT updates its processes to address disparities per direction from the Washington StateHEAL Act. Additional equity checks may be developed in consultation with historically marginalized communities. Availability of ADA-accessible facilities on state routes in census blocks with higher proportions of those populations will also serve as an equity check.

Participation

Increased use of active transportation in place of driving will support attainment of other transportation policy goals such as reductions in greenhouse gas emissions, management of existing highway capacity, commute trip reduction, and travel demand management. Based on the 2017 National Household Travel Survey an estimated 12 percent of all trips, 9 percent of commute trips, and 1 percent of all miles traveled were made on foot or by bicycle.[174] In addition to this plan, efforts toward the statutory directives to reduce vehicle miles traveled and other programs such as commute trip reduction will provide information that will be helpful in refining participation metrics in future.[175]

These performance metrics will help track how implementation of the Active Transportation Plan results in more people walking and biking for transportation. They focus on mode choice for different types of trips and overall changes in physical activity for better health. Chapter 2 discusses data limitations associated with tracking usage; nonetheless, measurement of usage serves important functions in calculations of crash exposure and other transportation planning functions and will need to be developed in the future.

[174] Rates of walking and bicycling continue to increase throughout Washington. WSDOT Gray Notebook 71, Sept. 2018. As described in Chapter 2, the data are not complete and this detailed survey has not been repeated since 2017.

[175] VMT reduction appears in several places in Washington state law including RCW 47.01.078, RCW 47.01.440 and SSB 5165 adopted in 2021.

Performance metrics	Calculation Measure	Baseline	Goal
Share of trips	Percentage of trips taken by (1) walking or (2) bicycling	12% (2017 NHTS[176])	30%
Access to multimodal transportation connections	Increase the number of miles of LTS 1 or 2 state highways or other connection identified as a parallel local facility within 3 miles of a modal connection (transit, ferry, commuter rail, and air)	BLTS 1-2: 19 miles on state highways PLTS 1-2: 13 miles on state highways	Bicyclist: 779 miles Pedestrian: 237 miles
Transit access by walking/ biking	Percentage of people who use active transportation to reach their transit connection	85%	TBD
Walk-on or bike-on ferry trips	Total number of ferry passengers by (1) walk-on or (2) bicycle-on	(1) 7,903,831; (2) 286,841 (2018)	TBD
Children walking/biking to school	Percentage of trips to school made by walking or biking	11.7%	26%
Physical activity	Percentage of adults aged ≥18 years achieving the Surgeon General's recommended weekly level of physical activity	58.4% (2019)	62.9%

Figure 5-9: Participation goal metrics.

Share of trips walking or biking

Having a complete network of sidewalks and bike lanes encourages more active trips, but it is only part of the solution. Land use changes that bring housing and destinations closer together make active trips more efficient and attractive. However, tracking those changes lies beyond the scope of this plan.

Mode share calculates the proportion of trips made by each mode of transportation. This performance metric tracks the percentage of all trips. Thirty percent of all trips made using pedestrian or bicycle modes is suggested as an aspirational goal, representing approximately three times the current reported rate.

As discussed in Chapter 2, trip data have several limitations. For example, some tools do not consider the use of walking or bicycling to connect with other modes such as transit, so those trips are absent from the data. Exploration of additional data sources is identified as one of the action recommendations for implementation of this plan.

176 FHWA NHTS Brief: Non-Motorized Travel.

Other trip type data sources

A review of potential data sources to track the percentage of trips made by walking and bicycle included a suitability assessment of the WSDOT Pedestrian and Bicycle Count Program, crowdsourced data, and the National Household Travel Survey (NHTS) conducted by the FHWA. The count program data source has limited coverage statewide and is not suitable for a statewide assessment of mode share. In 2021 staff began exploring the use of crowdsourced data to obtain estimates of bicycle and pedestrian count estimations and a research project on this topic will get under way in 2022. The NHTS has the only standard nationwide sample. Washington did not participate in a larger "add-in" sample for the most recent survey in 2017.

Multimodal transportation connections

This measure considers pedestrian and bicycle connectivity to modal hubs (airports, ferry terminals, train stations, bus stations, and transit centers). It focuses on people's ability to travel to different types of destinations using multiple modes. This analysis evaluates state highways within three miles of a modal connection.[177]

While there is overlap between this goal and some of the other pedestrian and bicyclist facilities goals, tracking this element separately focuses planning efforts on high-value segments and intersections and particularly addresses the transportation needs of those who cannot drive and rely on these modes. For the most part, such hubs are located in population centers; however, some such as ferry terminals may not be.

As of this plan's publication, for bicyclists, 19 miles of state highways within three miles of a modal connection have an LTS rating of 1 or 2. For pedestrians, 13 miles of state highways within one mile of those connections are similarly low stress. The goal is that 100 percent of state highways near modal connections will rank as an LTS 1 or 2 road. Alternatively, a low-stress local road, of similar or better utility to the active traveler, will close the gap.[178]

Walk-on and bicycle-on ferry passengers

Over eight million walk-on and bicycle-on passengers were recorded on Washington State Ferries (WSF), King County Marine Division ferries, Kitsap Transit ferries and Pierce County ferries in 2018.[179] The WSF long-range plan includes this recommendation: "Promote mode shift through investments in technology and infrastructure that promote walk-on and bike-on passengers and improve multimodal connections."[180] WSF identifies a significant increase to the total number of walk-on and bicycle-on ferry passengers as a goal in their long-range plan. The term "significant increase" was not defined as a number or percentage at the time of this document's publication. The updated ATP will include that number here as the goal when it has been determined.

177 Locations of most multimodal transportation hubs were based on the HERE Technologies database as provided within Cube Access software. WSDOT's Aviation Division identified public airports.

178 The total mileage used for this goal only includes state highways where pedestrian/bicyclist access is permitted.

179 Appendix L provides ferry service details. The over eight million figure does not include ferries operated by several other ferry service operators, such as Black Ball Ferry Line, because walk-on/bike-on data was not readily available from all ferry operators.

180 Washington State Ferries Long-Range Plan.

Children walking and biking to school

Performance metric goals for walking and biking to school reflect three observations:

- Far fewer children walk and bike to school in the United States than in 1969.
- Fewer children walked or biked to school in Washington in 2019 than 2016.
- Over half of Washington's elementary and middle schools are considered "walkable" according to a recent study, but only 11 percent of children walked in 2019.[181]

A truly aspirational goal would be to match the 1969 average of about 50 percent of children walking or biking to school. However, land use changes over the last 50 years make such a goal very challenging. A more realistic aspiration would be for children living within one mile of their schools to walk or bike (26 percent based on the 2019 Washington Student Travel Survey). If and when attaining this goal is within reach, the plan can be updated to establish a new, higher goal.

Increased physical activity

Active transportation improves physical, emotional, and mental health and represents both personal benefits and savings to society in the form of reduced healthcare costs.[182] Therefore, this is a doubly important performance metric. The US Surgeon General recommends adults aged 18 years and older get at least 150 weekly minutes of utilitarian and leisure physical activity, 75 minutes a week of vigorous-intensity aerobic activity, or a combination of the two totaling at least 150 minutes per week. The goal for this metric was identified in the 2019 Washington State Behavioral Risk Factor Surveillance System (BRFSS) managed by the Washington State Department of Health (DOH). The DOH found the baseline for adults getting the recommended amounts of physical activity to be approximately 58.4 percent and recommended the goal of increasing that activity to 62.9 percent.[183]

Participation equity check

Children walk/bike to school equity check

The 2020 Washington Student Travel Survey reports that a greater percentage of students from schools with relatively lower income status (based on the percentage of children enrolled in the free/reduced price meal program) walked to school compared to students from schools of relative higher income status. Among schools with a lower relative income, 14.3 percent of children walked to school, compared to 8.8 percent of children in schools with a higher relative income. There were no meaningful differences for walking or biking to school when considering race and ethnicity averages for the schools.

In 2021, the Washington Office of Superintendent of Public Instruction (OSPI) surveyed school districts to obtain data on schools that have walk route plans as required under state law (RCW 28A.160.160). The equity check for this measure will include an assessment of the number of schools that serve an above-percentage of children receiving free and reduced cost meals and whether they have walk route plans.

181 Vernez Moudon, Anne, Xiao Shi, and Yefu Chen. 2020. Washington State School Walk Score. Pacific Northwest Transportation Consortium in cooperation with USDOT.

182 Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. Lack of Physical Activity.

183 Washington State Department of Health, Center for Health Statistics, Behavioral Risk Factor Surveillance System (BRFSS), supported in part by the Centers for Disease Control and Prevention, Cooperative Agreement NU58/DP006066-03 (2017), NU58/DP006066-05 (2019)

Physical activity equity check

Access to safe and comfortable places for physical activity is affected by many societal forces beyond those this plan addresses. In the combined 2017 and 2019 BRFSS survey, people identifying their race as white reported the highest percentage of the population achieving recommended amounts of physical activity at 61.3 percent. This was followed by those of multi-race backgrounds and Native Hawaiian/Other Pacific Islanders at 58.0 percent and 57.2 percent respectively. Hispanics or Latinos reported the lowest levels of physical activity at 43.4 percent followed by African Americans/Blacks at 52.2 percent, Asian Americans at 52.3 percent, and American Indians/Alaskan Natives at 52.5 percent.[184] The goal is that there would be no racial disparity with respect to people achieving the recommended amount of physical activity.

Partnership

Partnerships are another core component to accomplishing the work of this plan. The first performance metrics track existing plans so that WSDOT can confirm its work connects with existing and planned facilities and can identify planning needs in future updates to this plan. As WSDOT develops its implementation plan and discusses the strategies and actions with partners, additional metrics can be identified that track progress over time on specific aspects of partnership.

WSDOT began developing an inventory included in this plan in Appendix G. It is not considered complete and work will continue on this.

Performance Metrics	Calculation Measure	Baseline	Goal
Active transportation plans—regional	Number of regions with active transportation, bicycle and/or pedestrian plans, or comprehensive plans directly addressing facility needs	TBD	18 (100% of MPOs and RTPOs)
Extent of reach for regional active transportation plans	Percentage of population served by regional active transportation plans.	TBD	100%
Active transportation plans—local	Number of counties and incorporated cities/towns with active transportation, bicycle and/or pedestrian plans, or comprehensive plans directly addressing facility needs	TBD	39 counties and 281 cities/towns

Figure 5-10: Partnership performance metrics.

184 Washington State Department of Health, Center for Health Statistics, Behavioral Risk Factor Surveillance System (BRFSS), supported in part by the Centers for Disease Control and Prevention, Cooperative Agreement NU58/DP006066-03 (2017), NU58/DP006066-05 (2019).

MPOs, RTPOs, and local jurisdictions with active transportation plans

A major role of both Metropolitan Planning Organizations (MPO) and Regional Transportation Planning Organizations (RTPO) is to prepare Regional Transportation Plans (RTPs) and align transportation elements of countywide and local plans with RTPs. While many jurisdictions may find it useful to develop a separate document for active transportation planning, a standalone plan is not always preferred. Such planning may constitute part of the transportation element of a comprehensive plan, for example. In addition, MPOs and RTPOs may produce plans specific to active transportation such as a bicyclist plan, pedestrian plan, Safe Routes to School assessment, or regional trails plan.

Counties produce comprehensive plans and may develop plans that address specific population centers within the county. Incorporated cities and towns produce comprehensive plans and may have mode-specific plans.

Tribal governments

This performance metric tracks whether each jurisdiction has developed a plan that identifies facility needs for active transportation. This could be a plan focused directly on those modes or active transportation could be incorporated within a regional transportation plan, capital facilities plan, or other document.

Other agencies and organizations develop plans relevant to active transportation planning coordination. Examples include tribal long-range transportation plans; municipal parks district or port district plans that include trails; and regional trail plans developed as part of green space plans. These can be added to the inventory in future to support development of shared priorities and locations.

An expanded inventory will identify jurisdictions that have a Complete Streets policy, a policy setting the goal of zero traffic deaths such as Vision Zero, a Neighborhood Safe Streets process for lowering speed limits to 20mph on non-arterial streets, and/or a Bicycle Friendly or Walk Friendly designation.

Partnership equity checks

Once the inventory of plans is complete WSDOT can identify whether overburdened communities and places with disproportionate rates of serious injuries and fatalities are included in plans that directly address active transportation facility needs. This will contribute to the funding award metric identified under the Participation goal, as a project must be included in a local plan to be eligible for funding. Metrics related to how WSDOT builds capacity for partners to participate effectively and provides information and guidance for places from very rural to very urban require further consideration; in the short term these may take the form of reporting on activities such as workshops, training, and publications.

FUTURE PERFORMANCE METRICS FOR CONSIDERATION

Pedestrian or bicyclist gaps created by prohibitions on walking and biking

About 180 centerline miles of limited access state highway are prohibited to bicycle riders and more than 1,100 miles are prohibited to pedestrians. In some of these instances, trails or parallel local facilities are fulfilling the travel need for pedestrians and bicyclists. However, WSDOT needs to know which local facilities are serving that role and whether the LTS there is appropriate in order to count a prohibited section as mitigated or support other interim actions if mitigation is not possible at a given point in time. This requires both an automated method, such as what WSDOT uses to evaluate state highways, and partner coordination to help validate the analysis.

Facility maintenance

Maintenance of pedestrian and bicycling facilities on WSDOT right of way, from surface conditions to snow clearing and more, allows active transportation to be a viable multimodal transportation option. This in turn supports the transportation system policy goals of preservation, safety, stewardship, mobility, economic vitality, and environment as well as compliance with the federal Americans with Disabilities Act. Unfortunately, relatively limited data on physical condition or logs of maintenance schedules specific to active transportation infrastructure were available for WSDOT-owned facilities. Future iterations of performance metrics should attempt to integrate a summary of walk/bike facilities maintenance. As more data become available, eventually WSDOT may report on the state of good repair of active transportation facilities the same way the agency reports on pavement condition, bridges, and other assets.

Traffic signals and other operational topics

Tools such as signs, pavement markings, guideposts, traffic signals, and other elements provide information and direction to all roadway users. This plan's action recommendations include a review of the inventory practices for traffic operations to enable the agency to identify needs in greater detail. A performance metric related to the percentage of signalized intersections in population centers with characteristics that facilitate safe crossings would enable measurement of improvement over time. Such data would also contribute to research.

To provide three examples of metrics for which complete inventory information would be needed:

- **Bicyclist detection:** Since 2009 with the passage of SB 5482, state law has required traffic signals to be updated to detect bicyclists and motorcyclists as well as larger motor vehicles when the signal is updated, with changes prioritized based on requests and reports from individuals contacting the appropriate agency (RCW 47.36.025).
- **Pedestrian signals:** Not all traffic signals include the portion of the signal that provides information to pedestrians seeking to cross (the "pedestrian head").
- **Leading pedestrian interval:** The number of traffic signals that provide a leading pedestrian signal is not available in a statewide data set for WSDOT-managed signals.[185]

[185] From the NACTO Urban Street Design Guide: "A Leading Pedestrian Interval (LPI) typically gives pedestrians a 3–7 second head start when entering an intersection with a corresponding green signal in the same direction of travel. LPIs enhance the visibility of pedestrians in the intersection and reinforce their right-of-way over turning vehicles, especially in locations with a history of conflict."

Consideration of level of traffic stress at signalized intersections should also be addressed in future, separate from calculation of LTS on the state route miles passing through those intersections that already appears as a metric.

Mode reliance

Public comments noted the importance of using performance metrics to identify people and places with the greatest reliance on active transportation and places where connections to important community resources are most lacking. Community conditions go well beyond the demographic characteristics captured at this point in the analysis.

A new tool, the transportation security index, emerged as WSDOT was finalizing the full plan for publication. This tool captures the notion of "transportation insecurity": being unable to regularly move from place to place in a safe or timely manner because of a lack of resources necessary for transportation. Disability Rights Washington highlighted these issues for people with disabilities in a white paper and story map released in 2021.[186] The idea of a transportation security index along with an integration of this plan with WSDOT's ADA Transition Plan, Public Transportation Plan, and local/regional analysis may help highlight these critical issues and locations and point to additional metrics.[187]

TAKEAWAYS FROM CHAPTER 5

This chapter presents initial performance metrics tied to the plan's goal and designed to fit into other state and federal reporting WSDOT is required to submit. A number of potential performance metrics require more investigation to identify a clear baseline and process to measure change over time. The equity checks WSDOT proposes to apply to metrics will align with the approach to environmental justice assessment to be developed under the requirements of the HEAL Act and other reporting requirements so the agency provides consistent reports to the public. Definitions and criteria included here were developed before the passage of the HEAL Act.

186 Disability Rights Washington. 2021. Transportation Access for Everyone: Washington State.

187 Gould-Werth, Alix, and Alexandra Murphy. 2021. "The 'Transportation Security Index' can help the United States plan for a more equitable transportation future." Washington Center for Equitable Growth.

Chapter 6: STRATEGIES AND NEXT STEPS

This plan is meant to guide WSDOT decisions as owner, partner, and administrator of funds, and serve as a resource for partners developing and implementing active transportation plans that connect across boundaries. It also informs the efforts of advocates and nonprofits across the state to promote and prioritize strategies that increase the number of people walking and bicycling and their safety and comfort. It provides information and references for use by agencies, journalists, and individuals. This plan serves as a guide for all of Washington state in the concepts, policies, and performance metrics necessary to understand and accomplish real progress.

Some actions and strategies may be achievable in a relatively short time frame, others will take much longer to realize. Both strategies and examples of actions are presented here without specific timelines, as they rely on identification of funding and other resources. Future reporting on the plan's progress and performance metrics will provide information on implementation activities.

BACKGROUND AND CONTEXT

Legislative actions in 2021

In 2021 with passage of the Healthy Environment for All (HEAL) Act (E2SSB 5141), the legislature directed WSDOT to develop analysis of environmental justice impacts of transportation projects in addition to existing requirements under Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act, and other relevant laws. The intent of the HEAL Act is to "reduce environmental and health disparities in Washington state and improve the health of all Washington state residents". The act found that "people of color and low-income people continue to be disproportionately exposed to environmental harms in their communities." The law's definition of environmental justice includes "addressing disproportionate environmental and health impacts in all laws, rules, and policies with environmental impacts by prioritizing vulnerable populations and overburdened communities, the equitable distribution of resources and benefits, and eliminating harm".

The new law requires state agencies to conduct environmental justice assessments when taking significant action and requires the integration of environmental justice principles in a host of decision processes including budget development, expenditures, and granting or withholding of benefits. The analysis of state right of way WSDOT undertook for this plan prepares the way for implementation of the HEAL Act with respect to active transportation.

Given reliance on walking, bicycling, and transit access by those for whom environmental justice is a critical everyday need, implementation of this plan will be essential to meeting the intent of that act. Crash data reported in Chapter 2 note that serious and fatal crashes occur out of proportion in locations with higher percentages of low-income households and Black, Indigenous, and people of color. Equity criteria recommended in Chapter 3 for use in prioritizing future investments and the equity checks described in

Chapter 5 will be updated to fit into the framework WSDOT and other state agencies develop and apply under HEAL Act requirements.

The legislature amended the state law that lays out the six transportation system policy goals for the state's transportation system (SHB 1137). They directed that state transportation agencies must prioritize preservation and safety in their work to meet the goals.[188] This plan's emphasis on safety in support of mobility and its description of data needs for asset management meet the intent of that law as well.

The legislature also directed WSDOT to recommend changes to the Safe Routes to School and Pedestrian Bicyclist Program application and selection processes "to increase utilization by a greater diversity of jurisdictions" in the agency's annual report on these funding programs (SSB 5165). This report was submitted Dec. 1, 2021. Implementation of its recommendations will affect the ability to meet the proposed performance metrics for funding awards and others such as the percentage of children walking and cycling to school.

ADDRESSING THE PLAN'S FINDINGS TO MEET GOALS

This chapter lays out proposed strategies associated with each of the five goals discussed in Chapter 1, the findings of the analysis presented in Chapter 3, and the approaches recommended in Chapter 4 to improve network safety and connectivity. Chapters 2, 3, 4, and 5 identify data limitations that need to be addressed during plan implementation.

Given that the plan's analysis examined state highw≠ays in detail, a number of the strategies rely on WSDOT as the lead agency for implementation. Many, however, are also suitable for application at the local or regional scale or may involve another agency in the lead role. For WSDOT, a number of these will require funding or new approaches to staff resources to add new activities.

Although strategies are presented here associated with specific goals, a number of them move the state toward accomplishment of multiple goals. The strategies provide overarching organization for a variety of implementation actions.

Selected actions are listed to provide examples of what emerged in the plan's outreach and analysis as necessary to make progress. These are sample actions only, not a comprehensive list. Internal and external discussions will build on this plan to create additional detail.

The first step will be to develop and prioritize a suite of actions with associated timelines, roles, and responsibilities. Some elements can be incorporated into scheduled updates of manuals and procedures, workforce development, and other existing agency processes. Others require exploration of options to identify a way forward, including identification of funding as needed.

188 SHB 1137- 2021-22. The six transportation system policy goals as defined in RCW 47.04.280 are preservation, safety, stewardship, mobility, economic vitality, and environment.

Connectivity

Connectivity Goal: Create and connect comfortable and efficient walking and rolling networks so people can reach their destinations and other forms of transportation and have everyday access to physical activity.

Strategies with Sample Actions

Strategies are listed in **boldface.** Action examples are listed below each strategy as a bulleted list.

- Adopt or update policies in support of network connectivity and comfort.
    - Adopt policies for Complete Streets design approaches on state highways in population centers.
    - Establish LTS 2 or better as the standard for baseline conditions that should be met as roads are improved.
    - Establish a minimum acceptable shoulder width for locations that lack alternate routes.
- Coordinate with partners for development of active transportation infrastructure across jurisdictional boundaries.
    - Develop connectivity analysis framework that identifies locations on the state system that connect with local and regional existing and planned infrastructure.
    - Participate in statewide trails planning.
    - Review statutes, rules, and other information related to trail development; identify aspects and issues that present barriers to network connectivity and propose solutions.
- Identify and address data gaps including the need for comprehensive facilities inventories and data stewardship to maintain and update information as conditions change.
    - Complete an asset inventory including facilities such as sidewalks and implement data stewardship plan.
    - Work with partners to identify data management solutions for understanding connectivity across jurisdictional boundaries.
    - Provide and utilize data in statewide trails database the Recreation and Conservation Office is developing.
    - Develop and maintain GIS data layers for the agency and its partners.
- Provide actionable tools to inform decisions in all phases of WSDOT's work that affect network connectivity and comfort.
    - Develop and apply tools to evaluate proposed projects and their effects on active transportation facilities with methods supported by this plan's analysis.
    - Develop and deliver training for WSDOT staff on best practices in design and operations to support seamless transit access and increase mode shift.
    - Develop additional guidance as needed for treatment selection based on this plan's analytical approach and resources such as FHWA, AASHTO, and NACTO guides; incorporate into future updates of manuals, forms, and processes.
    - Provide guidance for making iterative changes over time to accomplish long-term goal through incremental steps, such as decreasing LTS from 4 to 3 or creating a wider shoulder through restriping.

    - Develop definitions for state of good repair and other elements of asset management; track and report active transportation asset condition to enable preservation and maintenance.
- Improve connectivity through construction of sidewalks, trails, bicycle lanes, crossing and speed management treatments, operational changes, and/or identification of local alternatives to achieve LTS 2 or better.
    - Identify conditions to be addressed in pre-scoping phase on all projects.
    - Incorporate analysis into programming of any appropriate funding sources for changes to the state system that affect active transportation.
    - Update administrative processes concerning mitigation and right of way access to support completion of connections on and across state right of way.
- Measure and report on system performance and integrate core concepts into other agency plans.
    - Develop regular schedule for progress reports as part of agency's overall reporting systems.
    - Measure and report system performance for active transportation in terms of network usability, defined by pedestrian and bicyclist LTS and route directness.
    - Incorporate active transportation concepts into agency's updates to measures of VMT reduction, multimodal level of service, and other performance metrics.
    - Integrate this plan's approach into the update to WSDOT's Highway System Plan and other statewide and modal plans.

Trails present unique questions

Trails occupy a unique place in both state and federal laws. References to "recreational trails" draw a distinction between different purposes for using the same connection. This affects funding, right of way access, project development, and legal protections for agencies and landowners. [189] Under RCW 47.30.010, when WSDOT constructs a limited-access highway it is obligated to avoid severing or destroying existing trails or to provide an alternate trail if necessary.

The Washington State Supreme Court noted some of the complexity in Camicia v. Howard S. Wright Construction Co., and City of Mercer Island (2014), citing Pudmaroff v. Allen, 138 Wn.2d 55, 63 n.3, 977 P.2d 574 (1999): "Bicyclists enjoy an anomalous place in the traffic safety laws of Washington... Statutes variously treat bicycles and bike paths in a recreational context, and at other times the statutes treat them as part of the transportation system. These statutes indicate the Legislature has viewed bicycles and paths on a case-by-case basis, and without any continuity."

No other element of the transportation system faces this set of constraints. Someone can ride a ferry, get on the train, drive on the street or highway, walk down a sidewalk, or board a plane without their travel purpose being used as a reason to limit transportation funding. Cities designate scenic drives on streets used for transportation, scenic highways receive official recognition, and trips in "recreational vehicles" on any street or road count as part of traffic demand.

The outbreak of COVID-19 in 2020 provided an illustration of this issue. Some jurisdictions closed trails to prevent their use, citing the potential for people to come into closer contact than the appropriate social

[189] For example, the Washington State Parks and Recreation Commission manages four long-distance recreational trails illustrated in the conceptual state bikeways and trails map in Chapter 3. Though they may be utilized as transportation corridors their primary purpose is to provide trail-based recreation.

distance. These decisions treated trail use as optional while roads and sidewalks remained open. WSDOT, nonprofit organizations, and others highlighted the importance of trail connections and trails were reopened for essential transportation use.

Trails fulfill multiple functions including transportation, recreation, tourism destination, and access to places for healthy activity and experience of the outdoors. Recognition that trails connect to other facility types as continuations of an active transportation segment or corridor will support efforts to provide complete network connectivity. An inter-agency review of policies related to trails will clarify issues that may need to be addressed while maintaining important legal protections for recreational use.

RCO POLICY RECOMMENDATIONS FOR TRAILS

This plan provides an analysis that can extend efforts by Washington's Recreation and Conservation Office (RCO). Two reports in 2020 identify policy considerations that fit with this plan's emphasis on increasing connectivity and safety and addressing disparities.[190]

The studies emphasize the connections between equity and access to trails, noting that poor communities face more significant health challenges and more barriers to accessing trails than more affluent areas. Recommendations from these reports are relevant for development of trails as transportation corridors that provide lower cost travel options and safe, efficient access to destinations. Trail strategies and actions in this plan support and intersect with RCO's recommendations.

- Encourage development of new trails.
- Conduct comprehensive planning for trails.[191]
- Encourage development of trails that promote multi-day trips.
- Encourage visitation by adding new and improving existing amenities.
- Use trails as a health intervention.
- Improve data collection of trail usage and create consistency.[192]

[190] Recreation and Conservation Office. 2020. Economic, Environmental, & Social Benefits of Recreational Trails in Washington State. Recreation and Conservation Office. 2020. Health Benefits of Contact with Nature.

[191] RCO convened a work group in 2021 for an update to the state trails plan; WSDOT Active Transportation Division participates.

[192] RCO received direction under a 2021 capital budget proviso for development of a statewide trail database; WSDOT Active Transportation Division and other units participate.

Sidewalks present complex jurisdictional interactions

State law and local ordinances determine responsibilities for sidewalks differently from how the state determines responsibility for roads. These exemplify some of the differences between policy and funding of facilities for driving as compared with facilities for walking or rolling. These differences result in challenges and confusion for jurisdictions that negatively affect both compliance with the Americans with Disabilities Act and active transportation use.

For example, some sidewalks are in the public right of way, but local agency codes require abutting homeowners to maintain them. In other places the sidewalk is on publicly owned property and is maintained by public entities. Funding sources available to cities and counties for new sidewalk construction vary, from local improvement districts to development requirements to street bonds and other sources. At the planning and permitting stage laws concerning environmental mitigation address effects of large-scale increases in vehicular trips and may not address sidewalk needs and effects. A city or county may choose to wait until a developer builds on a property to fill a sidewalk gap along the edge.

State law requires that for streets that are also state routes cities and towns “shall exercise full responsibility for and control over” the portions beyond the curbs, although in smaller towns WSDOT has responsibility for traffic control devices including those for pedestrians and bicyclists.[193] This section of statute resulted in an additional set of guidelines for development of required agreements around maintenance tasks. This includes items such as snow and ice removal on sidewalks, which is identified as the city’s responsibility “in accordance with applicable city codes and ordinances regarding sidewalk and right of way maintenance.”[194]

If jurisdictions applied the same principle to streets they apply to sidewalks, property owners would own a piece of the street in front of their property. Cities would construct the street along part of a block, then leave dirt or gravel in front of an empty lot, then pave the rest of the block where buildings already stand.

The development of this plan has resulted in identification of some of the gaps in policy directives. Similar to the inter-agency trails work group suggested to examine those policies, a work group tasked with analysis of sidewalk responsibilities, implications of different approaches taken in local ordinances, opportunities to leverage funding sources, and other topics can improve both policy and practice around sidewalk completion and maintenance.

Such a work group would be expected to identify potential changes to policy that would be addressed through regular channels for review, adoption, and identification of implications for funding. It would include a broad range of stakeholder interests and constituencies similar to the Stakeholder Steering Committee for this plan.

WSDOT has an existing agreement with the Association of Washington Cities that needs to be updated and this will present an opportunity to consider whether language needs to be clarified concerning active transportation connections. Timing and sequencing of the work group concept and this agreement update will need to be worked out in the implementation plan.

[193] RCW 47.24.020. Population threshold for WSDOT responsibility as of 2021 is at 27,500. This population threshold increases to 30,000 in 2023, 32,500 in 2028, and 35,000 in 2033, meaning that WSDOT’s direct responsibility will expand to include more miles of state routes within city limits. This does not affect the calculations in this plan since the analysis considers all miles within population centers.

[194] “City Streets as Part of State Highways” agreement serves as an appendix to the WSDOT maintenance manual.

Safety

Safety Goal: Eliminate deaths and serious injuries of people walking and rolling.[195]

Strategies

- Adopt policies in support of the Safe System Approach including speed management for safety and increase capacity in WSDOT and partners to put the policy into practice.
    - Adopt an update to the agency's sustainable safety executive order to incorporate speed management for injury minimization.
    - Re-evaluate existing speed limits and update to injury minimization speed limits, particularly in population centers and where requested by partners to implement local plans.
    - Update intersection control evaluation policy to incorporate speed minimization principles.
- Increase ability in WSDOT and partners to create and manage active transportation facilities that provide lower levels of traffic stress and improved route directness.
    - Identify and schedule any updates to manuals and guidance needed to support the Safe System Approach, injury minimization speed management, crossing control recommendations from the 2018 Pedestrian Safety Action Plan, and principles from this plan for level of traffic stress and route directness.
    - Develop tools and provide training on LTS analysis for corridors, projects, roadway segments, and intersections/ramp junctions.
    - Develop performance metrics needed to account for preservation of active transportation facilities as agency assets.
- Improve the way active transportation access is maintained during weather events and construction, maintenance, and other activities that affect safety and accessibility.
    - Update the cooperative agreement with local agencies and other partners concerning maintenance responsibilities in accordance with this plan, local plans, and ADA requirements.
    - Develop template for consistent agreements associated with new infrastructure such as trails to facilitate routine maintenance coordination across jurisdiction boundaries.
    - Review work zone management guidance and update manual and associated trainings as needed.
- Develop proactive safety plans for each WSDOT region grounded in the Safe System Approach, systemic analysis, this plan's methodologies, and an equity framework and use them to identify priority locations for improvements.
    - Provide LTS data to WSDOT region offices for use in identifying baseline and contextual conditions.
    - Review safety programming guidelines and provide updated information on active transportation safety.
- Identify and incorporate crash data and methods of analysis for active transportation on par with those used to evaluate the transportation system for motorist safety.

[195] The goal in Washington's Strategic Highway Safety Plan, Target Zero, is for zero traffic deaths and serious injuries for people using any mode of transportation. This plan focuses on strategies and actions for the safety of those who are most vulnerable in a crash.

- Develop volume estimates for pedestrian and bicyclist miles traveled to enable calculation of crash exposure.
- Analyze the state system to identify the high injury network locations and common context or contributing factors; incorporate findings into safety plans and programming.
- Consider additional data sources as available and useful for understanding context and contributing factors, such as "close call" data, crashes that do not involve a motor vehicle collision report, hospital admission data, and other sources.

Safe System Approach and speed management

Community engagement and conversations with this plan's stakeholder steering committee identified safety as a top priority, with engineering decisions around facilities, crossings, and driver speed recognized as critical elements. Chapter 2, the Strategic Highway Safety Plan Target Zero, and reports from the Cooper Jones Active Transportation Safety Council all incorporate the Safe System Approach, which considers roadway design and other factors. WSDOT applies the predictive modeling laid out in the Highway Safety Manual and is updating policy and practice to continue to reduce crash exposure for vulnerable users.[196]

In 2004 (the baseline year referenced in the 2008 plan), pedestrians and bicyclists made up 14 percent of all traffic-related deaths. In each of the past five years, the number of pedestrians killed on Washington roads has increased, more than doubling since 2013 and appearing to reach a new high in 2020. [197] In 2020, pedestrians and bicyclists made up **22 percent of all traffic-related deaths.**[198]

[196] Vehicle design also plays a role in crash occurrence and outcomes for vulnerable users. Fatal crashes involving SUVs and high-horsepower vehicles have increased dramatically as these have become the predominant vehicles manufactured and sold in the US. Regulation of vehicle design is a federal responsibility and discussion of this topic lies beyond the scope of this plan. References: Hawkins, Andrew J. 2020. Go watch this local TV news investigation about front blind spots in SUVs and trucks. The Verge, Jan. 14. Gordon, Aaron. 2021. The US Invented Life-Saving Car Safety Ratings. Now They're Useless. Kids and Cars, March 4. Lawrence, Eric D., Nathan Bomey and Kristi Tanner. 2019. Death on foot: America's love of SUVs is killing pedestrians. Detroit Free Press, Dec. 15. Cooper, Ryan. 2020. The case against American truck bloat. The Week, Aug. 7. Insurance Institute for Highway Safety. 2018. Study highlights rising pedestrian deaths, points toward solutions.

[197] 2020 preliminary figures, WSDOT Crash Data and Reporting Branch, WSDOT Transportation Data, GIS & Modeling Office.

[198] WSDOT. 2021. Gray Notebook 82, Active Transportation Annual Safety Report. Chapter 2 provides more detail on crash statistics.

THE SAFE SYSTEM APPROACH

The Safe System Approach is identified in Washington's Strategic Highway Safety Plan (Target Zero) as a Priority Level One strategy. As discussed in Chapter 2, the Safe System Approach provides a specific set of principles grounded in data and proven effectiveness. It starts with the recognition that human deaths are preventable, and that those who design and operate roadways bear a greater responsibility than individuals for achieving this goal since they create the context. Individual roadway users respond to what has been built, and this design and operational environment shapes their range of choices, actions, and decisions. The Safe System Approach recognizes human physical tolerance and limits so it prioritizes the need to reduce the kinetic energy carried into a crash to save lives.[199]

The link between speed and injury severity in crashes is consistent, direct, and especially critical for pedestrians, bicyclists, and users of mobility assistive devices.[200] On higher-speed roads where other priorities are dependent on higher speeds, separated facilities or barriers to protect vulnerable road users may be the best way to reduce the chance of a deadly crash if a preferred local connection is not available, as discussed in Chapter 4.

Policies, manuals, and other materials will need to be updated for systematic incorporation of the Safe System Approach, injury minimization speed-setting, and other elements of this plan and best practices that will benefit people using every mode of transportation. Specific changes needed will be identified through the implementation phase.

199 Washington Traffic Safety Commission. 2019. Dumbaugh, Eric, Louis Merlin, Kari Signor, Wes Kumfer, Seth LaJeunesse, and Daniel Carter. Implementing Safe Systems in the United States: Guiding Principles and Lessons from International Practice. 2019. Collaborative Sciences Center for Road Safety, University of North Carolina, Chapel Hill.

200 Chapter 2, "Understanding Speed and Safety", provides information on speed management and cites a number of references. Chapter 3 discusses speed as an element of level of traffic stress analysis. Sam D. Doecke, Craig N. Kloeden, Jeffrey K. Dutschke and Matthew R. J. Baldock. 2018. Safe speed limits for a safe system: The relationship between speed limit and fatal crash rate for different crash types. Traffic Injury Prevention, 19:4, 404-408, DOI: 10.1080/15389588.2017.1422601.

ACTIVE TRANSPORTATION IN 2020

Transportation patterns shifted dramatically in 2020. The COVID-19 pandemic meant thousands of people shifted to teleworking, others shifted trips away from transit, and many types of businesses and events reduced or stopped activities entirely. Active transportation experienced large shifts in the percentages of people walking and bicycling, with both modes frequently up more than 100 percent from 2019 levels at times.[201]

In 2020 105 pedestrians died and 12 bicyclists died, making up 22 percent of the total of 523 people killed in crashes. 306 pedestrians and 95 bicyclists received serious injuries out of the 2,080 total serious injuries, making up 19.3 percent. This continues the pattern of the last decade in which serious injuries and deaths occur at higher rates among these vulnerable road users than among drivers and passengers in vehicles.

Design and operations guidance

As the state agency WSDOT sets standards for its own work and provides information and guidance consulted by other agencies, both state and local. WSDOT has updated its Design Manual regularly and has incorporated principles of context-sensitive design. Each round of updates provides opportunities to include guidance that will improve safety.

The WSDOT Design Manual and other manuals establish minimum standards and guidance that apply to the configuration of state transportation facilities to address the safety and mobility needs of all users. WSDOT tools for project development such as the basis of design and the context and modal accommodation report fill a gap by documenting the analysis and reasoning for design decisions and their effects on each mode.

The basis of design process is intended to embed a “right size” philosophy so design decisions do not default to the minimum standard, which in some locations can result in connections that discourage rather than support active transportation. An example would be a five-foot sidewalk with no buffer immediately next to a wide road that carries several lanes of traffic at posted speeds of 35 mph or more, which results in an uncomfortable facility.

201 WSDOT COVID-19 Multimodal Transportation Dashboard. Comparisons made at locations where WSDOT had permanent counters in place in 2019 and there were no breaks in the data. These numbers are not significant and do not necessarily reflect a causal relationship. Appendix E includes a map of locations for the 31 counters in 12 counties.

WSDOT also develops the Local Agency Guidelines Manual, which provides local agencies with statewide policies and standards to follow when using Federal Highway Administration funds for local transportation projects.

Incorporation into official manuals of LTS definitions, topics identified in the 2018 Pedestrian Safety Action Plan, and other guidance can serve as the basis for identifying facility designs appropriate to a given context that build on the manual's existing principles of context-sensitive design. As one example, a trail serving regional transportation needs in an area with a large population calls for a bigger minimum standard width than what may be suitable for a trail serving a much smaller population base in an area with few destinations.

In 2021 WSDOT's Traffic Manual was updated to incorporate references to setting speed limits to minimize fatal and serious injuries—a shift from older approaches.[202] Additional updates will take place on a regular schedule. To advance this plan those updates will need to involve additional changes in support of speed management and injury minimization, crossing countermeasures from the Pedestrian Safety Action Plan, and use of emerging performance metrics to guide the selection and configuration of bicyclist and pedestrian facilities.

WSDOT periodically adopts a state supplement to FHWA's Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) through the Washington Administrative Code (WAC) process. The supplement address points where the MUTCD departs from state law or does not address factors considered important for Washington. In 2021 FHWA released a proposed update to the MUTCD for public comment and WSDOT supplied extensive comments, including many specific to improving multimodal and context-specific operations. These comments can feed into the next state supplement update.[203]

Equity in safety

Chapter 2 of this plan discusses the historical context, crash data, and other information pointing to the need to prioritize equity considerations to achieve the safety goal. Development of safety plans grounded in the Safe System Approach informed by this plan's equity criteria will support alignment of local, regional, and state plans and contribute to meeting both state and federal safety goals, including implementation of the HEAL Act and prioritization of safety as a top transportation system policy goal.

Assessing connectivity and safety by mode will provide a more well-rounded multimodal understanding of investment effects. This analysis needs to address both existing conditions and the implications of proposed projects or changes on people's ability to choose lower-cost or more sustainable transportation modes. WSDOT intends to explore tools both for data analysis and for community and partner engagement in support of these efforts.

In 2021 the Cooper Jones Active Transportation Safety Council explored the many dimensions of traffic safety from an equity and mobility justice perspective. Their report to the legislature discusses concepts that in future may point to additional strategies and actions.

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202 To describe the actual speed drivers are traveling on a particular roadway, WSDOT considers two speed measures: the 10mph pace, the range of speed at which the majority of drivers are traveling on a particular stretch of road, and the 85th percentile speed, the maximum speed that 85 percent of drivers will not exceed on a given road. The 85th percentile speed provides a data point to understand existing driver behavior in setting appropriate speed limits along with context, local plans, pedestrian activity, and other factors; with the update it is not treated as a factor pointing to a decision to increase posted speed.

203 WSDOT. 2021. Comments submitted to FHWA on MUTCD May 14, 2021.

Maintenance

Maintenance includes such things as trimming shrubbery, sweeping debris, removing snow, repairing cracks and potholes, and ensuring adequate lighting. These maintenance activities affect both safety and the perception of safety. A jurisdiction's ability to maintain facilities year-round affects active transportation use and transit access, particularly for people with disabilities. It is important to note that the Americans with Disabilities Act requires maintenance as well as construction of accessible connections.[204]

A state highway or trail that runs through towns, census-designated places, and unincorporated areas of a county involves multiple agencies, making it difficult for a resident to know who handles maintenance and making coordinated efforts more challenging to organize. The work groups for trails and sidewalks discussed under the connectivity strategies will need to address maintenance as well as construction concerns to develop a fully coordinated lifecycle approach.

WSDOT has started to collect and update data to identify the location and condition of active transportation facilities that require maintenance and preservation. Some information already exists but may not be tracked specifically for active transportation purposes. For example, bike lanes are part of the roadway so their condition is considered under pavement preservation standards. When WSDOT incorporates active transportation facilities into the Statewide Transportation Asset Management Plan, it will work with FHWA and research other sources of information to consider maintenance and preservation needs.

[204] WSDOT. 2021. Comments submitted to FHWA on MUTCD May 14, 2021.

EQUITY CHALLENGES IN MAINTENANCE

As with other policy issues addressed in this plan, equity enters into the equation. If jurisdictions applied the same principle to street maintenance that they apply to sidewalks, property owners would own a piece of the street in front of their property, be expected to fill potholes and clear snow, and face potential lawsuits when they did not exercise reasonable care in maintaining a safe street. Instead, public policy acknowledges that it is in everyone's interest if jurisdictions maintain streets in working condition for anyone who might use them. A city plows the full block when snow falls, not just the street in front of certain properties where people can afford to pay.

Homeowners on fixed incomes or faced with declining property values may not be able to afford repairs and people may have difficulty handling maintenance in front of their property for a variety of reasons. Doubling down on the inequity, those who need the sidewalk may find it impassable as a result of any or all of these factors.

When an agency clears streets for drivers and piles snow onto active transportation facilities it penalizes those people who cannot or do not drive.[205] People using wheelchairs and other mobility aids may find sidewalks and curb ramps difficult or impossible to navigate. Patches of snow and ice interfere with those who have balance issues or use a cane or walker, and can make it incredibly difficult or impossible for blind and low-eyesight people to know whether their usual routes will be open or when they might encounter a slippery stretch. The common practice of using sidewalks, bike lanes, highway shoulders, and some trails for snow storage can result in people needing to walk or bike in the vehicular travel lanes the snow came from—a location where driver traction may be compromised.

[205] As of 2018 approximately 21.4 percent of Washington's residents did not hold a driver's license; this percentage will continue to rise as the proportion of older people increases in the population. This includes people who do not drive for a variety of reasons: financial; legal; religious; disability; age; physical, medical, or mental conditions that limit their ability to operate a vehicle; or by choice. Washington state population as of 2018: 7,524,000. Total number of licensed drivers: 5,909,967. For a discussion of a gender analysis of snow removal and other transportation issues: 99 Percent Invisible. 2019. Invisible Women. Criado Perez, Caroline. 2019. Invisible Women: Data Bias in a World Designed for Men.

Work Zone Management

Several manuals discuss work zones: the MUTCD, WSDOT Design Manual, Traffic Manual, and Work Zone Guidelines manual for maintenance operations. They use some variation of the MUTCD language noting that the use of temporary controls "should consider the needs of all road users (motorists, bicyclists, and pedestrians), including those with disabilities."[206] Examples raised during community engagement for this plan point to the importance of work zone policies and practices, particularly for compliance with the Americans with Disabilities Act. WSDOT has recently updated its guidance and training to improve work zone management for pedestrians and bicyclists.

Figure 6-1: An example of work zone sign placement that violates the MUTCD. Image from Google Maps.

In congested, urban areas placing work zone signs is difficult. Avoid blocking sidewalks, left photo. Instead, position the sign to maintain a minimum 48" (4-foot) pathway and consider rubber base stands to minimize tripping hazards, middle photo. With Engineer approval, use 7-foot mounting height, reduced sign size, or special 24"x48" signs (right photo) to better accommodate pedestrians.

Avoid blocking bike lanes with work zone signs, left photo. Instead, consider placing signs in utility strips between the street and sidewalk. Increase the sign's mounting height to 5 feet if placed behind parked vehicles.

5-12 Washington State: Traffic Control Supervisor Training Temporary Traffic Control Devices

Figure 6-2: Image from WSDOT's training for work zone management illustrating correct sign placement to avoid blocking movements of people walking or rolling

[206] Manual on Uniform Traffic Control Devices. 2009 Edition Chapter 6F, Temporary Traffic Control Zone Devices.

Mode-specific direction can improve mobility and safety through work zones. Current work zone policies do not specifically consider the greater physical effort involved with detours for active travelers and the extended exposure to weather or a potential crash that people may need to endure as a result of the detour or delay. In one example cited in WSDOT's engagement for the plan, shutting off a signal at an intersection and blocking cross traffic during construction meant eliminating pedestrian access across a state highway needed to reach essential services.

Existing work zone policies do not fully acknowledge the flexibility and advantages active transportation can provide for continued access through some work zones in locations where it is not possible to do so for drivers due to vehicle size. The typical working assumption is that if a connection is closed for drivers it is closed for all modes. WSDOT will update its manual and training to incorporate the opportunities that walking or rolling may still provide when a work zone is not suitable for drivers.

Opportunity

Opportunity Goal: Eliminate disparities in access to safe, healthy active transportation connections for people and communities most dependent on walking, bicycling and transit.

Strategies

- Integrate equity criteria into decision making and evaluation and report on progress.
    - Update the equity criteria developed for this plan to meet requirements of the HEAL Act and align with future agency practice in environmental justice analysis and project evaluation.
    - Identify equity issues not directly addressed in this plan that future updates can include.
- Clarify and strengthen connections between this plan and the ADA Transition Plan with tools for use in analysis, design, operations, and maintenance.
    - Continue to update the asset inventory that tracks accessibility needs.
    - Develop plans with partners to address locations prioritized based on accessibility needs.
    - Expand notion of ADA accessibility to include use of trail and on-road facilities using a variety of devices (such as three-wheeled bikes); update guidelines as needed.
- Prioritize walking and bicycling investments in historically overburdened and transportation-disadvantaged communities and in locations where these investments arise from local plans and priorities.
    - Provide equity analysis of crash data, network gaps, and other information essential to active transportation safety and mobility to WSDOT and partners.
    - Identify opportunities and implement changes that apply this approach to ongoing activities wherever possible.
- Update policy and practices for state-administered competitive funding programs related to active transportation to expand participation, capacity, and success for applicants in historically underserved communities.
    - Analyze applications to identify communities that do not apply; identify barriers to application; update administrative practices and support to increase participation; track and report results and adjust processes as needed.
    - Integrate this plan's analysis into WSDOT grants and funding awards beyond the funding programs administered by the Active Transportation Division.

- Develop equity checks on other goals, report findings, and use results to adjust future implementation efforts.
    - Identify data sources and limitations.
    - Collaborate with other agencies undertaking equity analysis and reporting to arrive at common definitions wherever possible.

The justification for facility changes under the Americans with Disabilities Act is not tied to existing use or counts of people passing by. It is grounded in the right to have access to appropriate facilities. Decisions about facilities design and operations create barriers that can be removed—or simply not be created in the first place. Active transportation facilities serve disabled people; accessibility is essential to completion of a transportation system that serves everyone.

Accessibility and the Americans with Disabilities Act

To help eliminate barriers to accessibility in the built environment, Congress enacted the Americans with Disabilities Act (ADA) in 1990. As a matter of civil rights, the ADA requires that all new and altered facilities—including sidewalks, street crossings, and related pedestrian and bicyclist facilities in the public right of way—be accessible to and usable by people with disabilities. In practice, ADA implementation encounters challenges ranging from cost to prioritization to missed opportunities.

WSDOT developed its federally required ADA Transition Plan as a living document to address all WSDOT-owned facilities and ferry vessels and barriers within the public right of way. Updated in 2018 and approved by FHWA the same year, that plan states: "WSDOT's goal in implementing this transition plan is to become fully compliant with the ADA by providing equal access for all users of its programs and services."[207]

This Active Transportation Plan incorporates and extends action recommendations from the ADA Transition Plan. Applying the LTS definitions and equity evaluation criteria from this plan will aid WSDOT in completing the ADA Transition Plan by identifying locations in need of improvement to provide accessible active transportation connections. Local jurisdictions are also required to develop ADA Transition Plans.

Equity evaluation and reporting

As WSDOT develops processes to apply this plan's methodologies at the corridor and project level, this will permit the agency to analyze the effects of its projects on active transportation connections, a critical concern in communities affected by large-scale transportation projects. The evaluation criteria laid out in this plan will need to evolve to be consistent with definitions of overburdened and environmental justice communities laid out in the HEAL (Healthy Environment for All) Act passed in 2021 and other required analysis and reporting. As other agencies covered by the HEAL Act and WSDOT collaborate to arrive at common definitions this plan's reporting will align with those.

The state's transportation system policy goals apply to WSDOT and state agencies with transportation-related responsibilities. Identifying places that are furthest from achieving them helps focus limited resources where they are most needed. Use of the evaluation criteria in this plan and future criteria developed under the HEAL Act will begin to address disparities in health, transportation access, safety, and mobility.

207 WSDOT. 2018. ADA / 504 Transition Plan for Public Rights of Way and Ferries. Annual reports are linked on the WSDOT Americans with Disabilities Act webpage.

Funding award processes

As described in Chapter 4, WSDOT administers two funding programs specifically for active transportation, the Safe Routes to School (SRTS) and Pedestrian/Bicyclist Program (PBP). Walk/bike improvements are also eligible for funding from other agency programs such as the City Safety Program, County Safety Program, and some grants from the Public Transportation Division.

Funding processes under SRTS/PBP already incorporate some equity evaluation criteria such as the percentage of children receiving free or reduced-price meals in a school; the percentage of the population that is low-income relative to the state average; and the percentage of the population that is Black, Indigenous, or people of color relative to the state average. In the city and county safety programs administered by WSDOT's Local Programs Division agencies are allowed to use equity as a consideration for improving systemic safety, so long as it is included in the overall agency local road safety plan and supported by qualitative and/or quantitative data.

In the 2021 transportation budget the legislature directed that WSDOT's annual report on the Pedestrian Safety/Safe Routes to School funding programs include recommended changes to the application and selection processes to increase utilization by a greater diversity of jurisdictions (SSB 5165). As noted under Performance Metrics, the majority of applications received are not at locations that score as high-need areas for equity criteria, while many jurisdictions do not apply at all. Identifying barriers to participation and increasing capacity of jurisdictions to develop and submit high-quality proposals would enable the state to make progress.

Participation

Participation Goal: Increase the percentage of everyday trips made by walking or bicycling.

Strategies

- Increase access to transit and other modes by improving active transportation infrastructure and/or lowering the LTS to extend mobility and access to essential services and destinations.
    - Coordinate with WSDOT's Public Transportation Division on grant priorities associated with transit access.
    - Participate in development of a guidebook to best practices in design and operations for improved transit and station area access.
    - Participate in agency initiatives addressing the effects of land use on active transportation use.
- Develop and implement updates to data collection to take advantage of new technologies, in-depth surveys, and other mechanisms.
    - Identify data sources needed to more fully understand active transportation use and barriers to participation.
    - Partner with local and regional agencies to collect data that all agencies can use.

- Develop and implement improved wayfinding, signage, route planning, and other information resources to make the system legible and understandable for all users.
    - Establish a plan for installation of uniform signage to support access from state highways to regional and local systems.
    - Collaborate with partners to develop trail signage standards as required by RCW 47.30.060; adopt regulations as needed to supplement MUTCD standards in support of appropriate trail signage.[208]
- Evaluate and improve existing Safe Routes to School curriculum, planning, and other programs that help increase the number and frequency of children walking and bicycling.
    - Continue to conduct the student travel survey on a regular basis to understand children's trips to/from school.
    - Convene state agencies and stakeholders to explore options for both school-based curriculum delivery and other mechanisms for people of all ages.
    - Identify schools adjacent to state highways with a high proportion of students receiving free and reduced cost meals. Inventory whether they have up-to-date walk route maps and work with partners to identify funding sources to develop maps where they are not available.
    - Provide data for WSDOT Region offices to assess in working with local agencies to identify the potential need for crossing locations, speed management, and other treatments.
- Partner with agencies and organizations to establish a central clearinghouse for active transportation safety education and training materials appropriate for all ages and abilities.
    - Explore opportunities with the Washington Traffic Safety Commission and other agencies and organizations.
    - Identify funding source(s) for development and maintenance of online materials.
    - Develop timeline for analysis of education and encouragement needs to address in a future update to this plan.

Safety in numbers effect

Sometimes the concern is raised that inviting greater participation for active transportation without having all infrastructure and operational improvements in place will lead to more crashes. Recent research indicates a measurable safety in numbers effect for people riding bicycles, whereby more activity is associated with relatively lower crash frequencies.[209] Said another way, crashes would increase at a slower rate than miles traveled, all other things being equal. While this finding applies to bicyclists, the logic behind the effect (that drivers are more aware of other users when there are more of them) is the same for pedestrians.

Data collection and sharing

Mechanisms for collecting data about motor vehicles are well established. As discussed in Chapter 2, WSDOT established a program of permanent pedestrian/bicyclist counters around the state and made use of short-duration manual counts utilizing volunteers for over a decade. With the rise in crowdsourced data and innovative approaches for understanding people's movements, it is timely to consider new sources of information.

208 This work will coordinate with the role of the Recreation and Conservation Office in designating trails as state recreational trails under RCW 79A.35.050, State Parks' role in designating State Scenic Bikeways (RCW 79A.05.800), and the efforts of local and regional trail organizations and partner jurisdictions.

209 Buehler, Ralph and John Pucher, eds., 2021. Cycling for Sustainable Cities. MIT Press.

Increasing participation by school-age children and young people

Federal and state laws establish the goal of increasing the number of students walking or biking to school. Washington state formally established the Safe Routes to School (SRTS) program with the passage of Engrossed State Senate Bill 6091 in 2005. SRTS funds capital improvements connecting to schools, and demand for funding continually and increasingly exceeds available resources. These improvements are effective in increasing student use of active transportation; as of 2018, there had been an average 20 percent increase in walking and biking to school at the 137 SRTS project locations where pre- and post-project counts were available.

Since an initial pilot program funded by the legislature in 2009, the program has funded a middle-school pedestrian/bicyclist safety curriculum program taught by PE teachers that increases rates of participation in schools that offer it.[210] As of 2020, over 115 districts had received the training along with a fleet of bicycles, reaching tens of thousands of students.

Due to shifting COVID-19 related priorities in the Office of the Superintendent of Public Instruction, the mechanism to implement this program will not continue past 2021. WSDOT staff will re-examine the program and identify options for continued support of safety education. This exploration will address the potential of an online clearinghouse and materials with applications beyond as well as in the school setting.

[210] WSDOT and Washington State Dept. of Health. 2016. Student Travel Survey State Report.

RECOMMENDATIONS FROM THE COOPER JONES ACTIVE TRANSPORTATION SAFETY COUNCIL

The Cooper Jones[211] Active Transportation Safety Council included these recommendations concerning school transportation in past reports to the legislature:

- The Washington State Legislature should direct the Office of Superintendent of Public Instruction to support all school districts to develop or update designated school walk routes (RCW 28A.160.160) for each of their schools. This effort should have no sunset and should continue until all school districts have complete, up-to-date walk routes and a mechanism to keep them current. (2018)
- RCW 28A.160.160 should be amended to require identification of suggested school walk routes for each school in each school district. The school walk routes would be developed inside the school walk areas already required for each school. Currently, school walk routes are only required for elementary schools, but many junior high/ middle school and high school students would walk or ride bicycles to school if they had information about routes where hazardous conditions do not exist. (2018)
- Amend RCW 28A.160.160 to change the name from "school walk area" to "school walk and bicycle area."[212] (2018)
- Expand authority for use of safety cameras around schools based on their proven effectiveness.[213] (2020)

School identification of walk routes supports student use of active transportation. Under Washington Administrative Code this responsibility rests with elementary schools; middle and high schools have no such requirement and there is no equivalent requirement for identification of bike routes.[214] The Palouse Regional Transportation Planning Organization has conducted a school walk study and so far is the only MPO or RTPO in the state to have done so.[215] In 2015 WSDOT, the Washington Traffic Safety Commission, and the Washington State Department of Health partnered to publish a guide to assist schools in planning walk and bike routes.[216]

211 To learn more about Cooper Jones read Tolme, Paul. 2020. The Legacy of Cooper Jones: How a Family's Loss Led to Washington's 'Share the Road' License Plates. Washington Bikes.

212 Washington Traffic Safety Commission. 2018. Pedestrian Safety Advisory Council 2018 Annual Report & Recommendations. Washington Traffic Safety Commission. 2018. Cooper Jones Bicyclist Safety Advisory Council 2018 Annual Report.

213 Washington Traffic Safety Commission. 2020. Automated Traffic Enforcement Systems (ATES): A Key Component for Increasing Safe Walking and Biking to Schools.

214 State law (RCW 28A.160.160(5)) defines "walk area" as the continuous roadways or public walkways around a school, where hazardous conditions do not exist, that provide students access to school with a walking distance of less than one mile. By definition, all schools have a walk area. Washington Administrative Code indicates that elementary schools shall identify walk routes within the walk area. Walk routes provide guidance to students and parents about where to walk based on considerations of traffic patterns and existing traffic controls such as crosswalks, traffic lights, or school safety patrol posts. As of 2020, 55 percent of school districts reported having recommended walk routes for their elementary schools.

215 Palouse RTPO. 2013. South East Washington Safe Routes to School Study.

216 WSDOT, Washington Traffic Safety Commission, and Washington State Dept. of Health. 2015. School Walk and Bike Routes: A Guide for Planning and Improving Walk and Bike to School Options for Students.

Partnership

Partnership Goal: Collaborate and coordinate with public, tribal, nonprofit, and private partners to complete and improve the network across boundaries.

Strategies

- Strengthen partnership mechanisms that enable advance planning and coordination for collaborative projects and activities throughout the network lifecycle.
    - Collaborate with partners to clearly identify needs along, across, and connecting to the state highway system and align plans around shared priorities and projects.
    - Establish reliable partnership mechanisms that enable advance planning and coordination for collaborative projects and activities.
    - Review Local Agency Guidelines Manual and update as needed to incorporate best practices.
- Partner in data-sharing to identify available facilities and their quality and condition, including ADA accessibility.
    - Develop a plan and timeline for data-sharing on facilities, active transportation modeling and forecasting, and other information needed for effective collaboration.
- Identify and implement process improvements to streamline agreements involving projects on state right of way.
    - Develop templates and umbrella agreements to simplify consistent decision making.
    - Develop clear mechanisms to fund projects on local systems that help close active transportation gaps on the state system.
    - Identify policies and processes that support or hinder this capability. Advance questions to appropriate leadership for consideration.
- Coordinate and collaborate with other state agencies where the work will advance multiple policy goals in health, environment, commerce, recreation, education, and equity.
    - Continue participation in existing efforts led by other agencies such as RCO's State Comprehensive Outdoor Recreation Plan steering committee.
    - Continue to review state plans that could incorporate active transportation as a means toward identified goals and submit suggested language.
    - Participate in the HEAL Act implementation team.
- Build on this plan's outreach and engagement relationships to develop networks of WSDOT partners for communication, coordination, and clearinghouse functions.
    - Build and maintain ongoing relationships with communities of those who have been historically underrepresented, marginalized, or disenfranchised to identify priority issues affecting the use of active transportation. Apply their knowledge to update implementation plans.
    - Convene regular information-sharing connections for WSDOT regions with partners and constituents to share progress on this plan's implementation, upcoming and completed projects, and other activities that cross jurisdictional boundaries.
    - Continue to coordinate with the Cooper Jones Active Transportation Safety Council on safety issues.

- Work with this plan's Stakeholder Steering Committee to develop a structure and recommendations for an ongoing advisory group.

Multijurisdictional network planning

State law requires this plan to address coordination with local and regional government (RCW 47.06.100). The state does not yet have a data structure that makes it possible to incorporate all relevant local, regional, tribal, state, and federal plans to lay out a statewide network and identify gaps and responsibilities. The strategies and actions in this plan represent essential first steps toward a future in which all partners are collaborating to plan for complete network connectivity. This topic is also addressed under the Connectivity goal.

The responsibility for planning and operating facilities that can serve active transportation purposes is distributed across a variety of local, state and federal agencies, including ones not directly focused on transportation. For example, state law assigns responsibility for a statewide trails plan to the Recreation and Conservation Office (RCW.79A.35.040), but RCO cannot plan for highway shoulders as part of the network. The RCO trails plan includes an inventory of existing and potential routes for use by all types of trail users, not just those walking or bicycling. Washington State Parks owns and maintains several trails, and State Parks is developing a State Scenic Bikeways program for the designation and promotion of bicycle routes of notable scenic, recreational, cultural, or historic value. WSDOT plans to coordinate US Bicycle Route identification with this new program where appropriate; the requirements of the two programs differ slightly.

The Growth Management Act requires that local comprehensive plans need to include active transportation facilities (RCW 36.70A.070(6)(a)(vii)). Active transportation planning within local jurisdictions necessarily focuses on their own infrastructure.

MPOs/RTPOs may develop plans that focus on regional connections such as trails. WSDOT's new analysis of active transportation needs can feed into these regional plans.

The Federal Lands Access Program (FLAP, or Access Program) was established in 23 U.S.C. 204 to improve transportation facilities that provide access to, are adjacent to, or are located within federal lands. The Access Program supplements state and local resources for public roads, transit systems, trails, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators. For example, Access Program funds awarded in 2018 are being used to construct 11.5 miles of a shared-use pathway next to SR 110 in Clallam County as part of the Olympic Discovery Trail.

All federally recognized tribes are required to develop long-range transportation plans in order to receive Tribal Transportation Program funding.[217] Tribes may also develop plans or policies specific to active transportation. For example, the Yakama Nation conducted a walk audit, analyzed crash data, and developed a pedestrian safety and heritage trail plan that would reduce crash potential and acknowledge traditional tribal travelways where possible.[218] The Kalispel Tribe adopted a Complete Streets policy.[219] The Jamestown S'Klallam Tribe's comprehensive plan addresses their partnership on construction of segments of the Olympic Discovery Trail.[220]

Agency coordination—data

In Washington, city streets and county roads comprise 70 percent of the public roads. Local and regional governments make many important decisions related to bicyclist and pedestrian transportation. This makes coordination among various transportation providers crucial, especially in project development.

Although pedestrians and bicyclists may use state, county and city roads during a single local trip, there is no collective inventory of active transportation facilities that supports cross-jurisdictional planning to make that trip seamless. No specific policy directs agencies to use a common data platform or approach and the funding to develop such a collaborative tool is not currently available.

Some efforts are under way, including work at FHWA on asset management definitions and standards for active transportation facilities. As a result of a proviso in the 2021-2023 capital budget, RCO will be redeveloping the state trails database and WSDOT will partner in this effort. Cross-jurisdiction data standards and sharing would support the work of all agencies involved.

Given funding, WSDOT and partners can extend the analytical methods from this plan to local facilities and collaborate to identify opportunities and priorities, including ways data can be shared across agencies. WSDOT obtained a small FHWA grant to begin the work of incorporating this plan's analysis into the agency's community planning portal the fall of 2020.

Agency coordination—funding

Effective partnership efforts will include expanded coordination on facilities that involve state right of way and adjacent local facilities that may provide a preferred lower LTS connection or more direct access to destinations, similar to the function of a business loop from an interstate highway. As an action item for implementation of this plan, clarifying the basis for decisions about use of state right of way and the role local facilities play in developing complete network connectivity will support identification and application of appropriate sources of funding. This way, scarce resources can be focused on routes that have been prioritized to provide the best connectivity.

217 Washington Indian Transportation Policy Advisory Committee. 2015. Tribal Consultation Best Practices Guide for Metropolitan and Regional Transportation Planning Organizations in Washington State.

218 Retka, Janelle. 2020. Pedestrian safety is an issue in the lower Yakima Valley. The Yakama Nation is making plans for a new trail system. Yakima Herald, Feb. 21.

219 Smart Growth America. 2019. Kalispel Tribe of Indians Adopts Complete Streets. Dangerous by Design.

220 Jamestown S'Klallam Tribe. 2016. Comprehensive Plan.

WSDOT practices in programming routine activities and capital projects require sufficient time to plan ahead with local partners in order to identify and coordinate appropriate funding sources. A mechanism for ensuring timely consideration of elements that can be incorporated will lead to more cost-effective multimodal designs. The multiagency network planning process described above and region-level partner coordination will produce work plans, timelines, and responsibilities.

Community engagement

WSDOT's community engagement plan guides how the agency engages with partners, stakeholders, tribes, and communities. This plan will be updated to incorporate new requirements from the HEAL Act passed in 2021. The agency routinely undertakes outreach for statewide plans, corridor studies, and projects. Depending on the type of study, such contacts may or may not highlight active transportation issues or opportunities. Region offices have connections with organized advocacy groups where those exist, as well as with local communities, jurisdictions, agencies, planning organizations, and tribal interests.

In undertaking outreach for this plan, agency staff connected with a variety of voices and organizations from around the state, including ones not previously engaged with on these topics. The challenge now is to turn those initial contacts into ongoing relationships, listen carefully, and co-create an understanding of the barriers to active transportation use and priorities for future improvements. Such efforts within a consistent structure to support commitment and consultation will extend the conversation and build toward future updates of the plan.

"FUTURE WATCH"

A number of policy topics came up during community engagement and research for development of the plan that WSDOT can address in future updates to this plan or as work on these moves forward for the agency as a whole. Examples of topics include:

Technology and innovation: How are changes in the availability of apps and information, crowdsourced data, mobility as a service or mobility on demand, automotive advanced drive assistance systems, remotely guided delivery devices, efforts to develop autonomous vehicles, and other new technologies and models affecting the use, safety, and comfort of active transportation spaces? As broadband is extended into rural areas, what opportunities might this create to extend trails on top of these and other utility corridors?

Electric bikes and e-mobility: As sales of electric bikes have exploded[221] and other small e-mobility devices have emerged, use of active transportation has become easier. What implications does this create for increased demand, potentially farther distances defined as "bikeable", different types of uses sharing the same facilities and the potential for conflicting needs, use of these devices for first/last mile access to transit, and the need for access to outlets for charging associated with bike parking/storage locations and bike travel routes?

Aging in place and human services transportation: What role can active transportation play in supporting transportation independence for those who cannot drive and those who need to give up driving? What elements that constitute the "rest areas" for walk/bike facilities—such as benches to rest on, shade, and access to water and bathrooms—are needed to create truly all-ages access?

[221] Glusac, Elaine. 2021. Farther, Faster and No Sweat: Bike-Sharing and the E-Bike Boom. New York Times, March 2. Fleming, Sean. 2021. Electric bike sales grew by 145% in the US last year - here's why that matters. World Economic Forum, March 12.

Sharing economy: Bikeshare, scootershare, and beyond—what opportunities and challenges are created for equitable access to equipment?

Urban freight mobility: How can the availability of electric cargo bikes and new concepts such as neighborhood delivery microhubs serve first/last mile needs for freight delivery while contributing to goals in climate, safety, and individual mobility?[222]

Curb management: How are curb management plans for delivery spaces and rideshare pick-up/drop-off affecting active transportation infrastructure and safety?

System resilience and disaster recovery: In the face of a significant disaster like an earthquake, walking and bicycling may be the only means of transportation for many. Cargo bikes can also play a role in effective response and recovery.[223] How can information and guidance be incorporated into emergency response plans at every level of government? What would be the priority for establishing walking and biking routes during recovery, which could be easier to do than to reestablishing vehicle routes?

Education, encouragement, incentives: In addition to facilities improvements, what new, expanded, or refined programs will enable and accelerate shifts to use active transportation in place of driving alone?[224]

Land use, housing costs, and displacement: How can the relationships between land use decisions, availability of low-income and affordable housing, and active transportation infrastructure work to support everyone's access, safety, and opportunity without leading to displacement of those with fewer transportation options?

Funding: As the state considers transition to a road usage charge and other funding mechanisms, how will consideration of active transportation facilities funding be addressed?[225]

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222 University of Washington Urban Freight Lab. The Seattle Neighborhood Delivery Hub: A Zero-emissions Last-mile delivery pilot in Seattle's Uptown. Schubert, Charlotte. 2021. Experimental zero-emissions last-mile delivery hub launches in Seattle as a test for urban logistics. Geekwire, June 17.

223 Federal Emergency Management Agency. 2016. Disaster Relief Trials Pedal Toward Community Resilience.

224 As noted earlier in this document, active transportation planning incorporates incorporates both the engineering-related topics emphasized in this plan and other topics. WSDOT's intention is to build on the facilities emphasis to address additional topics in future updates.

225 Local and state transportation agencies may use gas tax revenues for construction and maintenance of active transportation facilities (RCW 47.30.030). The law requires WSDOT to spend at least 3/10ths of 1% of the total state and federal construction budget and requires cities, towns and counties to spend at least 0.42% of the total amount of funds received from the motor vehicle fund for paths and trails. (RCW 47.30.050.

CONCLUSION AND NEXT STEPS

No one defines their travel needs by jurisdictional boundaries—they just want reasonably safe, complete connections when they are trying to get somewhere. Given the importance of working across jurisdictional boundaries to make measurable progress, achieving the plan's goals relies on every partner stepping up to the challenges the plan identifies.

In developing this statewide needs assessment WSDOT drew on a wide-ranging body of research, best practices, and the engagement of the people of Washington and partner jurisdictions. The results provide a starting point for understanding the current state of networks for walking, bicycling, and rolling, particularly with respect to conditions on state highways. Going forward, the lessons learned in this process point to future steps in working with communities and decision makers to build on and implement the plan.

Notable concepts

This plan incorporates a number of concepts that are not yet addressed across the full spectrum of policies, practices, and procedures for WSDOT or for all other agencies that provide transportation facilities. These include:

- Network connectivity across jurisdiction boundaries.
- Focus on population centers, with future analysis to consider more rural areas.
- Level of traffic stress as an evaluation tool.
- Travel need and latent demand as justification for facilities development, not usage counts alone.
- The importance of route directness and crossing availability.
- Application of equity factors in evaluation and future prioritization.

In developing the strategies and performance metrics proposed in chapters 5 and 6, WSDOT emphasized those that will accelerate adoption and application of these concepts and associated findings within the agency. Many of the strategies and metrics are also suitable for jurisdictions at any level of responsibility. Over time applying these concepts will point to additional facets that require further development for implementation.

Recommendations to accomplish the plan's goals

- Develop implementation plans with clear responsibilities for the strategies identified in this plan and others that may be identified as necessary for progress.
- Prioritize investments in locations with highest needs to make the most difference in addressing existing disparities in safety, mobility, access, and human and environmental health.
- Address gaps located on or created by state highways by identifying the best available locations to close these gaps. These locations may be on or off the state highway depending on local plans and facilities.
- Reduce the level of traffic stress on the network to make it possible for more people to use active transportation safely and comfortably.
- Align policy changes, funding, and commitment to meet the state's Target Zero goal to reduce traffic fatalities and serious injuries to zero and to meet the mobility and environmental goals for mode shift and reductions in vehicle miles traveled.

- Establish a regular update cycle for this plan to report progress on metrics and examine additional topics.
- Ultimately, complete a statewide active transportation network across jurisdictional boundaries.

Future updates

This plan focuses on facilities needs because active transportation is not at the advanced stage of development that facilities for driving have arrived at. It focuses primarily on state routes to address the effects of population growth and changes in land use. These forces result in state highways often serving a dual function: They are at once local streets within population centers and long roads carrying people between population centers.

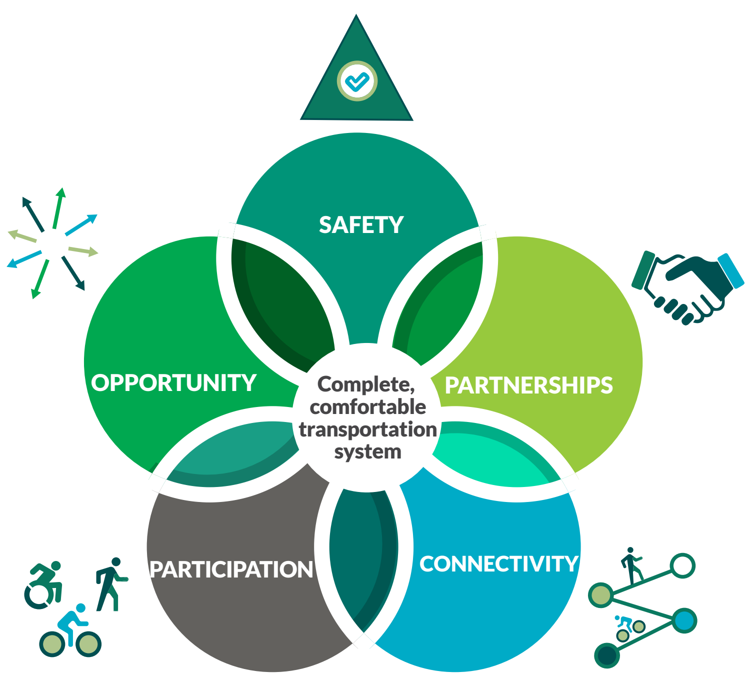
This plan's strategies and performance metrics take the stage of development into account. As actions to implement the various strategies get under way, new information will move WSDOT, partners, and decision makers toward greater understanding of barriers and opportunities. Other topics important to active transportation will be addressed in future updates, and the development of more baseline data will aid in refining the specific performance metric goals.

MOVING INTO THE FUTURE

With this plan complete, WSDOT staff will turn to the implementation plan. Future reports and updates to this plan will begin to fill the gaps this plan's analysis identified, explore topics this plan did not fully address such as education and encouragement, and report on performance metrics. All of these help us move toward achieving the plan's goals, which will serve as the closing points for the plan:

- **Connectivity:** Create and connect comfortable and efficient walking and rolling networks so people can reach their destinations and other forms of transportation and have everyday access to physical activity.
- **Safety:** Eliminate deaths and serious injuries of people walking and rolling.
- **Opportunity:** Eliminate disparities in access to safe, healthy, active transportation connections for people and communities most dependent on walking, bicycling, and transit.
- **Participation:** Increase the percentage of everyday trips made by walking or bicycling.
- **Partnership:** Collaborate and coordinate with public, tribal, nonprofit, and private partners to complete and improve the network across boundaries.

Let us move forward together now, compass in hand, to reach our destination: The integrated transportation system of the future will provide safe, welcoming, and connected networks that invite and enable everyone to walk and roll where they need to go.



Appendix A: ACKNOWLEDGEMENTS

The Washington State Active Transportation Plan, 2020 and Beyond was produced by the Washington State Department of Transportation (WSDOT), Active Transportation Division, with the financial support of the Federal Highway Administration and the state of Washington.

WSDOT would like to express its appreciation to all those who participated in the development of this plan.

STAKEHOLDERS STEERING COMMITTEE

WSDOT staff invited an initial set of participants representing a range of interests around active transportation who met and identified additional perspectives to invite. The WSDOT/MPO/RTPO Coordinating Committee was asked to identify representatives of metropolitan planning organizations and regional transportation planning organizations, and the Washington Indian Transportation Policy Advisory Committee was asked to identify tribal representatives. Some people participated actively in stakeholder meetings; others on the list participated through receipt of updates and had the opportunity to respond. Some organizations have two representatives listed due to a change of representation during the course of plan development. Affiliations are listed for information and do not represent endorsement of the plan as a whole by that organization.

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Alex Krieg, Sound Transit

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Amy Brockhaus, Mountains to Sound Greenway Trust

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Angie Coulter, Community Transportation Association of the Northwest

Anna Zivarts, Disability Rights Washington

Anne Fritzel, Department of Commerce

Ashley Probart, Transportation Improvement Board

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Dan Moore, Pandion

David Mendoza, Front and Centered

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DeSean Quinn, Tukwila City Council and Commission on African American Affairs

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Hester Serebrin, Transportation Choices Coalition

Jaimie Reavis, City of Tukwila

Jane Walla, Association of Washington Cities

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John Stewart, Feet First

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Karianne Schlosshauer, Safe Routes to School National Partnership, Northwest chapter

Keri Cleary, Swinomish Tribe

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Tim Garchow, Washington State School Directors' Association

Val Batey, Sound Transit

Vicky Clark, Cascade Bicycle Club

Cooper Jones Active Transportation Safety Council

This council created by the legislature provided invaluable insights in examining safety issues and provided feedback on draft concepts along the way. The statute that established the ATSC identified specific types of representation to be included and provided that other participants could be added as deemed appropriate. Participant recruitment included efforts to provide geographic representation and demographic diversity. During the plan development the members of the CJATSC included:

Alexandra Alston, Washington Bikes, Seattle

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Annie Kirk, Seattle, Target Zero Manager, Western Washington

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David Delgado, King County Medical Examiner's Office

Officer Eric Edwards, Richland Police Department

David Jones, Spokane, father of Cooper Jones

Dongho Chang, City Traffic Engineer, City of Seattle

Eveline Roy, Wenatchee, Target Zero Manager, Eastern Washington

Harold Taniguchi, liaison to Commission on Asian Pacific American Affairs

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Jon Pascal, City of Kirkland Councilmember, Association of Washington Cities

Josh Diekmann, City Traffic Engineer, City of Tacoma

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Katherine Miller, Director of Integrated Capital Management, City of Spokane

Kerri Wilson, Youth Education Specialist, Intercity Transit, Olympia

Kirsten York, Director of Family Services, Community Action Council of Lewis, Mason, and Thurston Counties

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Officer Paul Taylor, Spokane Police Department

Portia Shields, Data Manager, Engineering, Yakama Nation

Rep. Shelley Kloba, Kirkland

Will Hitchcock, Department of Health

WSDOT Active Transportation Coordination Group

This group is composed of representatives from WSDOT regions and divisions who meet monthly to share information and coordinate activities. List includes all who participated over the course of the plan's development.

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Mark Bozanich, Multimodal Planning and Data Division

Stacey Plumley, Multimodal Planning and Data Division

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Project Team

The team that developed technical background, conducted data analyses, planned and executed public engagement, and compiled and edited the draft and final plan documents included the following:

Barb Chamberlain, Charlotte Claybrooke, Kathy Murray, Justin Nawrocki, and Brian Wood with WSDOT; consultants from Alta Planning + Design including Steve Durrant, Kim Voros, Brandon Gonzalez, and Jean Crowther, in particular development of the level of traffic stress, network analysis, and highway permeability tools; Lawrence Frank, Eric Fox, Jim Chapman, Nicole Alfonsin with Urban Design 4 Health as consultants for performance measures and funding analysis; Meg O'Leary and 3 Square Blocks for outreach planning.

WSDOT Leadership

The support, encouragement, vision, and probing questions of WSDOT's executive team made this a better document. The members of the senior managers team from across the agency are too numerous to mention. The leadership of the units included in Multimodal Development and Delivery under Assistant Secretary Marshall Elizer has given their own time and that of their teams as well. They and others are essential to the plan's implementation, which will be the ultimate test of its value.

Appendix B:
GUIDING PRINCIPLES AND THEMES

These principles capture themes that arose through research and community engagement and support the goals and recommendations of the plan. They are equally important and mutually reinforcing.

COMFORTABLE CONNECTIONS MAKE ALL THE DIFFERENCE

Imagine someone who needs to cross a lake or river. The road leads to the water's edge but there's no bridge. Either they end the trip, or they find another far longer way around. This costs them time, money, and frustration. The transportation connection is only as good as its weakest link.

This scenario is all too familiar to those who walk, bike, or roll. Constructing networks that work well for people driving had unintended consequences. These included creation of gaps, barriers, and increased exposure to death and serious injury.

That bridge in our example may not have any pedestrian and bicyclist space at all. Imagine that it lies between houses on one side of the river and a school and grocery store a half-mile away on the other side.

Now imagine that instead of a bridge with nowhere to walk or roll, a wide, busy arterial lies ahead, with many drivers traveling at a high rate of speed. It may as well be a river for many people, presenting a barrier they can't cross, or one that feels so unsafe they won't cross it.

These scenarios describe two important elements of the active transportation system. The first is whether there's even a place to move: **network connectivity**. The second is whether the facilities provide separation from vehicular traffic for those walking and rolling. The concept of **level of traffic stress** (LTS) describes how close to that fast, heavy traffic a road's design forces people to come. Based on objective, quantitative data about the road design and the traffic it carries, LTS captures factors that are elements in the likelihood and severity of potential crashes. Describing the state's highways in terms of LTS enables WSDOT to identify gaps where changes will make the most difference for walking and biking connections.

If lack of connectivity and high traffic stress mean that someone drives when they would have walked or biked, they cause unnecessary motor vehicle use. This means associated cost, wear and tear on the roadway, and pollution that could all be avoided.

Figure B-1: As described in grant applications, this bridge over the Sultan River on U.S. 2 illustrates the kinds of gaps found on the state system: "The purpose of the Project is to construct a new bridge to provide safe passage for pedestrians and non-motorized users such as bicycles and wheelchairs across the Sultan River. Currently, the only pedestrian and bicycle connection between downtown Sultan and the portion of Sultan that is west of the Sultan River is an undersized pedestrian walkway on the north side of the existing U.S. 2 Bridge. The existing pedestrian and bicycle path is unsafe and does not meet Americans with Disabilities Act (ADA) requirements, including wheelchair accessibility. Both west and eastbound pedestrians and bicycles must share the same narrow path. The path also has a minimal separation between users and highway traffic." City of Sultan is now building a new bridge to carry pedestrians, bicyclists, and utility connections.

For someone who can't drive, the barrier isn't just high, it's impossible. Mobility is at the center of what Washingtonians need to navigate their daily lives, and yet over a quarter of the population cannot or chooses not to drive for various reasons.[226] Others lack access to a reliable personal vehicle. They still need to be able to get where they need to go.[227] These conditions are why WSDOT chose to focus on **network connectivity and level of traffic stress** as the foundation for defining and assessing statewide needs and recommending actions.

The network already exists for drivers. Someone can pull out of a driveway onto a local street, turn onto an arterial, and eventually get onto the highway that connects to more arterials and local streets. That network didn't appear overnight; cities, counties, and the state and federal government invested over decades. Society provided connections that made it easy to drive, so more and more people drove. The more lanes we build, the more people use them.[228]

The history lesson from construction of a network for driving is that when a complete network is in place,

226 2018 data from WA Dept. of Licensing: Percentage of total Washington State population who have an ID card (8.92 percent) or aren't classified as holding a driver's license or learner's permit (~16.46 percent) adds up to 25.38 percent. No data source available for people who hold a driver's license and choose not to drive. If the calculation included only people school age and older the percentage would be higher.

227 The Washington State Dept., of Health Washington Tracking Network provides data by census tract that includes "no access to a private vehicle" among population characteristics. This figure ranges from a low of 2.30% of households in Garfield County to a high of 9.9% of households in King County.

228 This phenomenon, known as "induced demand", has been well-documented. If road capacity increases, peak-period trips also increase until congestion again limits further traffic growth, in what is essentially a 1:1 relationship. A sample of recent publications: Milam, Ronald T. et al. 2017. Closing the Induced Vehicle Travel Gap Between Research and Practice. Transportation Research Record. https://doi.org/10.3141/2653-02. Litman, T. Generated Traffic and Induced Travel: Implications for Transport Planning. ITE Journal, Vol. 71, No. 4, 2001, pp. 38–47. Duranton, G. and Turner, M. The Fundamental Law of Road Congestion: Evidence from US Cities. American Economic Review, Vol. 101, No. 6, 2011, pp. 2616–2652. http://dx.doi.org/10.1257/aer.101.6.2616. Handy, S. , and Boarnet, M. G. . Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions. Policy Brief. Air Resources Board, California Environmental Protection Agency, Sacramento, 2014.

people use it. The same "build it and they will come" outcome can be true of active transportation connections as we build and connect them. Network connectivity and quality serve as the "leading indicators" of whether people can get where they need to go, and whether they can do so comfortably and safely.[229] Measuring these provides guidance for smart investments. As noted above, the Federal Highway Administration recommends measurement of network connectivity to identify high-priority gaps and implement cost-effective practical solutions.

Another key principle of the plan is its emphasis on **multimodal** network connectivity. Walking, biking, and rolling stand on their own as ways of getting around. They also provide access to and from other forms of transportation such as a bus, train, or ferry. Improving such connections extends people's ability to reach more destinations without using a personal vehicle, whether they're doing so out of choice or out of necessity. This is reflected in WSDOT's other modal plans such as the Public Transportation Plan and Washington State Ferries Long-Range Plan, which speak to the need for improved first-mile/last-mile connections and the goal of increasing active transportation access to these modes.

Consider Benefits for People of All Ages and Abilities

As Washingtonians told WSDOT during the plan's outreach, they need and deserve safe and convenient transportation to get where they need to go. The emphasis of this plan is on low-stress biking and walking connections that serve the needs of people of all ages and abilities. It is a plan to give older adults, children, people who have disabilities, and everyone the choice to walk, roll, or bike to get to their destinations. Improving connections to invite more people to walk or roll supports the mode shift requirements of the plan. It also serves the mobility and safety needs of people who walk or bike out of necessity rather than choice. They may use facilities that make them feel uncomfortable or unsafe but have no choice about doing so.

Providing transportation options means understanding facilities that support the safety of people with a variety of characteristics, including bicycling experience and disabilities that affect mobility. Road design, numbers of adjacent motorists, and their driving speed all factor into the evaluation of the facilities.

These quantitative descriptors of the roadway parallel the percentages of Americans who indicate they're willing to bicycle on particular types of facilities. Researchers have attempted to capture different levels of comfort and interest in bicycling. The original classification described four types of riders (No Way No How, Interested but Concerned, Enthused and Confident, Strong and Fearless) and more recently three categories based on variables of comfort (Uncomfortable or Uninterested, Cautious Majority, and Very Comfortable Cyclists).[230]

For example, some adults would find it acceptable to ride in a bike lane on a high-speed road with lots of traffic,

229 Guidebook for Measuring Multimodal Network Connectivity. 2018. USDOT, Federal Highway Administration. Buehler, Ralph, and Jennifer Dill. 2016. Bikeway Networks: A Review of Effects on Cycling. Transport Reviews 36:1. Tal, Gil, and Susan L. Handy. 2012. Measuring Nonmotorized Accessibility and Connectivity in a Robust Pedestrian Network. Transportation Research Record. https://doi.org/10.3141/2299-06

230 Mekuria, Maaza C., Peter G. Furth, and Hilary Nixon. 2012. Low-Stress Bicycling and Network Connectivity. Mineta Transportation Institute Report 11-19. Jennifer Dill and Nathan McNeil, "Four Types of Cyclists? Examination of Typology for Better Understanding of Bicycling Behavior and Potential," Transportation Research Record: Journal of the Transportation Research Board, 2387: 129-138, 2013. Jennifer Dill and Nathan McNeil, "Revisiting the Four Types of Cyclists: Findings from a National Survey," Transportation Research Record: Journal of the Transportation Research Board, 2587: 90-99, 2016. Geller, Roger. 2006. Four Types of Cyclists. Portland Office of Transportation. Angela Hull and Craig O'Holleran. 2014. Bicycle infrastructure: can good design encourage cycling?, Urban Planning and Transport Research, 2:1, 369-406, DOI: 10.1080/21650020.2014.955210. International Transport Forum. 2013. Cycling, Health and Safety.

but people with less bicycling confidence/ability such as children would find it too stressful. Low-stress bicycle facilities built for everyone need either lower driver speeds or more space between motorists and people who bike. The good thing is roads that serve all ages and abilities are low stress for all users. They invite the "cautious majority": the 50-60 percent of the general population interested in riding bikes for at least some of their trips if they felt comfortable on the connections provided.[231]

Researchers have asked people about their willingness to bike on different facility types because of the variety of designs and the potential to shift everyday trips from driving to biking. The stress levels created by vehicular traffic also affect people walking. Sidewalks are more standardized in design, but separation from high-speed traffic affects willingness to walk. People who walk or roll out of necessity, however, have no choice about the level of stress or their exposure to potential serious or fatal injury should a driver crash into them.

Good Roads Work for Everyone

When we create roadways that work well for people walking and rolling, we create roadways that work well for everyone.[232] This plan considers walking, rolling, driving, and riding a bus, train, or ferry all to be essential transportation.

The network approach evaluates active transportation connections in the context of other transportation modes. In fact, that context is essential for understanding the changes needed to improve conditions. Otherwise, it's as if as engineers built airport runways, told drivers they could use their cars there, and ignored the presence of jet planes landing and taking off.

Examples of how better active transportation facilities provide a safer and more pleasant experience for all:

- A well-marked, well-lit crosswalk not overgrown by vegetation enables oncoming drivers to see people waiting to cross the road and stop in time.
- A trail next to a highway provides separation of more vulnerable users from high-speed traffic and reduces the chance that a driver will hit someone.
- Striping, signage, and/or traffic signals cue drivers approaching an on- or off-ramp that they should be on the lookout for people walking or rolling along a side path, sidewalk, or bike lane that crosses the ramp.
- A street design that clearly allocates biking space past transit stops helps bus drivers and transit users as well as bike riders avoid crashes.
- Design and operational changes aimed at reducing death or serious injuries of people walking or bicycling are proven to reduce deaths and serious injuries of people driving, too.

Partnerships Are Essential

231 Federal Highway Administration, USDOT. 2016. Noteworthy Local Policies that Support Safe and Complete Pedestrian and Bicycle Networks. Alta Planning + Design. 2017. Level of Traffic Stress — What it Means for Building Better Bike Networks. Jennifer Dill and Nathan McNeil, "Four Types of Cyclists? Examination of Typology for Better Understanding of Bicycling Behavior and Potential," Transportation Research Record: Journal of the Transportation Research Board, 2387: 129-138, 2013. Jennifer Dill and Nathan McNeil, "Revisiting the Four Types of Cyclists: Findings from a National Survey," Transportation Research Record: Journal of the Transportation Research Board, 2587: 90-99, 2016. Laura Cabral and Amy M. Kim. 2020., An empirical reappraisal of the four types of cyclists. Transportation Research Part A: Policy and Practice, 137. https://doi.org/10.1016/j.tra.2020.05.006

232 Kay Teschke et al. 2012. "Route Infrastructure and the Risk of Injuries to Bicyclists: A Case-Crossover Study", American Journal of Public Health 102, no. 12 (December 1, 2012): pp. 2336-2343.https://doi.org/10.2105/AJPH.2012.300762 Wesley E. Marshall, Nicholas N. Ferenchak. Why cities with high bicycling rates are safer for all road users. Journal of Transport & Health, 2019; DOI: 10.1016/j.jth.2019.03.004

The information developed for the plan helps WSDOT partner with local agencies on shared goals. Local investment in sidewalks, bike lanes, and trails will have more value if those routes can continue across the highway that runs through town. This is particularly important due to the limited public resources available to meet the state's diverse transportation needs.

The tools developed for this plan to evaluate connectivity and level of traffic stress consider where needs for improvement exist on state routes. In the future, going beyond the pieces WSDOT directly owns and manages will expand understanding of what the local system offers and how best to complete connections. Making those improvements requires coordination of plans, timelines, opportunities, and funding sources both on and off the state system. During outreach for the plan WSDOT heard from local and regional jurisdictions that they welcome the opportunity for more planning and project coordination; they can do more to connect the overall network with WSDOT at the table as a partner.

Partners in this work include metropolitan planning organizations and regional transportation planning organizations, counties, local jurisdictions, other infrastructure partners such as port districts and utilities, tribes, and other state agencies that fund trails and transportation projects. Partnerships must be a cornerstone of implementation and this plan serves as a guide for coordinating discussions and decisions.

The Safe System Approach Works

The plan incorporates the Safe System Approach that is part of Target Zero, the state's Strategic Highway Safety Plan. Embedding and implementing these proven principles will be essential to improving safety for everyone:

- Fatal and serious injuries are preventable.
- Mobility does not need to come at the expense of human lives.
- The transportation system must directly address the needs of all roadway users.
- System design has to recognize human physical limits and work to reduce the force of impacts in the event of a crash.

The most effective work in transportation safety addresses the broadest possible contributions to crashes. Making changes that eliminate the possibility of a crash occurring, or reduce the severity if a crash does occur, will save lives.[233]

233 World Road Association. Road Safety Manual: The Safe System Approach. Washington Traffic Safety Commission. 2019. Target Zero: Washington State Strategic Highway Safety Plan.

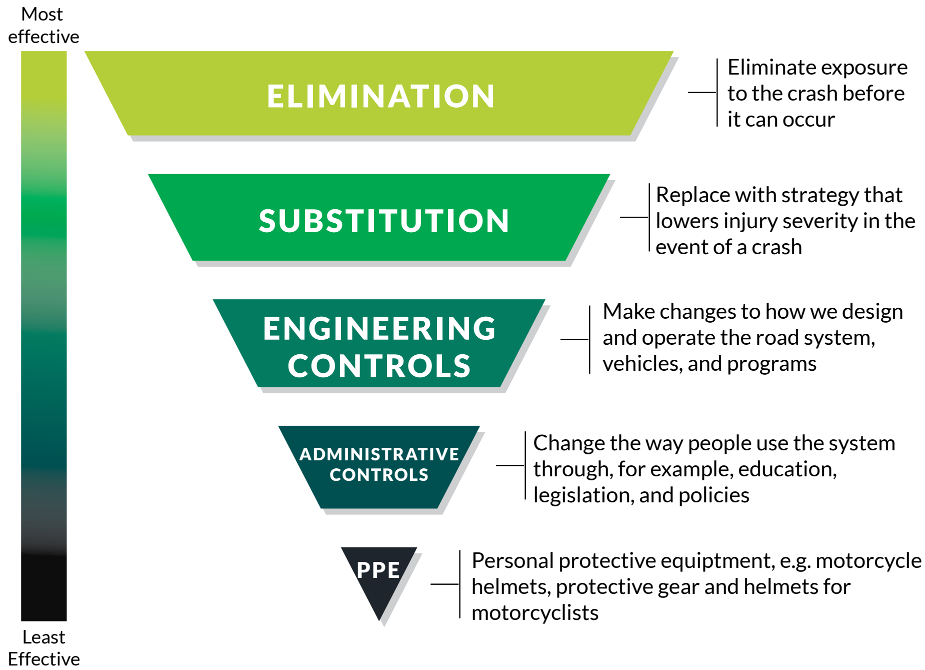

Figure B-2: This hierarchy of controls diagram from the 2019 Target Zero report illustrates the importance of systematic changes. Making changes that eliminate the chance a crash will occur is far more effective than relying on individual behaviors to save lives.

Equity Requires Action

Regardless of social, economic, or demographic differences, all people need access to transportation options.

Transportation inequities are especially problematic when transportation is the limiting factor for getting to jobs, healthcare, education, and community services. The key equity issues showing up in active transportation in both Washington data and national studies concern fatal and serious traffic crashes; lack of infrastructure, especially ADA-accessible facilities; and long distances between housing, jobs and resources.[234] Not all of these can be addressed through transportation agency work.

234 Safe Routes to School National Partnership. 2015. At the Intersection of Active Transportation and Equity. Lee, Richard J., Ipek N. Sener, and S. Nathan Jones. 2015. Understanding the role of equity in active transportation planning in the United States. Transport Reviews 37:2. PolicyLink. 2009. Healthy, Equitable Transportation Policy: Recommendations and Research.

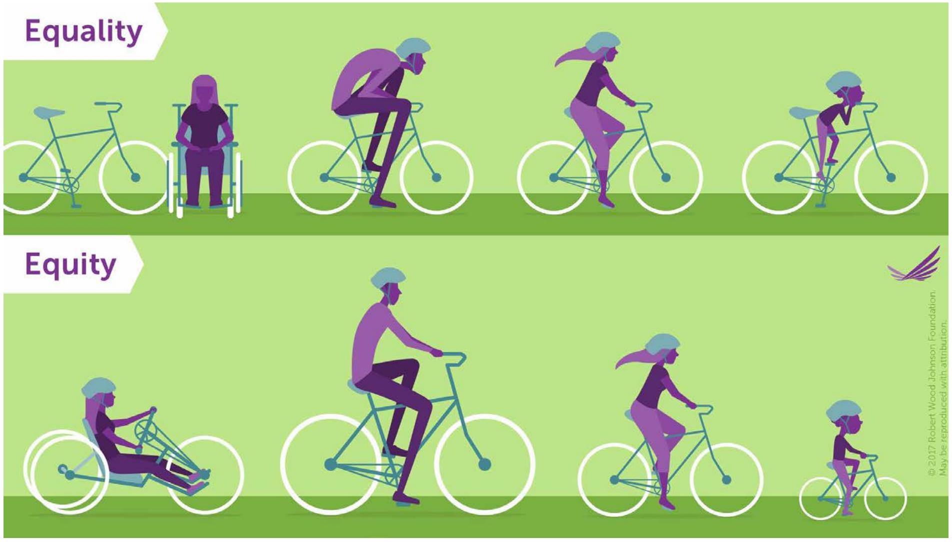

Figure B-3: The Robert Wood Johnson Foundation created this graphic to illustrate the difference between "equality"—everyone treated the same—and "equity"—recognizing and addressing differences to meet individual needs. Used with permission.

Fatal and serious injury crashes are more common in places where low-income populations live. In Washington State, people living in poverty include an overrepresentation of people of color, the elderly, and people with disabilities. Between 2013–2017 about 59 percent of fatal and serious crashes in Washington that involved someone walking or rolling occurred in neighborhoods with higher poverty rates, despite these areas only accounting for 43 percent of communities.[235]

Inequities in available transportation infrastructure connecting people to jobs, housing, food access, etc. have their roots in a history of residential segregation. This included policies such as "redlining" that restricted investment in areas where people of color were allowed to live. Those same areas have historically suffered from a lack of investment in public safety infrastructure. The long-term effects include a lack of sidewalks, crosswalks, lighting, and bicycling paths in certain neighborhoods.[236]

In some cases, transportation projects physically divided these neighborhoods with highways or arterials. Roads designed for higher vehicle speeds and higher traffic volumes increase the chance of fatal or serious crashes. People living there may experience higher rates of exposure to particulates, vehicle emissions, and other transportation-related pollutants.[237] In these mostly low-income areas, fewer people own private vehicles.[238] They rely more on public and active transportation. Lack of access to safe transportation denies people the ability to meet basic needs such as travel to jobs, food, and health care, and to reach opportunities for work, education, and community service.

"Data show the need to direct prevention efforts to communities with poverty rates higher than the state average as well as vulnerable and marginalized populations, such as older adults, individuals with disabilities, people of color, and youth. This will help us improve safety and public health, and decrease the burden on individuals, communities, and the state's economy."

—Target Zero 2019

235 Washington Traffic Safety Commission. 2019. Target Zero: Washington State Strategic Highway Safety Plan.

236 Rothstein, Richard. 2017. *The Color of Law: A Forgotten History of How Our Government Segregated America.* Bullard, Robert D., Glenn Johnson, and Angel Torres, eds. 2004. *Highway Robbery: Transportation Racism and New Routes to Equity.* Avila, Eric. 2014. *The Folklore of the Freeway: Race and Revolt in the Modernist City.* Gibbs K, Slater SJ, Nicholson N, et al. (2012.) "Income Disparities in Street Features that Encourage Walking." Bridging the Gap Program, University of Illinois at Chicago. Smart Growth America. 2019. Dangerous by Design. Brinkman, Jeffrey, and Jeffrey Lin. 2019. Freeway Revolts! Federal Reserve Bank of Philadelphia, Working Papers.

237 Washington State Dept. of Health. Washington Environmental Health Disparities Map.

238 Washington State Dept. of Health. Washington Tracking Network.

The location of affordable and low-income housing also plays an important role in transportation equity. For example, housing within walking or bicycling distance of a main street or neighborhood shopping district can allow for the reduction of daily car trips. Expanding public transportation is another means of providing alternatives to driving and connecting people to essential services. And yet, sometimes housing in neighborhoods with these types of options is more expensive, pushing lower-income people farther away and increasing their transportation costs in both time and money. Evaluating how many destinations and transit connections can be reached within a given travel time provides one way of understanding these issues.[239]

"Work to ensure that all people have access to their daily needs with dignity and independence, regardless of their ability or income and without discrimination based on race or other identity."
—WTP 2040 and Beyond

Current infrastructure investment strategies do not always directly address equity issues. For these reasons, the plan applies equity criteria and data in its evaluation methods. This helps identify those locations and people most affected by the decisions of the past, and those most in need of good decisions for the future.

Transportation Dramatically Affects Health

Active transportation supports many important societal goals and priorities. For example, when people have easy access to places where they can get out and move around they get more physical activity and are healthier as a result.[240] When the number of miles driven goes down, the pollutants associated with vehicles such as tire particles and emissions go down.[241] Safer connections for walking and bicycling bring down the most serious types of crashes for drivers, too, reducing costs of healthcare and lost productivity and quality of life.[242] Children who walk or bike to school are better able to concentrate for longer periods and perform better on standardized tests, which highlights the value of physical activity for mental health as well as physical.[243] The links between active transportation and improved health are so strong that the Centers for Disease Control and Prevention recommend the use of changes in transportation and land use as an effective way of increasing physical activity.[244]

Plans and priorities of other Washington State agencies, regional agencies, cities, counties, and tribes include goals such as bringing down the rates of heart disease and diabetes, decreasing health disparities, improving air and water quality, and increasing access to outdoor recreation and green space. Many factors affect these goals, but the people of Washington can't achieve them without addressing the essential role of transportation. Chapter 2 presents more research on the physical and mental health benefits of active transportation.

239 This performance metric is sometimes referred to as "accessibility"—not to be confused with the concept of ADA-accessible facilities.

240 US Dept. of Health and Human Services. 2015. Step It Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities. Zhu, Xuemei, Chia-Yuan Yu, Chanam Lee, Zhipeng Lu, and George Mann. A retrospective study on changes in residents' physical activities, social interactions, and neighborhood cohesion after moving to a walkable community. Preventive Medicine 69: 593-597. Active Living Research. 2016. Research Review: Moving Toward Active Transportation: How Policies Can Encourage Walking and Bicycling.

241 USDOT. Transportation and Health Tool: Cleaner Air.

242 Rojas-Rueda, David, et al. 2011. Health risks and benefits of cycling in urban environments compared with car use: Health impact assessment study. BMJ, www.bmj.com/content/343/bmj.d4521.full..

243 Vinther, Dann. 2012. Children who walk to school concentrate better. Science Nordic.

244 The Community Guide. 2016. Physical Activity: Built Environment Approaches Combining Transportation System Interventions with Land Use and Environmental Design.

This plan focuses on the fundamental transportation building blocks that will contribute to improved human, societal, and environmental health. Do people have somewhere safe to walk or roll? If they do, and participation increases, the benefits will show up in measurement of progress toward goals beyond those identified in this plan.

"We used to build transportation through communities. Now we need to build communities through transportation. "—Dan Burden, Washington resident and walkability expert

A Multimodal System Provides Resiliency

A resilient system can adapt to changing conditions and continue to function at some level even when faced with major disruptions or obstacles. Transportation resilience applies to individuals, communities, designs, economies, and strategies for the future.

Having more than one mode of transportation available provides multiple options for everyday movement and enables people to keep moving in the face of emergency conditions. Thinking long-term, a transportation system designed for future changes and potential declines in resources provides more resilient and sustainable connections over time.[245]

Compare transportation to a stool balancing on three or four legs. Relying on just one means of transportation puts too much weight on that leg and over time the pressure can become too much. Or if something happens to remove one of those legs, the stool can become unbalanced and fall unless the other legs have capacity.

In the simplest example of how a multimodal system supports transportation resiliency, someone planning to drive to the neighborhood coffee shop who can't get the car to start could still potentially walk or roll there if the sidewalk conditions permit them to. If snow and ice make it hazardous to drive, transit service can get more people to their destinations with far less chance of a multi-vehicle crash.[246] In more extreme circumstances, if fuel isn't available for motor vehicles or roads are jammed with vehicles, people will need to walk and bike for evacuation out of a disaster zone.

Washington has experienced multiple examples of the value of a multimodal system to provide more resilient mobility. In 2019 when State Route 99 construction closed down some routes into and through downtown Seattle, tens of thousands of vehicle trips "disappeared".[247] This was possible because people switched to using transit and bicycling and public agencies at all levels coordinated an intensive communications effort. Seattle and King County already had some bike infrastructure in place that facilitated this use of active transportation. The Seattle Department of Transportation bike counter on the Spokane Street Bridge leaving West Seattle had some of its highest ridership days since counting began in 2012—and this was in January.[248] In April 2020 the upper bridge that carries drivers experience cracks and had to be closed, and bike trips across the lower bridge once again climbed to levels even above those experienced when the world wasn't dealing with a

245 Weilant, Sarah, Aaron Strong, and Benjamin M. Miller. 2019. Incorporating Resilience into Transportation Planning and Assessment. RAND Corporation.

246 Taking transit reduces the chance of a crash when compared with driving; transit travel has less than half the total death rate as automobile travel, and as transit use increases crash numbers for road users reduce. Litman, Todd. 2020. Safer Than You Think! Revising the Transit Safety Narrative. Victoria Transport Policy Institute. Litman, Todd. 2014. A New Transit Safety Narrative. Journal of Public Transportation 17:4.

247 Gutman, David. 2019. 'The cars just disappeared': What happened to the 90,000 cars a day the viaduct carried before it closed?. Seattle Times, Jan. 24.

248 Lloyd, Sarah Anne. 2019. Bike commutes appear to spike after viaduct closure. Curbed Seattle, Jan. 15. Packer, Ryan. 2019. Seattle Smashed Bike Count Records in January. The Urbanist, Feb. 4.

pandemic.[249]

From fires to earthquakes to landslides, natural and human-made disasters can affect use of the transportation system. As we write this plan, the world faces the uncertainties created by the COVID-19 pandemic. Transit use has plummeted; bike counts are once again up across the state.[250] In multiple cities, mayors seek to expand access to low-contact transportation and healthy activity. In some places, they're closing vehicle lanes to driving and dedicating the space to walking and rolling. Jurisdictions from the local level to the state are taking actions to create more opportunities for essential physical activity in support of emotional and mental as well as physical health.

Washington's transportation agencies can't plan for every possibility, but can recognize the value of safe, accessible active transportation connections as essential infrastructure in good times and in bad.

We Can Build the Future

Washington State has a number of trail segments and systems growing toward each other thanks to the work of countless trail advocates and the jurisdictions that have invested for years. WSDOT has also been working with dedicated volunteers mapping the US Bicycle Route System, which identifies the best bike routes across the state. These routes use trails where they're available and make use of highway shoulders where trails don't yet exist. Some USBRs have already been designated; others are at the conceptual level awaiting turn-by-turn detail.[251]

Local and regional agencies, trail advocates, recreation and tourism interests have identified the potential for a more comprehensive active transportation network across the state.[252] The state Recreation and Conservation Office is responsible for developing a statewide trails plan focused on recreational use, which has some overlaps with transportation uses but doesn't replace the need for transportation-focused planning that can include facilities in addition to trails.[253] Based on gaps and opportunities in existing planning efforts, WSDOT identified the need to include a high-level conceptual plan for a statewide low-stress active transportation network—what might be thought of as the "bike highway system" based on trails wherever possible. WSDOT coordinated its data compilation to extend and update the RCO analysis.

To draw a parallel to the system built for driving, one might describe trails of statewide significance as the "interstate" of safe, separated connections for walking and biking. They support longer travel, bringing the "wallets on wheels" economic benefits of bike tourism and adding to the attractiveness of a destination, town, or region.[254] They also provide connections for trips over short distances, with separation from drivers reducing the chance of a collision. "Off-ramps" with safe crossings could connect these regional trails with community trails, bike lanes, and sidewalks. Linking trails to other safe walking and biking infrastructure provides less stressful, less dangerous routes. This ensures more people can travel on a low-stress network that invites people from age 8 to 80+ to walk or roll.

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249 Fucoloro, Tom. 2020. With the upper West Seattle Bridge closed, bike trips across the low bridge are higher than non-outbreak years. Seattle Bike Blog, May 28.
250 WSDOT. 2020. COVID-19 Multimodal Transportation System Performance Dashboard.
251 WSDOT. U.S. Bicycle Route System in Washington.
252 As one recent example, the fall 2018 Washington State Trails Coalition Conference included a presentation, "The Washington Cross State Trail System: Connecting Communities Across Washington" that demonstrated how local and regional trails could be linked.
253 Washington State Recreation and Conservation Office. 2018. Washington State Trails Plan.
254 Recreation and Conservation Office. 2020. Economic, Environmental, & Social Benefits of Recreational Trails in Washington State. RCO. 2015. Economic Analysis of Outdoor Recreation in Washington State.

Research and public input established the value of such a concept even before the global pandemic. With the pressing need for economic recovery, investments in trail projects could provide jobs in communities all around the state and support recovery through completion of a more resilient, healthier, and safer transportation system. When the American Association of State Highway and Transportation Officials requested a review of the American Recovery and Reinvestment Act, researchers found that active transportation projects created 17 jobs per $1 million of investment—more than any other type of transportation project.[255]

As this plan was under development, a bill passed the 2020 legislature establishing a State Scenic Bikeways program under the leadership of Washington State Parks (HB 2587, amending RCW 79A.05). This program aims at designating and promoting bicycle routes "of notable scenic, recreational, cultural, or historic value," somewhat similar to the Scenic Byways program for highways. This idea is closely related to transportation network planning but doesn't address the planning, design, or construction of such routes. As WSDOT works with partners to implement the Washington State Active Transportation Plan, 2020 and Beyond, the efforts will be coordinated to identify and connect routes that are both functional and scenic.

[255] Dowell, Paula, and Lisa Petraglia. 2012. Mining Recovery Act Data for Opportunities to Improve the State of Practice for Overall Economic Impact Analysis of Transportation Investments. NCHRP 08-36, Task 103.

Appendix C:
OUTREACH DETAILS

PHASE ONE OUTREACH

Distribution of information about the plan update went directly to 1,800+ agencies, nonprofits, businesses, and others interested in active transportation; the metropolitan planning organizations and regional transportation planning organizations in the state; and organizations representing cities, counties, and tribal governments.

WSDOT staff held a series of meetings and events around the state with stakeholders, city and county staff, regional planners, and the public. They distributed materials about the plan at meetings on WSDOT plans and projects and at community events. Presentations varied in length from a brief description of the planning process with an invitation to sign up for email to a longer workshop format, depending on the preferences of partnering organizations. A list of contacts and locations where this outreach took place appears below. The intent was to let people know about the active transportation plan update and start to collect input to inform the work. People were encouraged to sign up for e-mail news updates to stay informed. During that time, over 2,800 people subscribed to the WSDOT Walk and Roll Active Transportation E-News (an existing publication) and 1,750 subscribed to the ATP E-News created for the planning process.

Themes from Phase One

The following is a summary of what WSDOT heard from transportation partners between March and June 2019:

Safety and design

- Safety is a core concern everywhere.
- Safe places to cross the road are important.
- There is a need for an analysis of bicycle and pedestrian facilities on state highways: what is available and where it is stressful.
- Urban/rural differences need to be acknowledged and addressed.
- Provide technical assistance, training, standards, and guidance to local agencies.

Equity, accessibility, and user needs

- Equity and ADA accessibility are important priorities to build into process, projects, and programs.
- Consider the needs of both existing users and potential walkers and bikers.

Funding

- Include information about the cost of improvements and potential sources of funding.
- Continue to provide funding to local agencies to make improvements on city and county roads.

Complete network and trail connections

- Prioritize regional trail networks to create a "spine" of connections around the state.
- More comfortable/complete walk and bike connections support health, mode shift, multimodal trips, and economic development and safety.
- Incremental progress is still progress; identify and go for near-term improvements while also going for bigger gains.
- Balance the benefits of having complete walk or bike connections with the importance of having "perfect" facilities everywhere.

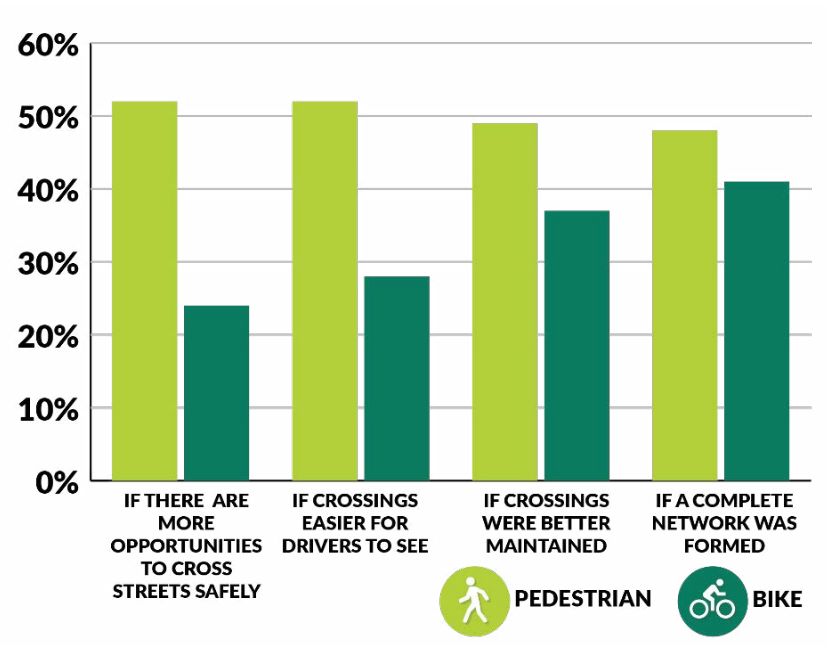

Figure C-1: Survey results regarding conditions that would encourage respondents to walk, roll or ride a bike more.

Respondents indicated they:

- Would walk more (52 percent) and bike more (24 percent) if there were more opportunities to cross streets safely
- Would walk more (52 percent) and bike more (28 percent) if crossings were made easier for drivers to see people crossing
- Would walk more (49 percent) and bike more (37 percent) if places to walk and bike were better maintained
- Would walk more (48 percent) and bike more (41 percent) if gaps in existing sidewalks, bike lanes, shared-use paths and trails were filled to form a complete network
- Agreed that children should learn the rules of the road and how to walk and bicycle safely (82 percent)

The responses about crossing safety, in particular, align with the analysis of state crash data.

Questionnaire

In March 2019, WSDOT and other active transportation partners around the state began using a "do it yourself" toolkit with posters, fact sheets, presentation slides, and other outreach materials. These materials included research-based information about core concepts of active transportation facility connectivity and quality and invited the public to provide input through an online questionnaire.


WSDOT

ACTIVE TRANSPORTATION PLAN FACT SHEET
Fall 2019

WSDOT State Active Transportation Plan Under Way

What is the Active Transportation Plan?

- The Active Transportation Plan will help guide decisions about investments and policies for increased access, safety and mobility to enable Washingtonians of all ages and dis/abilities to walk, bike and roll. It's required under state law (RCW 47.06.100).
- WSDOT is engaging the public and stakeholders across the state to provide vision, policy direction and actionable strategies for WSDOT and partner agencies.
- The Active Transportation Plan is one element in WSDOT's overall multimodal transportation plan. It supports the Highway System Plan, Strategic Highway Safety Plan (Target Zero) and plans for other modes of transportation.
- **October-November 2019:** Online open house and community conversations. **Early 2020:** The State Active Transportation Plan will be available for public comment before it's finalized.

What will the Active Transportation Plan address?

- Analyzing connections, gaps and barriers. What enables people of all ages and abilities to get from here to there safely?
- Prioritizing changes to WSDOT right-of-way and important connections on local systems to work toward complete, comfortable connections for all.
- Connecting active transportation networks to transit, ferries, rail and air
- Managing assets. What facilities does WSDOT own and how well do these serve a safe, accessible, connected network?
- Understanding funding and policy. What do we do now, what are the results, what needs to change?
- Measuring performance. How do we track and report meaningful progress?

What is Active Transportation?

Active transportation is human-scale transportation, and everyone uses it at some point in their day. It refers to getting from one place to another using walking, cycling, or rolling with motorized personal mobility devices such as skateboards, scooters and electric-assist bicycles and using mobility assistance such as a wheelchair, cane, walker, or adaptive bike/trike.

Figure C-2: Example of one of several ATP outreach tools used (figure was included for illustration purposes and not intended to be read at this size but could be made available on request).

To formulate questions WSDOT drew on research, examples from other local and state agencies, the analytical approach being applied in the plan to describe state facilities, and state traffic collision data. The purpose of the questionnaire was to get information about active transportation needs, priorities, and barriers. The agency had the questionnaire translated into simplified Chinese, Korean, Vietnamese, Russian, and Spanish. Statewide 5,694 people took the questionnaire by the end of May. While opt-in questionnaires are routinely used to gather public opinion on projects and plans, information received does not represent a random sample and responses cannot be generalized to the entire population. Questions on the survey about transportation use and barriers to active transportation nonetheless provide insights into the experiences of those who participated. Information about who participated and what they told us about their transportation habits is provided below.

Distribution of the call to action to take the questionnaire also allowed WSDOT to test who could be reached working through the outreach list of organizational partners and their communication channels. Staff tracked the demographics of questionnaire participants and how these compared to the overall state's 2019 population distribution for those questions that have that basis for comparison. This enabled targeted follow-up to invite participation from underrepresented geographic areas and demographics to try to get closer to figures that would generally reflect the state's population. Some questions asked, such as transportation usage habits, did not have a directly comparable figure available for comparison.

- 49 percent live in King, Snohomish, Pierce, Kitsap, Skagit and Whatcom Counties; 60 percent of the state population live in these counties
- 54 percent live in urban areas
- 65 percent are aged between 34 and 54; 25 percent of the state population are between the ages of 34 and 54
- 51 percent male; 49.9 percent of the state population are male
- 77 percent white; 78.8 percent of the state population are white
- 61 percent have total household income between $50,000 – $149,000

- 6 percent reported having a disability that affects use of the transportation system; 12.9 percent of the state population have a disability[256]
- 58 percent of respondents drive every day or nearly every day
- 37 percent walk every day or nearly every day and 59 percent walk at least once a week or more
- 13 percent bike every day or nearly every day and 31 percent bike at least once a week or more

These findings made it clear that the first phase of outreach techniques had reached a mix of people who drive, walk, and bike for transportation. Unfortunately, it did not reach enough of those whose voices and experiences are most often underrepresented in public processes and are essential to an equitable process (Black, Indigenous, people of color; people living in poverty; and people with disabilities). Some geographic areas were underrepresented relative to their share of the state's population. Despite the questionnaire translations, very few non-English-speaking communities responded. There were fewer opportunities to publicize the availability of the translated questionnaires than the English-language questionnaire before closing the questionnaire, which may have been a factor.

Organizations and events

- Access 4 All, Spokane
- Bellingham Climate Action Task Force
- Bellingham Green Drinks
- Bike Everywhere Breakfast, Spokane
- Bike Month kits, Community Transit, Snohomish County
- Bike to Work Day celebration, Sequim
- Cascade Bicycle Club
- Cooper Jones Bicycle Safety Advisory Council
- Federal Highway Administration, Division Office
- Lilac Century & Family Fun Ride, Spokane
- MPO/RTPO/WSDOT Coordinating Committee, Wenatchee
- North Sound Transportation Alliance, Mount Vernon
- Northwest Washington Planners Forum, Burlington
- Puget Sound Regional Council Bicycle Pedestrian Advisory Committee, Seattle
- Puget Sound Regional Council Special Needs Transportation Committee, Seattle
- Regional Transportation Council board, Vancouver
- Seattle Department of Transportation Transportation Equity Work Group
- Sequim Bicycle Alliance
- Snohomish County, Community Transit Bike Month

[256] The questionnaire wording asked specifically about having a disability that affects use of the transportation system. The statewide figure from the US Census does not include the wording about transportation use; it includes all disabilities that meet ADA definitions.

- Spokane Accessible Communities Advisory Committee
- Spokane Bicycle Advisory Board
- Spokane Bike Swap
- Spokane County Commute Trip Reduction coordinators, Downtown, Spokane Valley, West Plains
- Spokane Regional Transportation Council Active Transportation Work Group
- Spokane Summer Parkways
- State and federal agency partners: FHWA, National Park Service, U.S. Forest Service, State Department of Commerce, State Department of Health, Recreation and Conservation Office, State Parks, Transportation Improvement Board, Washington Traffic Safety Commission, Office of the Superintendent of Public Instruction, Department of Natural Resources
- Transportation Improvement Board
- Tri County Economic Development District, Colville
- Tribal Transportation Planning Organization, Airway Heights
- Walk Bike Bus Bellingham
- Washington Bike Summit
- Washington State County Engineers annual conference
- Washington State Ferries open houses: Bainbridge Island, Bremerton, Port Orchard, Vashon
- Washington State Transportation Commission
- Washington Transportation Professionals Forum, Spokane Valley
- Western Washington University undergraduate course in energy policy, Bellingham
- Whatcom Council of Governments

Phase Two Outreach

Efforts in fall/winter 2019 included a greater emphasis on public events, focused conversations in underrepresented communities with high levels of need for accessible active transportation, and an online open house. WSDOT responded to invitations to present and reached out to places and organizations that enabled connection with people whose views were underrepresented in responses to the spring questionnaire.

New insights from Phase Two

Feedback in the second round of outreach reinforced themes that came up in the first round and added specific points reflecting the experiences of participants in the focused conversations. These new points of emphasis include:

Rural issues

- State routes prohibited for walking/biking may still need walk/bike connections along or parallel to them; they often represent the only connection between population centers.
- (In applying Level of Traffic Stress) Recognize that rural high-speed state routes are stressful for everyone. Even if the majority of bicyclists who use them are more skilled/competent than the average bicyclist, they should be recognized as being stressful places to ride depending on the nature of traffic, available shoulders, and driver behavior. (This topic was discussed at the Transportation Improvement Board and the Active Transportation Safety Council. From notes taken at the TIB board discussion: Rural doesn't necessarily mean lower LTS depending on the nature of the traffic, lack of shoulder or driver behavior. From the ATSC discussion: "Rural LTS ratings are too green (e.g., SR101 on the west side of the Olympic Peninsula)", where "green" represented low LTS.

Equity and accessibility issues

- Design standards need to be updated to reflect newer equipment designs such as larger wheelchairs or adaptive bicycles/tricycles that need a bigger turning radius and/or do not fit between bollards. (Anacortes Accessible Community Advisory Committee, notes taken at the meeting: Wheelchair and equipment design have changed; we need to account for that in design standards. Bigger wheelchairs, bigger turning radius.)
- Some people who walk and bike struggle with mental health issues that make it difficult for them to follow traffic rules all of the time. (Aberdeen Coastal Community Action Program, notes taken during the discussion: Sometimes there are mental health issues and the person that might normally follow traffic rules doesn't when they are struggling with mental health concerns.)

Trail connections and bike tourism

- Prioritize complete and connected regional trail networks. (Transportation Improvement Board, notes taken at the meeting: Complete/connect regional trail networks as a priority: Can argue against (we can't afford it) and can also argue for--boon to local economies, outdoor recreation $21B business sector in WA, trails a big attractor; Blue Mountain Region Trails network cited as example.)
- Heritage connection trails that follow the historic tribal trading and travel routes represent an opportunity. (Yakama Nation citizen group, notes from the meeting: There is interest in heritage connection trails between the tribal nations that follow the old trading routes.)
- The US Bicycle Route System connections are valuable for bike tourism. (Ellensburg public open house.)

Safety and design

- Bridge crossings that have narrow (or no) sidewalks and a deep drop to the road level do not provide a connection for people who need to cross. (From the Aberdeen Coastal Community Action Program focus group: "All of the bridge crossings are bad – there are very narrow sidewalks with a 13-inch drop. Logging trucks on the bridge make the crossing even worse.")

- Bike lanes should not look like or become turn lanes at the intersections. These are points of conflict where drivers and riders need to know what to do. (Aberdeen Coastal Community Action Program: "It is not safe to bike – the pavement markings are not clear, bike lanes look like turn lanes.")
- Knowing that high speeds result in more crashes and more serious injuries or death will not cause people to drive slower. (This was based on the answer to the question asked during the community conversations in Aberdeen and with the Yakama Nation citizen group. When asked "Would knowing the information (about speeding and fatalities) cause people to drive slower?" the answer was unanimously "no".)
- Increase crossing frequency so people do not feel like they must go over the median barrier to cross the freeway between traffic signals. (Notes from the Yakama Nation citizen group: "People are crossing the freeway and going over the median barrier between traffic signals." Similar comments about needing to be able to cross the state routes were mentioned during other outreach discussions in Brewster, Aberdeen, and Shoreline, for example.)

Organizations and events

Below are the organizations and populations that received the phase two focused outreach:

- Aberdeen Coastal Community Action Program (low-income focus group conversation)
- American Planning Association Washington Chapter
- Anacortes Accessible Communities Advisory Council
- Boys and Girls Club, Brewster
- Chelan Douglas Transportation Council Regional Bike Advisory Council, Wenatchee
- Cooper Jones Active Transportation Safety Council
- Eastside Transportation Professionals Forum, King County
- Ellensburg open house, with City of Ellensburg as partner
- Feet First, Seattle
- Filipino American Association, Yakima
- Forever Green, Pierce County
- Infrastructure Assistance Coordinating Council, attended by local agencies, Wenatchee
- King County Regional Trails Coalition (Leafline Coalition)
- Mountains to Sound Greenway Trust
- Mountlake Terrace Pop-up Community Safety Event (Girl Scout STEM/safety event) (youth)
- Northwest Transportation Planners Forum
- Port of Columbia Staff
- Public Health Departments
- Puget Sound Regional Council, Regional Staff Committee
- Pullman League of Women Voters
- Regional Transportation Advisory Committee, Vancouver

- Safe Routes to School National Partnership, Vancouver chapter
- SeaShore Transportation Council, King County
- Skagit Council of Governments
- South County Area Transportation Board, King County
- Southwest Washington Regional Transportation Council
- Spokane Regional Transportation Council, Active Transportation Work Group
- State Route 28 open house, Wenatchee
- City of Spokane Sustainability Action Committee
- Tacoma Major Taylor Project students (Black, Indigenous, people of color, and low-income youth focus group conversation)
- Touchet Valley Trail, Port of Columbia Open House, Dayton
- Touchet Valley Trail, Port of Columbia Charrette, Waitsburg
- Transportation Improvement Board
- Transportation Professionals at the Washington State Innovations and Partnerships Conference
- Tri-Cities public open house, with Benton-Franklin Council of Governments, Ben Franklin Transit, and Bike Tri-Cities as partners
- Walk Bike Bus Bellingham
- Walla Walla Valley MPO
- Washington State Parks
- Washington State Trails Coalition
- Washington State Commission on Asian Pacific American Affairs
- Washington State Commission on Hispanic Affairs
- Whatcom Council of Governments
- Yakama Nation, Traffic Safety Committee and focus group, Toppenish
- Yakima Valley Council of Governments

Online open house highlights

WSDOT hosted an online open house from October 25 through December 15, 2019, and held three online information chats to go through the information included on the site and answer questions. Over 11,300 people viewed the information. The online open house included an associated questionnaire. The purpose of the second questionnaire was to get information about the level of traffic stress, as well as local and long-term active transportation facilities needs; 1,529 Washingtonians completed it. Since all responses to both questionnaires were anonymized there is no way to know how many people who responded to the first questionnaire also responded to the second questionnaire.

Summary of questionnaire results

- Nearly 56 percent of the respondents live in urban areas
- Nearly 6 percent have a disability that affects their use of the transportation system
- Nearly 90 percent identify as white
- Over 60 percent drive a motor vehicle every day or nearly every day
- The top barriers to active transportation (in order of importance):
    1. Lack of sidewalks, bike lanes, or other place to walk or bike separated from car traffic
    2. Distance (length of trip to the destination)
    3. Weather
    4. Time (the time it would take to make the trip by walking or biking)
    5. Driver behavior
- People reported that they would be more likely to walk, bike, or roll if the following were to change (in order of importance):
    1. More bike lanes, shared used paths and trails
    2. More sidewalks, shared used paths and trails
    3. Keeping places where people walk, bike or roll in good condition
- The most important changes affecting active transportation that government should focus on were (in order of priority):
    1. Reduce crashes that seriously injure or kill people walking, biking, or rolling.
    2. Provide safe places to walk, bike, and roll in low-income neighborhoods where people may not own a reliable vehicle.
    3. Make it easier for people to drive less to reduce air pollution and other environmental impacts.

Along with the questionnaire, the online open house offered interactive state-level network analysis maps. These illustrated the level of traffic stress information found in the analysis of state routes, showing which segments have more traffic, higher speed limits, and wider roads, and where separated walk/bike facilities are not available on the state right of way. WSDOT received 216 comments about the map and active transportation plan. Most people who responded (93 percent) supported development of low-stress walking and bicycling facilities on or near all state routes as a long-term goal for the plan. The input gained from community outreach and the online open house informed the active transportation plan.

Public comments on draft plan

WSDOT Active Transportation Division continued outreach to partner agencies, stakeholders, and individuals to share concepts from the plan as it was being revised. Staff publicized availability of the draft for public comment through e-mail, social media, a news release and blog posts. They pointed people to the online open houses which provided access to the draft plan, a form to submit comments and the webinars as an opportunity to learn more. There were three online open houses: One to share a draft of the level of traffic stress analysis, one for public comments on the first four chapters of the document, and a final one for public comments on the last two chapters.

The online open house for comment on the first four chapters received over 4,300 page views while it was open Dec. 21, 2020-Feb. 15, 2021. Three webinars held in January 2021 provided an overview of the document's organization and content; archive versions of the webinar recordings and a PDF of the slides formatted for accessibility were placed on the online open house. 250 people registered for the webinars, which were presented with real-time captioning for the audio portion. Staff also presented where invited, including the Council for the Blind legislative relations committee, Eastern Washington Planners Forum, Spokane Neighborhood Council Pedestrian and Traffic Committee, Palouse RTPO, Spokane Regional Transportation Council, and other meetings.

These efforts resulted in 637 comments. Most comments received—89 percent—were supportive or asked that the plan go further and do more. Only 2 percent were not supportive; this included a question as to why WSDOT plans for active transportation at all. Some implied that the plan was too long and yet 46 percent of commenters asked for more information.

The most common topics the comments covered concerned trails, safety, data limitations, equity, climate change, and health. Some comments were used to inform development of Chapters 5 and 6, in particular those having to do with WSDOT policies and practices for managing driver speeds in population centers, maintenance, safety, crossing improvements, and cooperation with local governments.

The open house on Chapters 5 and 6 received over 2,049 page views while it was open Sept. 13-Oct. 29, 2021. Three webinars held in September and October 2021 provided an overview of the performance measures, strategies, actions, and next steps; archive versions of the webinar recordings and a PDF of the slides formatted for accessibility were placed on the online open house. 129 people registered for the webinars, which were presented with real-time captioning for the audio portion. Staff also presented where invited, including the Infrastructure Assistance Coordinating Council, Leafline Trails Coalition, Trails Coalition Caucus, the WSDOT Project Development Engineers Meeting and other meetings.

These efforts resulted in 290 comments. Most comments received—85 percent—were supportive or neutral in nature. Many of the comments asked about how the plan would be implemented. Only about 7 percent were not supportive.

Appendix D:
METHODS OF ANALYSIS

INTRODUCTION

WSDOT explored several analysis techniques as part of the effort to develop the Washington State Active Transportation Plan, 2020 and Beyond. Two primary avenues of inquiry were level of traffic stress (LTS) and highway crossing analysis. Both methods utilize Geographic Information Systems (GIS) software. Both rely on objective, quantitative information that enables WSDOT to evaluate the effects of existing and proposed conditions and measure change. Of the two, LTS was more fully developed for use in estimating needs on the state system in population centers. A brief summary of these analysis tools follows:

1. Level of traffic stress: This tool considers roadway characteristics such as posted speed and number of travel lanes to rank roadway segments and intersections on their suitability for active travel.
2. Highway crossing analysis: This tool measures the amount of out-of-direction travel required for a person to complete a walking or rolling trip that involves a state highway crossing.

The two analysis techniques are synergistic and together they will provide a more robust understanding of statewide active transportation conditions and needs. Each is discussed below, followed by other elements of the overall analysis.

A component of the LTS analysis involved assessing identified gaps in the active transportation network-based criteria under the category labels safety, equity and demand. The demand category used data from a potential demand analysis discussed below in this appendix. In addition to state route LTS analysis, a second LTS analysis (supplemental analysis) was tested. Supplemental analysis addressed the interplay between state routes and two local systems. The methods and some selected results of that analysis are included below in this appendix. Finally, this appendix discusses next steps with a short summary of the scope of a new project to integrate LTS and highway crossing data into the agency's business processes and practices.

LEVEL OF TRAFFIC STRESS

The purpose of the level of traffic stress analysis was to develop a replicable methodology based on objective data that identifies active transportation network gaps on the state system. An additional goal was to associate identified gaps with data that can be used to inform planning and/or prioritize locations for improvements. The analysis followed a four-step process:

1. **LTS scor**ing: Compute an LTS score for all state roadways and intersections.
2. **Gap designation**: Designate highway segments/intersections with the highest LTS scores as gaps.
3. **Gap assessment:** Score each gap using safety, equity, and demand information about the location to aid in future decision making.
4. **Outreach:** Get input from cities, counties, and other transportation partners on the evaluation results to begin aligning results with local and regional plans.

Bicyclist and pedestrian networks were considered separately for travel along state roadways and together with respect to travel across state roadways. Two distinct datasets were produced: a baseline network housing roadway attributes and LTS values for all segments and intersections, and a gap network that stored only higher LTS segments and intersections along with gap assessment data.

Calculated LTS values depend on the specific roadway characteristics inputs chosen and LTS values can be updated/refined by including additional characteristics as new transportation system data becomes available. A more general look at characteristics associated with the LTS concept was provided in Figure 3-10 in Chapter 3. Those characteristics were based on narrative descriptions of LTS from a Mineta Transportation Institute study[257] and Oregon Department of Transportation[258] (ODOT). Those narratives are reproduced below for reference. The Mineta work focused more heavily on bicyclist concerns and the ODOT work adapted that structure to focus on pedestrians. The Figure in Chapter 3 does not include specific pedestrian or bicyclist facility types associated with the LTS levels since no one-to-one correspondence currently exists between a suite of facilities and the calculated LTS values. WSDOT staff are interested in further development of the LTS concept to align descriptive characteristics, treatment suites associated with LTS designations (and graphic representations of those suites), and how LTS is measured.

Mineta LTS Characteristics:

- **LTS 1**: Presenting little traffic stress and demanding little attention from cyclists, and attractive enough for a relaxing bike ride. Suitable for almost all cyclists, including children trained to safely cross intersections. On links, cyclists are either physically separated from traffic, or are in an exclusive bicycling zone next to a slow traffic stream with no more than one lane per direction, or are on a shared road where they interact with only occasional drivers (as opposed to a stream of traffic) with a low speed differential. Where cyclists ride alongside a parking lane, they have ample operating space outside the zone into which car doors are opened. Intersections are easy to approach and cross.
- **LTS 2**: Presenting little traffic stress and therefore suitable to most adult cyclists but demanding more attention than might be expected from children. On links, cyclists are either physically separated from traffic, or are in an exclusive bicycling zone next to a well-confined traffic stream with adequate clearance from a parking lane, or are on a shared road where they interact with only occasional drivers (as opposed to a stream of traffic) with a low speed differential. Where a bike lane lies between a through lane and a right-turn lane, it is configured to give cyclists unambiguous priority where drivers cross the bike lane and to keep operating speed in the right-turn lane comparable to bicycling speeds. Crossings are not difficult for most adults.
- **LTS 3:** More traffic stress than LTS 2, yet markedly less than the stress of integrating with multilane traffic, and therefore welcoming to many people currently riding bikes in American cities. Offers cyclists either an exclusive riding zone (lane) next to moderate-speed traffic or shared lanes on streets that are not multilane and have moderately low speed. Crossings may be longer or across higher-speed roads than allowed by LTS 2, but are still considered acceptably safe to most adults.
- **LTS 4:** A level of stress beyond LTS 3.

[257] Mekuria, Maaza C., Peter G. Furth, and Hilary Nixon. 2012. Low-Stress Bicycling and Network Connectivity. Mineta Transportation Institute Report 11-19

[258] Oregon Department of Transportation Analysis and Procedures Manual Version 2: Chapter 14, Multimodal Analysis. (2020)

ODOT Pedestrian LTS (PLTS) Characteristics:

- **PLTS 1**: Represents little to no traffic stress and requires little attention to the traffic situation. This is suitable for all users including children 10 years or younger, groups of people and people using a wheeled mobility device (WhMD). The facility is a sidewalk or shared-use path with a buffer between the pedestrian and motor vehicle facility. Pedestrians feel safe and comfortable on the pedestrian facility. Drivers are either far from the pedestrian facility and/or traveling at a low speed and volume. All users are willing to use this facility.
- **PLTS 2**: Represents little traffic stress but requires more attention to the traffic situation than young children may be capable of exerting. This would be suitable for children over 10, teens and adults. All users should be able to use the facility but some factors may limit people using WhMDs. Sidewalk condition should be good with limited areas of fair condition. Roadways may have higher speeds and/or higher volumes. Most users are willing to use this facility.
- **PLTS 3**: Represents moderate stress and is suitable for adults. An adult with no disabilities would feel uncomfortable but safe using this facility. This includes higher-speed roadways with smaller buffers. Small areas in the facility may be impassable for a person using a WhMD and/or require the user to travel on the shoulder/bike lane/street. Some users are willing to use this facility.
- **PLTS 4**: Represents high traffic stress. Only [adults with no disabilities] with limited route choices would use this facility. Traffic speeds are moderate to high with narrow or no pedestrian facilities provided. Typical locations include high-speed, multilane roadways with narrow sidewalks and buffers. This also includes facilities with no sidewalk. This could include evident trails next to roads or “cut-through” trails. Only the most confident or trip-purpose-oriented people will use this facility.

Urban vs. rural analysis methods and application to Washington state

WSDOT made an initial effort to distinguish between a ”population center” and a ”rural high-speed” analysis method. The baseline assumption was that the population center method would apply to users of all ages and abilities, and the rural high-speed method would apply to the subset of the population willing to travel along high-speed roadways between population centers. In practice, the LTS methodology appeared less well suited to informing decision making regarding high-speed routes so the analysis was restricted to the population center context (as discussed in Chapter 4). For the purposes of computing LTS, population centers were defined based on characteristics contained within the Highway Performance Monitoring System (HPMS). HPMS data classified roadways as “urban” or “rural”. A population center was inferred for locations designated as urban and also where rural segments had a posted speed of less than 45 MPH. Population center was later defined based on the boundaries of cities, towns and census designated places. Under the new definition, a number of false positives (identified through HPMS as a population center, but did not match the new definition) and a smaller number of false negatives (not identified through HPMS as a population center, but matched the new definition) were noted. False positives were removed, but false negatives are more challenging and will need to be addressed in future analysis.

In general, there was strong alignment between identified gaps (based on urban designation or posted speed) and population center boundaries. With respect to false negatives, it is useful to compare the communities of Lakeview and Almira as examples. Both communities represent false negatives with respect to the definition of a population center. The primary developed area of Lakeview is divided by State Route 28, which has a posted speed of 50 mph. There are residences and destinations on both sides of the highway and evident bicyclist activity based on Google imagery. The boundary of Almira includes a portion of State Route 2, but the segment passes through undeveloped land. So, in this instance Lakeview constitutes a true false negative and Almira turns out to be appropriately excluded. A detailed review of the highways intersecting population centers was beyond the scope of this analysis. A mechanism for amending the dataset with local data in coordination with local and regional agencies is under development.

Development of the network data for analysis

The network used for analysis was based on the 2017 HPMS roadway dataset for Washington state supplemented with existing data maintained by WSDOT. Figure D-1 outlines the data sources and relevant attributes that the analysis utilized.

Data Set Name	Source	Relevant Attributes	Purpose
HPMS 2017 Dataset	FHWA Office of Highway Policy Information	Ownership[259]	Roadway network will provide the base linework, to which all external datasets will be aggregated. This analysis will focus on roadways with an Ownership Code of 1, which equates to State Highway Agency.
HPMS 2017 Dataset	FHWA Office of Highway Policy Information	Urban_Code	Used to identify Urban and Rural Roadways. Census Code "99999" represents rural roadways; all other values will be considered Urban.
HPMS 2017 Dataset	FHWA Office of Highway Policy Information	Speed_Limit	Provides speed information for roadway segments.
HPMS 2017 Dataset	FHWA Office of Highway Policy Information	Access_Control	Used to identify limited access roadways where pedestrian use is prohibited (Access_Control = 1). These roadways did not receive a PLTS score.
WSDOT_Roadway_Data_Lane_Information	WSDOT Open Data Portal	NumLnsInc, NumLnsDec	Sum of the two relevant attributes will be utilized to determine the total number of lanes for assessment of roadway segments. This data will be aggregated to the HPMS data layer.
WSDOT_Roadway_Data_Shoulders	WSDOT Open Data Portal	ShoulderWi	Shoulders may provide space for bicyclist travel along state routes; evaluated based on width. Data will be aggregated to the HPMS base layer.

259 All codes associated with HPMS Data Attributes are pulled from the FHWA Field Manual.

Data Set Name	Source	Relevant Attributes	Purpose
WSDOT_Roadway_Data_ Special_Use_Lanes	WSDOT Open Data Portal	SUType, SULaneWidth, SULocation	Segments identified as SUType = BL (bike lane) will be merged into the HPMS base layer. For each location with an identified bike lane, the width (as defined by SULaneWidth) will also be included. In instances where bike lanes are not present in both directions, as indicated by the SULocation field, the weakest link approach will be used and bike lanes will not be included. For divided roadways, bike lane presence along that segment will be considered for the side it is located on, regardless of presence in the other direction.
Limited Access Roadways and Bicyclist Prohibitions	WSDOT, provided by staff		Areas of pedestrian prohibition were defined by this dataset to create an approximation of pedestrian access restrictions. Bicyclist prohibitions defined through the state Calendar Action process. Bicyclist prohibition data were mapped in GIS and current as of February 2019.
WSDOT_Functional_ Class_Data_for_Non-State_Highways	WSDOT Open Data Portal		This dataset will be utilized to identify intersection locations where the non-state network crosses the state network. This data reflects primarily arterial and collector roadways.

Figure D-1: Primary methodology data sources

The HPMS dataset provided the primary line segmentation for the state highway active transportation network. This data source was chosen for its high level of segmentation, allowing for a more granular assessment of attributes as they change along a corridor. As the HPMS dataset did not include all required attributes and also represents a larger number of roadways than those included in the state-owned network, the following steps were used to establish a primary analysis network:

1. **Filter HPMS dataset to represent only state-owned network links; select by Ownership Code = 1**
2. **Merge relevant attributes from existing WSDOT data, based on the table above**
3. **To develop intersection points:**
    a. Merge WSDOT Non-State Roadways data with filter HPMS dataset
    b. Extract nodes from dataset

Key considerations and assumptions

While developing the primary network, a series of assumptions were used, as follows:

- Aggregation of data followed the weakest link approach established through level of traffic stress methodology; for instance, if the value for a particular attribute changes across an HPMS-defined segment, the segment will be assigned the worst-case data. This analysis will maintain existing HPMS segmentation and will not further segment the network.
- The analysis will not consider the approach to the intersection (i.e., right turn lane or left turn lane presence).

BICYCLIST NETWORK ANALYSIS

Methodology

This data informed network analysis to assess existing conditions for bicyclist travel. The analysis was based on level of traffic stress, which assigned roadway segments a score ranging from 1 to 4. LTS 1 roadways are considered the most comfortable and often suitable for people of all ages and abilities; LTS 4 roadways are considered the least comfortable. Conditions for traveling both along and across were evaluated and scores for intersection points and segments were maintained as separate results. Roadway qualities assessed included:

- Posted speed
- Number of travel lanes
- Bike lane presence

As a starting point, the analysis was derived from methods presented in the Oregon Department of Transportation's (ODOT) Analysis Procedures Manual and supplemented by methods used by the Colorado Department of Transportation (CDOT). Both of these methods are based on a 2012 report by the Mineta Transportation Institute.[260]

The ODOT approach was selected based on its inclusion of rural roadways, incorporating presence of a shoulder. As noted, the characterization of the rural high-speed context through LTS was abandoned. Chapter 4 discusses considerations for active transportation planning for the high-speed context. Population centers were evaluated where posted speeds were less than 45 miles per hour or where roadways were defined as urban in HPMS. Figures D-2 through D-4 identify how a given roadway was classified for bicyclists.

Segments of highway closed to bicyclists were excluded from this analysis. Bicyclist prohibition data, based on the state Calendar Action process, were mapped in GIS.

In addition to evaluating the condition of bicyclist travel along a roadway, the travel across state roadways was also considered. Only the quality of the crossing as defined by the ODOT LTS methodology was evaluated. Intersection approaches on roadways crossing the state highway were not assessed. Intersection points will reflect both those points where state roads cross other state roads as well as locations where non-state roadways cross state roadways and on-and off-ramps to the state roadway system.

[260] Mekuria, Maaza C., Peter G. Furth, and Hilary Nixon. 2012. Low-Stress Bicycling and Network Connectivity. Mineta Transportation Institute Report 11-19.

In this analysis, all intersections were scored, regardless of the presence of a traffic signal. While the methodology presented in both Mineta and ODOT documentation recognizes that a traffic signal limits the effect of a high-stress crossing, signalized intersections may represent higher demand crossings for all users, therefore increasing the potential for conflict. Given this potential, and that many signalized intersections may benefit from infrastructure improvements, they were not excluded from assessment and prioritization. Both bicyclist and pedestrian LTS scores were based on posted speed and number of travel lanes.

Identification of corridors/crossings

Segments and crossings that should be considered for improvement were those ranking as an LTS 3 or LTS 4.

Pedestrian network analysis

A comprehensive dataset reflecting pedestrian facilities and accommodations does not exist at the statewide level. For this reason, the assessment was based on factors similar to those presented in the bicyclist assessment. Roadway qualities assessed included:

- Roadway Posted Speed
- Number of travel lanes

Methodology

The methodology followed the methods for bicyclist mixed traffic conditions in populations centers. The rural high-speed context, once again, was not evaluated for LTS. LTS scoring tables were consistent with those defined for the bicyclist network, with pedestrian tables (Figures D-5 and D-6) being identical to bicyclist tables (Figures D-2 and D-4). Note that bicyclist table (Figure D-3) does not have a pedestrian counterpart in that it accounts for the presence of bike lanes. A table corresponding to the bicyclist table 2 would have accounted for sidewalk presence, but sidewalk data was not available.

Identification of pedestrian corridors/crossings

Segments and crossings that should be considered for improvement were those ranking as an LTS 3 or LTS 4. Opportunities for upgraded facilities were identified based on where LTS 3 or LTS 4 roadways are coincident with existing designated on-street facilities, including bicycle lanes or shoulders.

NETWORK LTS SCORING TABLES

Bicyclist network scoring tables

Speed Limit	1 lane	2 lanes	>2 Lanes
≤20 mph	1	3	4
25 mph	2	3	4
30 mph	3	4	4
≥35 mph	4	4	4

Figure D-2: Bicyclist level of traffic stress corridor scoring table. Population centers: Urban roadways and rural roadways with posted speed less than 45 mph. The urban mixed. use table presented in Oregon Department of Transportation's Analysis Procedures Manual (APM) was modified to include 20 mph threshold for roadways. This threshold was utilized to account for roadways with unmarked centerlines, as centerline data is not available. The speed limit threshold of 20 mph is intended to identify low-speed roadways that are consistent with LTS 1 conditions; plan consultants set this in consultation with WSDOT, based on recommendations in the 2018 report on pedestrian crossing safety countermeasures and other research and guidance

	Through Lanes Per Direction				
	1 Lane			≥ 2 Lanes	
	Bicycle Lane Width (in feet)				
Speed Limit	≥7	5 – 7	≤ 5	≥ 7	< 7
<=25mph	1	1	2	1	3
30 mph	2	2	2	2	3
35 mph	2	3	3	2	3
≥ 40 mph	3	4	4	3	4

Figure D-3: Bicyclist level of traffic stress corridor scoring table with bicycle lane width consideration. Urban roadways with a bicycle lane present. Bicycle lanes provide a dedicated throughway for bicyclist travel on a roadway. This table reflects modifications utilized by the Colorado Department of Transportation, as the scoring and thresholds are more consistent with data available from WSDOT. Note that the speed limit categories stop at speeds 5 mph higher than those shown in other tables.

	Total Lanes Crossed (in Both Directions)		
Speed Limit (mph)	≤3	4-5	≥6
≤20	1	2	4
25	2	2	4
30	2	3	4
35	3	4	4
≥40	4	4	4

Figure D-4: Intersections bicyclist level of traffic stress scoring table. This table is the same as the pedestrian intersection table and reflects the methodology established in ODOT, utilizing the table marked for Unsignalized Intersection Crossing without a Median Refuge. The scores listed here, while generally higher than ODOT's, are consistent with WSDOT policy.

Pedestrian network LTS scoring tables

Speed Limit	1 lane	2 lanes	>2 Lanes
≤20 mph	1	3	4
25 mph	2	3	4
30 mph	3	4	4
≥35 mph	4	4	4

Figure D-5: Pedestrian level of traffic stress corridor scoring table. Urban roadways and rural roadways less than 45 mph. The urban mixed. use table presented in Oregon Department of Transportation's (ODOT) Analysis Procedures Manual was modified to include the 20 mph threshold for roadways. This threshold was utilized to account for roadways with unmarked centerlines, as centerline data is not available. The speed limit threshold of 20 mph is intended to identify low-speed roadways that are consistent with LTS 1 conditions; this was determined in consultation with WSDOT as noted under Figure D-2.

Pedestrian intersection LTS scoring table

	Total Lanes Crossed (in Both Directions)		
Speed Limit (mph)	≤3	4-5	≥6
≤20	1	2	4
25	2	2	4
30	2	3	4
35	3	4	4
≥40	4	4	4

Figure D-6: Intersection pedestrian level of traffic stress scoring table. This table is the same as the bicyclist intersection table and reflects the methodology established in ODOT, utilizing the table marked for Unsignalized Intersection Crossing without a Median Refuge. The scores listed here, while generally higher than ODOT's, are consistent with WSDOT policy.

Gap designation

Active transportation gaps were defined where segments and intersections on the baseline state highway network in population centers were identified as LTS 3 or 4. Essentially, this means that that the location exhibits higher speeds, more lanes, or a combination of the two. The presence of a bike lane served to mitigate an LTS 3 segment in some instances; however, these locations would still have rated as LTS 3 for pedestrians. Chapter 4 discusses how sidewalk presence was estimated to create an adjustment factor for the overall lane miles of pedestrian gap on the system.

HPMS data exhibits fine-grained segmentation; however. the project team was interested in identifying gaps more consistent with a "project length". Intersection gaps are point features, but segment gaps could be of various lengths in HPMS. A maximum gap length of 3 miles was chosen, representing a typical bikeshed distance on the network.[261]

261 A bikeshed is the land area within a defined biking range of a specified location, representing a distance that is relatively bikeable. Based on transportation planning standards a distance of three miles is used throughout the plan for the bikeshed.

Gap assessment

The table in Figure D-7 lists the data and data summary criteria that were associated with the identified bicyclist and pedestrian gaps; additional discussion follows the table. The various criteria were grouped under three categories: safety, equity, and demand. For the purposes of this assessment, connectivity to destinations, trails, and intermodal connections was viewed as a subcategory of safety. Essentially, these locations provide a high value for the user so conflict reduction infrastructure in those gaps may extend safety gains beyond the gap itself.

The data was captured as scores to aid in potential future prioritization efforts. Higher scores represent greater need or opportunity for improvement, paralleling LTS scoring where a higher number represents greater need. For example, a high safety score indicates the gap is associated with a higher number of more serious crashes, so improvements are likely to have a greater effect. For trail proximity, a higher score means the gap is closer to a trail. Improving a trail gap means a net gain of safety for an extended trip that includes both the gap and the trail. The method for each criterion ensures that all individual criteria will have a maximum score of 10. As a result, a total prioritization score can be calculated by summing all of the criteria at approximately equal weights.

CRITERION	DESCRIPTION	NUMERICAL CATEGORIES	CONDITION/METHOD	SCORE
SAFETY (CRASH HISTORY)	Number of crashes within 100 feet of defined gap. Source: WSDOT bicyclist and pedestrian involved collisions 2013–2018	10 bins assigned by ArcMap Natural Breaks (gaps normalized by length)	Points are assigned based on crash type. 5 points – fatality, serious injury 3 points – minor injury or suspected injury 1 point – no injury or unknown injury status Scores are normalized to gap length and then indexed to 0–10 using natural breaks	0–10
SAFETY (SYSTEMIC)	Score determined by locating majority of gap within areas where level of traffic stress (LTS) is ranked 3 or 4. Source: Network analysis	2 numerical rankings of LTS correspond to 100% of points (LTS 4) or 50% of points (LTS 3)	Majority of gap is located within LTS 4	10
			Majority of gap is located within LTS 3	5

CRITERION	DESCRIPTION	NUMERICAL CATEGORIES	CONDITION/METHOD	SCORE
SAFETY (DESTINATION CONNECTIVITY)	Score determined by the presence of a gap within biking (3 miles) or walking (1 mile) distance of a destination. Source: HERE Network. Note: Destinations falling within the multimodal category are not counted here as they are considered independently under intermodal connectivity,	10 bins assigned by ArcMap Natural Breaks of gap scores per 100 feet (gaps without intermodal facilities were scored zero)	A gap is assigned points for proximity to each facility as shown: Bank: 1 Education: 5 Entertainment: 1 Restaurant: 1 Grocery: 3 Health: 5 Public services: 5 Recreation: 1 Shopping: 1	0–10
SAFETY (INTERMODAL CONNECTIVITY)	Score determined by the types of intermodal facilities within 1-mile (airport, bus station, ferry terminal, train station) or ½ mile (local bus stop) distance of each gap. Source: 2017 GTFS Local Bus, WSDOT Intermodal Hubs	10 bins assigned by ArcMap Natural Breaks of gap scores per 100 feet (gaps without intermodal facilities were scored zero)	A gap is assigned points for proximity to each transit facility as shown: Airport: 5 Bus station or transit center: 5 Ferry Terminal: 5 Train station: 5 Local bus stop: 1	0–10
SAFETY (TRAIL CONNECTIVITY)	Score determined by whether or not the gap would connect to a trail *and* could fulfill a transportation function if filled. Source: Network analysis.	Binary (yes/no)	Yes	10
			No	0
EQUITY (LOW INCOME)	Score determined by locating gap within decile ranking of census tracts associated with people experiencing poverty.	Equal deciles (majority gap location)	Majority of gap is located within a census tract that is ranked between 1-10	1–10
EQUITY (BLACK, INDIGENOUS, PEOPLE OF COLOR)	Score determined by locating gap within decile ranking of census tracts associated with Black, Indigenous, people of color (BIPOC)	Equal deciles (majority gap location)	Majority of gap is located within a census tract that is ranked between 1 –10	1–10

CRITERION	DESCRIPTION	NUMERICAL CATEGORIES	CONDITION/METHOD	SCORE
EQUITY (DISABILITY)	Score determined by locating gap within decile ranking of census tracts associated with people with a disability.	Equal deciles (majority gap location)	Majority of gap is located within a census tract that is ranked between 1 –10	1–10
DEMAND* (POTENTIAL DEMAND)	Scores determined by normalizing gap-specific demand score with overall average demand score of the Urban or Rural Composite Demand Analysis.	10 bins (urban) or 5 bins (rural) assigned by ArcMap Natural Breaks for urban or rural demand (gaps normalized by overall average score)	Score from demand analysis	0–10

Figure D-7: Gap assessment criteria. *Data for demand criteria were based on a demand analysis discussed in greater detail below in this appendix.

Criteria scoring procedures

Safety: Crash history 2013–2018

Step 1: Sum crashes that are within 100 feet of the defined gap where the following crash outcomes have the following scores:

- Fatality or severe injury: 5 points
- Minor injury: 3 points
- No injury: 1 point
- No crashes: 0 points
- Example: A project with 2 fatality crashes and 1 no injury crash will receive 11 points initially

Step 2: Sort all recommended projects' crash scores per 100 feet into 5 bins (scores 1-5). All projects that did not experience a crash automatically get a "Safety" score of 0. Any projects that experience 1 or more crashes get a "Safety" score ranging from 1 –10 based on ArcMap Natural Breaks.

Safety: Systematic safety—crash types 2013–2018 and LTS

Level of traffic stress is used both as a means to identify gaps and as a criterion to assess a gap. LTS considers roadway characteristics that are commonly found at locations where pedestrian and bicyclist fatal and serious injury crashes have occurred in Washington state. Therefore, inclusion of LTS as a criterion is consistent with using a systemic safety approach.

Step 1: Calculate the assessment of existing facility quality based on the following:

- Majority of the gap is an LTS 3: 5 points
- Majority of the gap is an LTS 4: 10 points

Step 2: All gaps are assigned a score of 5 or 10 based on the criteria described in step 1.

Equity: Access for low-income people

Step 1: Calculate the low-income population score per census tract using methods developed for assessment of the performance metrics:

- Low-income populations are decile ranked from lowest to highest into ten equally large subgroupings of data. Areas of concentrated poverty are defined as ranked deciles eight through ten. Data source: Table S1701, American Community Survey (ACS) 5-Year (2013-2017) Estimates, U.S. Census Bureau, Census tract, collected 2017.

Step 2: All gaps are assigned a score of 1–10 based on the subgrouping score for the majority of the gap length. For example, if 2.5 miles of a 3-mile gap has subgrouping score of 6, the gap is assigned a score of 6.

Equity: Access for Black, Indigenous, people of color

Step 1: Calculate the BIPOC score per census tract using methods developed for assessment of the performance metrics:

- Black, Indigenous, people of color populations are decile ranked from lowest to highest into ten equally large sub groupings of data. Areas with concentrated BIPOC populations are defined as ranked deciles eight through ten. Data source: Washington State Office of Financial Management (OFM), Washington Tracking Network, Washington State Department of Health, Census tract, collected 2017.

Step 2: All gaps are assigned a score of 1–10 based on the subgrouping score for where the majority of the gap is located. For example, if 2.5 miles of a 3-mile gap has a subgrouping score of 6, the gap is assigned a score of 6.

Equity: Access for people with a disability

Step 1: Calculate the disability population score per census tract using methods developed for assessment of the performance metrics:

- Disability populations are decile ranked from lowest to highest into ten equally large sub groupings of data. Areas of concentrated poverty are defined as ranked deciles eight through ten. Data source: Table S810, American Community Survey (ACS) 5-Year (2013-2017) Estimates, U.S. Census Bureau, Census tract, collected 2017.

Step 2: All gaps are assigned a score of 1–10 based on the subgrouping score for where the majority of the gap is located. For example, if 2.5 miles of a 3-mile gap has a subgrouping score of 6, the gap is assigned a score of 6.

Safety: Destination connectivity—access to destinations (not including intermodal connections)

Step 1: Assign a binary yes/no score when any portion of a gap is within 1 mile (pedestrian) or 3 miles (bike) of the following destination types as classified by the HERE network. Point assignments by destination type:

- Bank: 1 point
- Education: 5 points
- Entertainment: 1 point
- Food and drink: 1 point
- Health care: 5 points
- Public services: 5 points
- Recreation: 1 point
- Shopping: 1 point
- Example: A gap with a ferry terminal, train station and 6 local bus stops will receive 16 points (only GTFS transit stops considered)

Safety: Trail proximity—gap partially closed by existing trail

Step 1: Determine whether the gap is within 400 feet of a trail that follows the alignment of the gap and could viably serve as a transportation function if trail gaps are closed.

- A binary yes/no for this criterion was assigned during development of gap segments.

Step 2: All gaps with a yes are assigned 10 points.

Safety: Intermodal connectivity—connection to other transportation modes

Step 1: Sum intermodal connections that are within 1 mile (airport, bus station, ferry terminal, or train station) or 1/2 mile (local bus stop) where the intermodal facilities have the following scores:

- Airport: 5 points
- Bus station: 5 points
- Ferry terminal: 5 points
- Train station: 5 points
- Local bus stop: 1 point
- Example: A gap with a ferry terminal, train station and 6 local bus stops will receive 16 points

Step 2: Sort all recommended gap intermodal scores per 100 feet into 10 bins (scores 1-10). All projects that do not have an intermodal facility in proximity automatically get a score of 0. Any projects in proximity to one or more intermodal facilities get a score ranging from 1–10 based on ArcMap Natural Breaks.

Demand: Potential walking/cycling activity in gap proximity

Step 1: Calculate average demand score based on Composite Demand Analysis.

- A normalized demand score is calculated for each gap. Urban and rural demand are each binned into ten urban or five rural categories based on natural breaks.

Step 2: All gaps are assigned the normalized score of 0–10.

Outreach

The level of traffic stress analysis was conducted using available data in a format that could readily be processed using GIS. The process identified segment and intersection gaps throughout the state. The project team recognized that some of these gaps might be in the process of being closed (future planned improvement), or they have been addressed using intersecting and adjacent local facilities. Therefore, an effort was made to collect local agency planning data that involved state routes. The intent was to use this data to eliminate some gaps that had been identified based on WSDOT data. Unfortunately, no mechanism that could be readily applied statewide was available to address local information regarding gaps. In addition, most local agencies had not looked at state routes as part of a local process to address active transportation networks. As of the publication date of this plan, the effort to develop a system to identify if a given gap has been closed through connections off the state system or is being addressed is ongoing.

HIGHWAY CROSSING ANALYSIS

Background and analysis method

This appendix item excerpts and summarizes a number of items that were included in a currently unpublished WSDOT report to FHWA, last edited July 20, 2020: Washington State Multimodal Permeability Pilot. When the report has been made final it will be available on the WSDOT website and will be linked in the archive version of this document as a reference.

A highway crossing analysis, also referred to as the Multimodal Permeability Pilot (MPP), was piloted in Washington state during 2019 and 2020. The MPP was undertaken concurrent with the level of traffic stress analysis. Although MPP uses a distinct methodology from LTS, the two analysis methods are complementary and provide a variety of tools to explore how the state roadway network aligns with bicyclist and pedestrian needs. The MPP was based on the Federal Highway Administration's 2018 Guidebook for Measuring Multimodal Connectivity (Guidebook).

Ease of use of a transportation system is especially important for pedestrians and bicyclists versus those made in vehicles or on public transit. Pedestrian and bicyclist trips are generally shorter than trips by other modes, consistent with the greater physical effort and exposure to environmental conditions that such trips entail. A state route system, which typically sees higher speeds, traffic volumes, and pavement widths than local streets, can sometimes act as a significant barrier to trip directness and connectivity for pedestrians and bicyclists.

The MPP developed a tool to assess the permeability of major roadways within the State of Washington. A major roadway with high travel speeds or traffic volumes can act as a relatively impermeable barrier for people who walk and bike. More intersections or other crossing facilities (such as bridges and tunnels) and more local roadway connections to those intersections increases permeability of major roadways. Permeability and LTS work together to determine network accessibility and completeness.

Assessing permeability of major roadways can help identify and prioritize areas in need of new or improved crossings for pedestrians and bicyclists. Higher densities of destinations (employment, schools, services, etc.) or the presence of key destinations such as multimodal hubs (airports, transit stations, ferry terminals, etc.) create increased need for crossing opportunities. Even where levels of walking and biking activity are relatively low, the presence of destinations is generally associated with latent demand for active transportation. Additionally, those without access to a motor vehicle or transit need equitable transportation options. People with disabilities, in particular, may be more disadvantaged by low highway permeability if they must go out of their way to reach a crossing.

Major roadways typically provide direct and efficient routes of travel for multiple travel modes; however, crossing major roadways can be challenging for pedestrians, bicyclists, and other vulnerable users. Some users will travel out of their way to cross at designated crossings, or crossings they perceive as less stressful, but there is a limit as to how far a pedestrian or bicyclist will travel out of their way to reach their intended destination. For example, bicyclists will travel an average of 10 to 25 percent farther on a given trip to utilize safe routes and crossings.[262] Pedestrians are also willing to go out of their way to reach more comfortable crossing facilities. One study found that "to avoid an additional unsignalized arterial crossing, a pedestrian

[262] Mineta Transportation Institute. 2012. Low Stress Bicycling and Network Connectivity.

would be willing to go over 70 meters (230 feet) farther via an alternate path".[263] In general, however, pedestrians appear to have a lower tolerance for out-of-direction travel when compared to bicyclists.[264] This tolerance decreases when a pedestrian is travelling with another person.[265] Travel routes that require pedestrians and bicyclists to go far out of their way likely will not be made at all, potentially resulting in lost local business revenue due to reduced trip making, or, for those without access to a vehicle, the inability to access basic amenities such as groceries or healthcare.

Out of direction travel can be quantified as a Route Directness Index (RDI), with high RDIs being less desirable than low ones—essentially a high RDI indicates a long detour. RDI is a way of comparing the out-of-direction travel for different routes rather than just comparing the travel distances of those routes. Clearly, the physical distance for any given walking or bicycling trip is important to consider, and longer distance trips between destinations may not be reasonable for all travelers. RDI tells a different story, however. A high RDI (more out-of-direction travel) means the available routes are not working well for active travelers. If a travel distance is long for a given trip but the RDI is low (indicating the crossings are relatively direct), there is not much that can be done to serve the travel need other than to provide other travel options such as transit. But, when the RDI is high, there may be ways to reduce travel distances between destinations. Even with a relatively short trip, a high RDI may affect the perceived utility of that trip and indicate the need for more direct connections between destinations.

In order to explore application of the RDI to the state highway system, it is necessary to consider both actual trip distances and a user's willingness to and likelihood of deviating from a direct travel path. According to the National Household Travel Survey (NHTS), the majority of walking trips made for any purpose are less than one mile while bicycling trips are less than three miles.[266] These facts and Broach's 2016 study suggest that a bicyclist is unlikely to add more than .75 miles (25 percent) to a three-mile trip and a pedestrian is unlikely to add more than 230 feet (4 percent) to a one-mile trip.[267] If a longer detour is required, active travel trips may be avoided unless those trips are essential (e.g., travel to a job or to health care appointments).

RDI is a ratio that compares the straight-line (as the crow flies) distance between two points to the actual distance imposed by the roadway network. Figure D-8 illustrates the RDI concept. The lowest RDI is 1, meaning a trip between the two reference points can be made directly along an existing roadway. The methodology used by WSDOT analyzed hypothetical trips where the start and end points were about a quarter mile apart relative to a straight line. In such a situation, an RDI of 2 would mean the trip is twice the distance it might otherwise be, or about one-half mile. Although one-half mile is not particularly far, the RDI is independent of the actual distance. Similar to congestion measurement for drivers, RDI measures the real and/or perceived burden/travel cost incurred by a person walking or bicycling. For study purposes, an RDI of 2 was selected as the threshold where that travel cost makes it increasingly unlikely that an active travel trip would be completed. The "design vehicle" when selecting that threshold was a walking pedestrian. An RDI of 2 is likely too large given the results of the Broach 2016 study cited above. Selecting an RDI of 2 was an attempt to balance observed travel behavior and the realities of existing crossing opportunities along the state highway system. In addition, an RDI of 2, as measured in this analysis with reference points a quarter-mile away from a given state highway, corresponds to the one-half mile transit catchment area transit planners assume a pedestrian will be willing to walk to catch a bus. An RDI of 2 would double that distance, making transit trips increasingly less attractive. Note that an RDI of 2 does not reflect WSDOT policy at this point; it is a study threshold based on a set of assumptions about the utility and appeal of active travel trips.

263 Broach, J.P. 2016. Travel Mode Choice Framework Incorporating Realistic Bike and Walk Routes. Portland State University. Note that disability was not a factor analyzed in the Broach study.

264 Broach, J.P. 2016. Travel Mode Choice Framework Incorporating Realistic Bike and Walk Routes. Portland State University.

265 Broach, J.P. 2016. Travel Mode Choice Framework Incorporating Realistic Bike and Walk Routes. Portland State University.

266 Federal Highway Administration. 2017. National Household Travel Survey (NHTS). Retrieved from: https://nhts.ornl.gov/

267 Broach, J.P. 2016. Travel Mode Choice Framework Incorporating Realistic Bike and Walk Routes. Portland State University.

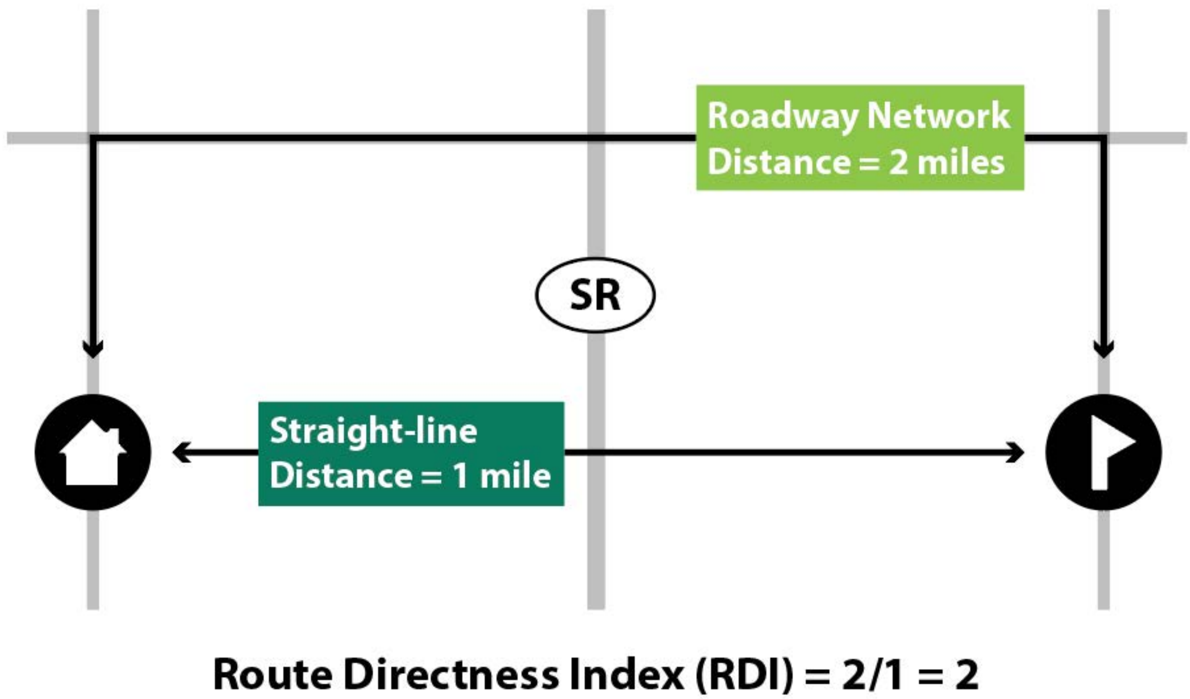

Figure D-8: Route directness index. An origin and destination point are separated by a straight-line distance of one mile. A hypothetical roadway network connects the origin and destination, but not in a straight line. The resulting ratio of roadway network distance to straight-line distance is 2:1, resulting in an RDI of 2.

Route directness index applications in planning

The RDI is a flexible tool that can be used at both the corridor level and network level to describe quality of service. RDI can be communicated in a number of ways including maps, tables, charts, and text. When used at the corridor level RDI allows planners to explore the effects of adding a new crossing (e.g., to calculate the number of new users who have access to a given destination based on reduced out-of-direction travel), or map the change in travel time created by closure of a bicyclist or pedestrian crossing (that is, loss of service created by changes to the roadway network). At the network level, the RDI can be used as a level of service measure calculated by computing an average RDI score based on a set of regularly spaced origins and destinations. Example level of service measures might include:

- Average spacing between bicyclist and pedestrian crossing opportunities
- Average out-of-direction travel required at existing crossing locations
- Percentage of crossing opportunities that provide a relatively direct crossing opportunity

The RDI measure can be further analyzed in conjunction with data regarding proximity to destinations and level of traffic stress. In terms of benefits and drawbacks, the measure is straightforward to understand and calculate but it can require substantial technical knowledge to automate calculations across a larger area and interpretation of results can become complicated as the scale of the analysis increases.

The MPP developed a tool to calculate the directness of travel routes from one side of major state roadways to the other, ultimately assessing the permeability of state routes throughout Washington as illustrated in Figure D-8. The methodology utilizes ArcGIS tools, including the Network Analyst extension, to:

- place points (centroids) at equal intervals along the state route system,
- create offset points on either side of the state route at each centroid interval,
- identify available routes where travel could occur from one offset point to the other.

Statewide network

The statewide data analysis network was built on several primary data sources:

- **OpenStreetMap (OSM).** Given the feasibility issues with constructing a statewide network from local data sources, OSM data was selected for the base transportation network. OSM is a continuously updated source of geospatial data that includes transportation networks, in addition to other map features. The network dataset was created by accessing OSM data using the Python package OSMnx to generate a routable transportation network. Use of OSM data was consistent with an application by CalTrans Highway District 4 (described in FHWA's Guidebook). CalTrans identified OSM as a viable source of routable network data for a large geographic area.
- **Level of traffic stress quality ranking of WSDOT transportation infrastructure.** An LTS analysis of WSDOT-owned roadways was completed as part of the ATP planning process as discussed above in this appendix). LTS provides a quantitative assessment by scoring locations based on roadway characteristics such as posted speed, number of lanes, traffic volumes, etc. that indicate a roadway is more or less suited to active travel. The GIS analysis of LTS produced a ranking of 1 to 4. In general, LTS 1 facilities are considered suitable for all ages and abilities. LTS 2 crossings would be acceptable to most people who walk and bike. The ATP planning process defined LTS 3 and 4 to be gaps in the active transportation network. High LTS and RDI scores both have the potential to reduce active travel. This idea is illustrated in Figure D-9.
- **WSDOT Transportation Network Data**. WSDOT network data was used to identify roadways to be tested for network permeability. The study was also informed by WSDOT data that identified roadways where bicyclists are prohibited and pedestrians are likely prohibited.

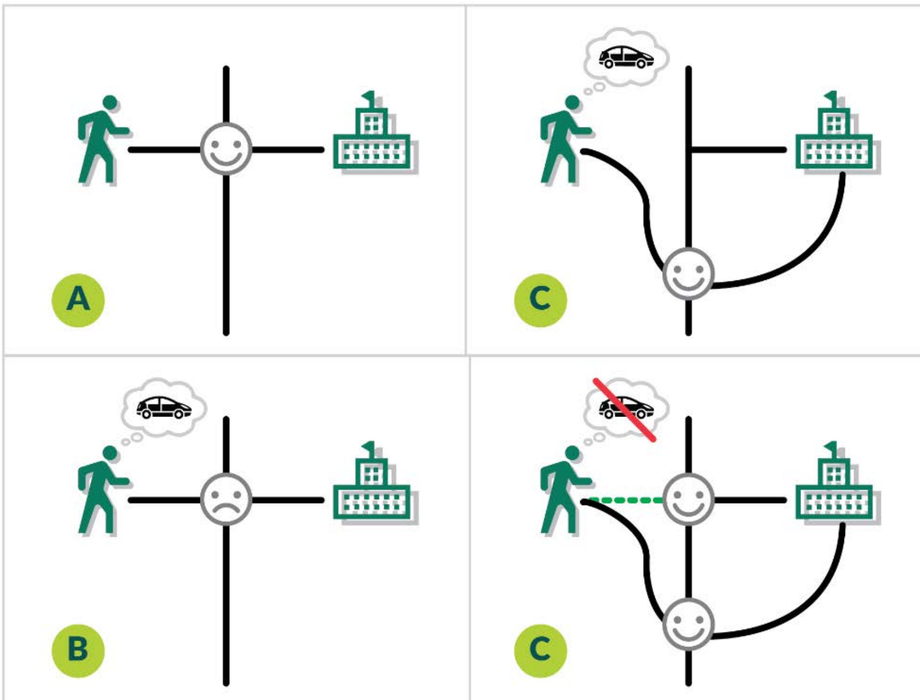

Figure D-9: Level of traffic stress and Route Directness Index effects on travel choice. This set of illustrations considers both how direct a pedestrian's trip is to their destination (straight versus winding path) as well as how stressful a crossing is on their route (symbolized by a smiling or frowning face). Illustration A offers the best scenario as it shows a direct route for the person walking between where they are and their destination, and a smiley face indicates that the crossing is low stress. Illustration B also offers a direct route, but the crossing is high stress. In C the route requires out-of-direction travel. In D, a local system link has been constructed to an existing low-stress crossing. Scenarios B and C depict the pedestrian considering whether to drive instead. Assuming driving is an option, the person would be more likely to use a car when both distances and LTS are greater.

A Washington State OSM transportation network dataset was downloaded using OSMnx. To increase processing efficiency, the analysis network was reduced to a one-mile buffer around the state highway system using the GIS clipping function. LTS scores, calculated for the state highway system, were also transferred to the analysis network.

The tool produces the following three files, which represent the analysis results:

- **Network distance**: The network distance represents the resulting travel routes between each offset point (see offset point illustration in Figure D-10). These are the routes a person would take from their start location to their destination using available roadways and using a state highway crossing.
- **Straight-line distance**: The straight-line distances represent straight lines between corresponding offset points.
- **Route directness index (RDI)**: The RDI values, calculated as the ratio of the shortest path route to the straight-line distance between two points. These values are saved to evenly spaced centroids (the midpoints of each 250-foot segment) along the state route network.

The **network distance** and **straight-line distance** work together to calculate the RDI values as illustrated below:

(Shortest Path Route)/(Straight line Distance)=Route Directness Index (RDI)

The resulting value identifies how far out of their way a person would need to walk or bike in order to reach their destination.

Route directness analysis process

The analysis process is described below and a more detailed explanation of these methods is provided in the methods section that follows.[268]

Step 1: Prepare the network dataset that will work for this tool such that roadway and trail connections are accurate, no broken links exist, prohibited roadways are removed, etc.

Step 2: Prepare a data file that includes the roadways to be analyzed and split these roadways into segments of a specified length.

Step 3. Create two offset points (origin and destination points for active transportation trips across the highway) that are offset an equal distance from their associated highway segment.

Step 4: Use GIS to calculate the **straight-line distance** and **network distance** (required travel route along the available roads used to complete the trip) between the two points. This step may also include ways to restrict travel based on certain roadway characteristics (e.g., restrict travel along high-stress roadways).

Step 5: Calculate the route directness index (RDI) from the route barrier layer. The barrier layer is that set of highways that must be crossed to reach a destination. RDI is calculated by dividing the **network-distance** by the **straight-line distance**, with higher RDIs indicating more out of the way travel in order to reach a destination. Once RDIs are computed, the GIS join tool is used to link the data to the roadway network for display and exploration.

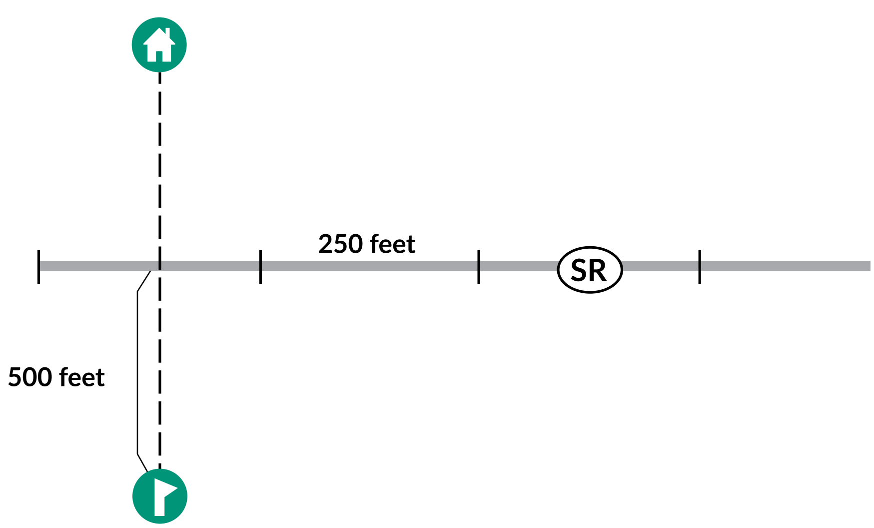

Figure D-10: Example of RDI offset points. In this example, a theoretical trip origin and destination are placed every 250 feet along the barrier roadway. An RDI value is calculated when viable origin and destination points are found.

268 A toolbox and accompanying documentation were also created using ESRI ModelBuilder to facilitate future RDI analysis by WSDOT.

Detailed RDI calculation methods

1. Determine analysis software.
2. Define barriers. All state-owned roadways are identified as potential barriers.
3. Obtain data. Data for this study was obtained from the Walla Walla Valley MPO, Open Street Map and WSDOT.
4. Calculate level of traffic stress. LTS was calculated as part of the development of the 2020 Washington State Active Transportation Plan, 2020 and Beyond.
5. Build Analysis Network. The analysis network will be constructed using the ArcGIS Network Analyst extension.
6. Develop Barriers. Barriers were broken into 250-foot-long segments, which will provide an analysis of cross-barrier connectivity at intervals of 250 feet along each barrier. For a finer-resolution analysis, barriers could be broken into shorter segments, or for a coarser analysis, longer segments.
7. Compute following steps for each segment.
    a. Define “offset points” to either side of the segment. Points will be drawn 500 feet perpendicular to either side of the segment midpoint. These points represent theoretical start and end points of a short trip with the sole purpose of crossing the highway.
    b. Connect offset points to the routable network.
        i. Offset points will be connected to the routable network at the closest available point along the network.
        ii. If no network access point is available within 500 feet of an offset point, routing between the access points will be considered unviable.
    c. Found shortest path along network.
        i. Dijkstra's algorithm will be used to find the shortest path between the network access points.
        ii. The routing algorithm will account for roadway weights so that priority will be given to more comfortable cycling or walking routes.
    d. Calculate “directness” ratio between network path length to straight-line distance.
        i. Network path length is the overall length of the shortest path calculated in the previous step.
        ii. Straight-line distance is calculated between the two network access points.
    e. The ratio between network path length and straight-line distance summarizes the directness of connectivity between the two sides of the barrier. The ratio can be interpreted as the “distance out of their way” that cyclists or pedestrians would need to travel to cross the barrier.
        i. Low ratio: Greater connectivity; direct crossing
        ii. High ratio: Less connectivity; indirect crossing

Route directness analysis considerations

The following parameters were tested and refined during development of the analysis process.

Pedestrian emphasis

While the MPP considers both the needs of bicyclists and pedestrians, research shows that bicyclists have a greater tolerance for out-of-direction travel, while the distance deviation tolerated by pedestrians appears to be relatively small.[269] One stated goal of the MPP was to develop metrics for use with the active transportation plan. Pedestrians were selected as they are more sensitive to out-of-direction travel and focusing on a single set of metrics for this user group covers both transportation modes. The analysis can be made more mode-specific by changing RDI thresholds, average distance between crossing opportunities, etc. Assessment of LTS quality-rated networks can also be included, but LTS data was only available for state highways. It was decided that that LTS of state route intersections could be used to consider a component of network quality during the data overlay analysis. Although this is a limitation, often the intersection LTS reflects the corresponding roadway LTS.

Analysis segment length

During sensitivity testing, segment lengths of 250, 500, 750 and 1,000 feet were explored. Longer segments resulted in faster data processing but lower accuracy in terms of finding the available intersections. Crossing opportunities were missed in population center areas with shorter blocks. A length of 250 feet was selected for statewide analysis, with the understanding that even at that scale a small number of existing crossings might be missed.

Offset point distance and snapping distance

During sensitivity testing, multiple offset point distances were considered including 250, 500, 700 feet and 1,000 feet. These distances were tested to ensure that start/end points were not incorrectly associated with the roadway network. A given offset point is rarely directly touching the local network, so a hypothetical pedestrian must "snap to" the nearest local roadway to begin a trip. If an offset point was too far away from the local network that hypothetical pedestrian would not "find" a route that would let them complete a trip. By contrast, if an offset point were too close to the state route, the hypothetical pedestrian would use the state route to complete a trip rather than the available local network. An offset distance of 500 feet was selected as the distance that minimized both potential issues.

A variety of metrics were calculated using the results produced by the tool. The following exploratory metrics were calculated:

- **Average RDI**: Defined as the average RDI for a corridor or given area.
- **Average distance between crossing opportunities where RDI is less than two (direct crossings):** This metric calculates the average distance between crossing opportunities where the RDI values are less than two. This value was selected because it is unlikely that trips where RDI is significantly greater will be completed by most active transportation users unless the trip is relatively short or they have no other option. An RDI value of two means that a pedestrian or bicyclist would have to travel 100 percent farther than the straight-line distance between their start and endpoints. Therefore, if the straight-line

269 Broach, J.P. 2016. Travel Mode Choice Framework Incorporating Realistic Bike and Walk Routes. Portland State University..

distance is one mile, but the calculated RDI is 2, then the person walking or biking would have to travel two miles via the roadway network to reach their destination.

- **Average RDI by intersection LTS**: This metric calculates the average RDI value by intersection LTS in order to answer the question of whether low or high stress crossings are more or less direct. Ideally, the lowest-stress crossings would also be the most direct.

Statewide analysis of population centers vs. rural areas

A statewide summary was developed for population centers.[270] Population centers were defined as cities/towns and/or Census Designated Places (CDP).[271] A result was classified as part of a population center when it intersected or fell within the boundary of a city/town or CDP. The reported metrics were expanded to include intersections within a reasonable walking distance of a destination.[272] Figure D-11 describes the results. Roughly 1,500 intersections on the state system are close to a destination and afford relatively direct crossings. About half of these intersections would be considered comfortable for the average adult based on LTS. The average RDI, distance between crossing opportunities, and average RDI by intersection LTS are useful tools for comparison of corridor, county, or regional crossing information. However, additional context would be needed to determine overall investment needs. A suggested next step for study is to develop a comparison of populations centers by geographic size to better understand and compare crossing levels of service.

Metric	Population Centers
Average RDI	6.64
Average Distance Between Any Crossing Opportunities (RDI > 0)*	1,186 FT
Average Distance Between Crossing Opportunities where RDI < 2	2,517 FT
Average RDI by (by crossing) LTS**	LTS 1: N/A LTS 2: 11.05 LTS 3: 8.4 LTS 4: 7.35
Number of Intersections within 1 mile of a Destination where RDI < 2	3,159
Number of Intersections within 1 mile of a Destination where RDI < 2 and LTS Scores are 1 or 2	639
Percent of Intersections within 1 mile of a destination where RDI < 2 and LTS is 1 or 2 Compared to Similar Intersections with ANY LTS Score	20%

Figure D-11: Population center statewide metrics.

[270] A regional analysis and a statewide rural context were also evaluated, which is detailed in the full MPP report. The active transportation plan was focused on developing cost estimates for statewide need in population centers.

[271] US Census Bureau. 2019. TIGER/Line Shapefiles. State of Washington Urban Area. https://www.census.gov/cgi-bin/geo/shapefiles/index.php

[272] Reasonable proximity to a destination was defined as one mile of a destination included within the Sugar Access places database.

Applications for decision-making

The tools and metrics developed as part of the MPP have several identified applications.

Practical Solutions framework and project identification

The Practical Solutions model represents WSDOT's approach to selecting the right project or solution, for the right location, at the right time. As stated on the Practical Solutions website: "This approach uses performance-based, data-driven decision making and early community involvement to guide the development and delivery of transportation investments." Practical Solutions should be implemented early in the project lifecycle not only to identify options for intervention, but also to better consider the use of all modes from the beginning.

WSDOT's draft mobility performance framework ties Practical Solutions to key WSDOT decision points in a project lifecycle by establishing performance measures and metrics appropriate for each stage. The framework responds to development context—rural, rural center, suburban, town/urban, or urban core—and it responds to the established goals of the framework, as shown in Figure D-12 below.

For each decision point, the mobility performance framework outlines measures and applicable metrics and identifies which land use contexts they apply to. For example, corridor sketch planning is the first phase, and it includes measures of housing and jobs density, availability/connectivity of pedestrian facilities, and access for special needs populations. The intent of providing these measures is to help prioritize projects, compare solutions, guide public involvement, and ultimately determine interventions that best respond to the identified needs.

Goal/Category	Definition
Accessibility: Ability to easily connect to goods and services across modes, abilities, and socioeconomic groups.	
Proximity to Service	Quantity of jobs, households, services, schools, ports, freight terminals, etc. available within a reasonable distance or time, by mode
Travel experience	Convenience and ease of accessing destinations, by mode

Figure D-12: Accessibility goal, draft mobility performance framework.

RDI tools align well with the draft mobility framework and can be adopted as metrics to make future state roadway projects more bicyclist and pedestrian friendly. For example, a desired maximum distance between LTS 2 crossings in population centers could be set. An RDI of less than two could be required to encourage use of newly constructed crossings or evaluation of proposed closings of crossings to determine overall effect on RDI and distance between LTS 2 crossings.

The MPP study uncovered the complex relationship between crossing spacing, crossing quality, and crossing directness. In order to development a flexible, data-based policy framework around low stress crossing frequency needs, several questions must be addressed:

- Is there an appropriate crossing density standard based on land use?
- Can a minimum RDI be established based on anticipated users, existing roadway configuration, and proximity of current destinations?
- How can the crossing quality or LTS be paired with RDI data to inform policy decisions?

Active transportation plan and performance metrics

WSDOT's active transportation plan includes a significant focus on LTS for gap identification. Performance metrics based on LTS are being evaluated. A primary constraint on adopting a given metric will be data availability. Two metrics calculated as part of the MPP appear to be viable performance metrics that could included in the ATP:

- Average distance between LTS 2 crossings
- Percentage of intersections within one mile of a destination where RDI is less than (X) and LTS is 1 or 2

Note the second potential metric leaves the acceptable RDI level unspecified (X). This study uses an RDI of 2 as a starting point, but the level chosen has significant user and/or policy implications. Given the current average population center RDI of 6.64, a target of RDI 2 would be ambitious. Together these two metrics describe both the need for new crossings on the state system as well as the need to improve existing crossings that are likely to serve active transportation users.

Additional uses of results

The following list of additional ways the tools developed as part of the MPP may be used provide a few examples of how the results can be applied to real-world planning situations:

- **Determine likely crossings**: Low RDI values indicate routes that provide a relatively direct crossing for people who walk and ride a bike. Therefore, routes with low RDI values may experience more crossings than routes with high RDI values, which require additional out-of-direction travel. This information can be used to identify crossings that may be more frequently utilized by pedestrians and bicyclists. This information can also be used to help prioritize safety improvements at those crossings and on the routes that lead to them.
- **Identify potential for new connections to existing crossings:** Working with partner jurisdictions and using RDI data, there may be opportunities to make access to existing, low-stress crossings more direct. A new trail that connects to a crossing, for example, could be a much more feasible means of lowering RDI than building a new crossing.
- **Identify need for new, more direct crossings:** The tool's results can be used to help identify preferred locations for new, more direct crossing opportunities, especially where they serve major destinations. Where major destinations are found but with long distances between existing crossings, there may be an opportunity to increase permeability through installation of a new crossing.
- **Project prioritization:** Where network improvements are being considered and a number of projects have been proposed, RDI values can be used to prioritize among them. The data can help inform decisions about new crossings or improvements to existing crossings. In areas with high RDI values (or no crossing routes), safe and comfortable crossings are essential for creation of a balanced and connected network that enables pedestrians and bicyclists to cross state routes in order to reach destinations.
- **Create walking/biking maps**: The RDI scores can help identify efficient and comfortable routes and contribute to development of walking and biking maps for neighborhoods or municipalities. These results can also be cross-referenced with intersection LTS scores to make crossing recommendations. A safe route to school, for example, is not always obvious to community members who are more familiar with driving routes that use collectors to reach destinations.

DEMAND ANALYSIS

Introduction

This section discusses the approach taken to assessing relative statewide demand for walking and bicycling. Data from this analysis were used in the assessment of identified LTS gaps. Active and public transportation demand is often expressed as where people live, work, play, take transit, and learn. This analysis equally weights each of these variables, described in Figure D-13. A composite demand score summarizes the geographic distribution of active transportation demand in Washington.

Data inputs and methods

The model chosen provides a general understanding of expected active transportation activity by analyzing spatial data that are representative of origins and destinations in the study area. In the model, demand for biking and walking is influenced by where people live, work, shop, obtain education, and access other destinations. Figure D-13 includes details about each indicator included in the demand analysis with the data source, measurement method, and rationale for inclusion. Each factor was mapped to a hexagon grid and then a composite score was developed. Two scoring scales were developed to account for more urban and more rural land use development patterns.[273] The composite score is calculated by adding the scores of input factors and mapping the results based on using natural breaks methodology.

Demand Indicator	Rationale	Measurement Method	Data Source
Employment Density	Scores	Employment density is mapped to a hexagon, which is classified as urban or rural. Scores within the urban and rural categories are then indexed on a 0 – 100 scale.	2015 Longitudinal Employer-Household Dynamic (LEHD), Work-Area Characteristics, scale: census block
Population Density	A measure of where people live	Population density is mapped to a hexagon, which is classified as urban or rural. Scores within the urban and rural categories are then indexed on a 0 – 100 scale.	2012-2017 American Community Survey (US Census), Scale: census block group
Presence of Colleges and Universities	A measure of where people attend two- and four-year institutions	A binary score was assigned to census block group which include a college or university.	College/university data obtained based on listing of university and college list on Wikipedia; calculated based on whether or not a block group contains a college/university location
Retail Employment Density	A measure of where people shop and are employed by retail industries	Employment density is mapped to a hexagon, which is classified as urban or rural. Scores within the urban and rural categories are then indexed on a 0 – 100 scale.	2015 Longitudinal Employer-Household Dynamic (LEHD), Work-Area Characteristics, scale: census block

[273] This analysis defines urban areas as Urban Growth Areas (UGA) within a Metropolitan Planning Organization boundary (MPO).

Demand Indicator	Rationale	Measurement Method	Data Source
Access to Destinations	Access to non-work destinations by biking or walking assuming a perfect transportation network	Access for 9 non-work destination types was calculated assuming perfect roadway network connectivity utilizing a distance decay curve.	Distance weighted access summarized at the census block group level. Access was computed using the Sugar Access analysis platform Summer 2019.
Intermodal Connections	Connections to local service bus, airports, bus station, commuter rail station, ferry terminal, train station	Hot spot analysis was used to create a transit score. Local bus stops scored 1 point while all other hubs received 5 points. Scores were calculated using ArcMap's Kernel Density tool utilizing a search radius of one mile. The highest score observed in each hexagon was taken as the overall score for the cell. Urban and rural hexagon scores were indexed on a scale of 0–100 to produce a final score.	2017 GTFS feeds and WSDOT Intermodal hub location data.

Figure D-13: Demand analysis inputs.

Demand analysis summary

The demand analysis scoring method is a function of density and proximity. Areas that have higher instances of the data inputs have higher scores. Low feature density areas receive lower scores. Composite demand is calculated by summing all the indicators. All indicators are given the same weight in the composite demand map shown in Figure D-14. Pockets of demand exist in both rural and urban areas throughout the state and providing quality connections by closing network gaps is critical to building a complete, continuous active transportation network. Additionally, connecting people via the state route system to intermodal hubs can support regional trips that combine bicycling and walking with transit, rail, and other modes.

Major urban areas such as Seattle, Spokane, Tacoma, and Vancouver register as higher demand areas for both walking and bicycling. These types of areas typically have greater densities for population, employment opportunities, and retail locations. Maps depicting these individual criteria bear that out.

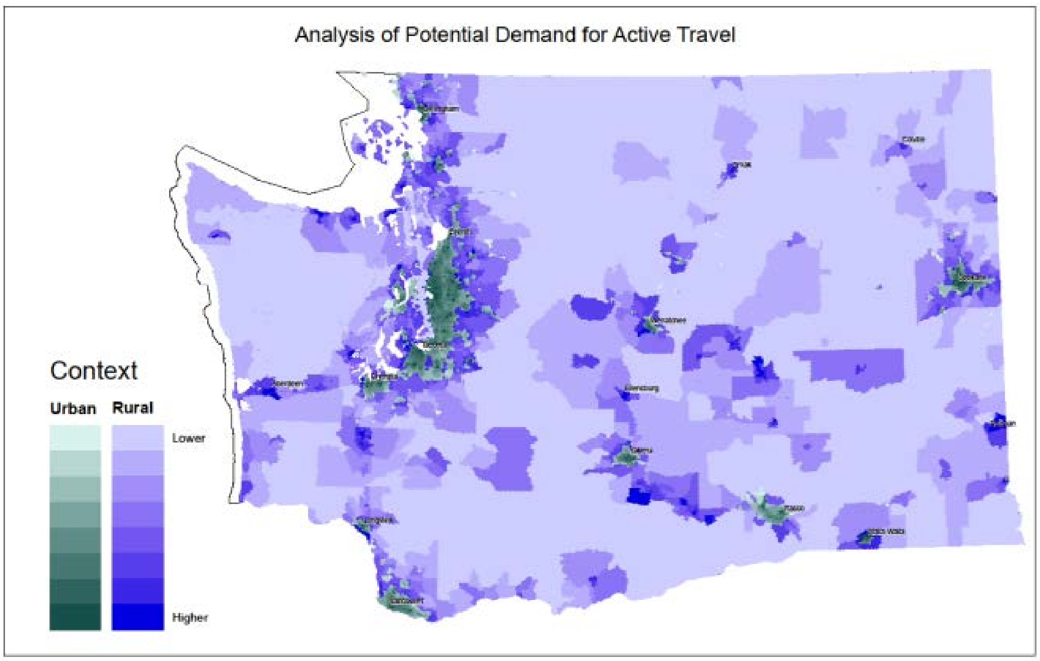

Figure D-14 Composite demand map

Secondary concentrations of higher demand are also found around other urban areas, such as Bellingham, Olympia, Yakima, the Tri-Cities, and Walla Walla. These pockets of moderate demand reflect the fact that biking and walking access to destinations in these areas is high. Demand for walking and bicycling facilities is also present in smaller towns and rural areas, for example along I-82. When considering the composite bicycling demand, there is greater potential along corridors with destinations, like Highway 2. Pedestrian demand is more locally concentrated, due in part to the shorter travel distances typically associated with trips made on foot or using a mobility assistive device such as a wheelchair.

For this analysis, urban growth areas (UGAs) within larger metropolitan planning organization (MPO) boundaries were compared with each other as one group, while all other areas comprised a second comparison group. The two comparison scales prevented smaller communities from disappearing from demand consideration as they would if compared with larger cities. This method recognized that there is demand for walking and biking (and therefore a need for safe and accessible facilities) wherever destinations are within walk or bike sheds (1-mile or 3-mile catchment areas respectively). Visually, the comparison scale is color coded on the map.

SUPPLEMENTAL ANALYSIS

As noted above, in addition to WSDOT's LTS analysis of state routes, a more detailed analysis of two local road networks was also tested. Ideally, planners would have access to a full set of data and analysis outputs for every roadway, trail or other route that might be available to active travelers. In practice, there are both data limitations and analysis capacity limitations to consider. The supplemental analysis looked at two contexts (cities of Seattle and Walla Walla) and the techniques explored provided insight regarding how local system data can be tied into state system data to identify the best opportunities for active transportation improvements.

Like the state system analysis, the supplemental analysis considered bicyclist and pedestrian networks separately and accounted for travel along and across state roadways.

Intent and assumptions

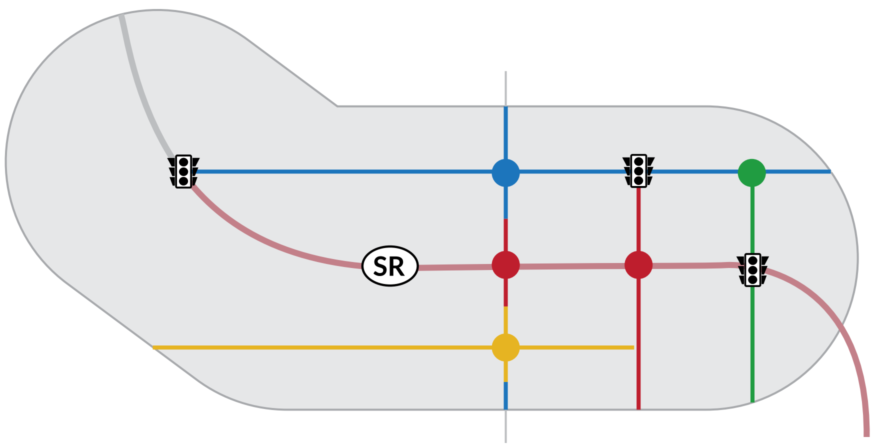

Figure D-15: Level of traffic stress evaluated for a hypothetical state route and local system within one mile of a state route. The LTS designations are blue (1), green (2), yellow (3) and red (4) with red and yellow counting as gaps. The state is shown in red as an LTS 4.

Supplemental analysis was intended as a proof-of-concept exercise that would provide further insight for potential project development of gaps identified through the state highway LTS analysis, including consideration of parallel routes and connections to local bicyclist and pedestrian networks. Supplemental analysis remained centered on state routes, but with a goal of identifying opportunities for coordination with local jurisdictions and identifying solutions to infill or close network gaps (see Figure D-15).

The following assumptions guided the supplemental analysis:

1. The state network LTS analysis informed the elements considered in the supplemental analysis. The supplemental analysis focused on network links and intersections identified as gaps through the state system analysis.
2. Local networks were designated based on data available through that jurisdiction. Data was obtained either through Open Data portals or requests to the jurisdiction.
3. All public roadways within one mile of a state route gap were considered (Figure D-16). This buffer distance provided a more complete picture of gap context and corresponded to common active travel trip lengths (catching a bus for example).
4. Where available, bicyclist and pedestrian facilities in the local network were considered, both existing and proposed. By considering proposed facilities, this analysis provides for improved future consistency with local plans.

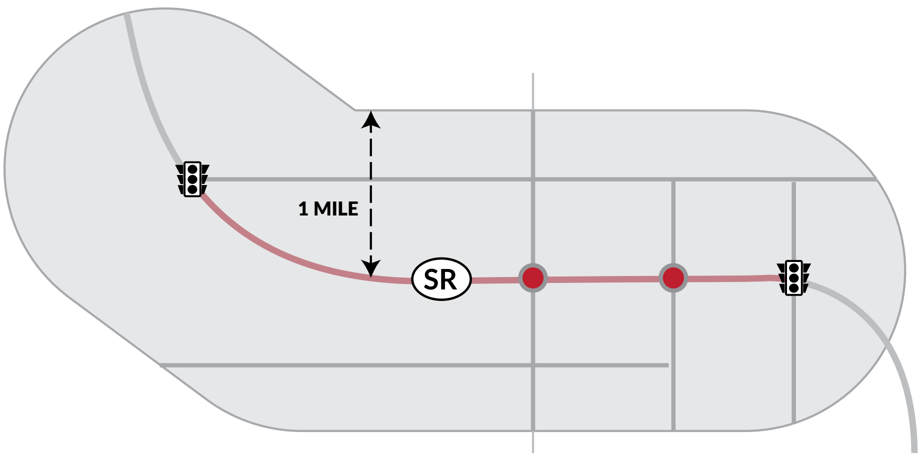

Figure D-16: A hypothetical state route and a one-mile buffer that captures local system links and parallel routes.

Data collection

Data was collected for jurisdictions and MPOs for the supplemental analysis. A high-level census of data available through online portals was conducted to determine the minimum viable data inputs required, resulting in a data request list that was shared with WSDOT Region Office active transportation coordinators (Figure D-17). Coordinators were asked to distribute the request to the selected jurisdictions to identify the final list of available data. The data returned through this request provided the set of inputs to be utilized in this analysis. Capacity constraints limited supplemental analysis to two contexts. Seattle and Walla Walla were selected based on available data, and a desire to look at diverse contexts.

The data inputs requested included:

Bicyclist Network	Pedestrian Network
Roadway centerline	Roadway centerline
Posted speed limit	Posted speed limit
Number of travel lanes	Number of travel lanes
Existing and proposed bicycle facility presence and type	Existing and proposed sidewalk presence
Bicycle facility width, including buffer if applicable	Traffic signal location
Traffic signal location	Pedestrian signal location (RRFB, Hybrid Beacon, etc.)
Existing and proposed trail locations	Existing and proposed trail locations
Trail surface type	Trail surface type

Figure D-17: Supplemental analysis data considered.

Methodology

Bicyclist facilities

The supplemental analysis network included public roadways and existing and proposed bicycle facilities, as available. By utilizing both existing and proposed bicyclist facilities, the local transportation network data provided WSDOT the ability to assess improvements that are consistent with local plans. All facilities were aggregated to the roadway centerline, with the proposed facility taking precedence when overlapping with an existing facility.

The local network for analysis was determined by selecting all public roadways within one mile of the identified state network gaps. By selecting within the specific distance threshold, roadways that provided a continuous route but were not fully within a one-mile buffer were generally also captured.

The supplemental bicyclist methodology utilized the scoring tables developed for the state system; however, modifications to the state system table and methods occurred after the completion of the supplemental analysis test (Figures D-18-D-20 below). Where bike lane widths were not available, an assumed width of five feet was used. The five-foot substitution scored the segment at the lowest LTS score.

Intersections were scored based on the table in Figure D-20. Consistent with the methodology presented in the Mineta Institute and ODOT methodology, signalized intersections were assumed to have no effect. However, unlike the state system methodology, intersection scores were integrated with the final network score links.

Building on the weakest link methodology utilized in LTS, the comfort level associated with a link is only as comfortable as its highest stress intersection. For example, while a neighborhood boulevard provides a low-stress pathway for people who bicycle, an arterial crossing affects the ability to travel along that link continuously without encountering a high-stress element.

Trails were integrated into the dataset where present. Trails, cycle tracks, or other fully separated facilities were considered LTS 1 (lowest-stress). However, similar to roadways, the ability of a trail or separated facility to accommodate low-stress travel is influenced by the intersection with roadways or other facilities.

Bicyclist network scoring tables

Speed Limit	1 lane	2 lanes	>2 Lanes
≤20 mph	1	3	4
25 mph	2	3	4
30 mph	3	4	4
≥35 mph	4	4	4

Figure D-18: Population centers: urban roadways and rural roadways less than 45 mph. The urban mixed use table presented in Oregon Department of Transportation's Analysis Procedures Manual was modified to include 20 mph threshold for roadways. This threshold was utilized to account for roadways with unmarked centerlines, as centerline data is not available. The speed limit threshold of 20 mph is intended to identify low-speed roadways that are consistent with LTS 1 conditions.

	Through Lanes Per Direction				
	1 Lane			≥ 2 Lanes	
	Bicycle Lane Width (in feet)				
Speed Limit	≥7	5 – 7	≤ 5	≥ 7	< 7
<=25mph	1	1	2	1	3
30-35 mph	2	3	3	2	3
≥ 40 mph	3	4	4	3	4

Figure D-19: Urban roadways with a bicycle lane present. Bicycle lanes provide a dedicated throughway for bicyclist travel on a roadway. This table reflects modifications utilized by the Colorado Department of Transportation, as the scoring and thresholds are more consistent with data available from WSDOT.

	Total Lanes Crossed (in Both Directions)		
Speed Limit (mph)	≤3	4-5	≥6
25	1	2	4
30	2	2	4
35	2	3	4
≥40	3	4	4

Figure D-20: Intersections. This table reflects the methodology established in ODOT, utilizing the table marked for unsignalized intersection crossing without a median refuge. The scores listed here, while generally higher than ODOT's, are consistent with WSDOT policy.

Pedestrian facilities

The analysis considered roadway segments with or without sidewalks. In the absence of more detailed sidewalk data, including sidewalk width and condition, the methods considered where sidewalks are present as well as qualities of the roadway, including posted speed and number of travel lanes (this did not include parking or turn lanes). The methodology scores roadway segments based on whether or not a sidewalk is present on one or both sides of the roadway, how quickly traffic is moving (based on posted speed limit), and how wide the road is. All sidewalk information was aggregated to the roadway centerline, and the local network was merged with the state network and clipped to the one-mile buffer distance utilizing the approach outlined in the previous section.

Similar to the bicyclist level of traffic stress, roadway width (operationalized as number of traffic lanes) was intended to capture the potential volume of traffic present. Scores ranged from 1 to 4, roughly correlating to bicyclist scoring methods, where a score of 1 or 2 is best suited for low-stress travel while scores of 3 or 4 correspond to high-stress facilities (Figure D-21).

Pedestrian Space along Roadway	Posted Speed					
	≤25 mph		30-35 mph		≥40 mph	
	2 lanes	>2 lanes	2 lanes	>2 lanes	2 lanes	>2 lanes
Complete sidewalk on both sides	1	1	2	3	3	4
Complete sidewalk on one side	2	3	3	4	4	4
No sidewalk	2	3	4	4	4	4

Figure D-21: Pedestrian network segment scoring table.

Crossings

An additional analysis considered the distance between fully signalized/or and grade-separated crossings. The results of this analysis provided a quick assessment of where new crossings may improve the utility of local networks and the permeability of the state network (Figure D-22).

The testing process provided insight into the project opportunities available to address a network gap or barrier. For example, the supplemental LTS score, in some cases, revealed parallel routes that allowed for low-stress travel or a series of state route crossings that limited travel across the route. WSDOT and local partners could potentially use this information (along with additional considerations such as topography, environmental considerations, destination locations, destination access points, and safety) to select projects that would help optimize the network.

Distance Between Signalized Intersections	Traffic Volume (AADT)	Number of Travel Lanes in Each Direction		
		2	3	4+
< 600 ft	<10k	1	1	2
	>=10 k	1	2	3
600 – 1200	<10k	2	3	4
	>=10 k	3	3	4
> 1200 ft	<10k	3	4	4
	>=10 k	4	4	4

Figure D-22: Distance between signalized (protected) crossings scoring table.

Selected analysis outputs for Walla Walla

State routes 12 and 125 cross each other in downtown Walla Walla. The state route LTS analysis determined both of these highways represent travel need gaps (discussed in Chapter 3) for bicyclists. Looking at the local roadway network reveals a number of potential parallel routes and crossing opportunities associated with or within one mile of the state routes. The local roadway network also exhibits LTS gaps. Figure D-23 illustrates the roadways and gaps in the two networks. Figure D-24 zooms in a portion of the city and adds existing bicycle paths that serve to address some of the roadway gaps, including a state route gap. Figure D-25 looks at gaps in the state and local pedestrian networks. As a result of the largely complete network of sidewalks, relatively few pedestrian gaps are present. Where pedestrian gaps were identified the posted speed, number of travel lanes, and/or greater distances between signalized crossings are affecting the LTS rating.

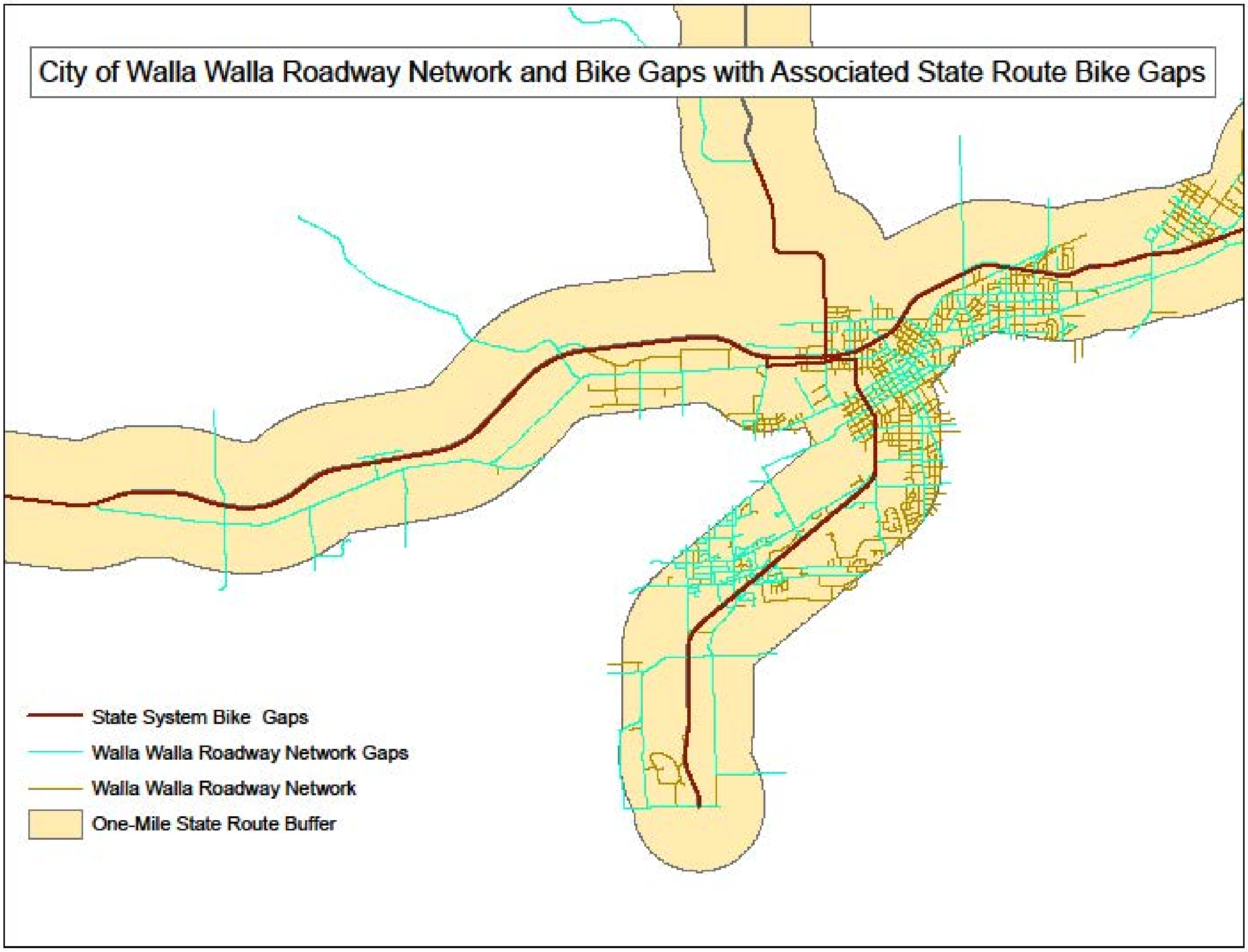

Figure D-23: Bicyclist gap analysis output for Walla Walla.

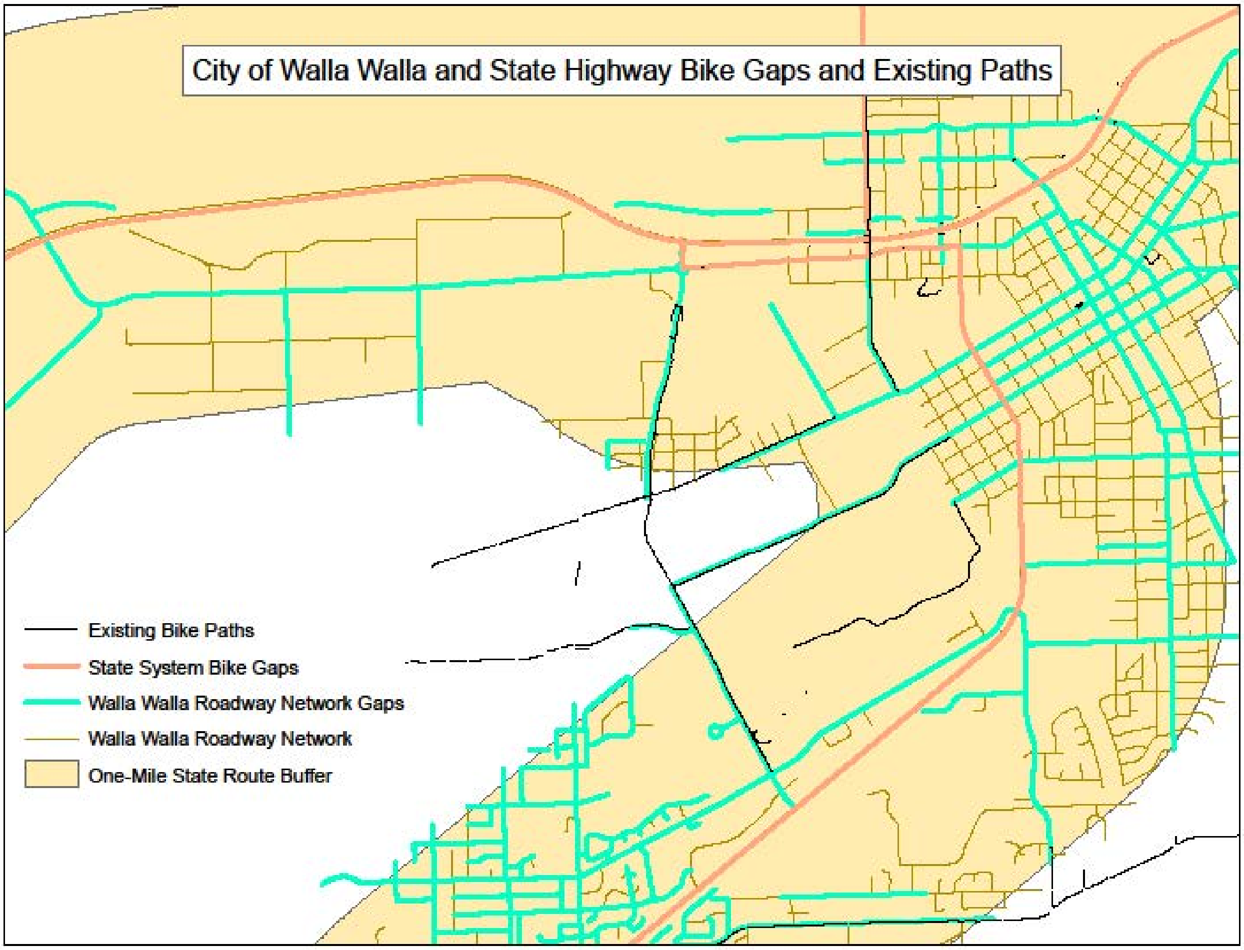

Figure D-24: State and local roadway system bike gaps in Walla Walla with existing trails indicated. Much of the existing trail system addresses identified roadway gaps though generally they are located away from the primary street grid where most of the destinations are found. One of the paths is associated with state highway segment and intersection gaps.

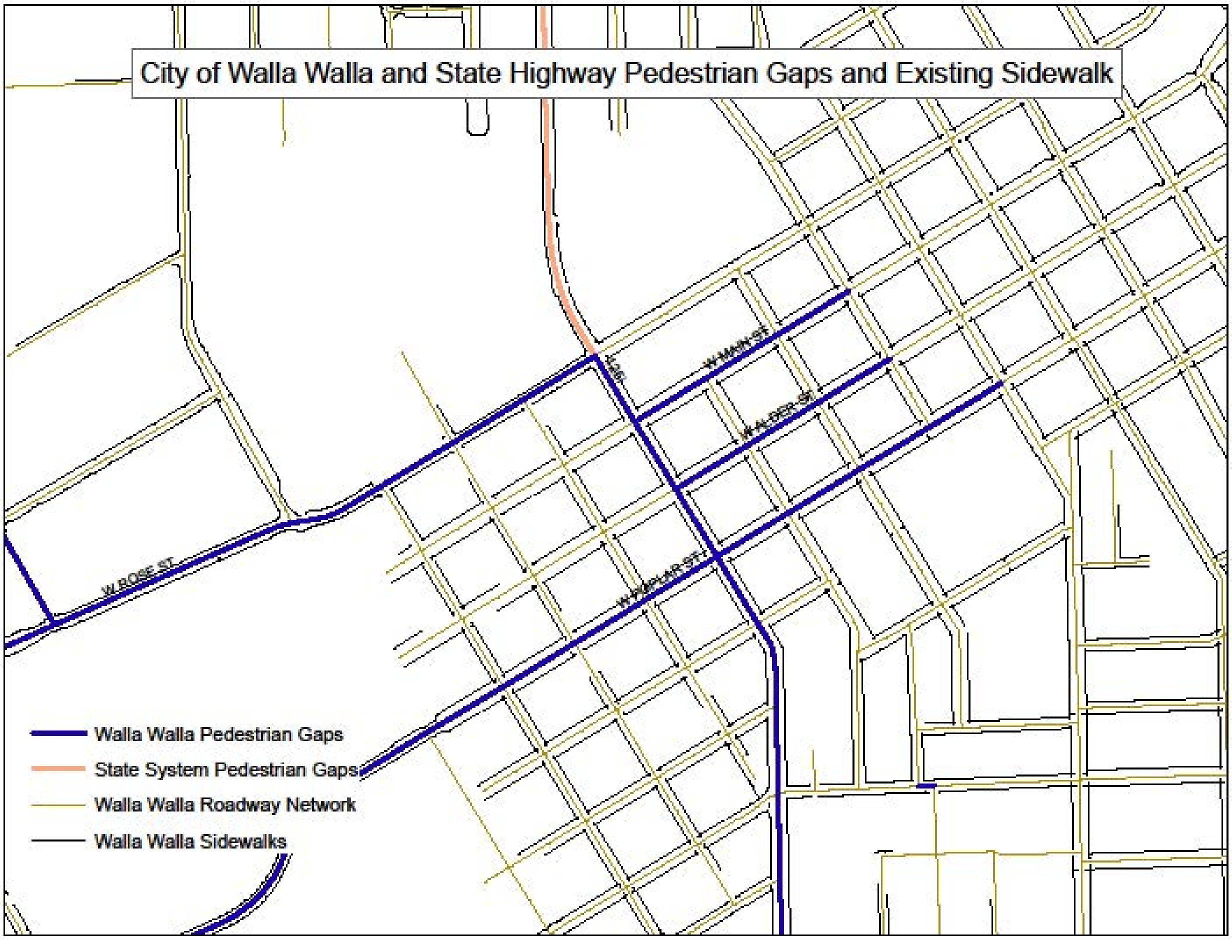

Figure D-25: Pedestrian gaps on the local and state roadway systems with associated sidewalk facilities. The extensive sidewalk network mitigates many of the gaps relative to the bicyclist gaps shown in Figure D-24. However, some pedestrian gaps are still identified where sidewalk exists, which may reflect the posted speed, number of travel lanes, and/or the proximity of signalized crossings.

NEXT STEPS

Although WSDOT has developed the tool sets described in Chapter 3 and this appendix, more work is needed to refine the tools and make the data results widely available to agency staff and partners. The LTS data generated to date has been instrumental in helping the agency to identify high-level statewide needs, but the tools and data are not optimized or ready for integration into the agency's planning, scoping, and design workflows. An FHWA-funded project to complete that work was outlined in early 2020 and is set to begin in early 2021. The scope of that project, *Integrating New Active Transportation Network Analytical Tools and Data into the Multimodal Decision-Making Process*, includes:

- Data modeling that covers existing and expected datasets (e.g., sidewalk data)
- Exploring the need to base the LTS and highway crossing availability tools on the WSDOT linear referencing system (LRS) instead of the Highway Performance Monitoring System (HPMS) currently used
- Exploring the potential to integrate LTS and highway crossing availability tools into a single process (or determining how they can be used in a parallel process) and exploring the potential for and utility of a single integrated analysis approach to support decision-making, evaluation, and progress reporting, as well as collaboration efforts with local jurisdictions
- Integration of additional datasets (sidewalk, traffic volume, and total roadway width data for example) into LTS and highway crossing availability tools
- Determining the best level for roadway segmentation for LTS and highway crossing availability tools
- Preparing the LTS, highway crossing availability, gap locations, and assessment data for agency use in the WSDOT enterprise database
- Developing active transportation staff expertise for ongoing data stewardship
- Identifying secondary network analysis data sets (for example, functional classification, local agency public routes data, trails data, etc.) that can be obtained statewide for facilities that intersect, are adjacent to, or closely associated with state facilities
- Exploring ways to expand and integrate the roadway network to include both state and closely associated local transportation systems as well as known trail facilities and to establish LTS values for the additional local system segments and intersections
- Exploring expansion of the LTS gap assessment inputs to point to crossing recommendation resources based on Pedestrian Safety Action Plan framework criteria that are based on traffic volumes, posted speed, number of lanes, and presence of raised median, for example
- Exploring expansion of the LTS gap assessment inputs to incorporate potential target operating speed recommendations based on WSDOT's speed management and injury minimization policy recommendations (developed by a multi-agency, multidisciplinary work group 2019-2020)
- Researching ways to improve ADA data collection including linear feature data and exploring the potential to use available asset inventory data to inform future project prioritization efforts by using the data as inputs to the LTS analysis (including assessment) and highway crossing availability tools.

Appendix E:
LOCAL USAGE COUNTS

LOCAL AGENCY USE OF COUNT DATA

In 2019 WSDOT sent a survey to 281 incorporated cities and 39 counties in Washington asking about their count programs and received 116 responses. About half of the 116 responses indicated that they conduct regular active transportation counts. Most conduct counts on an as-needed basis according to project scopes, funding opportunities, or by request from residents.

As of 2019 WSDOT has installed 65 permanent active transportation counters around the state (see Figure E-1).

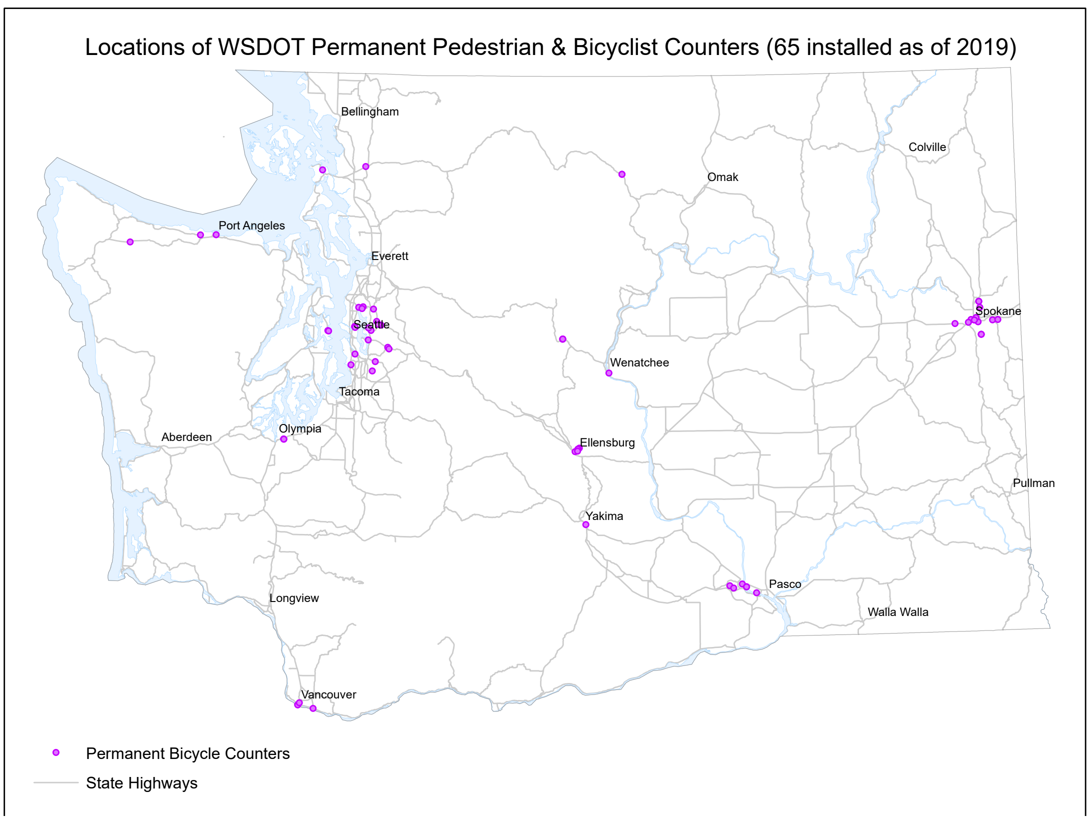

Figure E-1: WSDOT permanent active transportation counters. Many counters are associated with major shared use paths. Data from these counters and from manual counts conducted are available for review or download through the WSDOT Bicycle and Pedestrian Count Portal.

Very few agencies have consistent or permanent active transportation counting measures, and a majority of agencies have yet to conduct any sort of active transportation counts. Many of the agencies who do not perform counts also indicate that they do not plan to conduct any counts in the future. However, some agencies who currently do not have a consistent, permanent active transportation counting system indicate that they would be interested in obtaining a permanent counter in the future and would share resulting data with WSDOT. Those who currently share count data with WSDOT and have permanent counters indicate that they will continue doing so in the future.

When asked about the use of active transportation counts:

- 50.0% of respondents use count data in grant applications
- 30.7% of respondents use count data for project evaluation
- 27.19% of respondents use count data in bicycle and/or pedestrian planning
- 19.3% of respondents use count data in project prioritization
- 50.0% of respondents use count data for other purposes which include:
    - General ridership tracking
    - Project development decisions
    - Information sharing with other agencies

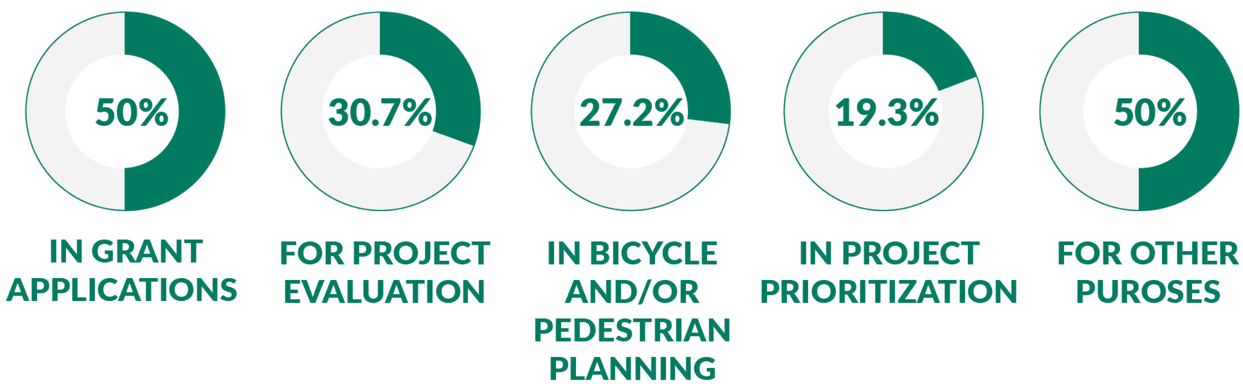

Figure E-2: Graph of survey responses to the question regarding how agencies use of active transportation counts data.

Appendix F:
COST ESTIMATION BACKGROUND

INTRODUCTION

Appendix F provides additional details on cost estimates presented in Chapter 4 associated with the following categories:

- Speed management for safety
- Separated pedestrian and bicyclist facilities
- Crossing treatments
- Bridge retrofit/improvements
- Washington Bikeways and Trails Network
- Wayfinding and signage
- Local needs
- Maintenance and operating support needs

For speed management, separated facilities, and crossing treatments, roadway segments and intersections on the WSDOT managed roadway system were evaluated and ranked for level of traffic stress (LTS). Locations identified as LTS 3 or 4 within population centers were designated as gaps in the active transportation network. Gaps were then assigned a recommended accommodation type for the purpose of estimating infrastructure improvement costs. The bridge retrofit/improvements category was also informed by network gaps, in that bridges considered were within those gaps. However, specific bridges were identified based on shoulder width and sidewalk presence from a separate dataset. The bikeways and trails network and the wayfinding and signage category needs were not based on the LTS analysis. The local needs and the maintenance and operating support needs categories are also not directly informed by WSDOT's LTS analysis. By definition, local needs are determined through local planning processes and supported through WSDOT grant programs. Maintenance and operating support needs refer to maintenance of facilities and capacity within WSDOT for active transportation project development and data stewardship and analysis.

Recommendations such as suites of improvements for a pedestrian or intersection gap included here are consistent with best practices as of 2019 in bicyclist and pedestrian transportation planning, including the following sources:

- FHWA Small Town and Rural Multimodal Networks Guide, 2017
- FHWA Bikeway Selection Guide, 2019
- NACTO Urban Bikeway Design Guide, 2012
- NACTO Urban Street Design Guide, 2013

- NACTO Designing for All Ages and Abilities, 2017
- WSDOT Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations, 2018

The facilities used here for cost estimation are not intended as formal infrastructure recommendations. As part of a comprehensive Practical Solution process, WSDOT will need to conduct detailed assessments of existing conditions, inclusive of intersections within the identified gaps, to refine the preferred bicyclist or pedestrian accommodation type based on WSDOT design manuals and approved design guidance documents and to provide a more detailed assessment of project cost. In addition, the preferred solution for a given gap closure may not be located on the state system.

Cost estimates were determined for identified intersection or segment gaps. For intersection gaps the minimum recommended facilities depended on posted speed, traffic volume and number of lanes. Improvement recommendations were identified that included an increasingly robust use of countermeasures as the speed/volume/lane number increased.

A procedure similar to that used for intersections was applied to segment gaps, with different infrastructure needs identified for pedestrian and bicyclist gaps. For segment gaps the minimum recommended facilities depended on posted speed and number of lanes. Costs for those facility recommendations were multiplied by the miles per gap. Where roadway characteristics within a given gap varied, the higher traffic stress portion was used to define the gap and costs were estimated from those characteristics.

PARAMETERS FOR CALCULATION

Defining the basis for estimated costs

All cost estimates are based on the “snapshot in time” data from WSDOT records and cost basis sources. The basis for establishing system gaps was the 2017 Highway Performance Monitoring System (HPMS)[274] and most facility costs are based on a 2013 FHWA publication, *Costs for Pedestrian and Bicyclist Infrastructure Improvements*[275] (cited throughout this appendix as Bushell et al. 2013).

Cost estimates for need categories based on Bushell et al., 2013 were not inflation adjusted with the exception of intersections which were recently recalculated and adjusted to 2021 dollars. The local needs and maintenance/operating support categories are shown as a per-biennium cost in 2020 dollars and are not inflation-adjusted in future biennia. Bridge cost estimates were from WSDOT’s Bridges and Structures Office as of March 2020. Cost estimates would need to be further refined for use in future budget development; their use in this plan is intended to provide a macro-level understanding of the scale of need.

274 WSDOT. Highway Performance Monitoring System.

275 Bushell, Max A., Bryan W. Poole, Charles V. Zegeer, Daniel A. Rodriguez. 2013. Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public. Prepared for the FHWA by the UNC Highway Safety Research Center.

Mileage basis

As discussed in Chapter 3 and Appendix D, Methods of Analysis, WSDOT examined the statewide roadway network to establish network gaps in order to estimate active transportation need and cost. The agency divided the system into two categories:

- Population centers: Cities, towns, and Census Designated Places. Population centers have a defined boundary and only state highway gaps within this boundary were used to estimate statewide need. The gaps themselves were first established by selecting locations within HPMS, 2017 where the posted speed was under 45 mph and/or the segment passes through an area designated as "urban" by the US Census Bureau[276]. Those gaps were then 'cut' by the boundaries of the population centers. Highway locations that were prohibited for use by active travelers were excluded, with pedestrian and bicyclist exclusions being accounted for separately.
- High-speed rural routes: All state highways that are not within the boundaries of a population center were considered high-speed rural routes. Costs were not developed for these locations because the LTS methodology did not lend itself to effective gap identification for high-speed routes in terms of alignment with local agency expectations. Chapter 4 discusses an alternative planning framework for this context.

Washington has a total of around 81,000 miles of public roads. For this plan, WSDOT used data from the HPMS, 2017 and examined 6,977 miles of state highway.[277]

Specific parameters applied to define which miles were considered for cost estimation in a particular treatment category are described below. Two LTS analysis methods were tested; in the end only the "urban method" was retained. All mileage information in Figure F-1 reflects use of this method.

	HPMS Selection	Highway Miles
Evaluated Miles	All increasing lane miles	6,977
Population Center Gaps	LTS 3 or 4 miles, within population center boundaries	1,152
Speed Management Opportunity Gaps	LTS 3 or 4 in population centers where pedestrians are permitted and posted speed is 30 mph or greater	849
Bicyclist Gaps	LTS 3 or 4 in population centers where bicyclists are permitted, and no bike lanes are present	1,142
Pedestrian Gaps	LTS 3 or 4 in population centers where pedestrians are presumed to be allowed to use the highway and subtracting estimated sidewalk miles in population centers.	542

Figure F-1: Mileage summary for highway miles considered.

276 Highway speeds are generally 45 mph or greater except where conditions, context, and/or land use indicate the need for a lower speed. A speed limit below 45 mph is more often associated with population centers versus locations outside of population centers.

277 2017 HPMS was used to take advantage of the format's highly segmented linework. The analysis uses highway miles marked in HPMS as "increasing direction", referring to the direction of milepost numbering. Gaps and their associated costs are intended to apply to both directions. In some cases a highway is divided. Gap closure cost estimates did not make a distinction for these contexts.

DEFINING TREATMENTS AND COSTS

Speed management for safety

Total statewide need was found by multiplying miles of state highway gaps in population centers by the average cost of speed management improvements per mile. The gaps were obtained from the network analysis methodology where the following were true:

- LTS 3 or 4
- In population centers
- Pedestrians permitted
- Posted speed 30 mph or greater

Average speed management treatment costs were found by considering a suite of potential infrastructure improvements that might be used to support a lower posted speed. Costs for the treatments followed Bushell et al. 2013 and were not inflation adjusted. Speed management involves both the posting of a lower speed limit and supporting the lower speed with appropriate infrastructure (effectively creating a new design speed). Higher and lower cost treatment suites were considered based on the existing posted speed. Where the posted speed was over 35 mph, the average cost used to address gaps was $500,000 per mile. Where the posted speed was equal to 35 mph or 30 mph a cost of $100,000 per mile was used (Figure F-2).

Treatment	Average Cost Each	Estimated Cost/Mile Speed Limit 30-35 mph Roads*	Estimated Cost/Mile Speed Limit 40+ mph Roads**
Chicane	$9,960	$49,800	N/A
Curb extensions	$13,000	$65,000	$130,000
Diverter (raised with curb)	$26,040	$130,200	$260,400
Median Island Crossing	$13,520	$67,600	$135,200
Median (raised with curb)	$7.20 sq ft	$ 76,032	$152,064
Raised pedestrian crossing	$ 8,170	$40,850	N/A
Raised intersection	$50,540	$252,700	$505,400
Mini round about or traffic circle	$85,370	$426,850	N/A
Speed bumps/humps	$2,640	$13,200	N/A
Full roundabout	$1,300,000	N/A	$2,600,000
Road diet (pavement markings only)	N/A	$25,000	$40,000
Average	N/A	$114,723	$546,152
Rounded values used (100Ks place)	N/A	$100,000	$500,000

Figure F-2: Suites of treatments and costs considered for speed management need calculations based on Bushell et al. 2013 and not inflation adjusted.

*Assumes 5 treatments of this type per mile

**Assumes 10 treatments of this type per mile, except roundabouts

Figure F-3 summarizes mileage, average cost, and estimated need for speed management improvements. There is an interplay between speed management strategies and other need categories such as pedestrian/ bicyclist crossing and linear improvements; lowering speeds and investing in speed management treatments may decrease the need for higher cost pedestrian and bicyclist improvements. However, as noted above the cost to support a lower speed on a facility that had previously been designed for higher speeds is generally greater so the interplay between speed management and other improvement strategies is complex.

Miles Of Highway With Speed Management Needs	Average Cost Per Mile	Total Statewide Need (rounded)
849	$333,480	$283,000,000

Figure F-3: Chapter 4 summary table of statewide need for speed management.

Figure F-4 provides a breakdown by posted speed of mileage gaps with respect to speed management.

Existing Posted Speed	Miles of gap at posted speed	Percent of gap miles at posted speed	Cost
> 35 mph	496	58.4%	$247,834,645
35 mph	253	29.8%	$25,289,023
30 mph	101	11.8%	$10,062,483
Total	**849**	**100%**	**$283,186,150**

Figure F-4: Population center speed management infrastructure gaps and costs.

Separated pedestrian and bicyclist facilities

Bicyclist and pedestrian accommodations for cost estimation

Tables under the *Pedestrian Facilities* and *Bicyclist Facilities* sections below list proposed bicyclist and pedestrian facilities for cost estimation. These tables are consistent with those used in scoring the baseline LTS analysis. Cost estimates include infrastructure elements only and do not consider the costs of additional potential factors such as drainage, utilities, and property acquisition that will vary by location. The recommended facility types target an LTS 2, while recognizing that in certain contexts (school zones, for example) LTS 1 facilities will be the standard. The following facility types are used:

- **Bike boulevard** – A street with low motor vehicle volumes and posted speeds designed to prioritize bicyclist travel. Design treatments include pavement markings, wayfinding and traffic calming.
- **Bike lane** – Designated roadway space for exclusive use by bicyclists. Space intended for travel on the roadway is delineated by pavement markings and signs.
- **Buffered bike lane** – A standard bike lane paired with designated buffer space indicated by paint separating the bike lane from the motor vehicle travel lane and/or a parking lane.
- **Protected bike lane** – A physically separated on-street facility designated for exclusive use by bicyclists. The facility may be either one-way or two-way and is protected by some form of barrier.
- **Separated facility** – A multi-use trail completely separated from the roadway.
- **Shoulder –** The portion of a roadway adjacent to motor vehicle travel lanes and separated by pavement markings. Shoulders accommodate stopped vehicles and emergency use, among other uses (snow

storage, for example). In more rural areas bicyclists and pedestrians sometimes use shoulders.

- **Sidewalk –** A paved facility adjacent to a roadway intended for exclusive use by pedestrians. Sidewalks are typically separated from a roadway by a curb and gutter.
- **Sidewalk with buffer –** A paved facility adjacent to a roadway intended for exclusive use by pedestrians. Inclusion of a landscaping strip or furniture zone in addition to curb and gutter provides additional space between pedestrians and motor vehicle travel lanes and may increase user comfort.

Pedestrian facilities

Total statewide need, summarized in Chapter 4 and Figure F-5 below, was found by multiplying miles of state highway pedestrian gaps in population centers by the per-mile cost of providing sidewalk facilities on both sides of the road. The gaps were obtained from the network analysis methodology where the following were true:

- LTS 3 or 4
- In population centers
- Pedestrians were permitted

Two categories of cost were considered:

- Gaps where the posted speed is ≥ 35 mph
- Gaps where the posted speed is < 35 mph

Miles of Pedestrian Gaps in Population Centers	Average Cost Per Mile (Both Sides of Roadway)	Total Statewide Need (rounded)
542	$2,321,585	$1,258,000,000

Figure F-5: Pedestrian linear facility needs in population centers.

Referring to Figure F-6, pedestrian infrastructure needs are assumed to be either standard curbed sidewalk or sidewalk with buffer, depending on the speed of the adjacent roadway. The cost of providing sidewalk for roadways with speeds over 35 mph was presumed to be greater than for lower speed roadways, due to the addition of the buffer and other circumstances associated with higher speed roads.

Speed Limit	1 lane*	2 lanes*	>2 Lanes*
≤20 mph	Sidewalk	Sidewalk	Sidewalk
25 mph	Sidewalk	Sidewalk	Sidewalk
30 mph	Sidewalk	Sidewalk	Sidewalk
≥35 mph	Sidewalk with Buffer	Sidewalk with Buffer	Sidewalk with Buffer

Figure F-6: Pedestrian facility types for urban and suburban roadways.

A per-mile cost for both sides of the road was calculated based on Bushell et al. 2013. The maximum sidewalk cost from the guide was used for roads where the posted speed is equal to or greater than 35 mph and the median cost was used for all other roadways. Figure F-7 summarizes the per-mile costs for the two contexts.

Existing posted speed	Cost per square foot	Cost per mile	Cost for both sides of the roadway	Rounded cost used
≥35 mph	$230*	$1,214,400	$2,428,800	$2,400,000
<35 mph	$170**	$897,600	$1,795,200	$1,800,000

Figure F-7: Cost per mile for pedestrian gaps.

*Represents maximum cost from Guide for sidewalk curb facilities.

**Represents median cost from Guide for sidewalk with curb facilities

Sidewalk gaps identified through the network analysis did not account for existing sidewalk due to a lack of available data. WSDOT staff made an effort to collect some basic sidewalk data through inspection of imagery for highway segments within the boundaries of population centers. Observed sidewalk elements were recorded and analyzed in GIS. The quality of observed sidewalk was not recorded, which is discussed in more detail below. As of Oct. 6, 2020, 405.29 miles of sidewalk (as measured on WSDOT linear referencing system, not the HPMS) were identified. About 50 percent of the state highway lane miles in population centers had been scanned for sidewalk presence as of that date. For population centers that had been scanned, sidewalk was found on about 37 percent of the centerline miles. This percentage was taken to be the best estimate of sidewalk presence for all population center highway miles. Sidewalk need was determined by calculating:

$$\text{Miles Sidewalk need} = \text{Miles Sidewalk Gap} - (\text{Miles Sidewalk Gap})(0.37)$$

Figure F-8 shows the miles of sidewalk need and cost by posted speed context. The percent of gap miles at each posted speed is also provided.

Existing Posted Speed	Miles of gap at posted speed (adjusted for sidewalk presence)	Percent of gap miles posted speed	Cost
≥ 35 mph	471	86.9%	$1,130,942,932
<35 mph	71	13.1%	$127,518,981
Total	542	100%	$1,258,461,913

Figure F-8: Population center pedestrian gaps and infrastructure cost estimates.

The effort to collect existing sidewalk data was useful for computing statewide need, though data collectors reported that the coverage, condition, and ADA accessibility varied between population centers. Some issues identified include:

- Sidewalk present on only one side on a given segment of state route
- Portions of an otherwise continuous segment of sidewalk missing
- Portions of a sidewalk segment not in a state of good repair
- Accessibility features missing or not at the current standard

A report to the Joint Transportation Committee on city transportation funding needs noted deterioration of sidewalks, lack of preservation funding, and the costs of ADA-compliant designs as issues creating a backlog of needs; the report did not provide a cost estimate specific to sidewalks.[278] The need estimates in Table 8 likely underestimate the actual need since condition of existing sidewalks was not factored in.

[278] Berk Consulting. June 2019. Assessment of City Transportation Funding Needs. Report prepared for the Joint Transportation Committee.

Bicyclist facilities

Total statewide need, summarized in Chapter 4 and Figure F-9 below, was found by multiplying miles of state highway bicyclist gaps in population centers by the per-mile cost of providing bikeway facilities on both sides of the road. The gaps were obtained from the network analysis methodology where the following were true:

- LTS 3 or 4
- In population centers
- Bicyclists are permitted

Miles of Bicyclist Gaps in Population Centers	Average Cost Per Mile (Both Sides of Roadway)	Total Statewide Need (rounded)
1,142	$499,145	$570,000,000

Figure F-9: Bicyclist linear facility needs in population centers.

Three cost categories, corresponding to a bike boulevard, a bike lane or buffered bike lane, or a separated facility were considered under a variety of combinations of posted speed and number of travel lanes. Figure F-10 lists the specific combinations of facilities based on roadway characteristics. Using the Bicycle and Pedestrian Facility Types guide a separated facility was presumed to require the maximum bike lane type facility cost and standard or buffered bike lanes were associated with the median bike lane cost. Bike boulevards were counted as “signed bicycle routes with improvements” and the lowest cost for that facility type was used; however, no gap locations matched the conditions in which a bike boulevard would be considered suitable.

Speed Limit	1 lane*	2 lanes*	>2 Lanes*
≤20 mph	Bike boulevard	Bike lane or buffered bike lane	Separated facility
25 mph	Bike boulevard	Bike lane or buffered bike lane	Separated facility
30 mph	Bike lane or buffered bike lane	Bike lane or buffered bike lane	Separated facility
≥35 mph	Separated facility	Separated facility	Separated facility

Figure F-10: Bicyclist facility types for urban, suburban, and rural roadways signed at less than 45 mph.
* Number of travel lanes in one direction.

Figure F-11 shows the miles of bicycle gap for each set of roadway characteristics where gaps were observed in population centers. The percentage of gap miles at each posted speed is also provided.

Existing Posted Speed & number of lanes*	Miles of gap for posted speed & number of lanes	Percentage of gap miles for posted speed & lanes	Cost
≥ 35 mph any lanes	1,043	91.3%	$559,828,534
30 mph and 1 lane	70	6.1%	$6,226,075
30 mph and 2 lanes	19	1.6%	$1,659,448
30 mph and >2 lanes	2	0.2%	$1,253,927
25 mph and 2 lanes	8	0.7%	$700,106
25 mph and > 2 lanes	0.3	0.03%	$180,230
Total	**1,142**	**100%**	**$1,258,461,913**

Figure F-11: Population center bicyclist gaps and infrastructure cost estimates.

*Number of lanes in each direction.

Although standard bike lanes are relatively low-cost and could be added during regular preservation activities, such improvements would still require some funding given the need for community engagement and other pre-scoping activities.

Bicyclist facilities on state routes often take the form of bike lanes. Few bike lanes currently exist in population centers; where they exist, adjacent roadway characteristics may still result in a bicyclist level of traffic stress of 3 or 4. Highways in population centers with speeds over 30 mph indicate a need for protected bike lanes to produce a lower bicyclist LTS. Where speeds can be reduced (addressed under Speed Management Safety above), lower-cost standard bike lanes can be an adequate facility.

The total cost estimate assumes that the appropriate treatment would be provided on all state routes in population centers. Site-specific bike lane needs depend on related improvement decisions such as speed management strategies, crossing treatments, and other changes to the roadway.

Combined linear facilities need

Looking at linear facilities for pedestrians and bicyclists together, the total estimated cost is about $1,828 million. If funding were made available to address these needs, funds would be used to develop a site-specific mix of treatments for each segment based on alignment with local active transportation plans and opportunities for incorporating active transportation improvements into other programmed activities or projects.

Crossing treatments

Total statewide need is summarized Figure F-12 below. Note that the numbers for intersections have been updated and revised estimates will be used to update the final version of chapter 4 following the public comment period.

The cost was found by multiplying the number of state highway intersection and on-/off-ramp gaps in population centers by the average cost to provide a suite of safety improvements at the intersection. The gaps were obtained from the network analysis methodology where the following were true:

- Intersections and ramp connections were located in population centers
- LTS 3 or 4
- Pedestrians are permitted

Intersections used to develop cost estimates included those where state routes come together and where state highways intersect local roads. Intersection types included signalized and unsignalized intersections and unsignalized ramp junctions. Intersections were generally examined collectively through GIS and efforts made to select for relevant intersections within population center boundaries.

Signalized intersections may already provide a protected crossing signal phase; however, it is not clear that these intersections are optimized for pedestrian or bicyclist crossings. While an unsignalized intersection may appear to have a higher crash potential versus a signalized one, the signalized intersection may have increased complexity, a wider road to cross, and more potential conflict points. In addition, active travelers may use the signalized crossing more often, increasing the chance of conflict, where more destinations are associated with these crossing locations.

An attempt was made to generally exclude intersections between limited access highways where they connect to a ramp (the gore point); however, there was no unique identifier for such locations in the available data so some remain. Some gore point and ramp-ramp intersections were removed by visual inspection of large interchange areas, but this effort was not comprehensive. Generally, only bicyclists may need to navigate ramp intersections that are on limited-access travel ways. Currently there is no obvious design solution (and therefore no ability to estimate a cost) to reduce potential for a crash in the situation in which a bicyclist crosses an off/on ramp to continue in their direction of travel[279]. It should be noted that the available data presents challenges to interpretation. In some cases, a given intersection at the gore point of a limited access highway was labeled as an unsignalized ramp and in other cases as an unsignalized intersection. The reverse was also sometimes true for intersections with the local system. Ramp intersections, at the point where they connect with the local system (or state roadway that functions as a local roadway), were sometimes labelled unsignalized. However, visual inspection of imagery at selected locations often indicated some level of signalization. Also, the available data generally did not allow analysis of the conditions at a given intersection. For example, an intersection involving a ramp may have a signal, but also slip lanes that are unsignalized.

Similar to the discussion on high-speed rural segments in Chapter 4, the plan does not estimate a cost for intersection needs outside of population centers. Where there is an opportunity to improve such intersections generally, a prioritization process weighted to designated bicycle routes or routes that appear in regional or local plans will add the most value for network connectivity, safety, and mobility. Some intersections, such as those associated with regional trails, may warrant robust crossing enhancements. For very rural intersections with frequent use by active travelers and long crossing distances, the addition of refuge islands would allow active transportation users to make crossings in stages. Again, no cost estimate for improvements outside of population centers was included.

[279] Some design concepts orient a bicyclist perpendicular to the ramp crossing and help the rider to see oncoming traffic before crossing, but the rider remains exposed to high-speed traffic. The safest action for bicyclists traveling along limited-access highways is to exit the highway at each off-ramp and then re-enter the highway using the corresponding on-ramp where an on-/off couplet exists. At present, no highways have signage to indicate the best course of action for the rider at such locations. In situations where riders are crossing a freeway interchange regularly, there is likely an existing (perhaps unrecognized) touring route or strong need for people on bikes to connect to destinations. In either case, a non-limited access option would provide a lower level of traffic stress and reduce exposure to potential crashes.

Number of Unsignalized Intersection Gaps	Average Cost Per Intersection	Total Statewide Need
4,752	$212,480	$1,009,704,055
Number of Signalized Intersection Gaps	**Average Cost Per Intersection**	**Total Statewide Need**
1,201	$38,573	$46,326,101
Number of Unsignalized Ramp Gaps	**Average Cost Per Intersection**	**Total Statewide Need**
1,206	$125,768	$151,676,461
Total Intersection Gaps	**Average Cost Per Intersection**	**Total Statewide Need**
7,159	$168,698	$1,207,706,617

Figure F-12: Intersection facility needs for bicyclists and pedestrians in population centers.

Unsignalized Intersections

For unsignalized (non-ramp) intersections the context was evaluated, and recommendations were made, by adapting the table in FHWA's Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (2018), p. 15, copied below in Figure F-13. Figures F-14-F-16 provide tables that identify which improvement types were selected by the ATP project team from the FHWA guide for different combinations of lane number, posted speed, and traffic volume. Costs for those combinations were then developed in 2021 dollars based on Bushell et al. 2013, shown in Figure F-17.

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- \# Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2. Raised crosswalk
3. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

Figure F-13: Table 1 (page 16) from FHWA's Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (2018). This table identifies pedestrian interventions with number codes (1-9) that are relevant for a given roadway context.

2-Lane Roadway			
AADT	Speed		
	<=30	35	>=40
<9K	1,5	1,5,7	1,9
9-15K	1,5	1,5,7	1,9
>15	1,5	1,5,7	1,9

Figure F-14: Treatment codes (from FHWA Countermeasure selection table in Figure F-13) used to develop cost estimates for 2-lane roadways. The chosen treatment codes are based on posted speed and traffic volume and are representative of the kinds of improvements that might be selected for the given context.

3-Lane Roadway			
AADT	Speed		
	<=30	35	>=40
<9K	1,5,6	1,3,5,6,7	1,3,6,9
9-15K	1,5,6	1,3,5,6,7	1,3,6,9
>15	1,5,6	1,3,5,6,7	1,3,6,9

Figure F-15: Treatment codes (from FHWA Countermeasure selection table in Figure F-13) used to develop cost estimates for 3-lane roadways. The chosen treatment codes are based on posted speed and traffic volume and are representative of the kinds of improvements that might be selected for the given context.

4-Lane Roadway			
AADT	Speed		
	<=30	35	>=40
<9K	1,5,6,7	1,3,5,6,7	1,3,6,9
9-15K	1,5,6,7	1,3,5,6,7	1,3,6,9
>15	1,5,6,7	1,3,5,6,7	1,3,6,9

Figure F-16: Treatment codes (from FHWA Countermeasure selection table in Figure F-13) used to develop cost estimates for 4-lane roadways. The chosen treatment codes are based on posted speed and traffic volume and are representative of the kinds of improvements that might be selected for the given context.

Unsignalized Intersection												
Recommended Treatment	Infrastructure Cost Equivalent	Average Cost Per Unit	Units Per Intersection	Cost Per Intersection	Treatment Number Code	1,5	1,5,6	1,5,7	1,9	1,5,6,7	1,3,5,6,7	1,3,6,9
Pedestrian Scaled Illumination	Streetlighting	$4,480	4	$17,920	1	$17,920	$17,920	$17,920	$17,920	$17,920	$17,920	$17,920
Marked Crosswalk	Stripped Crosswalk Pavement Markings	$770	4	$3,080	1	$3,080	$3,080	$3,080	$3,080	$3,080	$3,080	$3,080
Pedestrian Warning Sign	Stop Here for Pedestrians Signs	$300	4	$1,200	1	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200
Advance Pedestrian Warning Sign	Stop Here for Pedestrians Signs	$300	4	$1,200	3	NA	NA	NA	NA	NA	$1,200	$1,200
Stop Line	Advance Stop Line Pavement Marking	$320	4	$1,280	3	NA	NA	NA	NA	NA	$1,280	$1,280
Curb Extension	Curb Extension/ Choker/Bulb-Out	$13,000	8	$104,000	5	$104,000	$104,000	$104,000	NA	$104,000	$104,000	
Pedestrian Refuge Island	Median Island	$13,520	4	$54,080	6	NA	$54,080	NA	NA	$54,080	$54,080	$54,080
Rapid Flashing Beacon	Rectangular Rapid Flashing Beacons (RRFBs)	$22,250	4	$89,000	7	NA	NA	$89,000	NA	$89,000	$89,000	NA
Pedestrian Hybrid Beacon	Pedestrian Hybrid Beacon	$57,680	2	$115,360	9	NA	NA	NA	$115,360	NA	NA	$115,360
Totals	NA	NA	NA	NA	NA	$126,200	$180,280	$215,200	$137,560	$269,280	$271,760	$194,120
Inflation Adjustment (2021)	NA	NA	NA	NA	NA	$143,174	$204,527	$244,144	$156,062	$305,498	$308,311	$220,229

Figure F-17: Representative improvement elements for unsignalized intersections with average costs per unit and per intersection. The total cost was inflation adjusted from 2012 values to 2021. Cost were based on Bushell et al. 2013. Treatment number codes refer to the FHWA table in Figure F-13.

Signalized Intersections

Signalized intersections might see high numbers of active travelers given that such intersections may represent more critical nodes in a transportation network. A signalized intersection likely means driver demand is also higher, which may increase potential conflicts with active travelers despite the controls present. Generally, signalized intersections include active travel treatments such as fully or partially protected signal phasing. The extent to which pedestrian treatments are optimized is unknown, and unsignalized elements such as slip lanes may warrant design enhancements. Leading Pedestrian Intervals (LPI) are not commonly employed on the state system, are relatively low-cost,[280] and provide a 13 percent reduction in driver-pedestrian crashes at intersections; these were chosen as a representative improvement type for estimating costs. For bicyclists, a variety of intersection treatments may reduce potential conflicts. To date, WSDOT has employed relatively few tools to prioritize bicyclists or increase their conspicuity through an intersection. Bike boxes and dashed lines through intersections are relatively low-cost tools to increase bicyclist conspicuity. Both treatments

[280] Costs for the Leading Pedestrian Interval used the high-cost estimate from Pedsafe 2013, Pedestrian Safety Guide and Countermeasure Selection System, prepared for FHWA by the University of North Carolina Highway Safety Research Center, Vanasse Hangen Brustlin, Inc. and Toole Design Group.

are employed on SR 20 in Port Townsend (Figure F-18), but they are uncommon statewide. For signalized intersections, the bike box was chosen as a representative tool to develop costs for need estimation. Figure F-19 details the costs used for developing statewide need estimate in Figure F-12.

Figure F-18: Green painted bike boxes and bicycle intersection crossing pavement markings on SR 20 in Port Townsend. The wider dashed green markings in the foreground indicate to drivers that they are crossing a dedicated bike lane. The shorter dashed markings indicate that a bicyclist can be expected to proceed through the intersection.

Signalized Intersection				
Recommended Treatment	**Infrastructure Cost Equivalent**	**Average Cost Per Unit**	**Units Per Intersection**	**Cost Per Intersection**
Bicycle Intersection Improvement	Bike Box[281]	$10,000	2	20,000
Pedestrian Signal Improvement	Leading Pedestrian Interval	$3,500	4	14,000
Total				**$34,000**
Inflation Adjustment (2021)				$38,572.94

Figure F-19: Representative improvement elements for signalized intersections with average costs per unit and per intersection. The total cost was inflation adjusted from 2012 values to 2021. See footnotes 7 and 8 for cost estimate sources.

281 Cost estimates taken from a Seattle Bike Blog article reporting on a 2012 installation in Seattle. The reporter cites a Seattle Department of Transportation reported cost of $10,000 per installation.

Unsignalized Ramps

Intersections with ramps often involve local system roads where the extent of bicyclist intersection treatments is unknown. Statewide cost estimates were developed for the portion of the ramp that intersects the local system (or state route functioning as a local system roadway) using costs from Bushell et al. 2013 and inflation adjusted to 2021. The assumption is that active travelers are on the local route so improvement elements would be focused there versus traveling along the ramp itself; costs are thus multiplied by 2 instead of 4 to complete the intersection. Curb extensions were reduced from 8 to 4.

Ramp unsignalized					
Recommended Treatment	**Infrastructure Cost Equivalent**	**Average Cost Per Unit**	**Units Per Intersection**	**Cost Per Intersection**	**Treatment Identifier**
Pedestrian Scaled Illumination	Streetlighting	$4,480	2	$8,960	1
Marked Crosswalk	Stripped Crosswalk Pavement Markings	$770	2	$1,540	1
Pedestrian Warning Sign	Stop Here for Pedestrians Signs	$300	2	$600	1
Advance Pedestrian Warning Sign	Stop Here for Pedestrians Signs	$300	2	$600	3
Stop Line	Advance Stop Line Pavement Marking	$320	2	$640	3
Curb Extension	Curb Extension/Choker/ Bulb-Out	$13,000	4	$52,000	5
Rapid Flashing Beacon	Rectangular Rapid Flashing Beacons (RRFBs)	$22,250	2	$44,500	7
Bicycle Intersection Improvement	Dashed line across intersection	$133,170/mi	0.015 mi	$2,018	NA
Total				**$110,858**	
Inflation Adjustment (2021)				$125,768.21	

Figure F-20: Representative improvement elements for unsignalized ramps with average costs per unit and per intersection. The total cost was inflation adjusted from 2012 values to 2021. Relative to intersections where active travelers would be expected to travel along all legs the assumption at ramp junctions is that they are moving along the local route, so most improvement elements are multiplied by 2 instead of 4 to complete the intersection. Similarly curb extensions were reduced from 8 to 4 relative to a full four-leg crossing. Costs were based on Bushell et al. 2013. The dashed line across intersection cost was calculated from the per mile cost of a standard bike lane. Treatment number codes refer to the FHWA table in Figure F-13.

Bridge retrofit/improvements for active transportation

Total statewide need, summarized in Chapter 4 and Figure F-21 below, was found by multiplying the total linear footage of state highway bridges in population centers that were lacking sufficient sidewalk for pedestrians and shoulder space for bicyclists by an estimated cost to provide active transportation facilities. Pedestrian-based gaps were obtained from the network analysis methodology where the following were true:

- Bridges are within an identified segment gap (LTS 3 or 4 in a population center)
- Pedestrians are permitted
- There is less than 5 feet of sidewalk on both sides, or 8 feet if only on one side

Bicyclist-based bridge gaps use the following criteria:

- Bridges are within an identified segment gap (LTS 3 or 4 in a population center)
- Bicyclists are permitted
- There is less than 10 feet of extra width beyond the travel lanes

Feet of Bridge Needing Bicyclist Improvements	**Cost Per Linear Foot and Width Needed**	**Bicyclist Only Statewide Need (rounded)**
20,427	$1,200 x 10ft	$245,000,000
Feet of Bridge Needing Pedestrian Improvements	**Cost Per Linear Foot and Width Needed**	**Pedestrian Only Statewide Need (rounded)**
1,603	$1,200 x 10ft	$19,200,000
Feet of Bridge Needing Both Pedestrian and Bicyclist Improvements	**Cost Per Linear Foot and Width Needed**	**Bicyclist/Pedestrian Statewide Need (rounded)**
102,105	$1,200 x 14ft	$1,720,000,000
Total Feet of Bridge needing Active Transportation Improvements	**Cost Per Square Footage of Bridge Needed**	**Total Statewide Need (rounded)**
124,135	$15,950	$1,980,000,000

Figure F-21: Feet of population center bridge needs for pedestrians, bicyclists, or both with estimated cost per linear foot and estimated width needed.

A separate level of traffic stress for a given bridge was not calculated, although the identified bridges were associated with LTS 3 or 4 facilities. A bicyclist gap (LTS 3 or 4) was inferred when the bridge had less than 10 feet available for shoulder space, because such a bridge would not be able to provide four feet of operating space plus one foot of shy space for the rider[282]. Note that available data did not specify actual shoulder width, so equal width shoulders were assumed. Similarly, a separate LTS was not calculated for bridges with pedestrian gaps.

[282] The WSDOT Design Manual calls for a four-foot minimum shoulder width, with wider shoulders where guardrail or barriers affect the usable space. Bridge structures present pinch points in the system, where active travelers have no exit in the event a driver encroaches on the shoulder. Where conditions will not allow for that space, speed management strategies could be used to reduce the level of traffic stress.

The total number of bridges appearing to have pedestrian needs was 305; the total found to have needs for bicyclists was 375. Cost estimation was based on the 278 population center bridges that showed both bicyclist and pedestrian needs together, as well as bridges that would only address a single need. Examining the intersection of the two need categories created a conservative estimate. Because the method used to identify bridge gaps was tied to identified state highway gaps, it was only able to capture bridges that permitted movement along a state highway. Bridges over a state highway (owned by WSDOT, but permitting travel on the local system) and bridges over a local road (also owned by WSDOT) were not necessarily identified despite potential deficiencies affecting active travel. Figures F-22 and F-23 provide examples where WSDOT bridges were not identified by the network analysis but should have been if all travel effects and directions were considered. Figure F-24 shows a bridge identified through the network analysis approach; however, identification was based on how it affects travel along the state highway and not any effects on the local system. From an active travel perspective, local system effects may be of even greater concern given a higher potential demand for local routes by people who walk and bike.

WSDOT is exploring modifications to the methodology. The list of bridges identified through the current methodology provides a starting point for estimating total statewide need but should not be considered exhaustive. Locally identified needs involving WSDOT bridges in population centers, and in some cases outside of population centers, need to be considered.

Figure F-22: Bridge gap in Pasco not identified through network analysis approach to finding network gaps. Bridge 395/102 on West Sylvester Street passes over SR 395. SR 395 at this location is prohibited to pedestrians and bicyclists, so it was not identified as an active travel gap. Bridges associated with active travel gaps were identified, but the presence of such gaps was only evaluated on the state highway system. This bridge, which connects residential and commercial areas of Pasco, has a narrow sidewalk on one side and no shoulders and therefore presents a local system barrier for pedestrians and bicyclists. The city has expressed interest in improving active transportation connections here.

Figure F-23: Bridge gap in Bellingham not identified through network analysis approach to finding network gaps. Bridge 5/809W on I-5 passes over Lakeway Drive. I-5 at this location is prohibited to pedestrians and bicyclists, so it was not identified as an active travel gap. Bridges associated with active travel gaps were identified, but the presence of such gaps was only evaluated on the state highway system. This underpass connects the Western Washington University district to residential and commercial areas of Bellingham. It has sidewalks but no bike facilities. With five lanes and freeway ramps the location presents a local system barrier for pedestrians and bicyclists. The city has expressed interest in improving active transportation connections here.

Figure F-24: Bridge gap in Prosser that was identified through the network analysis approach to finding network gaps. Two views of Bridge 22/104 on SR 22 that passes over Lincoln Road are shown. Bridges such as this one were identified because they were associated with active travel gaps along the highway. However, gaps were only evaluated on the state highway system. The image on the right shows that this bridge has narrow sidewalks and no bike lanes, which make it a higher stress facility for pedestrians and bicyclists who are traveling along SR 22. The image on the left shows a different concern; the bridge pillars constrain the local roadway such that sidewalks and bike lanes cannot be provided here. This underpass connects a residential area to recreation, schools, and commercial destinations and the community has expressed interest in providing active transportation facilities here.

The methods used were unable to distinguish between a bridge over a pedestrian or bicyclist gap versus a bridge that allows movement along such a gap. A state system bridge that acts as the local road over a state highway where pedestrians and bicyclists are prohibited would be missed (example, bridge 0007819A on West Sylvester Street in Pasco that passes over a prohibited section of SR 395).

In addition to bridges associated with prohibited highway segments, costs were not generated for bridges in the high-speed, rural highway context. Similar to linear gaps, multiple considerations affect which bridges would be addressed first in that context (discussed in the section on high-speed rural segment gaps in Chapter 4).

Cost estimates considered retrofit options. However, the average cost of retrofits for various types of bridge structures was higher than the cost of a separated pedestrian/bicyclist bridge, so the separated cost estimate of $1,200 per square foot was used for the costs summarized in Figure F-25. A separated structure could involve additional costs related to permitting and right of way acquisition that might not apply to a retrofit; for a statewide estimate, site-specific variables such as these were not addressed. Cost estimates assumed that a separated structure intended to serve both pedestrians and bicyclists would be 14 feet wide[283]. An assumed need of 10 feet (five-foot bike lanes or five-foot sidewalk on each side) was used for pedestrian-only or bicyclist-only needs in locations that had facilities for one mode but not the other. Adding bike lanes and sidewalks to bridges through a retrofit would require similar or larger widths.

[283] AASHTO recommends a minimum of 10 feet for multi-use trails; however, where heavy use is anticipated, a 12 to 14-foot width is recommended. WSDOT Design Manual recognizes the need for 1 foot of "shy space" where solid barriers exist. The cost assumption here considered a moderate use (12-foot wide multi-use trail) with 1 foot of shy space on either side. Given that a bridge structure is likely to be in place for 60 years or more, during which time active transportation network buildout is likely to increase demand, it is prudent to anticipate higher use cases for these structures to provide forward compatibility.

Bridge Type	Total project cost
Separate pedestrian/bicyclist bridge	$1,200/SF
Pre-tensioned concrete girder or Steel Beam	$1,600/SF
Concrete Slab, Concrete T-Beam, or Concrete box	$2,400/SF
Treated Timber Trestle, Steel Thru Truss	Site specific

Figure F-25: Selected bridge types with high-level project costs, as reported by WSDOT Bridges and Structures Office.

Washington bikeways and trails network

Total cost for this opportunity category, summarized in Chapter 4 and Figure F-26 below, was found by multiplying the number of identified trail miles by an average trail cost or a maximum trail cost, depending on context assumptions. Existing and some planned trails were identified in coordination with the Recreation and Conservation Office and their data sources and by outreach to local agencies where the following were true:

- Trails that could be presumed to serve a transportation function
- Planned or conceptual trails being considered by local agencies
- Conceptual Washington Bikeways and Trails Network that would serve to link existing and locally proposed trails in a statewide network passing through population centers

Only trails that could be presumed to serve a transportation function were considered under this plan. Such trails have the potential to connect users with destinations versus only providing a recreational service within a destination (such as a loop trail in a park). Generally, only paved trails were included, but other surfaces were considered in some cases (such as the Palouse to Cascades Trail).

The cost for multi-use trails varies depending on a number of factors including availability of right of way, the presence of critical areas, and the need to cross roadway facilities. WSDOT used the average cost estimate for 85 percent of trail needs and the maximum cost estimate for the remaining 15 percent where urban areas and proximity to wetlands could make trail construction more expensive, based on Bushell et al., 2013.

Locally Proposed Trail Mileage	Cost Per Mile	Statewide Estimate
819	$1,052,000	$862,000,000
Existing, But Primitive Trail Mileage	**Cost Per Mile**	**Statewide Estimate**
464	$1,052,000	$488,000,000
Statewide Connector Trail Mileage	**Cost Per Mile**	**Statewide Estimate**
1,209	$1,052,000	$1,270,000,000
Total Trail Mileage	**Cost Per Mile**	**Total Statewide Trail Estimate**
2,492	$1,052,000	$2,620,000,000

Figure F-26: Washington Bikeways and Trails Network opportunity.

Wayfinding and signage

Total statewide need, summarized in Chapter 4 and Figure F-27 below, was found by multiplying the number of miles of planned and existing United States Bicycle Route System (USBRS) routes by a cost estimate developed as part of a development and implementation project in Skagit County. Figure F-28 provides the cost estimate breakdown for implementing 100 miles of signage for USBRS 10 in Skagit County.

Designated USBRS Route Mileage	Cost Per Mile	Existing Statewide Route Need (rounded)
864	$1,400	$1,210,000
Planned USBRS Route Mileage	**Cost Per Mile**	**Planned Statewide Route Need (rounded)**
2,340	$1,400	$3,280,000
Total USBRS Mileage	**Cost Per Mile**	**Total Statewide Route Need (rounded)**
3,204	$1,400	$4,490,000

Figure F-27: United States Bicycle Route System (USBRS) wayfinding signage program.

Fabrication Source	Cost per mile	Installation Source	Cost per mile
WSDOT	$24	WSDOT	$180
Non-WSDOT	$180	Non-WSDOT	$1,020
Total	**$204**		**$1,200**
Total cost per mile applied (rounded)			**$1,400**

Figure F-28: Estimated wayfinding cost per mile based on 2021 USBRS pilot signing project for Skagit County (source, WSDOT Northwest Region).

Addressing local needs

To characterize local need this plan considered unfunded projects from the date of the last pedestrian and bicyclist plan in 2008 through the 2021-2023 biennium. Since that time, 985 projects have gone unfunded, totaling $552,917,487. The actual need is likely higher than what is included in the backlog given that some jurisdictions do not apply for the grant programs, despite having worthwhile projects, because these are such highly competitive programs. With less than 20 percent of applicants receiving awards, agencies may not be able to justify the effort of putting forth an application. When considering unfunded local needs, it is also useful to reference Transportation Improvement Board data for the Urban Sidewalk Program and Small Cities Sidewalk Program to illustrate unmet need. Looking at a 10-year span, from FY 2012 to 2021, these programs funded 274 projects totaling $69.3M. Considering all 801 projects submitted during that 10-year period, the total funding request was $212.8M; TIB was able to fund 32.6 percent of the amounts requested. The 2020 call for projects (affecting FY 2022) for those two programs was suspended though sidewalks continue to be funded through other TIB grant programs. Local need is also emphasized by a report to the Joint Transportation Committee on city transportation funding needs. The report noted deterioration of sidewalks, lack of preservation funding, and the costs of ADA-compliant designs as issues creating a backlog of needs.[284] The local need per biennium is summarized in Figure F-29.

[284] Berk Consulting. June 2019. Assessment of City Transportation Funding Needs. Report prepared for the Joint Transportation Committee

Local Network Program or Project Category	Per Biennium
Local projects funded through active transportation grant programs	$200 million

Figure F-29: Local system active transportation grant programs.

OPERATING AND SUPPORT NEEDS

Operating/Support Program or Project Category	Per Biennium
Maintenance	$32.65 million
Engineering support, data analysis and tools*	$1.04 million

Figure F-30: Costs for program support, data, asset management and maintenance needs for active transportation facilities Estimates for these categories are based on 2021-23 labor pricing and current estimated costs for items such as data acquisition. Maintenance costs are calculated as a percentage of capital needs listed above.

*See cost breakdown below

Maintenance

Maintenance needs for active transportation include repairs to the physical facilities, pavement markings, and signage; sweeping and removal of snow, ice, and debris; and upkeep related to environmental factors such as vegetation and weather-related changes. In addition to the labor cost of maintenance activities, equipment specific to the typical width and scale of active transportation facilities may be needed. In some instances, this equipment purchase can result in a cost savings; that has not been factored into the estimate here since maintenance budgets for all assets do not meet needs as identified in the Transportation Asset Management Plan.[285,286] Accurately forecasting maintenance cost assumes a complete inventory of current assets as well as consideration of future assets. Given asset data limitations at this time, a complete understanding of maintenance costs cannot be determined. This plan considered only estimated maintenance of future assets constructed over the next 20 years using the following formula: *(Estimated Capital Cost / 20 years)(4%) = Annual Cost, and (Annual Cost)(2) = Biennial Cost*

The estimated biennial maintenance costs are shown in Figure F-30 and Figure F-31 shows the cost categories considered to determine the total future capital cost used as a basis for estimating the biennial need.

Infrastructure Program or Project Category	Total Identified Need
Speed management for safety	$1,828 million
Separated pedestrian and bicyclist facilities	$1,600 million
Crossing treatments	$283 million
Bridge retrofit/improvements for active transportation	$1,980 million
Washington Bikeways Network, regional trail system, route identification and signage	$2,620 million

285 WSDOT. Statewide Asset Management Plan.

286 WSDOT has identified significant shortfalls in maintenance funding in the annual State of Transportation address to legislative transportation committees. Maintenance level of service for highways is reported in the Gray Notebook, most recently in GNB 76, Dec. 2019.

Infrastructure Program or Project Category	Total Identified Need
Total Active Transportation Capital Cost	**$8,311 million**

Figure F-31: Costs used as basis for estimating maintenance costs.

Figure F-32 breaks out the cost elements associated with the engineering support, data analysis, and tools from Figure F-30. The capacity represented here assumes continuation of existing activities that support data collection, development of guiding documents, and other elements; the need identified is to supplement those activities with expertise specific to active transportation.

Engineering support, data analysis and tools	Cost Elements	Per Biennium
Planning and engineering: decision analysis tool	1.0 FTE, data integration, data stewardship	$0.14 million
Pedestrian and bicyclist count data collection and analysis	1.0 FTE, data purchase, counter purchase/installation, data stewardship	$0.3 million
Accessible active transportation network analysis and asset management data	1.0 FTE, asset management coordination, LiDAR data analysis and stewardship*	$0.3 million
Innovation and adaptation	1.0 FTE, facilitate active transportation opportunities in projects/programs, standards/ guidance support, provide project development support and training	$0.3 million

Figure F-32: Summary of engineering support, data analysis and tools cost elements.

* Estimate does not cover full cost of LiDAR and its use would not focus solely on active transportation asset data; this line includes an amount in support of a central resource.

Appendix G:
PLANS

This appendix describes transportation plans that have recommendations specifically related to active transportation. The state plans are listed in alphabetical order. This is an updated version of the Appendix G published in May 2021.

WHY ARE THERE SO MANY PLANS?

WSDOT develops plans as described in state law under chapter 47.06 RCW and applicable USDOT requirements. All modal plans are consistent with each other, the statewide policy plan (WTP 2040 and Beyond) and the state transportation policy goals (RCW 47.04.280). Metropolitan planning organizations (MPOs) and regional transportation planning organizations (RTPOs) prepare Regional Transportation Plans (RTP) and align transportation elements of countywide and local plans with RTPs. Counties, cities, and towns produce comprehensive plans and other plans that include aspects of active transportation, such as regional trail plans.

KEY ISSUES COMMON TO PLANS

- Define system performance, particularly how to address equity.
- Identify right-size infrastructure to meet needs of communities and established performance objectives.
- Increase system reliability.
- Improve connections to other modes.

STATEWIDE PLANS WITH ACTIVE TRANSPORTATION RECOMMENDATIONS

WSDOT develops these types of plans:

- Modes that WDOT owns or manages, such as the state highway system or state ferry system.
- Modes that the State has an interest in, such as the public transportation system, state rail system, state aviation system, and freight mobility system.
- Statewide policy level plans for all the modes.

WSDOT develops plans depending on:

- When state or federal requirements require an update. Sometimes, these timelines coincide, and plans can be combined. Other times, the deadlines do not allow for plan combination.
- Availability of data and information.
- Availability of stakeholders and the public.

Aviation System Plan (2017)

Author: WSDOT Aviation Division

Type of plan: State interest modal plan that defines the state's interest in developing a viable system of public use airports. This includes all airports, regardless of size, except private and military airports.

Community engagement

- Planners from WSDOT, MPOs and RTPOs were included on advisory groups.

Recommendations

- Support and improve multimodal connections, including multiple transportation options for users.
- Develop policy recommendations
- Identify collaborative, systematic approaches to enhance airport participation in local, regional, and statewide transportation planning activities to recognize multimodal opportunities and needs that support airport activities.
- Increase multimodal coordination, communication, and partnerships between airports and other modal representatives (state, regional, local transportation planning entities) that strengthens connectivity between modal planning and results in identification of policies that support multimodal needs.

Washington State Ferries 2040 Long Range Plan

Author: WSDOT Ferries Division

Purpose: Efficiently manage the state-owned ferry system

Community engagement

- Bicyclist and pedestrian groups served on a policy advisory group.

Recommendations

- Enhance mobility by improving pedestrian, bike, and transit connections to and from terminals.
- Prioritize bicyclist and pedestrian loading.
- Look for opportunities to incorporate improved bike and pedestrian infrastructure in terminal preservation and improvement projects.
- Continue to partner with local agencies when programming terminal projects. Synchronizing capital projects such as bike paths and sidewalks could improve connections for customers beyond the terminal for bicyclists and pedestrians.
- Meet requirements in the Terminal Design Manual. These requirements include dimensional standards that allow for more efficient and reliable operations and the safe movement of motorized and non-motorized vehicle operators and pedestrians on and off the vessel, through the terminal, and ultimately connecting them to their transit or other means of transportation.

Washington State Freight System Plan (2017)

Author: WSDOT Rail, Freight and Ports Division

Purpose: Define the state's interest in freight mobility and maintain eligibility for FHWA freight funds.

Community engagement

- Planners from WSDOT, MPOs, RTPOs, Tribes, freight shippers, and freight companies were included on advisory groups.

Issues for further recommendation development

- Due to their size and weight, heavy trucks pose higher risks of death and serious injury in crashes, particularly for the other involved drivers. This also is true for other roadway users, especially in urbanized areas, where trucks have greater exposure to pedestrian and bicyclist activity.
- More than 60 percent of fatal truck crashes and nearly 35 percent of serious injury truck crashes in Seattle involved pedestrians or bicyclists.

Highway System Plan (2007; update under way 2021)

Author: WSDOT Multimodal Planning and Data Division

Purpose: Efficiently manage the state-owned highway system

Community engagement

- Input was gathered from local governments, reginal planning agencies, and private transportation providers.

Recommendations

- Fully fund ability to plan, participate in planning efforts, or develop a community's transportation future depends on having trained planning staff. This is a key issue for many of Washington State's tribes, small cities, and counties that lack funding for such planning capacity.
- Coordinate with the Growth Management Services Division of the Department of Commerce. WSDOT and Commerce should convene a task force to identify sources and ways of pooling funds in order to support local governments seeking assistance in addressing the Growth Management Act requirement to include a pedestrian and bicycle component in comprehensive plans. Pedestrian and bicycle facilities and network constructed to provide for safe and healthy transportation options through walking and biking.

Washington Statewide Human Services Transportation Plan (2013; update underway 2021)

Author: WSDOT Public Transportation Division

Purpose: Serves as a strategic framework for addressing the state's existing and future human services transportation needs. The Federal Transit Administration defines human service transportation to include "a broad range of transportation service options designed to meet the needs of transportation disadvantaged populations including older adults, disabled persons and/or those with lower income. Individuals have different needs and may require a set of different services depending on their abilities, their environment, and the options available in their community. Examples may include dial-a-ride (responding to individual door-to-door transportation requests), the use of bus tokens and/or transit passes for fixed route scheduled services, accessing taxi vouchers and/or mileage reimbursement to volunteers or program participants."

Community engagement:

- Specific outreach was made to engage with populations that depend on human services transportation such as veterans, low income, and those with disabilities. Public Transportation Division and Active Transportation Division presented together to the 2021 annual conference for those who work in this arena to encourage greater integration of active transportation consideration into local and regional human services transportation plans.

Recommendations

- Still in draft as of 2021. Will focus on improving access to transportation statewide for people with special needs and to those who are unable to transport themselves due to physical or mental limitations, income, or age.

Washington State Public Transportation Plan (2016)

Author: WSDOT Public Transportation Division

Purpose: Describe the state's interest in providing public transportation facilities and services

Community engagement

- Bicyclist and pedestrian groups served on advisory groups.

Recommendations

- Align and coordinate transportation investments to support local comprehensive plans and community priorities, such as improving first- and last-mile pedestrian connections to transit or connections between buses and ferries.
- Develop and implement integrated, multimodal system improvements that move more people in fewer vehicles and at least cost.
- Develop tools and processes to promote timely adoption of innovations that improve the customer experience.
- Test pilot service concepts to increase vehicle occupancy and use of public transportation, including transit, active transportation, ride-hailing, telework and more.

Washington State Rail Plan (2019)

Author: WSDOT Rail, Freight and Ports Division

Purpose: Describe the state's interest in the statewide freight and passenger rail system. Efficiently manage WSDOT managed Amtrak Cascades and Palouse River and Coulee City rail.

Community engagement

- Planners from WSDOT, MPOs, RTPOs, Tribes, freight shippers, freight companies were included on advisory groups.
- Specific outreach was made to communities that live near passenger rail at-grade crossings to promote Operation Lifesaver educational events.

Recommendations

- Improve multimodal connectivity for passenger rail and commuter rail stations, including infrastructure around stations for pedestrians, bicyclists, transit riders, and drop-off passengers. WSDOT can use the analytical methods in the active transportation plan to prioritize locations for future projects.
- The plan identifies several funding sources for pedestrian/bicyclist improvements specifically around rail lines:
- WSDOT can utilize FHWA Section 130 Railway-Highway Crossings funding for crossing improvements.
- Sound Transit can utilize its System Access Fund to make it easier and more convenient to get to ST and partner services, including projects to develop safe sidewalks, protected bike lanes, and shared-use paths.
- The Utilities and Transportation Commission administers the Grade Crossing Protective Fund that provides grants; these can include pedestrian improvements.
- Use the active transportation plan analysis that will identify gaps in the state network of pedestrian and bicycle trails. This network analysis could help local communities determine whether a rail line entering the abandonment process can address an identified statewide need for a trail.
- Railroads and public agencies can partner on rail safety education initiatives.
- Communities can identify safer alternate routes for pedestrians and bicyclists, including "rail with trail" facilities that need to be designed to discourage trespassing and maximize safety.
- Local jurisdictions can take the lead on grade separation projects in their communities.

Strategic Highway Safety Plan (2019 Target Zero)

Author: WSDOT Traffic Division with cooperation from the Washington State Traffic Commission

Purpose: Maintain federal traffic safety improvement funding by developing a multi-agency approach to reducing the number of traffic fatalities and serious injuries**.**

Community engagement

- WSDOT, Washington Traffic Safety Commission, State Patrol, emergency medical services providers, local governments, and tribal governments were included in development of the plan.
- The Cooper Jones Active Transportation Safety Council and public were invited to review and comment on the draft plan.

Recommendations

- Reduce speeds through design and speed limits.
- Address crossings.
- Provide infrastructure that reduces the likelihood of a crash occurring and the severity of a crash if one does occur.

WTP 2040 and Beyond (2018)

Author: Washington State Transportation Commission with assistance from WSDOT

Purpose:

Community engagement

- Bicycle users and pedestrian groups were included on a plan advisory group.
- Planners from WSDOT, MPOs, RTPOs participated.

Recommendations

- Increase revenues dedicated to transportation system safety education and enforcement activities.
- Support efforts to increase reliable multimodal travel for people and goods in communities across the state, recognizing that the diverse nature of places, needs, and opportunities statewide require equally diverse strategies applicable to those communities.
- Encourage the design and development of communities that make walking and biking more viable for more people and increase opportunities for active travel for all ages.

Long-range statewide transportation plan (WTP Phase 2 Implementation 2017-2040)

Author: WSDOT Multimodal Planning and Data Division

Purpose: This plan identifies transportation issues and facilities that cross local and regional boundaries that are vital to the statewide economy and the cross-state mobility of people and goods. This plan is consistent with all the FHWA required plans. Projects in the STIP must be consistent with this plan.

Community engagement

- Bicycle users and pedestrian groups were included on a plan advisory group.
- Planners from WSDOT, regional transportation bodies (MPOs and RTPOs), Tribes, and federal land management agencies participated.

Recommendations

- Maintain, preserve, and operate assets and manage demand to meet desired performance on multimodal transportation systems before funding expansion projects.
- Prioritize access for people and goods, instead of throughput for vehicles, to improve multimodal options, livable communities, and economic vitality for people and businesses.
- Provide transportation facilities and services to support the needs of all communities, with a focus on equity for populations with specialized needs, those in rural areas, and those who are traditionally underserved.
- Support funding flexibility to reduce barriers and create an integrated multimodal system that achieves performance objectives.

REGIONAL, LOCAL, AND TRIBAL PLANS

A major role of both Metropolitan Planning Organizations (MPO) and Regional Transportation Planning Organizations (RTPO) is to prepare Regional Transportation Plans (RTP) and align transportation elements of countywide and local plans with RTPs. While many jurisdictions may find it useful to develop a separate document for active transportation planning, a standalone plan is not always preferred. Such planning may constitute part of the transportation element of a comprehensive plan, for example. In addition, regional agencies may produce plans specific to active transportation such as a bicyclist plan, pedestrian plan, Safe Routes to School assessment, or a regional trails plan.

Counties produce comprehensive plans and may develop plans that address specific population centers within the county. Incorporated cities and towns produce comprehensive plans and may have mode-specific plans.

WSDOT conducted an online search in 2019-2020 to identify bicyclist, pedestrian, active transportation, or trails plans. This search did not identify every plan that includes components relevant to active transportation. Public comment helped identify additional plans and WSDOT will continue to work with partners to update this inventory.

MPOs and RTPOs

WSDOT provides oversight and fiduciary responsibilities for 12 federally designated metropolitan planning organizations (MPOs) and 16 state regional transportation planning organizations (RTPOs). The WSDOT tribal and regional planning web page provides more information. If no link is listed a plan document was not identified in the initial inventory. WSDOT will continue to update the list.

Benton-Franklin Council of Governments (BFCG) MPO and Benton-Franklin RTPO

- Regional Active Transportation Plan
- Transition 2040

Chelan-Douglas Transportation Council

- Wenatchee Valley Bicycle Master Plan
- 2020 Chelan-Douglas Regional Transportation Plan Update

Cowlitz-Wahkiakum Council of Governments (CWCOG) & Southwest Washington Regional Transportation Planning Organization (SWRTPO)

- Bicycle and Pedestrian Assessment Cowlitz-Wahkiakum Council of Governments
- 2045 Regional Transportation Plan Cowlitz-Wahkiakum Council of Governments

Grays Harbor Council of Governments

- Grays Harbor Regional Transportation Plan

Island Regional Transportation Planning Organization (IRTPO)

- Island Access 2040 Regional Transportation Plan for the Island Region

Lewis Clark Valley Metropolitan Planning Organization (LCVMPO)

- Lewis Clark Valley Metropolitan Planning Organization Bicycle Master Plan
- Lewis Clark Valley Metropolitan Planning Organization ADA R-O-W Inventory

Northeast Washington Regional Transportation Planning Organization (NEW RTPO)

- Northeast Washington Regional Transportation Plan

Okanogan Council of Governments (OCOG)

Palouse Regional Transportation Planning Organization (Palouse RTPO)

- Palouse Regional Transportation Plan
- Blue Mountain Region Trails Plan
- Palouse School Walk Study

Peninsula Regional Transportation Planning Organization (PRTPO)

- Peninsula Regional Non-Motorized Connectivity Study
- Peninsula Regional Transportation Plan

Puget Sound Regional Council (PSRC) MPO and RTPO

- Puget Sound Regional Council Regional Transportation Plan

Quad-County Regional Transportation Planning Organization (QuadCo RTPO)

- Quad-County Regional Transportation Plan

Skagit Council of Governments (SCOG) MPO & RTPO

Southwest Washington Regional Transportation Council (RTC) MPO and RTPO

- Regional Transportation Plan for Clark County

Spokane Regional Transportation Council (SRTC) MPO and RTPO

- Spokane Regional Transportation Council Unified Planning Work Program
- Spokane Regional Transportation Council Pedestrian Plan
- Horizon 2040 Spokane Metropolitan Transportation Plan
- Spokane West Plains Transportation Subarea Plan

Thurston Regional Planning Council (TRPC) MPO and RTPO

- What Moves You Regional Transportation Plan 2045 for the Thurston Region, Washington State
- Thurston Regional Trails Plan 2007

Walla Walla Valley Metropolitan Planning Organization (WWVMPO) & Walla Walla Sub-Regional Transportation Planning Organization

- Walla Walla Valley Sub-Regional Transportation Planning Organization Comprehensive Plan Review and Certification Manual
- Walla Walla Valley Sub-Regional Transportation Planning Organization Metropolitan and Regional Transportation 2040 Plan
- Blue Mountain Region Trails
- Blue Mountain Region Trails Plan
- Walla Walla Valley Metropolitan and Regional Transportation 2045 Plan

Whatcom Council of Governments (WCOG) MPO and RTPO

- Whatcom Council of Governments Whatcom Mobility 2040
- Mount Baker Highway Corridor Management Plan

Yakima Valley Conference of Governments (YVCOG) MPO and RTPO

Counties

If no link is listed a plan document was not identified in the initial inventory.

Adams County

Adams County Bicycle & Pedestrian Plan 2013

Asotin County

Benton County

Chelan County

Clallam County

Clark County

Clark County, WA Bicycle and Pedestrian Master Plan

Columbia County

Cowlitz County

Douglas County

Ferry County

Franklin County

Garfield County

Grant County

Grays Harbor County

Grays Harbor Active Living Project Biking Assessment

Island County

Island County Non-Motorized Trail Plan 2018

Jefferson County

Jefferson County Comprehensive Plan

King County

King County Open Space Plan: Parks, Trails, and Natural Areas 2016 Update

King County Metro Connects

Kitsap County

Kitsap County Non-Motorized Facility Plan

Kittitas County

Klickitat County

Regional Transportation Plan for Klickitat County, Washington

Lewis County

Lincoln County

Mason County

Mason County Regional Trails Plan

Okanogan County

Okanogan County Outdoor Recreation Plan 2020

Pacific County

Pend Oreille County

Pierce County

Pierce County Regional Trails Plan

Pierce County Safe Routes to School Prioritization Analysis 2019 Update

Pierce County Comprehensive Plan Transportation Element Active Transportation/Nonmotorized Transportation

San Juan County

San Juan County Parks, Trails, and Natural Areas Plan Non-motorized Transportation Plan 2017-2022

Skagit County

Skamania County

Regional Transportation Plan for Skamania County, Washington

Snohomish County

Spokane County

- Spokane County Comprehensive Plan
- Mead-Mt Spokane Transportation Area Plan
- Spokane County Comprehensive Plan Transportation Element

Stevens County

Thurston County

Wahkiakum County

- Wahkiakum County Park and Recreation Plan

Walla Walla County

Whatcom County

Whitman County

Yakima County

- Yakima County Trails Plan 2020

Cities and Towns

If no link is listed no plan was identified in the initial inventory. A place not listed here may be a census-designated place that is not an incorporated municipality. WSDOT included CDPs in the definition of population centers used for analysis in this plan. County comprehensive and transportation plans should address CDPs.

Aberdeen

- Aberdeen Comprehensive Land Use Plan

Airway Heights

- Transportation Circulation Plan

Albion

Algona

- 2015 Comprehensive Plan

Almira

Anacortes

- 2016 Anacortes Comprehensive Plan

Arlington

- City of Arlington Bicycle Improvement Plan, October 2018
- City of Arlington Pedestrian Improvement Plan, October 2018

Auburn

Bainbridge Island

- Nonmotorized Transportation Plan

Battle Ground

- Transportation System Plan & Update

Beaux Arts Village

Bellevue

- Pedestrian-Bicycle Plan
- Transportation Facilities Plan

Bellingham

- Bicycle Master Plan
- Pedestrian Master Planning

Benton City

Bingen

Black Diamond

- City of Black Diamond Comprehensive Plan
- City of Black Diamond, Washington Trails Plan

Blaine

- City of Blaine Non-Motorized Transportation Plan

Bonney Lake

- Community Mobility Element

Bothell

- Imagine Bothell Comprehensive Plan

Bremerton

- Non-Motorized Transportation Plan

Brewster

Bridgeport

Brier

Buckley

Bucoda

Burien

- Master and Facility Plans

Burlington

Camas

- Transportation System Plan

Carbonado

Carnation

Cashmere

Castle Rock

Cathlamet

Centralia

2018 Comprehensive Plans and Documents

Chehalis

Chehalis Comprehensive Plan

Chelan

2017 Comprehensive Plan Update

Cheney

Long-Range Planning

- Chewelah

Clarkston

Lewis Clark Valley MPO Bicycle Master Plan

Cle Elum

City of Cle Elum Bicycle and Pedestrian Plan

Clyde Hill

Colfax

College Place

Colton

Colville

Conconully

Concrete

- Concrete Trail System Concept Plan

Connell

Cosmopolis

Coulee City

Coulee Dam

Coupeville

Covington

Creston

Cusick

Darrington

Davenport

Dayton

Deer Park

Des Moines

DuPont

Duvall

East Wenatchee

Eatonville

Edgewood

Edmonds

City of Edmonds Bicycle Plan

City of Edmonds Non-Motorized System

Electric City

Ellensburg

City of Ellensburg Active Transportation Plan

Elma

Elmer City

Endicott

Entiat

Enumclaw

Comprehensive Plan City of Enumclaw 2015 Chapter 5 Transportation

Ephrata

Everett

- Everett Comprehensive Plan Transportation Element
- Everett Comprehensive Plan
- Everett Bicycle Master Plan

Everson

Fairfield

Farmington

Federal Way

- City of Federal Way Bicycle and Pedestrian Master Plan

Ferndale

Fife

Fircrest

Forks

Friday Harbor

Garfield

George

Gig Harbor

- Gig Harbor Comprehensive Plan

Gold Bar

Goldendale

Grand Coulee

Grandview

Granger

Granite Falls

Hamilton

Harrah

Harrington

Hartline

Hatton

Hoquiam

Hunts Point

Ilwaco

Index

Ione

Issaquah

Kahlotus

Kalama

Kelso

Kenmore

Kennewick

- City of Kennewick 2040 Transportation System Plan

Kent

- City of Kent Transportation Master Plan
- Kent Valley Loop Trails Master Plan

Kettle Falls

Kirkland

- City of Kirkland More People, More Places, More Often An Active Transportation Plan
- Kirkland 2035 Transportation Master Plan

Kittitas

Krupp

La Center

- La Center Comprehensive Plan 2016-2035

La Conner

Lacey

- Pedestrian and Bicycle Plan for the City of Lacey and Lacey UGA

La Crosse

Lake Forest Park

Lake Stevens

Lakewood

Lamont

Langley

Latah

Leavenworth

Liberty Lake

- City of Liberty Lake Comprehensive Plan

Lind

Long Beach

Longview

Lyman

Lynden

- City of Lynden Park and Trail Master Plan

Lynnwood

- Multi-Choice Transportation System
- Connect Lynnwood: Active and Accessible Transportation Plan

Mabton

Malden

Mansfield

Maple Valley

- Maple Valley Non-Motorized Transportation Plan

Marcus

Marysville

Mattawa

McCleary

Medical Lake

Medina

- City Of Medina Comprehensive Plan

Mercer Island

- Pedestrian and Bicycle Facilities Plan

Mesa

Metaline

Metaline Falls

Mill Creek

Millwood

Milton

Monroe

Montesano

Morton

Moses Lake

- Moses Lake Activity Trails Master Plan

Mossyrock

Mount Vernon

- Transportation Element Of The Comprehensive Plan (2016 to 2036)

Mountlake Terrace

Moxee

Mukilteo

- City of Mukilteo By The Way Plan

Naches

Napavine

Nespelem

Newport

- City of Newport Comprehensive Plan

Nooksack

Normandy Park

North Bend

North Bend Comprehensive Plan

North Bonneville

Northport

Oak Harbor

Oak Harbor Transportation Plan

Oakesdale

Oakville

Ocean Shores

Odessa

Okanogan

Olympia

Transportation Master Plan

Omak

Oroville

Orting

Othello

Pacific

City Of Pacific Comprehensive Plan – Chapter 8: Transportation

City Of Pacific Comprehensive Plan – Chapter 7: Park, Open Space, Recreation & Trails

Palouse

Pasco

Pasco Bicycle & Pedestrian Master Plan

City of Pasco Americans with Disability Act Sidewalk Transition Plan

Pateros

Pe Ell

Pomeroy

Port Angeles

Port Orchard

Port Townsend

Non-Motorized Transportation Plan

Poulsbo

Urban Paths of Poulsbo

Prescott

Prosser

Pullman

Washington State University Bicycle and Pedestrian Plan

Puyallup

City of Puyallup Active Transportation Plan

Quincy

Rainier

Raymond

Reardan

Redmond

Transportation Master Plan

Renton

Trails and Bicycle Master Plan

Republic

Richland

Citywide Transportation Plan (includes Bicycle and Pedestrian plans)

Ridgefield

City Of Ridgefield Multimodal Transportation Plan

Ritzville

Riverside

Rock Island

Rock Island

Rockford

Rosalia

Roslyn

Roy

Royal City

Ruston

Sammamish

- 2004 Trails, Bikeways & Paths Plan

SeaTac

Seattle

- Bicycle Master Plan
- Pedestrian Master Plan

Sedro-Woolley

Selah

Sequim

Shelton

Shoreline

- Bicycle Plan

Skykomish

Snohomish

- Transportation Master Plan City Of Snohomish

Snoqualmie

Soap Lake

South Bend

South Cle Elum

South Prairie

Spangle

Spokane

- Bicycle Master Plan website
- City of Spokane Comprehensive Plan Part VI: Spokane Bicycle Master Plan
- Pedestrian Master Plan website
- Draft City of Spokane Transition Plan
- Downtown Plan Update
- South University District Sub-Area Planning
- US 195/Interstate 90 (I-90) Transportation Study (Executive Summary)

Spokane Valley

- Spokane Valley Comprehensive Plan 2017-2037

Sprague

Springdale

St. John

Stanwood

- Stanwood Transportation Plan

Starbuck

Steilacoom

Stevenson

Sultan

Sumas

Sumner

- Sumner Parks & Trails Plan

Sunnyside

Tacoma

- Tacoma Transportation Master Plan
- 2010-2011 Mobility Master Plan Progress Report

Tekoa

Tenino

Tieton

Toledo

Tonasket

Toppenish

Tukwila

- City of Tukwila's Non Motorized Plan

Tumwater

- Tumwater City Plan 2036 Transportation Master Plan

Twisp

- 2014 Twisp Trail & Recreation Plan

Union Gap

- City Of Union Gap Comprehensive Plan

Uniontown

University Place

Vader

Vancouver

- City of Vancouver Transportation Plan

Waitsburg

Walla Walla

- City of Walla Walla Six Year Comprehensive Transportation Program (CTP) 2019–2024

Wapato

Warden

Washougal

- City of Washougal 2015 – 2035 Comprehensive Plan (2016 Update)

Washtucna

Waterville

Waverly

Wenatchee

- City of Wenatchee Complete Streets Policy
- Wenatchee Valley Bicycle Master Plan

West Richland

- City of West Richland Comprehensive Plan 2017 Update
- City of West Richland Parks and Recreation Master Plan Update 2012

Westport

White Salmon

Wilbur

Wilkeson

Wilson Creek

Winlock

Winthrop

- Winthrop In Motion

Woodinville

- Non-Motorized Transportation Plan

Woodland

Woodway

Yacolt

- Comprehensive Growth Management Plan

Yakima

- Bike Yakima Bicycle Master Plan

Yarrow Point

- Town Of Yarrow Point Comprehensive Plan

Yelm

Zillah

Tribes

If no link is listed a plan document was not identified in the initial inventory.

Chehalis

- Confederated Tribes of the Chehalis Indian Reservation's Park and Recreation Plan

Colville

Cowlitz

Hoh

Jamestown S'Klallam

- Outdoor Recreation Plan
- Tribal Comprehensive Plan

Kalispel

Lower Elwha

Lummi

Makah

Muckleshoot

Nisqually

Nooksack

Port Gamble

Puyallup

Quileute

Quinault

Samish

Sauk-Suiattle

Shoalwater

Skokomish

Snoqualmie

Spokane

- Sustainable Community Master Plan

Squaxin Island

Stillaguamish

Suquamish

Swinomish

Tulalip

Upper Skagit

Yakama

Appendix H:
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Appendix I:
MAPS

PLANNING FOR TRAILS AND UNITED STATES BICYCLE ROUTE SYSTEM

Chapter 3 highlighted some of the high-level trail system planning and bicyclist touring route planning that was conducted as part of the ATP data analysis process. Data inputs for this effort included:

- Existing trails that are owned and operated by a variety of public agencies including cities, counties, state parks and WSDOT and that appear to serve a transportation function.
- Planned or conceptual trails associated with cities, counties, regional transportation planning organizations, or other local public organizations that will likely serve a transportation function.
- Existing and conceptual United States Bicycle Route System (USBRS) routes in Washington state.

Existing trails

There is no single, comprehensive, public database for trail information in Washington state so identifying all of the existing and planned/concept trails is challenging. WSDOT, working with Recreation Conservation Office (RCO) partners, identified Washington Hometown as the best developed resource for locating and verifying many of the state's existing trails.

Although RCO is interested in all trails and the Washington Hometown database catalogues many hundreds of them, WSDOT limited its planning focus to trails that appear to serve a transportation function. Transportation function was loosely defined as facilities providing access to destinations such as residences, jobs, school, shopping and other services. Access to parks was also counted as a transportation function, but a loop trail within a park was considered to primarily provide a recreational function. Most to the transportation function trails identified were paved. Ideally, all of them would be fully ADA accessible, however many paved trails have accessibility issues because of slopes and other circumstances. In some cases trails were included with relatively primitive surfaces, such as the Palouse to Cascades or Willapa Hills trails. These trails offer significant regional and even cross-state connectivity and some or all of their extent could be made more accessible in the future.

Planned/conceptual trails

Many of the planned and conceptual trails identified were collected through outreach to local agency/organization planners. Trails were submitted in a form that could be used in GIS (shapefile, GDB, KMZ). The trails were in various stages of planning, from newly identified concepts to funded projects. It is expected that the number of included trails will increase over time as planning efforts for new trails advance.

USBRS routes

The USBRS in Washington is still under development. One cross-state route, USRBR 10, and four shorter routes in the northern Puget Sound arear (USBR 87, 95, and 97) are currently recognized by AASHTO. Planning for some of the other conceptual routes is under discussion, including regular regional stakeholder meetings aimed at establishing the eastern Washington half of USBR 20 and significant development of the USBR 81 concept route. Figure I. 1 provides a more detailed map of the current and proposed USBRS system for Washington State. Other than proposed signage, USBRS routes are not specifically improved for bicyclists though they may offer benefits not available on other roadways open to bicycling such lower traffic volumes, connections to services and scenic value. Most of the proposed USBRS routes follow state routes, though adopted routes may deviate from the state corridor. Portions of some USBRS routes follow separated, multi-use trails.

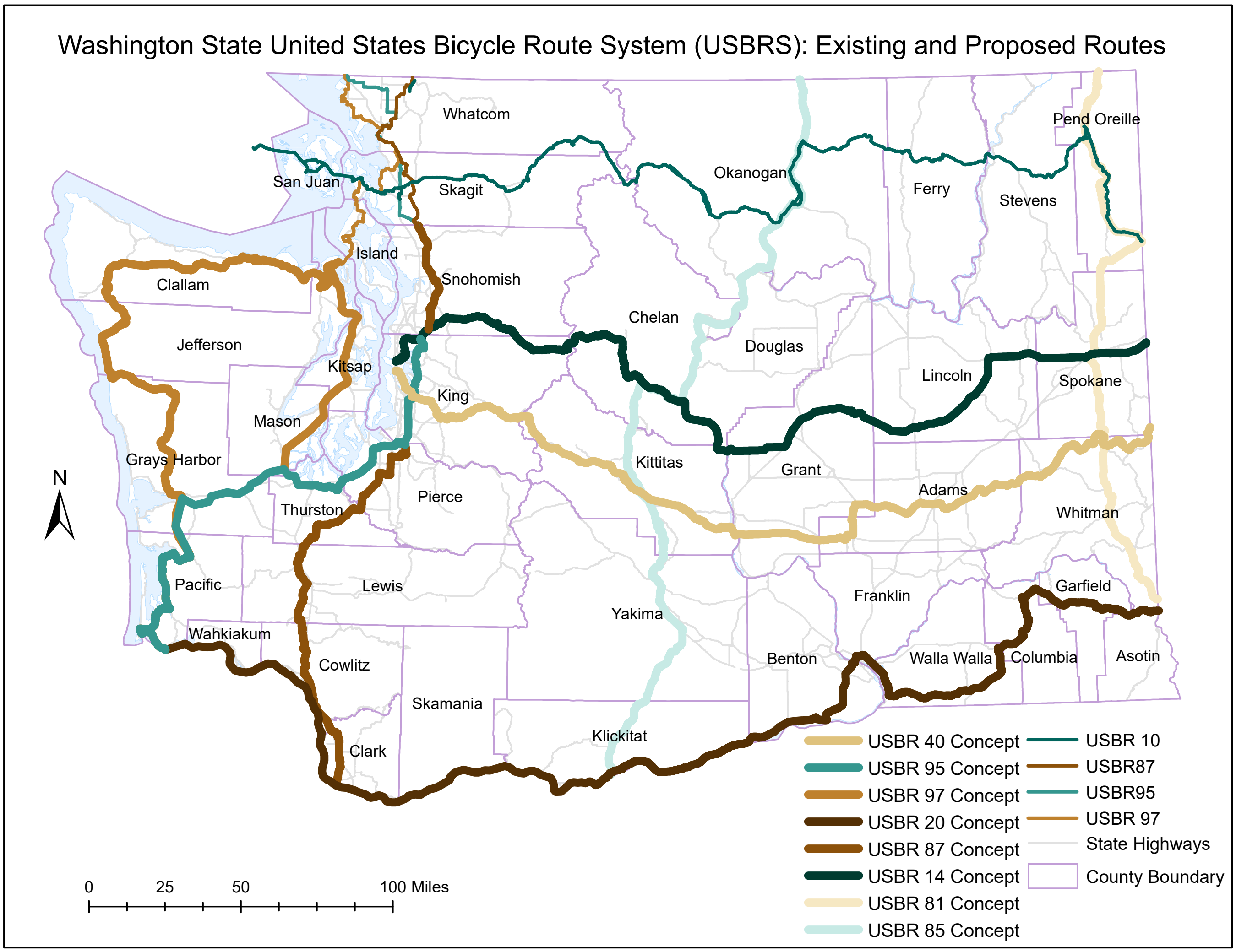

Figure I-1: Existing and conceptual United States Bicycle Route System routes in Washington state. The conceptual routes shown continue to be developed, and already designated routes may be adjusted to take advantage of better facilities as those are developed. In April 2021 WSDOT applied for designation of portions of USBR 81, 281, 20 and 40 in southeast Washington. There has also been recent planning work done to extend the USBR 40 concept route through Kitsap, Jefferson and Clallam counties, terminating in La Push, and other spur options are also being explored.

Statewide concept trails

By mapping the three data sets outlined above, a conceptual network of statewide trails was developed for the ATP. These trails provide a high-level conceptual framework for discussing the potential for a future connected network of multiuse trails across the state. Developing such a network is a long-term aspiration and it would involve input and resources from many agencies and stakeholders. Figure I-2 shows these trails in gold along with existing trails and those that are being considered locally. The statewide concept trails primarily create links between the other mapped trails, link population centers and follow existing and proposed USBRS routes where possible. Small gaps exist for the statewide concept trails where they reach municipal boundaries with the idea that local planning would lead route discussions inside those boundaries.

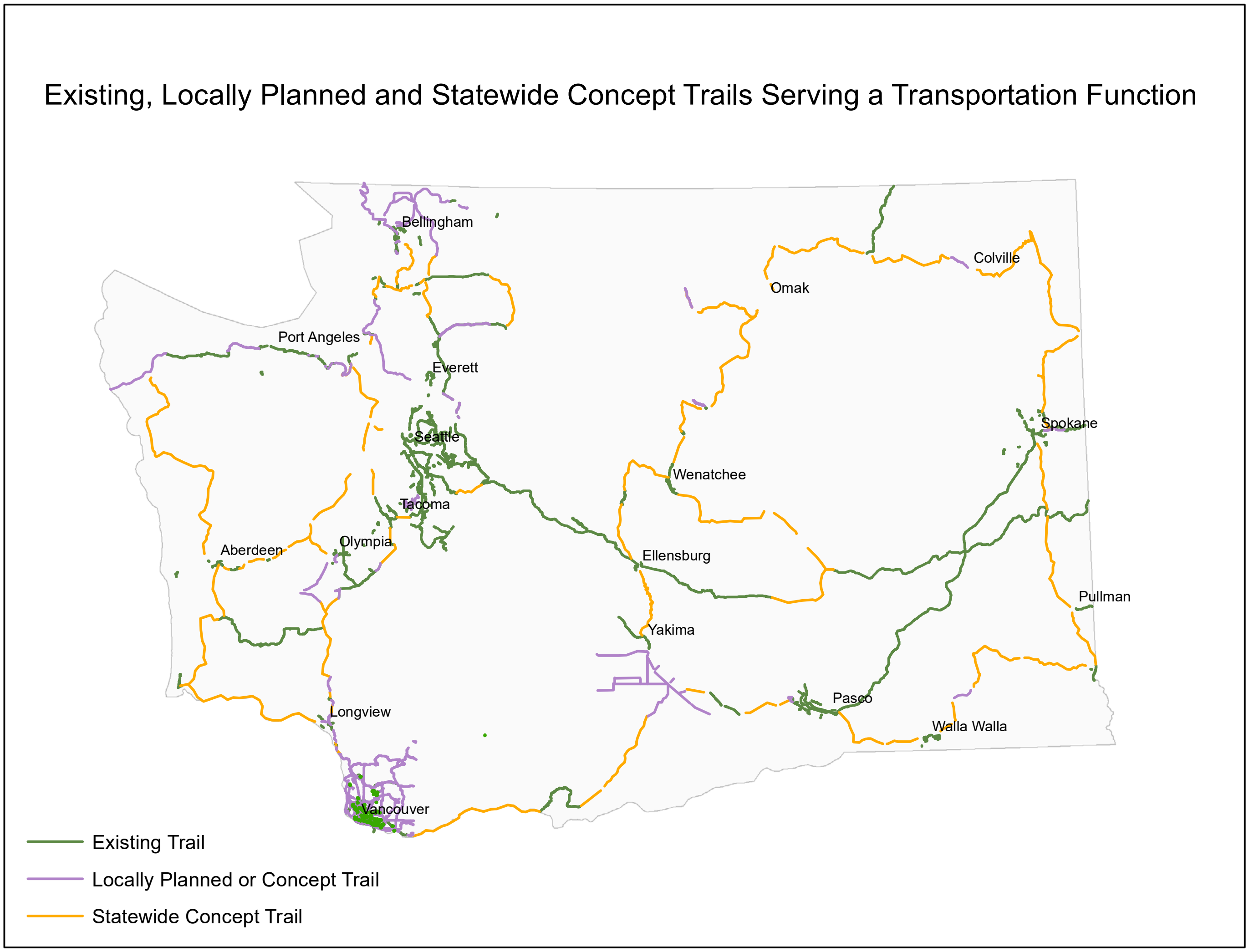

Figure I-2: This map shows existing trails, plans or concepts obtained from local agencies/organizations and a set of conceptual linkages referred to as Statewide Concept Trails.

Existing and planned/conceptual trails by WSDOT region

This section maps existing and planned or concept trails by WSDOT region. In addition to showing one map per region, enlargements for some areas are provided to show where extensive trail networks exist or where significant network planning exists. The maps also include the names of population centers. A list of named existing and planned/concept trails is also provided, however, they are not cross referenced to the maps due to scale limitations and the early development of this mapping effort. In some cases, trail concepts provided by agencies/organizations did not include a name and/or it was unclear which segments were associated with a given trail name. In addition to the trail names, county references (and cities/towns in some cases) are provided, however, this does not imply that a given county or city/town would serve as the lead for a given trail development effort.

South Central Region

Existing

County	Trail Name	City (if applicable)
Asotin	Greenbelt Trail	Clarkston
	Scenic Way Bike & Pedestrian Path	
Benton	Badger Mountain Community Park Trail	Richland
	Belmont Blvd Bike Path	West Richland
	Butte Bike Lane	West Richland
	Claybell Park Pathway	Richland
	Columbia Park Trail	Kennewick
	Fallon Drive Bike Lane	West Richland
	Greenbelt Trail	Richland
	Hanford Trail	
	Harrington Rd Bike Lane	West Richland
	Horn Rapids Pathway	Richland
	Keene Rd Bike Path	West Richland
	Keene Road Trail	Richland
	Keene Road Trail	West Richland
	Lower Yakima Valley Pathway	
	Park at the Lakes Bike Paths	West Richland
	Richland Riverfront Trail	
	Riverfront Trail	Richland
	Riverfront Trail	Richland
	Sacagawea Heritage Trail	Kennewick
	Sacagawea Heritage Trail	Richland
	Spirit of America Trail	Kennewick
	Steptoe Road Trail	Kennewick
	Steptoe Road Trail	Richland
	Urban Greenbelt Trail	Richland

County	Trail Name	City (if applicable)
Franklin	A Street Pathway	Pasco
	Columbia Plateau State Park Trail	
	Interstate 1-82 Bike Route	Pasco
	Sacagawea Heritage Trail	Pasco
	Sacajawea Heritage Trail	Pasco
	Sacajawea Historical State Park	Pasco
Kittitas	Carey Lakes Loop	Ellensburg
	Irene Rinehart Riverfront Park Trail	Ellensburg
	John Wayne Trail Connector	Ellensburg
	Lodge Loop	
	McElroy Park Loop	Ellensburg
	Nelson Dairy Loop	
	Palouse to Cascades State Park Trail	
	Ridge Loop	
	Rotary Park Loop	Ellensburg
Walla Walla	College Ave-Old Milton Hwy Trail	
	Fort Walla Walla Bike Trail	Walla Walla
	Highway 12 Trail	
	Hood Park Pathway	Pasco (Burbank)
	Kingfisher Trail	
	Meadow Lark Trail	
	Mill Creek Trail	
	Myra Road Trail	
	N 13th Ave Trail	Walla Walla
	Provenance Loop Trail	Walla Walla
	US12 Snake River Bridge Trail	Yakima
	Whitetail Trail	
Yakima	SR-24 Yakima Bridge Trail	Yakima
	Yakima Greenway Trail	Yakima

Planned or conceptual

County	Trail Name	City (if applicable)
Benton	Belmont Blvd Bike Path	West Richland
	Darcy Rd Bike Path	West Richland
	Keene Rd Bike Path	West Richland
	West Richland Planned Bike Lane	West Richland
Walla Walla	Dayton to Waitsburg Rail Trail	Dayton/Waitsburg
Yakima	Heritage Connectivity - Union Gap to Parker	Yakama Nation
	Heritage Connectivity - Parker to Wapato	Yakama Nation
	Heritage Connectivity - Wapato to Toppenish	Yakama Nation
	Heritage Connectivity - Toppenish to White Swan to Ft. Simcoe	Yakama Nation
	Other Heritage Connectivity Trail Options	Yakama Nation

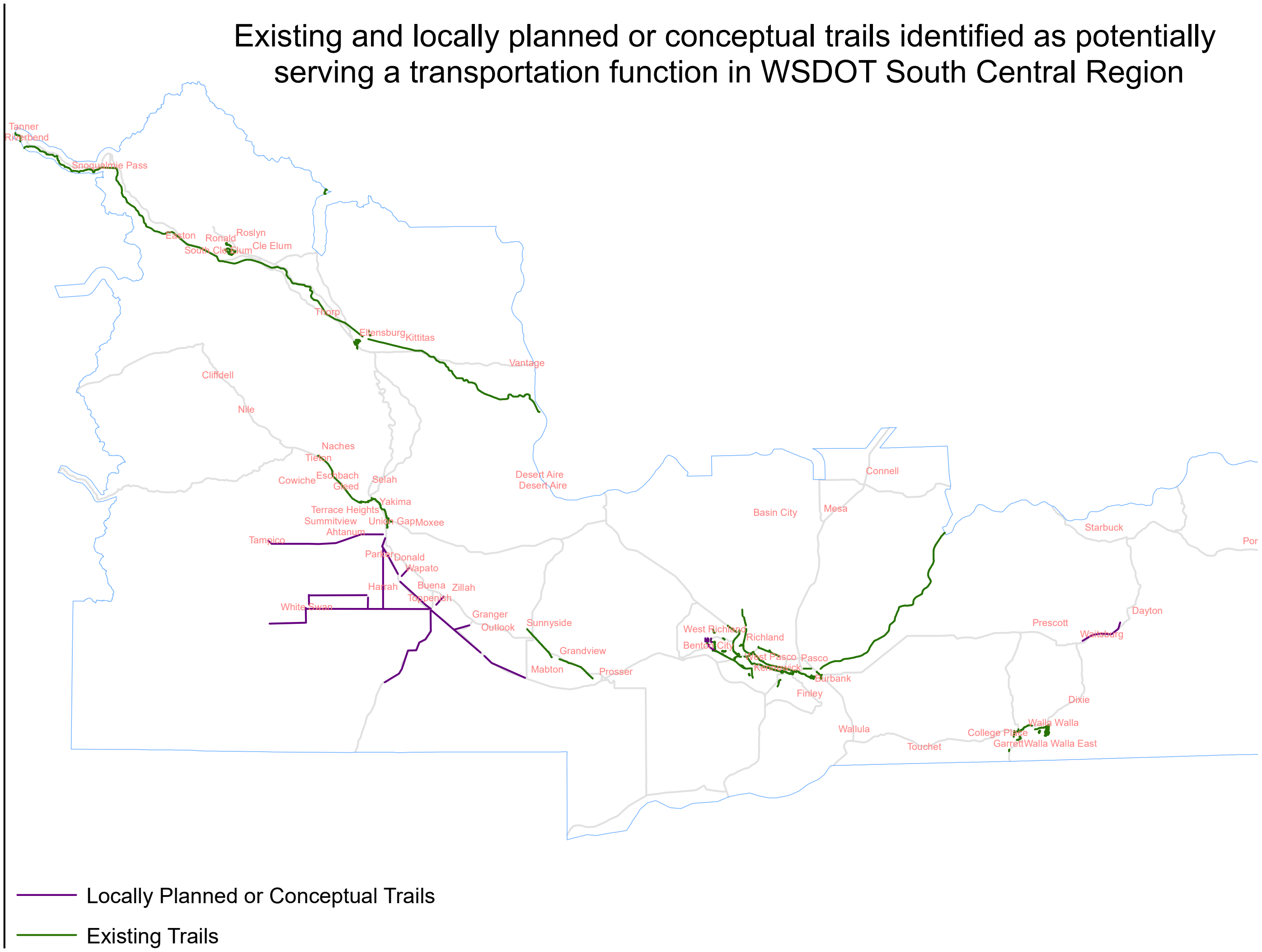

Figure I-3: WSDOT South Central Region existing and locally planned/conceptual trails.

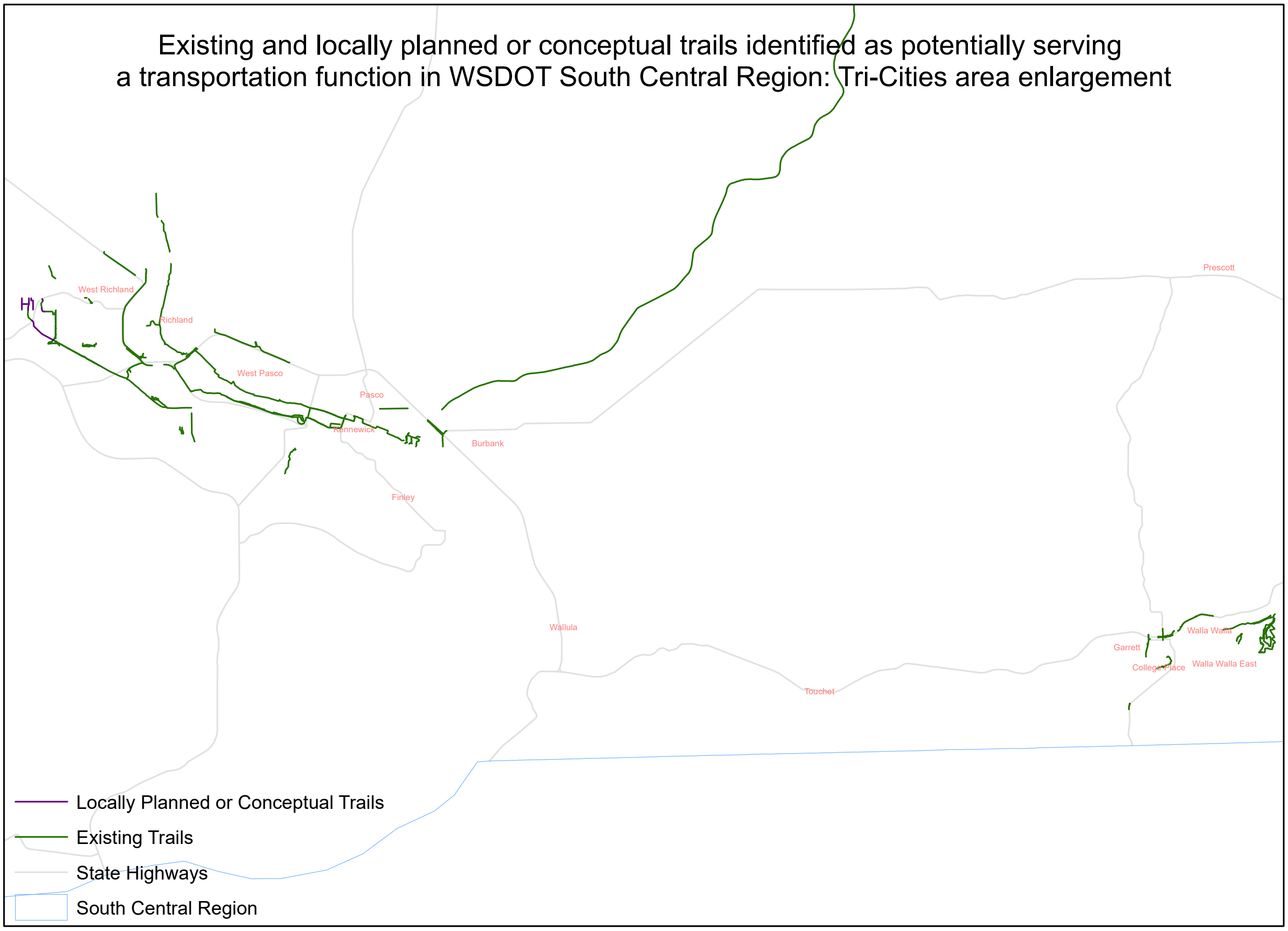

Figure I-4: Tri-Cities area enlargement of WSDOT South Central Region existing and locally planned/conceptual trails.

Southwest Region

Existing

County	Trail Name	City (if applicable)
Clark	Brezee Creek Trail	
	Burnt Bridge Creek Greenway Trail	
	Central Park	Battle Ground
	Chelatchie Prairie Railroad Trail	
	Cherry Park	
	Columbia River Renaissance Trail	Vancouver
	Diamond Park	Vancouver
	Discovery Historic Loop	Vancouver
	Ellen Davis Trail	Vancouver
	Esther Short Park	Vancouver
	Evergreen Highway Trail	Vancouver
	Fort Vancouver National Historic Site	Vancouver
	Fort Vancouver Waterfront Trail	Vancouver
	Frenchmans Bar Loop	Vancouver
	Goot Park	Camas
	Heritage Park - Camas	Camas
	I-205 Trail	Vancouver
	Kiggins Bowl Trail	Vancouver
	La Center Bottoms	
	La Center Heritage Trail	La Center
	Lacamas Creek Park	Camas
	Lacamas Heritage Trail	Camas
	Lacamas Regional Park	
	Lacamas Regional Park	
	Leverich Park	Vancouver
	Lewis and Clark Heritage Trail	
	Lucia/Moulton Falls Trail	
	Marine Park (Vancouver)	Vancouver
	Meadowbrook Marsh	Vancouver
	Padden Parkway Trail	
	Paradise Point State Park	Ridgefield
	Pleasant Valley	
	Ridgefield National Wildlife Refuge	
	Salmon Creek Greenway	
	Salmon Creek Park	

County	Trail Name	City (if applicable)
	Salmon Creek Trail	
	Sternwheeler Park	La Center
	Vancouver Lake	
	Vancouver Lake Loop	Vancouver
	Vista Meadows Park	
	WA State University Vancouver Trails	
	Washougal River Greenway Loop	Camas
Cowlitz	Coweeman River Trail	
	Cowlitz River Trail	
	Highlands Trail	Longview
	Pacific Way Trail	
	Riverfront Trail	Castle Rock
Klickitat	Klickitat Trail	
Lewis	Willapa Hills Access Trail	
	Willapa Hills State Park Trail	Raymond
Pacific	Discovery Trail	Long Beach
	Grayland Beach State Park	
	Willapa Hills State Park Trail (Undeveloped stretch)	Pe Ell
Skamania	Bigfoot Discovery Loop	North Bonneville
	Greenleaf Discovery Trail	North Bonneville
	Hamilton Discovery Trail	North Bonneville
	Rock Creek Trail	Stevenson

Planned or conceptual

County	Trail Name	City (if applicable)
Clark	Burnt Bridge Creek Greenway	
	Camp Bonneville	
	Chinook Park Trail	
	Columbia Renaissance	
	Discovery Historic Loop	
	Killian	
	Livingston Mtn - Dole Valley	
	North Fork of the Lewis River	
	Paradise Park System	
	Salmon Creek Crossing	
	Salmon Creek Greenway	
Cowlitz	Columbia and Cowlitz Railway	
	Six Rivers	
	Six Rivers	Kelso
	Six Rivers	Woodland
	Six Rivers	Kalama

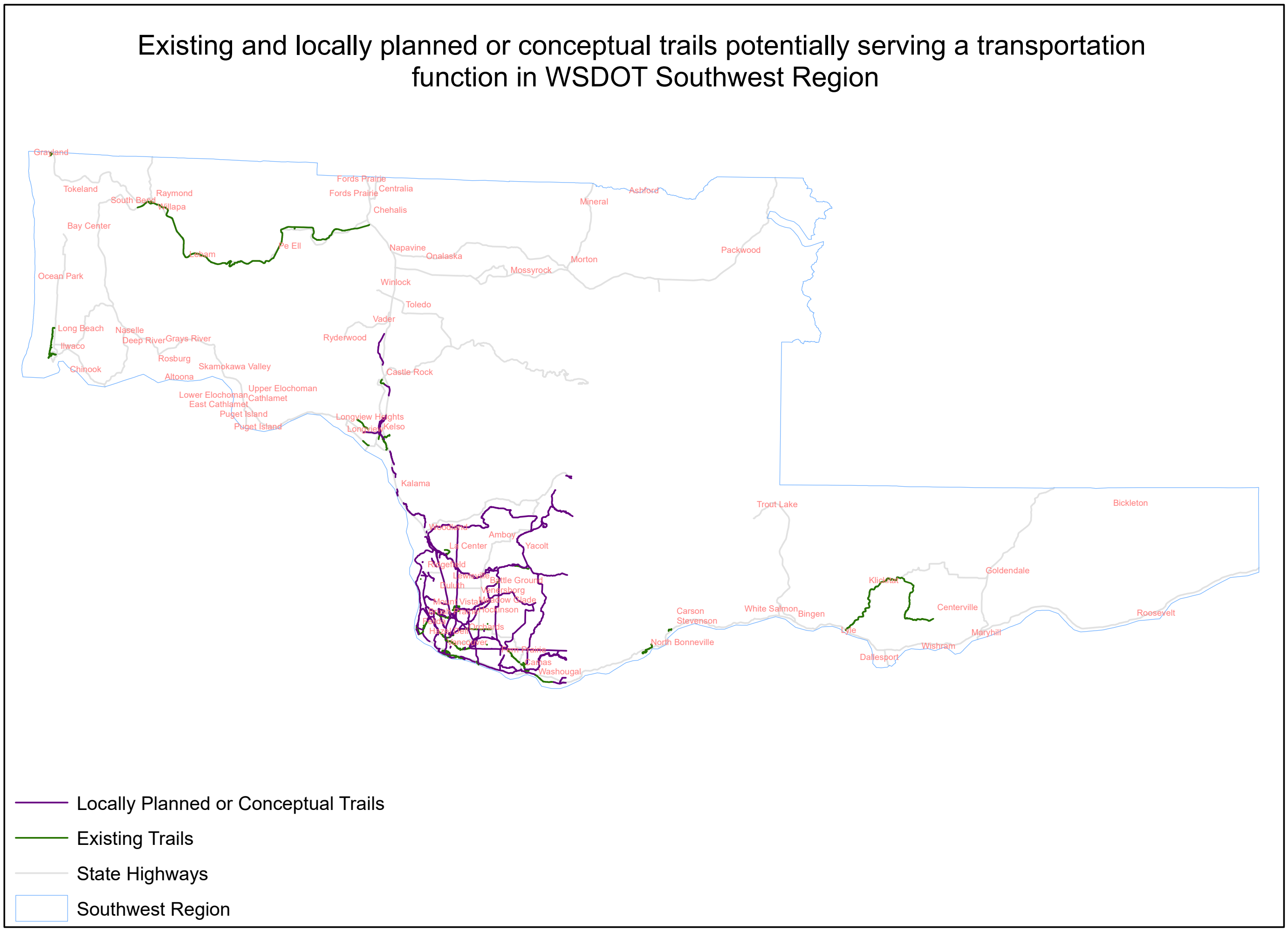

Figure I-5: WSDOT Southwest Region existing and locally planned/conceptual trails.

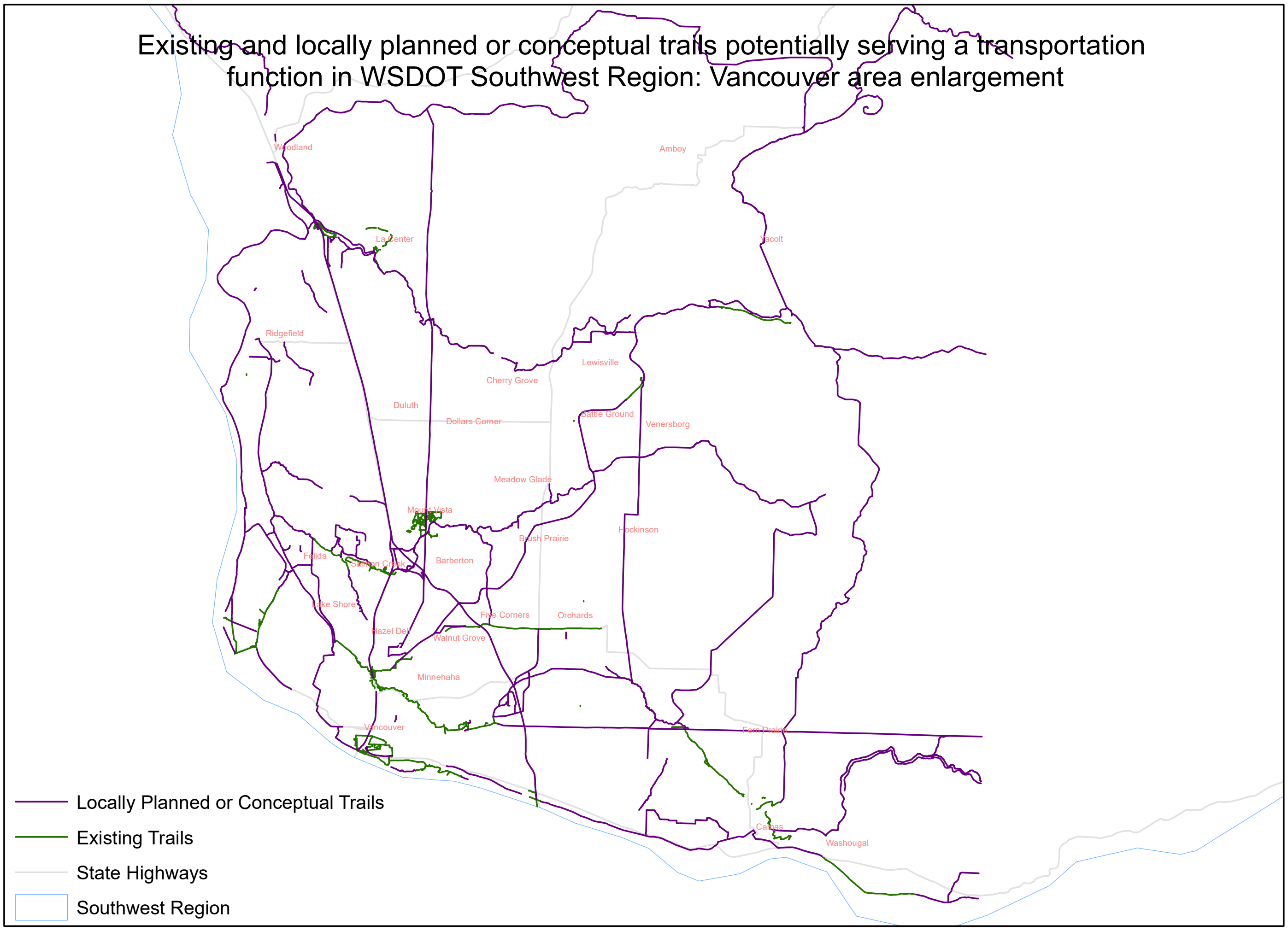

Figure I-6: Vancouver area enlargement of WSDOT Southwest Region existing and locally planned/conceptual trails.

Olympic Region

Existing

County	Trail Name	City (if applicable)
Clallam	Olympic Discovery Trail	
Grays Harbor	Basich Trailway	Aberdeen
	Chehalis River Trailway	Aberdeen
	Cosi Levee trail	Cosmopolis
	DNR Preachers Slough Rd Trails	
	Johnny Green Dike pathway	Hoquiam
	Levee St Pathway	Hoquiam
	Morrison Riverfront Path	Aberdeen
	Preacher Slough Interpretative Trail	
	Seashore Conservation Trail	Westport
	Vance Creek Family Friendly Loop	
	Vance Creek Park Loop	
Jefferson	H-5 Trail	Port Townsend
Kitsap	Clear Creek Trail	

County	Trail Name	City (if applicable)
Pierce	Cushman Power Line Trail	Gig Harbor
	Flume Trail Access	
	Foothills Trail	Carbonado
	Garfield Park	Tacoma
	Grandview Trail	University Place
	Interurban Trail - Milton	Milton
	Interurban Trail - Milton	Milton
	Lakeland Hills Trail	Auburn
	Lakeland Hills Trail	Dupont
	McNeil Street Trail	DuPont
	Narrows/Grandview Trail Access	
	Nathan Chapman Memorial Trail	
	North Puyallup River Trailhead	Milton
	Ohop Trail Extension	
	Perimeter Rd to 176th St S Trailhead	Milton
	Pipeline Trail (PPW)	Auburn
	Prairie Line Trail	Tacoma
	Puget Gardens	Tacoma
	Puget Gulch Creek Trail	Tacoma
	Puyallup Riverwalk Trail	Puyallup
	Ruston Way Esplanade	Tacoma
	Ruston Way Esplanade	Tacoma
	Schuster Corridor Multi-Use Trail	Tacoma
	Schuster Parkway Sidewalk/Trail Access	
	Scott Pierson Trail	Tacoma
	Sumner Confluence Trail - Stuck & Puyallup	Sumner
	Thea Foss Esplanade Trail	Tacoma
	Thea Foss Esplanade Trail	Tacoma
	Water Ditch Trail	Tacoma
	Waterwalk at Point Ruston Trail	Tacoma
	White River (Sumner) Trail	Sumner

County	Trail Name	City (if applicable)
Thurston	26th Ave Shared Use Pathway	Olympia
	Capitol Lake Interpretive Trail	Tumwater
	Capitol Switchback Trail	Olympia
	Chambers Lake Connector	Lacey
	Chehalis Western Trail	Olympia
	Descutes Valley Trail	Tumwater
	East Bay Trail	Olympia
	I-5 Pedestrian Bridge	Tumwater
	I5 Trail	Olympia
	Karen Fraser Woodland Trail	Lacey
	Littlerock Tyee Connector	Tumwater
	Nisqually Tribe Connector	
	North Basin Shoreline Trail	Olympia
	Olympia Woodland Trail	
	Ralph Munro Trail	
	SR 510 Bike Path	Yelm
	St Martins Trail	Lacey
	Tumwater/Simons Street Trail	Tumwater
	Yelm-Tenino Trail	Rainier
	Yelm-Tenino Trail	Rainier

Planned or conceptual

County	Trail Name	City (if applicable)
Clallum	Olympic Discovery Trail	
Jefferson	Olympic Discovery Trail	
Pierce	Interurban Trail	Milton
Thurston	Yelm-Tenino Trail	Rainier
	Gate-Belmore Trail	
	Elsie Heron Baney Memorial Trail	
	Olympia Woodland Trail	
	Tumwater Valley Urban Trail	Tumwater
	Descutes Valley Trail	Tumwater

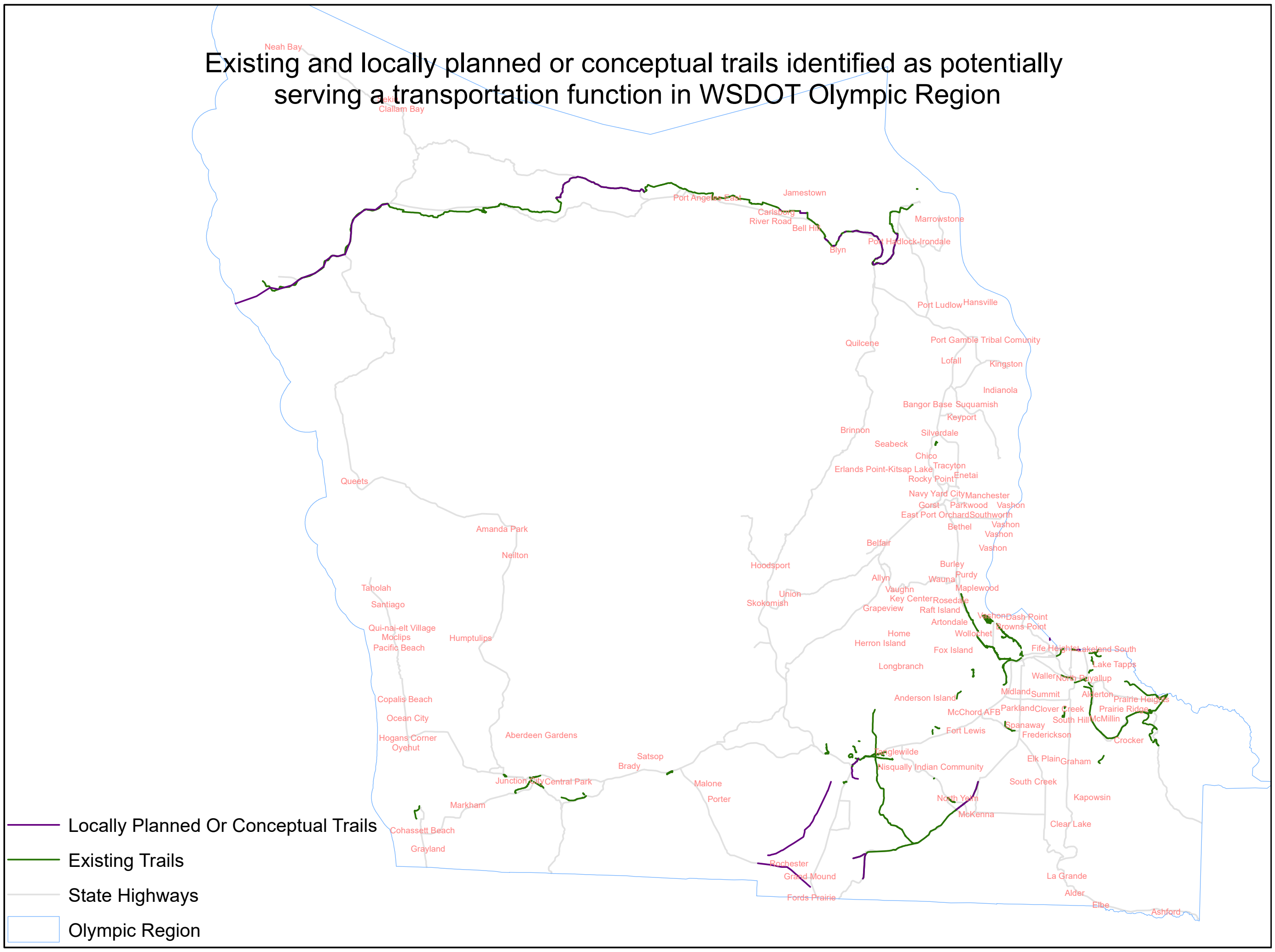

Figure I-7: WSDOT Olympic Region existing and locally planned/conceptual trails.

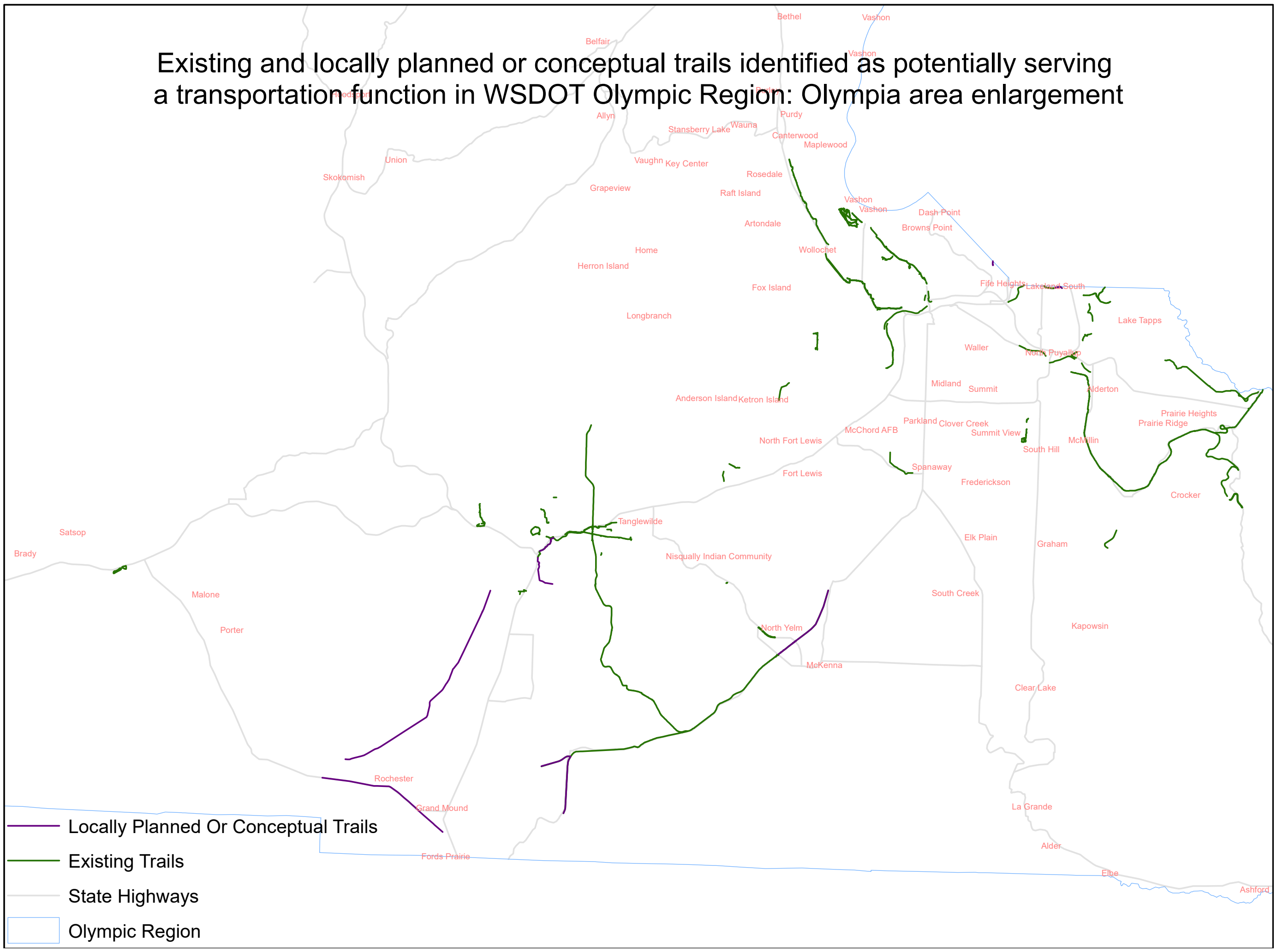

Figure I-8: Olympia area enlargement of WSDOT Olympic Region existing and locally planned/conceptual trails.

Northwest Region

Existing

County	Trail Name	City (if applicable)
Island	Broadway St	Coupeville
	Discovery Trail	
	Monroe's Landing to Oak Harbor Beach Trail	Oak Harbor
	SR20 Trail	Coupeville
King	21st Ave St Multi-Use Trail	Seattle
	277TH Street	Auburn
	37TH ST SE	Auburn
	64th Ave South Trail	Kent
	7TH Avenue Connector	Issaquah
	Alki Trail	Seattle
	Arboretum Trail	Seattle
	Auburn Neighborhood Connector	Auburn
	Bear Creek Trail	Redmond
	Big Bend Natural Area Trails	
	Boat Launch Trail	
	Bonneville Powerline Trail	Issaquah
	BPA Trail	Federal Way
	Bridle Crest Trail	Redmond
	Brink Swamp Connector	Issaquah
	Burke-Gilman Trail	Seattle
	C C C Trail	
	C Street Trail	Auburn
	Cedar River Access	
	Cedar River Trail	Renton
	Cedar to Sammamish Trail	Issaquah
	Centennial Trail Snoqualmie	Snoqualmie
	Central Park	Issaquah
	Central Park Trail	Seattle
	Central Park Trail - Detention Pond	Issaquah
	Chief Sealth Trail	Seattle
	Clay Pit Road	Bellevue
	Confluence Park	Issaquah
	Confluence Park - Margaret's Meadow	Issaquah
	Maple-Juniper Trail	Issaquah

County	Trail Name	City (if applicable)
	Coulon Park Trail	Renton
	Cross Kirkland Corridor Trail	Kirkland
	Dash Point Trail	Federal Way
	Dearborn Connector Trail	Seattle
	Delridge Connector Trail	Seattle
	Des Moines Creek Trail	Des Moines
	Duwamish Trail	Seattle
	East Lake Sammamish Trail	Sammamish
	East Plateau Trail	
	Elliott Bay Trail	Seattle
	Enumclaw Foothills Trail	Enumclaw
	Evans Creek Trail	Redmond
	Factoria Trail	Bellevue
	Fairwood Park Trail	
	Falls Drive - Central Park Connector Trail	Issaquah
	Foothills-Sycamore Trail	Issaquah
	Foundation Trail	Auburn
	Gilman Edible Landscaping Trail	Issaquah
	Gilman Trail	Issaquah
	Green Lake Trail	Seattle
	Green River & Issac Evans	Auburn
	Green River Natural Resources Area Trails	Kent
	Green River Trail	Kent
	High School Trail	Issaquah
	High School Trail	Federal Way
	I-90 Trail	Bellevue
	I-90 Trail	Mercer Island
	Illahee State Park	
	Interurban Trail	Kent
	Issaquah Highlands Connector	Issaquah
	Issaquah Highlands Trail	Issaquah
	Issaquah-Preston-Snoqualmie Trail	Issaquah
	Jefferson Park Trail	Seattle
	Judkins Park and Playfield	Seattle
	Kanaskat-Palmer State Park	Ravensdale
	Kennydale Hillcrest Connector	Renton
	Kimball Creek / Parkway Trail	Snoqualmie

County	Trail Name	City (if applicable)
	Klahanie Community Trail	
	Klahanie Park	
	Klahanie Trail	
	Lake Washington Public Access Trail	Kirkland
	Lake Washington Trail	Seattle
	Lake Washington Trail	Renton
	Luke McRedmond Landing	Redmond
	Magnolia Connector	Seattle
	Maple-Juniper Trail	Issaquah
	Neighborhood Connectors	Bothell
	Newport Way Trail	Issaquah
	North Creek Sportsfields Trail	Bothell
	PANTHER LAKE TRAIL	Federal Way
	Pickering Multiple Use Trail	Issaquah
	Pine Crest Trail	Issaquah
	Points Trail	Kirkland
	Providence Ridge Neighborhood Trail	Issaquah
	PSE Lakeland Trail	Auburn
	PSE Trail	Redmond
	Puget Power Trail	Issaquah
	Rainier Greenway Trail	Issaquah
	Rattlesnake Lake Trail	
	Redmond Central Connector	Redmond
	Redmond Neighborhood Connectors	Redmond
	Redmond PSE Trail	Redmond
	Redmond Ridge Trail	
	Redmond Way SR-520 Trail	Redmond
	Salmon Run Nature Park Trail	Issaquah
	Sammamish Community Trails	Sammamish
	Sammamish Greenway Trails	Sammamish
	Sammamish River Trail	Redmond
	Scenic Hill Trail	Kent
	Seattle Neighborhood Connectors	Seattle
	Sena Park Trail	Issaquah
	Seward Park Trail	Seattle
	Silent Creek Trail	Snoqualmie
	Skinner Road Trail	Auburn

County	Trail Name	City (if applicable)
	Snoqualmie Ridge Trail	Snoqualmie
	Snoqualmie Valley Trail	Snoqualmie
	Sodo Trail	Seattle
	Soos Creek To Lake Youngs Trail	
	Soos Creek Trail	
	South 156th Way Trail	SeaTac
	Squak Mountain Access Trail	Issaquah
	Squak Mountain South Access Road	
	SR-520 Cross-Lake Shared Use Path	Seattle
	SR-520 Trail	Redmond
	Tibbets Creek Trail	
	Timberlake Park	Issaquah
	Tolt Pipeline Trail West	Bothell
	Town Center Open Space Trail	
	Tradition Lake/Around the Lake Trail	Issaquah
	Utility Corridor Trail	Issaquah
	West Campus Trail	Federal Way
	West Riverside Trail	Bothell
	West Seattle Bridge Trail	Seattle
	Westside Trail	SeaTac
	Whitaker Trail	Snoqualmie
	White River Trail	Auburn
	Woodinville Valley Trail	Woodinville
Skagit	Cascade Trail	
	Fruitdale/McGarigle Shared Use Path	Sedro-Wooley
	Gage's Slough Trail	Burlington
	Guemes Channel Trail	Anacortes
	HWY 20 Burlington Trail	Burlington
	Hwy 20 Sedro Wooley Trail	Sedro-Woolley
	Kulshan Trail	Mount Vernon
	Padilla Bay Shore Trail	
	Skagit Riverwalk	
	SR 20 Sharpe's Corner to Christianson Rd Bike Path	Anacortes
	Tommy Thompson Parkway	Anacortes
	Trumpeter Trail	Mount Vernon
Snohomish	Airport Trail	Arlington
	Centennial Trail Snohomish	Arlington

County	Trail Name	City (if applicable)
	Golf Course Trail	Lynnwood
	Green Lantern Trail	Everett
	Lowell Riverfront Trail	Everett
	Milltown Trail	Everett
	Neighborhood Connectors	Bothell
	North Creek Trail	Bothell
	Riverside Road Waterfront Trail	Everett
	Scriber Creek Trail	Lynnwood
	Seattle-Edmonds Interurban Trail	Lynnwood
	Smith Island Trail	Everett
	Snohomish Centennial Trail	Arlington
	US 2 Bridge Trail	
	Waterfront Place Trail	Everett
	Whitehorse Trail	Darrington
Whatcom	Barkley Trail	Bellingham
	Bay to Baker Trail	Bellingham
	Bay to Baker Trail	
	Connelly Creek Trail	Bellingham
	Fragrance Lake Road	Bellingham
	Haxton Way Trail	
	Hertz Trail	
	Jim Kaeming Sr Trail	Lynden
	Laurelwood Trail	Bellingham
	Lower Padden Creek Trail	Bellingham
	Marine Drive Trail	Bellingham
	Railroad Trail	Bellingham
	Semiahmoo Spit Trail	Blaine
	South Bay Trail	Bellingham
	Squalicum Creek Trail	Bellingham
	Squalicum Promenade Trail	Bellingham
	Whatcom Creek Trail	Bellingham
	Whatcom Interurban Trail	Bellingham
	Wild Goose Trail	

Planned or conceptual

County	Trail Name	City (if applicable)
Island	Whidbey Isle Trail Concept	
King	1st Ave Sth Trail	Federal Way
	296th St Connector	Federal Way
	308th St Connector	Federal Way
	352nd St Extension	Federal Way
	Auburn Proposed Trails	Federal Way
	BPA Trail	Federal Way
	Celebration Park Trail	Federal Way
	Celebration Park Trail	Federal Way
	Dash Point Trail	Federal Way
	Dash Point Trail	Federal Way
	High School Trail	Federal Way
	Joe's Creek Trail	Federal Way
	Rodondo Way Connector	Federal Way
	West Campus Trail	Federal Way
Snohomish	Centennial Trail	
	Centennial Trail	Arlington
	Lowell Riverfront Trail	Everett
	Whitehorse Trail	Darrington
	Whitehorse Trail	
Whatcom County	Arroyo To Woodstock	Bellingham
	Bay to Baker Trail	
	Clarita Moore To Old Samish Connector	Bellingham
	Coast Millennium Trail	
	Cordata Trails	Bellingham
	King Mountain East-West Trail	Bellingham
	Nooksack Loop Trail	
	Nooksack Trail	
	North Chuckanut Trailhead (Lower)	Bellingham
	Padden Estates	Bellingham

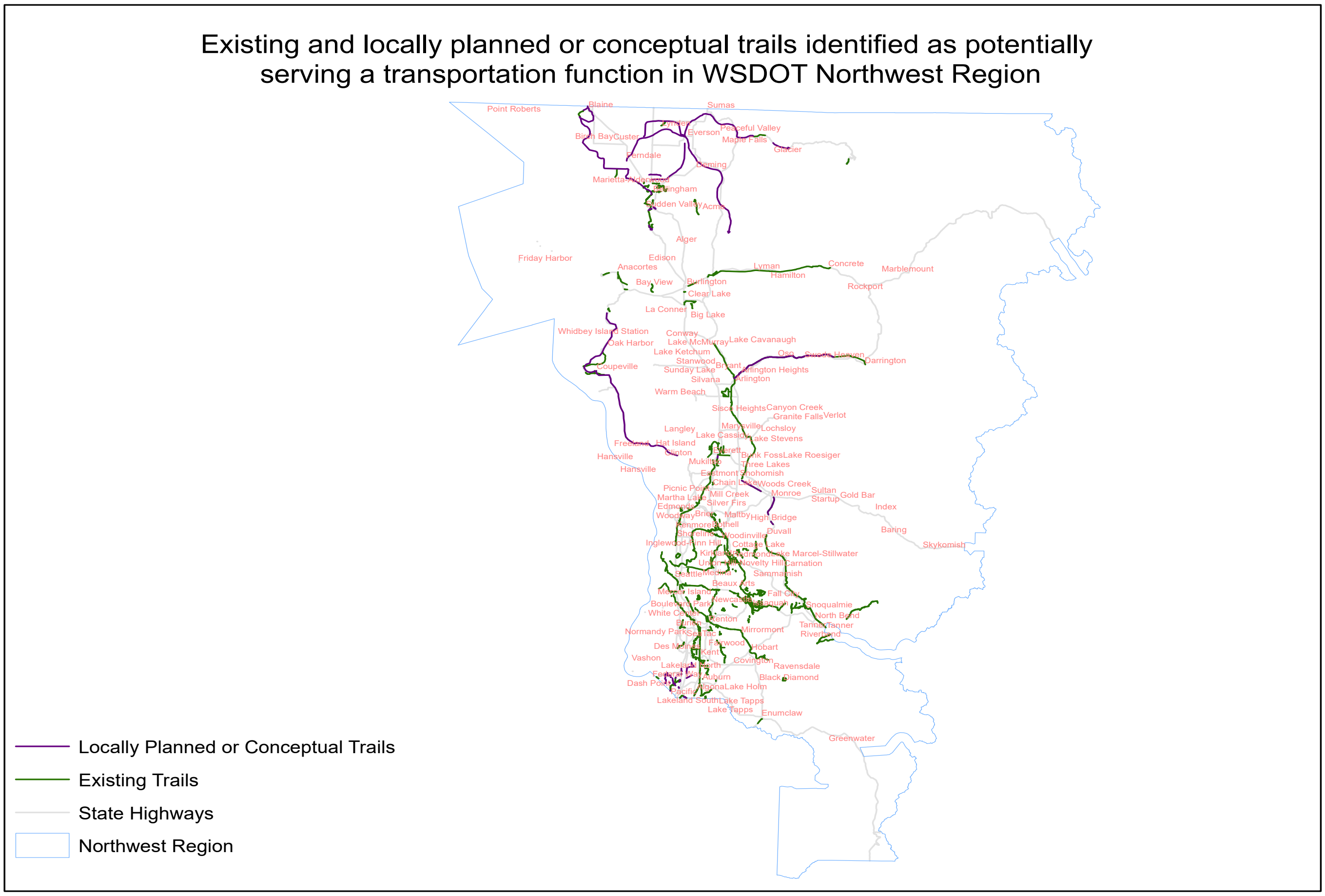

Figure I-9: WSDOT Northwest Region existing and locally planned/conceptual trails.

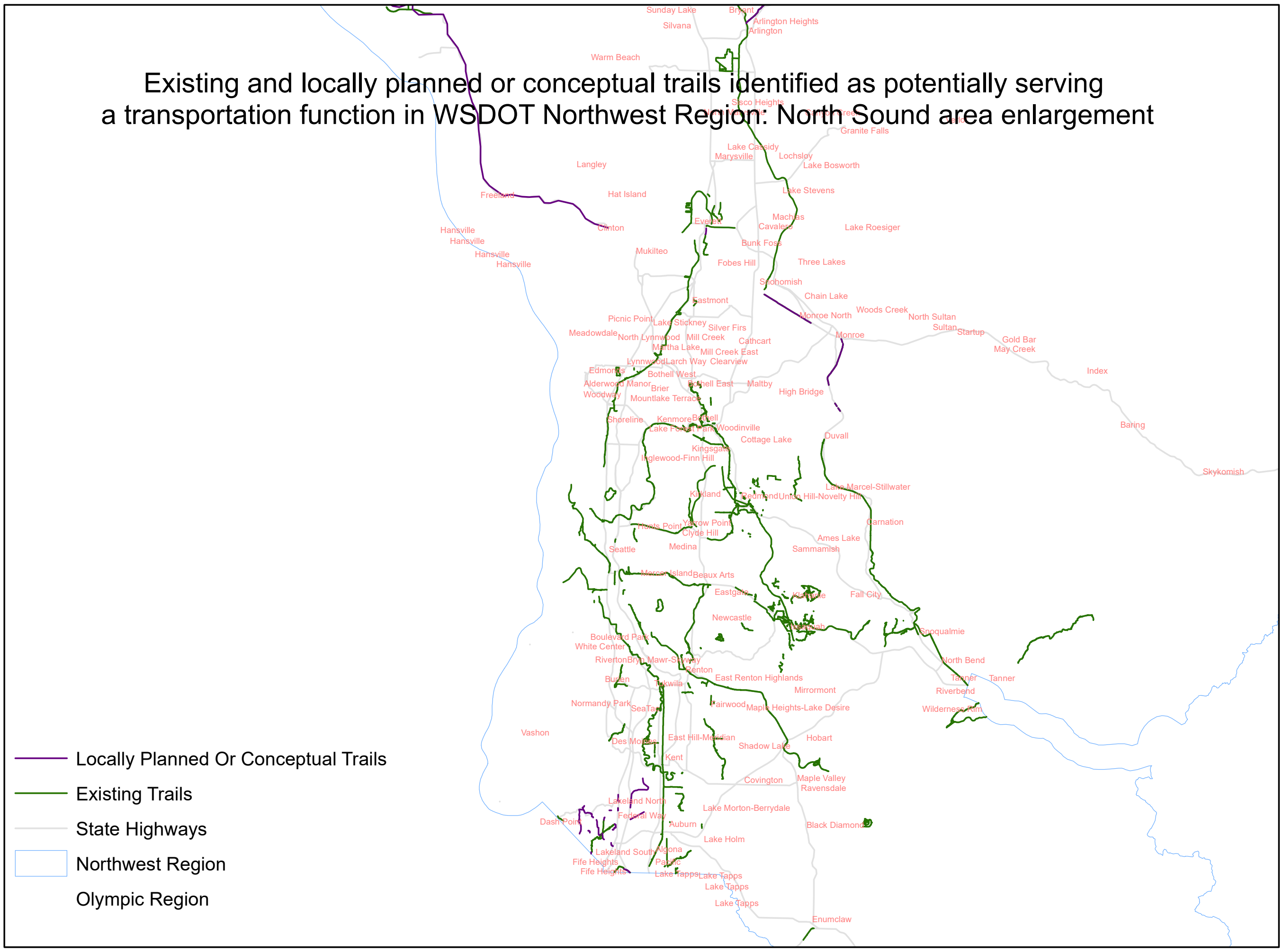

Figure I-10: Seattle area enlargement of WSDOT Northwest Region existing and locally planned/conceptual trails.

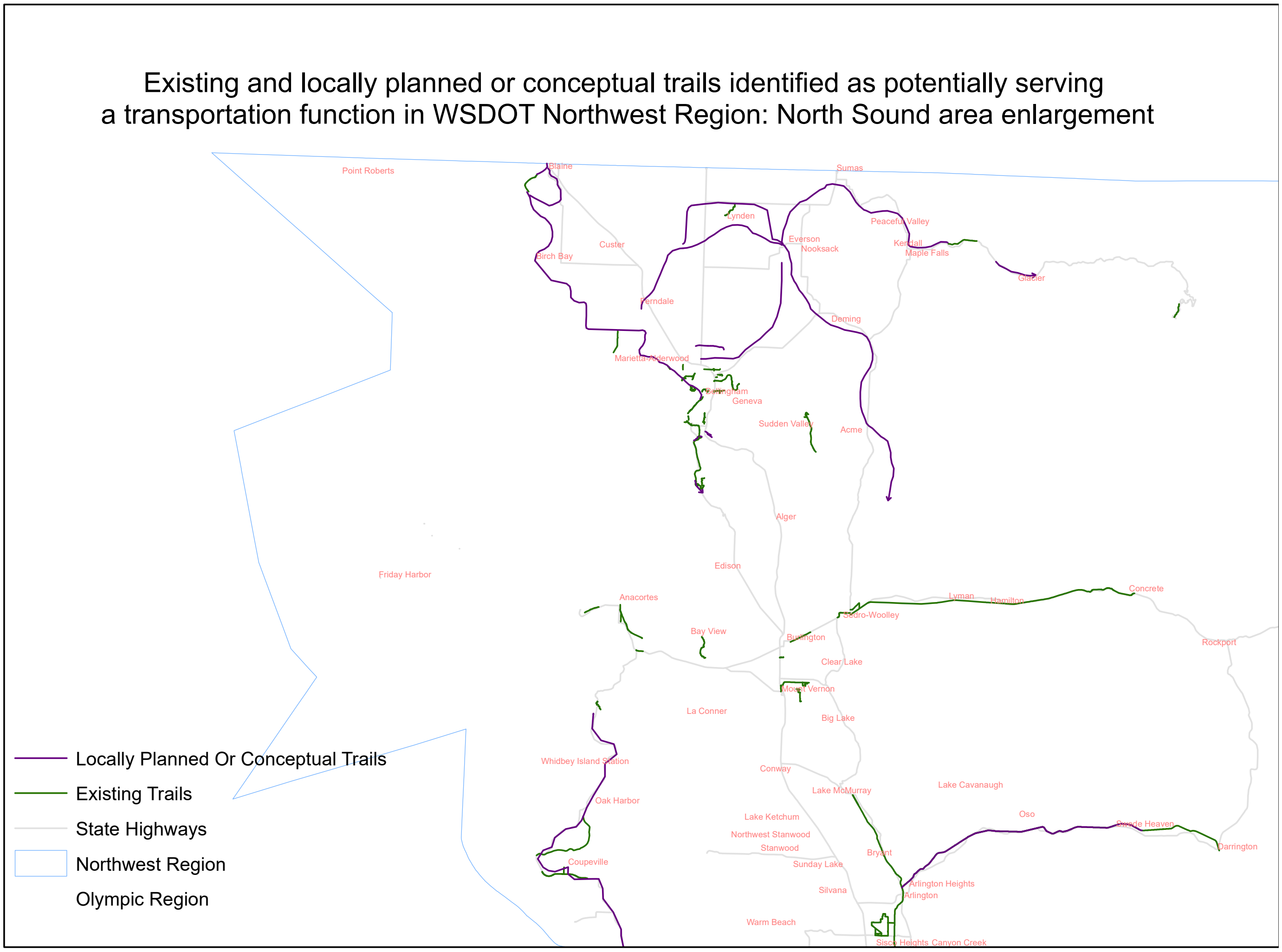

Figure I-11: North Sound area enlargement of WSDOT Northwest Region existing and locally planned/conceptual trails.

North Central Region

Existing

County	Trail Name	City (if applicable)
Chelan	Old Blewett Pass Trail	
	Wenatchee Confluence State Park & Horan Nature Area	
Douglas	Apple Capital Recreation Loop Trail	East Wenatchee
	Kirby Billingsley Hydro Park Trail	
	Lincoln Rock State Park Trail	
	Rocky Reach Trail	East Wenatchee

Planned or conceptual

County	Trail Name	City (if applicable)
Chelan	North Shore Trail	Chelan
Okanogan	TWiN Trail	Twisp/Winthrop

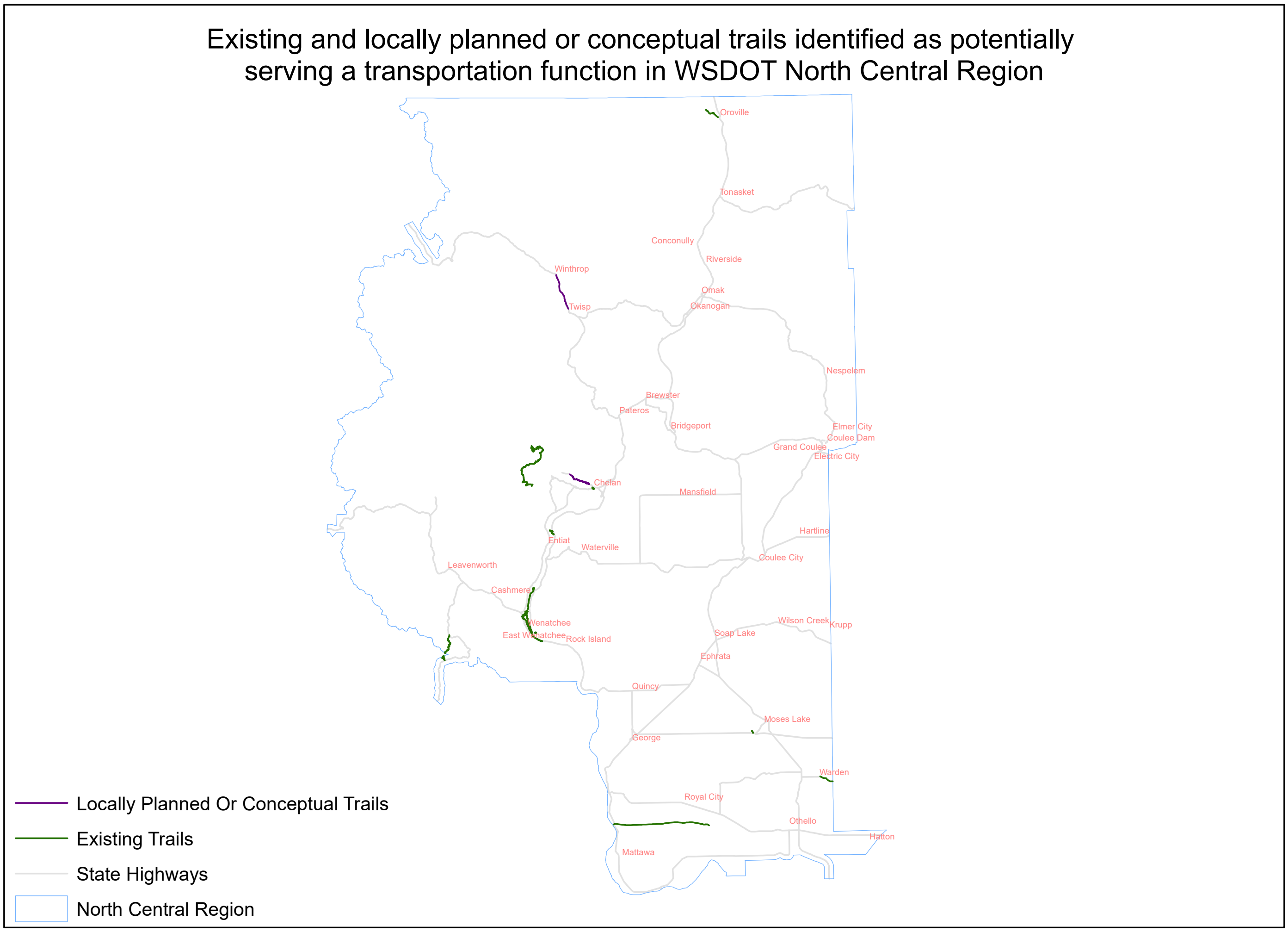

Figure I-12: WSDOT North Central Region existing and locally planned/conceptual trails.

Eastern Region

Existing

County	Trail Name	City (if applicable)
Adams	Palouse to Cascades State Park Trail	
Ferry	Ferry County Rail Trail	
Ferry	Golden Tiger Trail	
Grant	Palouse to Cascades State Park Trail	
Spokane	Appleway Trail	
	Bear Lake Trail	
	Ben Burr Trail	Spokane
	Bluffs to Peoples Park Overlook Trail	Spokane
	Children of the Sun Trail	
	E 2nd Ave Trail	Spokane
	Fish Lake Trail	Spokane
	Garfield Road Area Bike Paths	Airway Heights
	Geiger Medical Lake Trail	
	Hatch Rd/44th St Connector	Spokane
	High Dr	Spokane
	Howard St	Spokane
	Liberty Lake Area Multi-Use Paths	
	Little Spokane Dr Area Trails	
	Medical Lake Loop	Medical Lake
	Millwood Trail	Millwood
	Moran Prairie Trail	
	North River Trail	Spokane
	Palouse to Cascades State Park Trail	
	Riverside State Park	
	Spokane Multi-Use Trail	
	Spokane River Centennial State Park Trail	Mulitple
	Sunset Blvd	Spokane
	US 195/Wandermere Trail	Spokane
	US2 N Nevada Trail	Spokane
	Wandermere Trail	
Whitman	Bill Chipman Palouse Trail	
	Palouse to Cascades State Park Trail	

Planned or conceptual

County	Trail Name	City (if applicable)
Spokane	Ben Burr Trail	Spokane
	Millwood Trail	Spokane Valley
Stevens	Kettle Falls to Colville Trail	

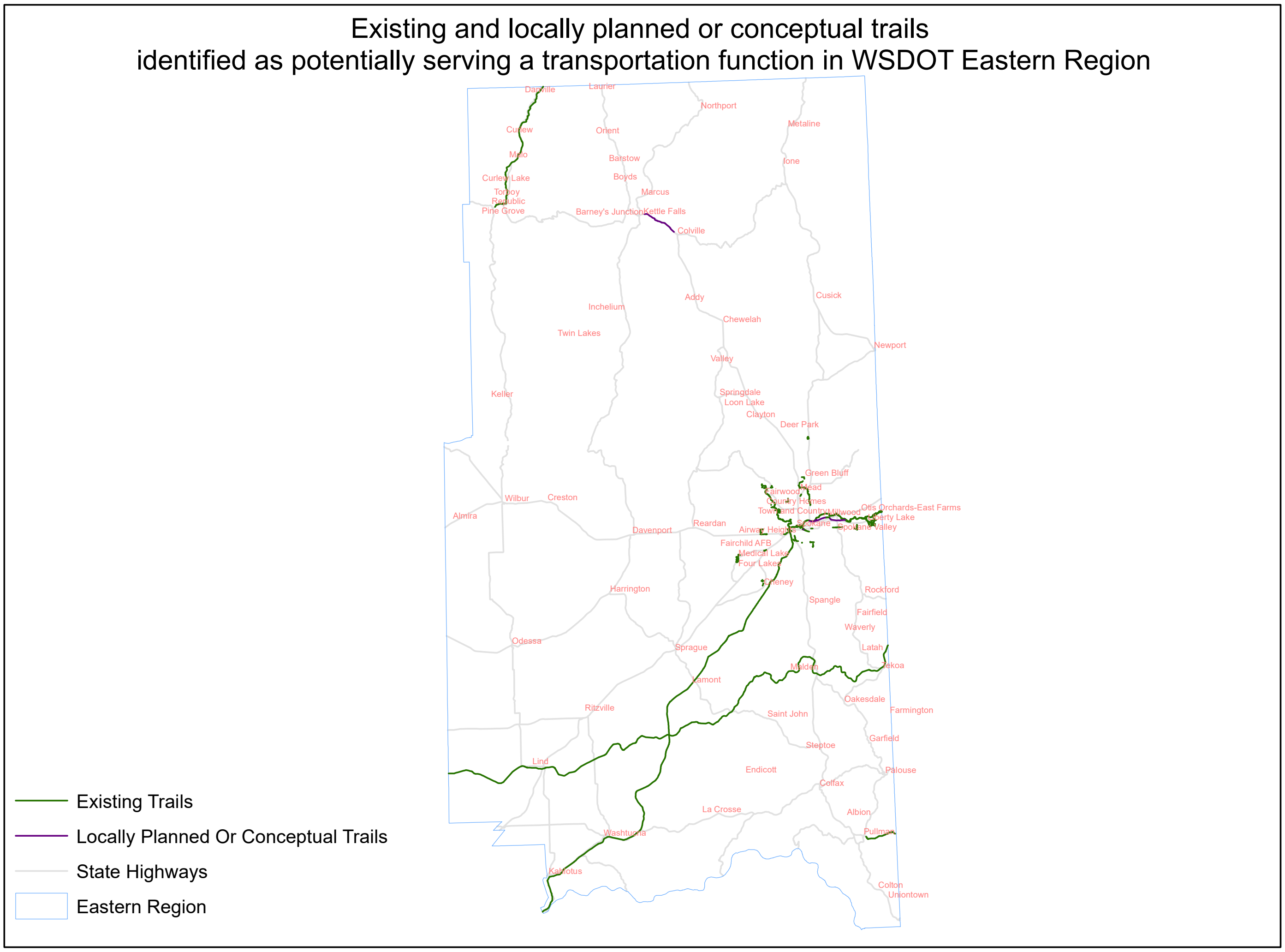

Figure I-13: WSDOT Eastern Region existing and locally planned/conceptual trails.

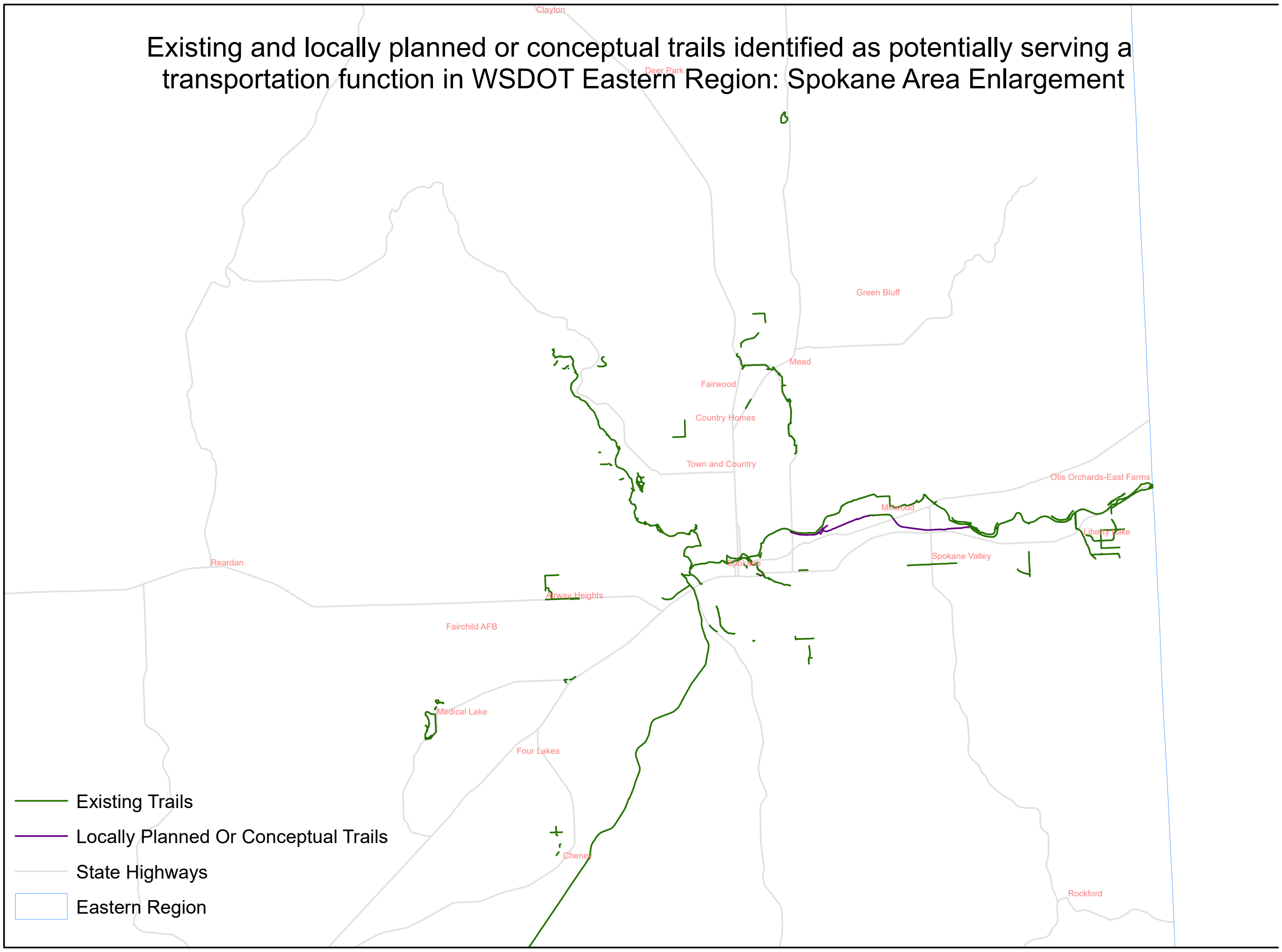

Figure I-14: Spokane area enlargement of WSDOT Eastern Region existing and locally planned/conceptual trails

Appendix J:
TRANSPORTATION FUNDING SOURCES

HOW IS ACTIVE TRANSPORTATION FUNDED?

Sources of transportation revenue vary by level of jurisdiction. A bike lane, trail, or sidewalk could be paid for by a mix of local sales tax, real estate excise tax, federal income tax, property tax, utility taxes, and other sources in addition to the motor vehicle fuel tax that people commonly think of as funding transportation. No state in the US funds 100 percent of its streets, roads, highways, trails, and sidewalks from fuel taxes.[287] This list serves as a brief reference on sources of funding that may be used for active transportation facilities. It does not provide information on application requirements, specific grant programs, and other details. For more information:

- WSDOT page of links to funding sources for pedestrian and bicyclist projects and programs.
- Summary of transportation funding sources in Washington state includes information about all types of public funding programs and other transportation revenue sources, not just those that may be used for active transportation.

LOCAL

Cities and counties can access these sources:

- Local option taxes
- 3.75 cents/gallon of state gas tax
- Property tax
- Transit taxes (sales and/or utility)
- Real estate excise tax
- Commercial parking tax
- Development impact fees
- Formation of a transportation benefit district that can be funded through sales tax and vehicle license fees—the two most common sources used—and through other options including border area fuel taxes, general obligation bonds, impact fees, vehicle tolls, excess property taxes and local improvement districts[288]
- Improvements added as a requirement for approval of a development project or use of right-of-way for connections such as utility corridors

287 How Are Your State's Roads Funded?. 2019. Tax Foundation.
288 Municipal Research Service Center. Transportation Benefit Districts.

Walk/bike facilities may be developed by special taxing districts such as a parks district.

Loans may be available as well; for example, the state Public Works Board oversees loan funds backed by bond sales authorized by the legislature.

REGIONAL

Metropolitan Planning Organizations and Regional Transportation Planning Organizations distribute grants made with federal transportation funds. Some of these organizations have a specific set-aside for active transportation projects and/or award points to projects based on their incorporation of walk/bike facilities to improve air quality and support mode shift.

Transit authorities and public transportation benefit areas may use funds from a variety of sources for improvements to walk/bike facilities, sometimes described as transit access, station access, or first/last mile. Transit revenue consists primarily of local sales taxes, property taxes, vehicle fees, passenger fares, and federal and state grants. For local tax revenue, most transit agencies in Washington rely on the transit sales tax under RCW 82.14.045. City or county transit departments may also rely on other funding sources such as transportation benefit districts, commercial parking taxes (RCW 82.80.030), or utility taxes.[289]

Port districts construct trails and sidewalks as part of developing property. They are funded by property taxes and may issue bonds and apply for economic development grants from a variety of sources.

Public utility districts may own and operate parks and construct trails as part of mitigation. For example, the Apple Capital Loop Trail in the Wenatchee area was constructed with funding from Chelan-Douglas PUD.

STATE

State transportation revenue sources as of 2020 include:

- State motor vehicle fuel tax
- Bonds
- Licenses, permits, and fees
- Tolling
- Ferry fares
- Motor vehicle excise tax
- Rental car tax
- Federal funds (described briefly below)

The Transportation Resource Manual prepared for the legislative Joint Transportation Committee summarizes most of the state's transportation taxes and fees. Appendix B of the Washington Transportation Plan, Phase 2 – Implementation also provides information specifically on transportation revenue sources/expenditures under the control of the legislature. The Municipal Research Service Center provides information for local government on funding sources that may be used for active transportation as well as other types of public facilities.

289 Municipal Research Service Center. Local Transit Authorities and Funding Sources.

Trails may be funded with Washington State Recreation and Conservation Office grants from both gas-tax and non-gas-tax sources including the Land and Water Conservation Fund.

The Community Economic Revitalization Board of the Washington State Department of Commerce oversees grants to public entities and tribes that can include transportation projects. Eligible facilities must be linked to economic development outcomes and they can fund planning studies.

FEDERAL

Transportation: The federal Highway Trust Fund receives revenues from federal motor fuels tax; three nonfuel taxes related to heavy highway vehicles; and general fund revenues that Congress approves drawn from non-transportation-related sources such as the federal income tax.[290]

The Federal Transit Administration defines all pedestrian improvements located within one-half mile and all bicycle improvements located within three miles of a public transportation stop or station as having “a de facto physical and functional relationship to public transportation," making active transportation projects eligible for funding through FTA grant programs. The agency also stipulated that projects located beyond those distances can be eligible if people could reasonably be expected to make longer walking and biking trips to reach transit.

The Federal Lands Access Program (FLAP, or Access Program) was established in 23 U.S.C. 204 to improve transportation facilities that provide access to, are adjacent to, or are located within federal lands. The Access Program supplements state and local resources for public roads, transit systems, trails, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.

Other federal funding sources may also be used for efforts related to active transportation. For example, HUD Community Development Block Grants can fund streets, sidewalks and other infrastructure for community revitalization benefiting low- and moderate-income people.

TRIBAL

Washington’s 29 federally recognized tribal nations have a variety of revenue sources including federal funds under the Tribal Transportation Program, Public Transportation on Indian Reservations Program, and other relevant federal programs, as well as income from tribal enterprises in some cases.

PRIVATE PHILANTHROPY, BUSINESS, AND INSTITUTIONS

While sometimes overlooked as part of the funding mix, nonprofits raise funds for trails, businesses invest in active transportation connections, and institutions such as colleges and hospitals create improved connections as part of their facilities plans. Private funds may play a critical role as part of the match for public funds.

In Washington state trail advocates have raised millions of dollars over the years and have helped create hundreds of miles of trails around the state.[291] The Eastrail project in King County provides a recent example. Significant contributions from Group Health, REI, Facebook, and Google along with King County, cities along the trail route, Puget Sound Regional Council, the state legislature and others will help complete a significant network that includes two shared-use paths WSDOT built on the I-90 and SR520 bridges. The Mountains to

290 Eno Center for Transportation. The Life and Death of the Highway Trust Fund. 2014.
291 Washington Bikes maintains a list of bicyclist, pedestrian, and trail groups.

Sound Greenway Trust, Friends of the Spokane Centennial Trail, Yakima Greenway Foundation, Peninsula Trails Coalition, and many more trail groups have built a legacy for future generations in partnership with local jurisdictions and state agencies.

A 2014 national report on the variety of ways communities have funded protected bike lanes includes examples of approaches to this newer facility type that wouldn't typically have nonprofit engagement.[292]

[292] Advocacy Advance. 2014. How Communities are Paying for Innovative On-Street Bicycle Infrastructure.

Appendix K:
PROGRESS AND CHALLENGES, 2008-2021

In 2008 WSDOT published the last statewide plan for active transportation, the Bicycle Facilities and Pedestrian Walkways Plan. That same year the League of American Bicyclists named Washington the #1 Bicycle Friendly State in their first-ever list ranking the states. Washington has held the top position every time the League has released a ranking since its inception. The state receives high marks across the board in the five categories reviewed: infrastructure and funding, education and encouragement, legislation and enforcement, policies and programs, and evaluation and planning.[293]

Other signs of progress: Separated trails have been constructed alongside state routes and green bike lanes created on stretches of highway. Guiding documents such as the WSDOT Design Manual have been updated to reflect a broader array of facilities for walking and bicycling such as context-appropriate bike lanes. The agency has conducted multimodal trainings in every region. To name a few more accomplishments in Washington since the last state plan:

- Creation of the Active Transportation Division in 2017
- Creation of a pedestrian/bicyclist count program that includes a growing system of state-funded permanent counters
- Development of a Pedestrian Safety Action Plan in 2018 with a focus on safer crossing designs
- Creation of the Cooper Jones Active Transportation Safety Council[294]
- Substantial rewrite of active transportation sections in the WSDOT Design Manual in 2016 and subsequent annual updates
- Performance reporting through the Gray Notebook, including equity analysis of patterns in crash locations beginning in 2017 and a mobility analysis added to the long-running safety analysis beginning in 2018
- Designation of several segments of US Bicycle Routes beginning with USBR10 in 2014, a conceptual map for a statewide system, and ongoing efforts to submit routes for designation
- Selection of 270 recipients of Safe Routes to School and 208 Pedestrian/Bicyclist Program grant awards for a total of 478 since the programs began in 2005. 207 SRTS projects and 136 PBP projects have been completed, for a total of 343 completed projects.[295] WSDOT's evaluation finds reduced serious and fatal crashes at all project locations reviewed to date.[296]

293 League of American Bicyclists. Bicycle Friendly State Ranking.

294 An earlier Cooper Jones Bicyclist Safety Committee created in 1998 under the Washington Traffic Safety Commission had not been actively staffed for some time. The legislature created separate councils, the Pedestrian Safety Advisory Council in 2015 and the Cooper Jones Bicyclist Safety Advisory Council in 2017. In 2019 the legislature merged these into the Active Transportation Safety Council.

295 Includes grants awarded and reported on as of December 2020 and additional projects receiving awards based on funding levels approved in the 2021 legislative session.

296 WSDOT compares crash data from three years before and after a project is constructed to evaluate effects on safety.

POLICY TIMELINE

Since 2008, Washington has ranked #1 in the Bicycle Friendly State program every year by scoring in the top ten on many important indicators tracked by the League of American Bicyclists. The timeline of efforts before and after that date demonstrate an ever-growing body of work and continued commitment to bicyclist and pedestrian transportation.

1974:

- First Master Plan for Statewide Bicycle Corridors approved by Washington State Department of Highways

1991:

- Legislature passes the Commute Trip Reduction Act that required certain employers to create a plan to shift commuter behavior to more sustainable modes, such as active transportation

1998:

- Legislature creates Cooper Jones Bicycle Pedestrian Safety Education program under the Washington Traffic Safety Commission

1999:

- First WSDOT budget to include a program for funding improvements to rural bicycle touring routes
- State Supreme Court rules in Pudmaroff v. Allen that a bicyclist in a crosswalk has the same rights, duties, and obligations as a pedestrian
- Department of Licensing updates Driver's Guide to include information about bicycling

2000:

- Legislature enacts the provisions of I-695, which eliminated funding for rural bicycle touring routes

2003:

- Legislature creates Safe Routes to School Pilot Program

2005:

- Legislature designates funding for Pedestrian/Bicycle Safety Program and Safe Routes to Schools grants the year before Congress establishes the National Safe Routes to Schools Program
- Legislation passes requirement for comprehensive plans to include an inventory of bicycle and pedestrian facilities
- Legislature approves Share the Road specialty license plate
- Legislature passes HB 1108, prohibiting drivers from passing when cyclists, pedestrians, or farm equipment are in view and approaching from opposite direction (Ann Weatherill bill)

2008:

- League of American Bicyclists ranks states for the first time; Washington named #1 Bicycle Friendly State in the US
- WSDOT releases the Washington State Bicycle Facilities and Pedestrian Walkways Plan
- Climate change legislation sets goals for reducing greenhouse gas emissions

- Legislature passes HB 2564 requiring public school driver's education programs to incorporate a module on safe driving around bicyclists and pedestrians into their curriculum

2009:

- WSDOT identifies approximately 610 miles of Main Street Highways
- State law passes requiring that all new traffic signals must be able to be triggered by bicycles (SB 5482)

2013:

- Neighborhood Safe Streets Bill (HB 1045) authorizes cities to reduce speeds in residential and business districts without first requiring an engineering traffic study

2014:

- USBR 10 across Washington receives designation as first US Bicycle Route in the Pacific Northwest and on the West Coast

2015:

- Legislature creates Pedestrian Safety Advisory Council
- Legislature adopts transportation revenue package that includes ~$500 million for bicycling, walking, Complete Streets, and trails over 16 years

2016:

- SR 520 Floating Bridge ribbon-cutting; bridge includes the world's longest floating shared-use path

2017:

- WSDOT creates the Active Transportation Division
- Legislature creates Cooper Jones Bicyclist Safety Advisory Council

2018:

- WSDOT releases its Safe Transportation for Every Pedestrian (STEP) Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations document
- WSDOT receives 255 applications for SRTS/PBP grants; requests reach an all-time high of $187.4 million
- Legislature updates e-bike law

2019:

- WSDOT creates Injury Minimization and Speed Management Work Group to develop model policy
- Active Transportation Plan update gets under way with analysis and community engagement
- Legislature provides $41.4 million in funding for 53 SRTS/PBP projects
- Safe Passing Law updated to require drivers to move over a full lane where possible to pass a vulnerable road user or to leave at least three feet where the full lane change is not possible; fines increased and deposited into a new Vulnerable Roadway User Education Account for use by the Washington Traffic Safety Commission (SB 5723)

- State Driver's Education Manual updated to include "Dutch Reach"[297]
- Legislature merges Pedestrian and Bicyclist Safety Councils to create Cooper Jones Active Transportation Safety Council
- Legislature updates regulatory framework for scooter-share systems in municipalities

2020:

- The Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations document is released
- WSDOT announces Safe, Healthy, Active Streets Initiative in response to pandemic social distancing and active transportation needs
- Due to revenue reductions created by the passage of I-976 and the COVID-19 pandemic, the Transportation Improvement Board announces it is temporarily suspending the Complete Streets grant program and eliminating the Sidewalk Program in its call for projects
- Legislature passes SB 6208, the Safety Stop law, allowing people bicycling the option to treat a stop sign as a yield when safe to do so
- Legislature amends the automated traffic safety camera law to provide penalties for blocking pedestrian crossings, requiring cities collecting the fines to use 50 percent for improvements to transportation supporting equitable access and mobility for persons with disabilities and to deposit the other 50 percent into a new Cooper Jones Active Transportation Safety Account for use by the Washington Traffic Safety Commission (ESHB 1793)

2021:

- Active Transportation Plan Part 1 published May 4
- The Transportation Improvement Board begins the process of renaming its Sidewalk Program to the Active Transportation Program and resumes funding for this program and the Complete Streets grant program
- Segments of US Bicycle Routes 20, 40, 81, and 281 added to the designated routes, bringing the total to just over 1,000 miles in the state[298]
- Active Transportation Plan Part 2 released for public comment
- Active Transportation Plan Parts 1 and 2 consolidated and published as one final document

297 WSDOT Blog. 2019. New bicyclist and pedestrian safety messages, among others, added to Department of Licensing driver guides. Feb. 26. Washington State Dept. of Licensing. Driver guide (available in multiple languages).

298 WSDOT. 2021. New bike route designations expand to southeast corner of the state. Aug. 9.

Appendix L: PERFORMANCE METRICS IDENTIFICATION AND METHODOLOGY

INTRODUCTION

This document explains the decision process used to identify the WSDOT Active Transportation Plan performance metrics. It also provides a summary of the methodology and decisions used to determine the baseline value and goal for each selected metric. It is based on the work of Urban Design 4 Health (UD4H), input from the WSDOT Active Transportation Plan Stakeholder Steering Committee, and the work of WSDOT staff.

PERFORMANCE METRIC DECISION PROCESS

The following steps were used to select the performance metrics for the Active Transportation Plan (ATP):

- Review performance metrics related to active transportation, including from WSDOT (existing, past, or aspirational) and other state and federal agencies.
- Identify need and data availability
- Prioritize and select performance metrics
- Determine baseline measures
- Set performance metric goals

In addition to the work of UD4H and the WSDOT ATP Stakeholder Steering Committee, public comments, reviewer feedback, and data refinements were used to make the final selection of the metrics for the plan. The intention was for the performance metrics to include both outcome and output metrics with a focus on infrastructure or programs that support walking and bicycling improvements delivered by WSDOT.

The ability of a metric to be applicable statewide was also a key consideration. This contrasts with metrics more suitable for project or corridor level assessments, which often require site-specific data not available for the entire state. The ATP performance metrics address and are guided by:

- The goals and objectives established in the Washington State Active Transportation Plan
- WSDOT statewide transportation policy goals
- Washington State Transportation Commission Washington Transportation Plan 2040 & Beyond[299]
- Transportation equity practices, environmental justice considerations, and transportation-disadvantaged community considerations

[299] Washington Transportation Plan 2040 & Beyond, Washington State Transportation Commission, 2018.

- U.S. Department of Transportation, Federal Highway Administration national performance metrics guidelines
- Required reporting under state (RCW 70.235.020)[300] and federal law, including Moving Ahead for Progress in the 21st Century Act (MAP-21) requirements[301] and the State Agency Climate Leadership Act[302]
- WSDOT strategic plan goals (practical solutions, inclusion, and workforce development)

Existing, past, or aspirational performance metrics review

An inventory and review of WSDOT's current, previously utilized and retired performance metrics was conducted. This information came from four main WSDOT documents:

- 2008 Washington State Bicycle Facilities & Pedestrian Walkways Plan[303]
- WSDOT Gray Notebook and supplementary subject index
- WSDOT Mobility Performance Framework
- WSDOT Economic Vitality Performance Framework

Two federal/peer agency documents were also reviewed:

- Guidebook for Developing Pedestrian & Bicycle Performance Metrics, U.S. Department of Transportation, Federal Highway Administration (FHWA), 2016[304]
- Oregon Bicycle and Pedestrian Plan, Oregon Department of Transportation, 2016

The decision was made to only prioritize those performance metrics within the context of statutory policy goals that would be easily accessible and applicable to a wide range of planners. Also important to the selection of the metric was how well it would consider the equity needs of transportation-disadvantaged communities that are the most reliant on active transportation connections.

Using the resources listed above, a total of 103 performance metrics previously developed by WSDOT were inventoried. These are provided in Figure L-1, which includes the source of the metric and the associated goal it was/would have been assigned to in the 2008 Washington State Bicycle Facilities & Pedestrian Walkways Plan that this plan replaces. Most metrics were derived from that plan and the WSDOT Gray Notebook, WSDOT's performance and accountability report.

300 Washington Energy Conservation & Environmental Stewardship: RCW 70.235.020
301 Moving Ahead for Progress in the 21st Century Act (MAP-21)
302 State Agency Climate Leadership Act
303 WSDOT State Bicycle Facilities & Pedestrian Walkways Plan, 2008.
304 Guidebook for Developing Pedestrian & Bicycle Performance Metrics, U.S. Department of Transportation, Federal Highway Administration, 2016.

Topic Area	Measure Description	Statewide Policy Goals	Source
Access to Community Destinations	A numeric score (from 0-100) based on the number of non-work destinations accessible by walking from households in a project or planning area	Economic Vitality	WSDOT Economic Vitality Performance Framework
Access to Community Destinations	The percentage of people in Washington living within a walkable or bikeable distance to goods and services	Health & Environment	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Access to Community Destinations	Increased access to goods and services (percent of population within two miles of goods and services)	Health & Environment	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Access to Community Destinations	Percentage of people within 20-minute neighborhood walk/bike of services	Mobility	Mobility Performance Framework
Access to Jobs	Jobs/services within xx minutes by vehicle and transit	Mobility	Mobility Performance Framework
Adherence to Accessibility Laws	Portion of State, Regional and Local Transportation Agencies with Adopted ADA Transition Plans/ Implementing ADA Transition Plans	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Adherence to Accessibility Laws	Percentage Pedestrian and Bicycle Fatalities For At-Risk Groups (Ages 0-14 and 71+)	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Adherence to Traffic Laws	Percentage of state population affected by locally adopted bicycle helmet ordinances	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Adherence to Traffic Laws	Number of Cities and Counties with Adopted Bicycle Helmet Ordinances	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Adherence to Traffic Laws	Track the ratio of citations issued to motorists, pedestrians, and bicyclists	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Average Travel Time	Travel time (speed) by mode	Mobility	Mobility Performance Framework

Topic Area	Measure Description	Statewide Policy Goals	Source
Average Travel Time	Travel time reliability buffer index (travel time during specific time compared to free-flow travel times)	Mobility	Mobility Performance Framework
Connectivity Index	Intersection density	Mobility	Mobility Performance Framework
Crashes	Bicyclist Fatality Rates: Overall	Safety	WSDOT Gray Notebook
Crashes	Bicyclist Fatality Rates: By Location	Safety	WSDOT Gray Notebook
Crashes	Bicyclist Fatality Rates: By Road Type	Safety	WSDOT Gray Notebook
Crashes	Bicyclist Fatality Rates: By State	Safety	WSDOT Gray Notebook
Crashes	Bicyclist Fatality Rates: Compared to Reduction Goal	Safety	WSDOT Gray Notebook
Crashes	Bicyclist Fatality Rates: Washington State vs. National Average	Safety	WSDOT Gray Notebook
Crashes	Pedestrian Fatality Rates: Overall	Safety	WSDOT Gray Notebook
Crashes	Washington Metro Areas Rank for Pedestrian Fatalities	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Crashes	Pedestrian Fatality Rates: By Age Group	Safety	WSDOT Gray Notebook
Crashes	Pedestrian Fatality Rates: By Location	Safety	WSDOT Gray Notebook
Crashes	Pedestrian Fatality Rates: By Race and Ethnicity	Safety	WSDOT Gray Notebook
Crashes	Pedestrian Fatality Rates: By Road Type	Safety	WSDOT Gray Notebook
Crashes	Pedestrian Fatality Rates: By State or Metropolitan Area	Safety	WSDOT Gray Notebook
Crashes	Pedestrian Fatality Rates: Compared to Reduction Goal	Safety	WSDOT Gray Notebook
Crashes	Pedestrian Fatality Rates: Washington State vs. National Average	Safety	WSDOT Gray Notebook
Crashes	Factors in Vehicle/Pedestrian Collisions	Safety	WSDOT Gray Notebook

Topic Area	Measure Description	Statewide Policy Goals	Source
Crashes	Number of annual bicycle or pedestrian involved traffic crashes	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Crashes	Number of annual fatal bicycle or pedestrian crashes.	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Crashes	Washington's Rank Among State's for Bicyclist and Pedestrian Fatalities	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Crashes	Percentage of Pedestrian and Bicycle Fatalities of All Traffic Fatalities	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Crashes	Results Washington: Pedestrian and Bicyclist Fatalities Measure	Safety	WSDOT Gray Notebook
Crashes	School Age Pedestrian and/or Bicyclist Fatalities	Safety	WSDOT Gray Notebook
Crashes	Statewide Annual Fatal and Serious Injury Traffic Collisions Involving Pedestrians and Bicyclists	Safety	WSDOT Gray Notebook
Crashes	WSDOT's Strategies for Reducing Bicyclist and Pedestrian Fatalities	Safety	WSDOT Gray Notebook
Crossing Opportunities	Percentage Reduction in Pedestrian Fatalities at Crosswalks	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Crossing Opportunities	Pedestrian crossing opportunities per mile	Mobility	Mobility Performance Framework
Crossing Opportunities	Number of unmarked vs. marked/ signed/signalized crossings within cities.	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Delay	Hours of person-delay by mode	Mobility	Mobility Performance Framework

Topic Area	Measure Description	Statewide Policy Goals	Source
Delay	Intersection delay (weighted by person)	Mobility	Mobility Performance Framework
Density of Destinations	Job density	Mobility	Mobility Performance Framework
Land Value	Estimated change in US dollar value of single-family, residential, multifamily residential, and commercial real estate	Economic Vitality	WSDOT Economic Vitality Performance Framework
Level of Service	Track Washington metro areas rank and other US cities for pedestrian safety	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Miles of Pedestrian/ Bicycle Facilities	Percentage of missing bicycle facilities within xx [305] mile(s) on each side of corridor segment	Mobility	Mobility Performance Framework
Miles of Pedestrian/ Bicycle Facilities	Bicycle facilities (miles) per capita	Mobility	Mobility Performance Framework
Miles of Pedestrian/ Bicycle Facilities	Percentage growth in miles of trails or on street bicycle facilities per year	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Miles of Pedestrian/ Bicycle Facilities	Total linear miles of designated bicycle facilities – bike lanes and shared use paths	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Miles of Pedestrian/ Bicycle Facilities	Net total linear miles of designated bicycle facilities (bike lanes and shared use paths)	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Miles of Pedestrian/ Bicycle Facilities	Sidewalk miles per capita	Mobility	Mobility Performance Framework
Miles of Pedestrian/ Bicycle Facilities	Percentage of missing (or unsuitable) pedestrian facilities within xx[305] mile(s) on each side of corridor segment	Mobility	Mobility Performance Framework

305 The placeholder xx appears in the WSDOT Mobility Performance Framework

Topic Area	Measure Description	Statewide Policy Goals	Source
Miles of Pedestrian/ Bicycle Facilities	Percentage growth in miles of sidewalk per year	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Miles of Pedestrian/ Bicycle Facilities	Total linear miles of sidewalks on state highways	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Miles of Pedestrian/ Bicycle Facilities	Net total linear miles of sidewalks on state routes within cities	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Miles of Pedestrian/ Bicycle Facilities	Addition of bicycle and pedestrian facilities to the WSDOT Maintenance and Accountability Plan	Preservation	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Mode Split	Biking miles traveled	Mobility	WSDOT Gray Notebook
Mode Split	Walking miles traveled	Mobility	WSDOT Gray Notebook
Mode Split	Percentage mode shares	Mobility	Mobility Performance Framework
Mode Split	Percentage capacity used by mode (Person counts/capacity)	Mobility	Mobility Performance Framework
Mode Split	Person miles traveled (person counts and forecasts), roadway network mileage by segment	Mobility	Mobility Performance Framework
Mode Split	Percentage of and type of trips made by biking and walking	Health & Environment	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Mode Split	Percentage of trips and miles traveled by bicycling and walking	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Mode Split	Walking and Biking Trends and Counts	Mobility	WSDOT Gray Notebook

Topic Area	Measure Description	Statewide Policy Goals	Source
Mode Split	Comparison of Cities by Population: Congestion vs. Non-motorized Mode Share	Mobility	WSDOT Gray Notebook
Mode Split	Comparison of Cities by Population: Congestion vs. Non-motorized Mode Share: Count Program and Technology	Mobility	WSDOT Gray Notebook
Mode Split	Active miles traveled (walking miles traveled + biking miles traveled)	Mobility	WSDOT Gray Notebook
Network Completeness	Percent of corridor segments lacking a connecting and parallel network (by mode)	Mobility	Mobility Performance Framework
Other	Population density	Mobility	Mobility Performance Framework
Other	U.S. Bicycle Route System	Mobility	WSDOT Gray Notebook
Other	Most "Bicycle-Friendly" States Rankings	Mobility	WSDOT Gray Notebook
Other	Number of state, regional, and local transportation personnel receiving design training	Stewardship	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Other	Number of cities and counties with bicycle and/or pedestrian plans (should include measurable goals and project lists)	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Other	Number of law enforcement officers receiving training on bicyclist and pedestrian rights and responsibilities per year	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Other	Number of students receiving pedestrian and/or bicycle safety education or skill training	Safety	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Other	Percentage of transportation plan and project teams that include bicycle and pedestrian representatives	Stewardship	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008

Topic Area	Measure Description	Statewide Policy Goals	Source
Person Throughput	Bicycle and pedestrian user counts on state highways, major arterials, trails, and related bicycle miles traveled	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Physical Activity and Health	Examine lessons learned from the pilot SR520 Health Impact Assessment	Health & Environment	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Physical Activity and Health	Safe Routes to Schools Grant Program	Safety	WSDOT Gray Notebook
Physical Activity and Health	Safer People - Safer Streets Program	Safety	WSDOT Gray Notebook
Physical Activity and Health	Bicycle and Pedestrian National Documentation Project	Stewardship	WSDOT Gray Notebook
Physical Activity and Health	Percentage of students walking or bicycling to Washington schools	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Population served by bike/walk/transit	Bike Share Programs	Mobility	WSDOT Gray Notebook
Population served by Walk/Bike/Transit	Percentage of Cities and Counties with Current Bicycle & Pedestrian plans	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Population served by Walk/Bike/Transit	Number of schools/students participating in the Safe Routes to School Program	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Population Served by Walk/Bike/Transit	Documented use of state and local Paths and Trails expenditures (RCW 47.30)	Preservation	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Population Served by Walk/Bike/Transit	Pedestrian and Bicycle Program	Stewardship	WSDOT Gray Notebook
Population served by Walk/Bike/Transit	Number of students being transported by yellow school bus to Washington schools	Mobility	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Retail Effects	Direct economic activity (tax revenue) generated compared to project lifecycle cost	Economic Vitality	WSDOT Economic Vitality Performance Framework

Topic Area	Measure Description	Statewide Policy Goals	Source
Retail Effects	Estimated dollars of benefit from increased person miles traveled by biking and walking across a defined geographic area	Economic Vitality	WSDOT Economic Vitality Performance Framework
Transportation-Disadvantaged Population Served	Percentage accessibility for low-income, minority, youth/elderly or other disadvantaged population	Mobility	Mobility Performance Framework
Transportation-Disadvantaged Population Served	Average housing and transportation costs in a specified geographic area as a percentage of household income	Economic Vitality	WSDOT Economic Vitality Performance Framework
Transportation-Disadvantaged Population Served	Percentage of ADA-accessible facilities along corridor segments both sides	Mobility	Mobility Performance Framework
Transportation-Disadvantaged Population Served	Project is in a designated location with identified health disparities and will help address those disparities	Economic Vitality	WSDOT Economic Vitality Performance Framework
Transportation-Disadvantaged Populations Served	Portion of state, regional and local transportation agencies with adopted ADA Transition Plans and Implementing ADA Transition Plans. These plans identify locations where the transportation system are not accessible to people with physical challenges or people with other limitations to mobility	Stewardship	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Transportation-Disadvantaged Population Served	Student travel	Stewardship	WSDOT Gray Notebook
Quality of Service & Systemic Safety	Bicycle Level of Traffic Stress (LTS)	Mobility & Safety	WSDOT Gray Notebook
Quality of Service and Systemic Safety	Level of pedestrian stress	Mobility & Safety	Mobility Performance Framework
Vehicle Miles Travelled (VMT) Effects	Monitor achievement of VMT goals involving bicycle and pedestrian efforts	Health & Environment	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008

Topic Area	Measure Description	Statewide Policy Goals	Source
VMT Effects	Greenhouse gas emissions reductions attributed to installation of bicycle and pedestrian facilities	Health & Environment	WSDOT State Bicycle Facilities & Pedestrian Walkways Plan 2008
Volume	Active transportation count	Mobility	WSDOT Gray Notebook
Volume	Walk-on & bicyclist Washington State Ferry passenger counts	Mobility	WSDOT Gray Notebook

Figure L-1: Metrics derived from past WSDOT performance measure source documents.

The metrics were predominantly related to the WSDOT mobility goal, especially those that measure the linear distance of walking and bicycling infrastructure, and to the safety goal, with metrics such as traffic crashes involving pedestrians and bicyclists. Fewer performance metrics were related to the other goals: Stewardship, Environment and Health[306], Economic Vitality, and Preservation.

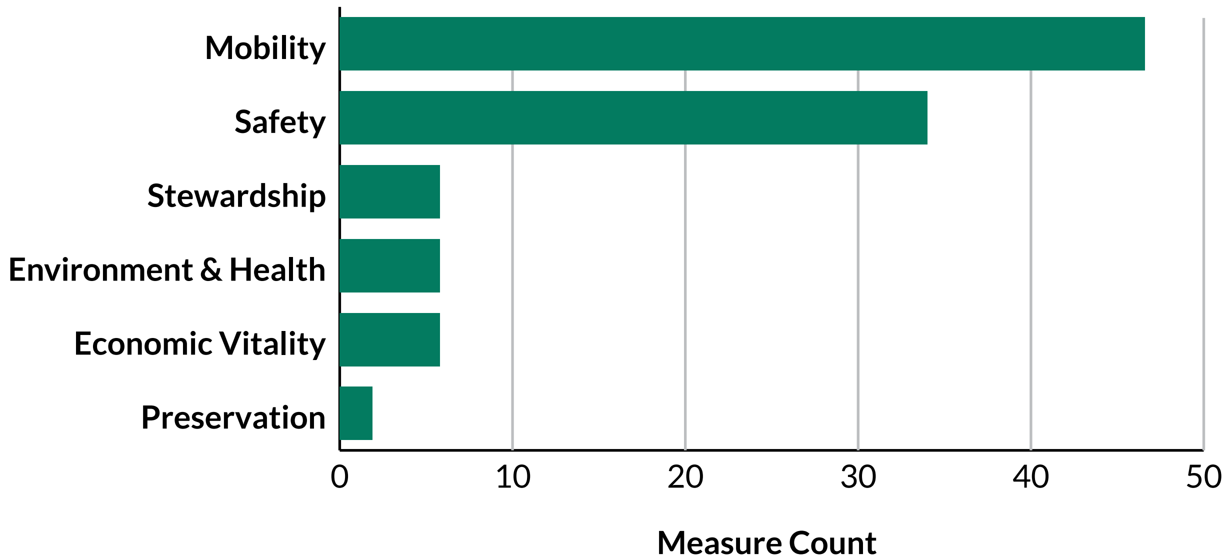

Figure L-2: Breakdown of how each measure fits into WSDOT statewide policy goals.

Similar metrics were combined. Those remaining were categorized based on the new goals of the ATP: Connectivity, Safety, Opportunity, Participation, and Partnership. The metrics that were least connected to the new goals and those without available data sources were removed from further consideration. The WSDOT Active Transportation Plan Stakeholder Steering Committee provided input to identify the most important ones and the initial set was chosen. Metrics were selected based on:

- Review of the existing inventory of WSDOT's active transportation-related performance metrics
- Review of FHWA and other agency recommendations, with consideration of unique WSDOT needs
- Prioritization of key topic areas
- Data availability/suitability

Staff worked to develop the calculation measures, baseline, and measurement goals for each selected metric. During this process further refinements were made as the availability of data and compatibility with other WSDOT priorities were further defined. The section below includes the final list of selected performance metrics for the ATP.

306 Washington Transportation Plan 2040 & Beyond, Washington State Transportation Commission, 2018.

Active Transportation Plan 2020 and Beyond Performance Metrics

Figure L-3 lists the ATP performance metrics and calculation measures, distinguishing between those related to walking and bicycling where possible.

Performance Metric	Calculation Measures
Connectivity Goal Metrics	
Bicyclist and Pedestrian level of traffic stress	Increase the total linear length (miles) of WSDOT-owned infrastructure or other connection identified as a parallel local facility with a bicyclist and pedestrian LTS rating of 1 or 2 in population centers
Miles of bicycle facilities - facility length	Increase the total centerline miles of bicyclist facilities on state highways or other connection identified as a parallel local facility in population centers
Miles of pedestrian facilities - facility length	Increase the total linear length (miles) of centerline miles of WSDOT-owned infrastructure with sidewalks in population centers
Intersection crossings level of traffic stress	Increase the number of intersections on state highways in population centers that are LTS 1-2 or that meet WSDOT guidance for pedestrian crossing treatments
Ramp crossing level of traffic stress	Increase the number of highway ramps on state highways in population centers that are LTS 1-2 or that meet WSDOT guidance for pedestrian crossing treatments
Miles of multi-use paths/ trails	Increase the total linear length (miles) of multi-use paths serving a transportation function and connecting population centers
Safety Goal Metrics	
Eliminate fatalities from traffic crashes	Decrease to zero the total number of people walking or biking who are killed in traffic crashes involving a motorist on all roads in Washington state
Eliminate serious injuries from traffic crashes	Decrease to zero the total number of pedestrians and bicyclists seriously injured in traffic crashes involving a motorist on all roads in Washington state
Eliminate fatal and serious injury traffic crashes involving people 65 years or older	Decrease to zero the total number of pedestrian and bicyclist fatal and serious injury crashes involving people 65 years or older on all roads in Washington state
Injury minimization speed limits	Increase the number of miles of state highway (that are not full limited access) in population centers that have a posted speed of 25mph or less
Opportunity Goal Metrics	
Provide ADA-accessible active transportation facilities	Percentage of highway miles with ADA-accessible sidewalks in population centers[307]
Eliminate transportation disparities for BIPOC people walking and bicycling	Increase the number of highway miles in population centers with pedestrian or bicyclist LTS 1 or 2 adjacent to or running through census blocks with a percentage of Black, Indigenous, people of color higher than the state average

307 WSDOT shares this responsibility with local jurisdictions depending on the population size of incorporated cities/towns. Data not yet available to provide a complete and accurate baseline. Identifying data sources to develop the baseline is included in this plan's action recommendations.

Performance Metric	Calculation Measures
Eliminate transportation disparities for low-income people walking and bicycling	Increase the number of highway miles in population centers with pedestrian or bicyclist LTS 1 or 2 adjacent to or running through census blocks where the percentage of people living at or below 200% of the federal poverty is higher than the state average
Air pollution emissions prevented	Total greenhouse gas emissions in MMT avoided (millions of metric tons) by walking and biking
Increase participation in agency grantmaking by high-need communities	Percentage of applications received and funded for the Safe Routes to School and Pedestrian/Bicyclist Program awards that score at or above the 75th percentile on equity criteria
Participation Goal metrics	
Share of trips	Percentage of trips taken by (1) walking or (2) bicycling
Access to multimodal transportation connections	Increase the number of miles of LTS 1 or 2 state highways or other connection identified as a parallel local facility within 3 miles of a modal connection (transit, ferry, commuter rail, and air)
Transit access by walking/ biking	Percentage of people who use active transportation to reach their transit connection
Walk-on or bike-on ferry trips	Total number of ferry passengers by (1) walk-on or (2) bicycle-on
Children walking/biking to school	Percentage of trips to school made by walking or biking
Physical activity	Percentage of adults aged ≥18 years achieving the Surgeon General's recommended weekly level of physical activity
Partnership Goal Metrics	
Active transportation plans—regional	Number of regions with active transportation, bicycle and/or pedestrian plans, or comprehensive plans directly addressing facility needs
Extent of reach for regional active transportation plans	Percentage of population served by regional active transportation plans.
Active transportation plans—local	Number of counties and incorporated cities/towns with active transportation, bicycle and/or pedestrian plans, or comprehensive plans directly addressing facility needs

Figure L-3: ATP performance metrics.

PERFORMANCE METRICS METHODOLOGY

Connectivity Goal Metrics

All of the connectivity performance metrics except the one dealing with multi-use paths/trails are specific to state highways. They establish an initial baseline of conditions on state right of way and goals for improvement. They are reported here without regard for the population size of cities, with the understanding that WSDOT may not have full jurisdiction to make pedestrian and bicycle improvements on state-owned right of way in larger cities. Direction specific to the content of the ATP necessitates the inclusion of active transportation baseline numbers and goals for all of the state system. Some of this information is limited at this time but as state, regional, and local active transportation plans come into alignment the identification of a complete system (including parallel local facilities) will emerge. Expansion of the connectivity goal metrics to include regional and local active transportation data and goals will be a priority for future updates of this plan.

Connectivity metrics were determined using the “Baseline Network” layer derived from WSDOT’s 2017 Highway Performance Monitoring System (HPMS) data and other layers appended to it from the US Census and other WSDOT data layers for bike lanes, limited access highway ramps, rural and urban designations, and bicyclist highway prohibitions. Calculated or derived fields in the Baseline Network included Bicyclist and Pedestrian Level of Traffic Stress and pedestrian highway prohibitions. An “urban method” field was used to identify more populated areas and a “rural method” field captured everything else. Later, the population center definition (boundaries of cities/towns and census designated places) was adopted. A population center layer (2010 census designated places and 2020 municipal boundaries) was then used to only select highways within those boundaries (refer to Appendix D for additional information).

Connectivity performance metric calculations differed from those used to identify the need estimates in chapter 4. As noted, pedestrian and bicyclist gaps did not take population center boundaries into account initially and population center gaps were identified using two different methods: rural and urban. Based on public outreach feedback only the urban method was retained for this initial stage of analysis; the results of the rural method made it clear that those segments need more exploration to arrive at a final LTS scoring method. However, this decision removed some population center gaps on higher-speed roads that should have been included. The performance metric calculations restored those lost miles. Goals were established by querying the baseline network for any state highway miles within population centers where it was legal to walk or bike.

As a point of clarification on the mileage differences between need estimates and the connectivity performance metrics, the data query to identify mileage under consideration in Chapter 4 used the filter “increasing miles only”. Some decreasing miles were also present in the Baseline Network. An example would be the divided highway that is found within the Port Angeles population center. When the performance metrics were calculated, the decision was made to include the decreasing miles. Including decreasing lanes in population centers that are open to pedestrians and bicyclists accounts for the potential need to provide sidewalk on both sides of the two separated roadways. In terms of bike lanes, there may only be a need for one for the decreasing lane set and one on the increasing set. In summary, including decreasing lanes, in addition to including the lost miles referred to in the preceding paragraph, resulted in higher metric “goal mileage” than the gap mileage described in Chapter 4.

Pedestrian and bicyclist level of traffic stress (LTS)

Arch GIS tools and data from the WSDOT workbench were used to determine the total linear length (1930 miles) of WSDOT-owned infrastructure in population centers where either pedestrians and/or bicyclists are permitted. Using the Alta Urban Method (refer to Appendix D), the baseline linear length (miles) of pedestrian and bicycle level of traffic stress 1 or 2 was determined. This information was filtered using the layer prepared by WSDOT staff for population centers (cities, towns and census designated places). This work identified the baseline number of miles of WSDOT infrastructure in population centers with an LTS of 1 or 2 (90 miles). The goal is that 100 percent of the 1930 miles of WSDOT-owned infrastructure or other connection identified as a parallel local facility within population centers where pedestrians and/or bicyclists are permitted have an LTS rating of 1 or 2. Ninety miles was reported as the baseline and 100 percent of the total, 1930 miles, was recorded as the goal.

Miles of bicycle facilities - facility length

This metric tracks the miles of condition-specific bicycle facilities on state routes. Roadway conditions can also be changed to change the type of bike facility needed. Using the WSDOT GIS baseline network and population center boundaries, a total length was found of WSDOT-owned infrastructure in population centers where bicyclists are permitted (1,930 miles), and the baseline length (miles) of designated bicycle lanes (over 4 feet wide). Bicycle lanes were examined for increasing and decreasing sides of the road (overlapping data was ignored) and bicycle lanes were counted when they were found on both sides of the road. A baseline measure of 60 miles of bike lane was determined. Existing bicycle lanes were not evaluated to determine if the design type matched the roadway characteristics so this number will likely be adjusted in the future. The goal was recorded as completing condition-specific bike facilities on 100 percent of WSDOT-owned infrastructure in population centers where bicyclists are permitted. Note: in some cases, a connection identified as a parallel local facility with an LTS of 1 or 2 could be used as a substitute for a given length of state highway.

Miles of pedestrian facilities - facility length

This metric tracks the number of miles of condition-specific pedestrian facilities on state routes. Using the WSDOT GIS baseline network and population center boundaries, a total length was found of WSDOT-owned infrastructure in population centers where pedestrians are permitted (1,800 miles). The existing sidewalk presence estimate dataset was used (refer to Appendix D). Sidewalk data are not complete and sidewalk attributes such as width, ADA compliance, and condition are unknown. When collecting data, there was an effort to exclude at-grade facilities that are not separated from the travel way by a physical barrier since such spaces do not meet the definition of a sidewalk in the WSDOT Design Manual. Sidewalk was estimated to exist on 37 percent of WSDOT-owned infrastructure in population centers. The goal was recorded as completing condition-specific pedestrian facilities (sidewalks) on 100 percent of WSDOT-owned infrastructure in population centers where pedestrians are permitted (currently estimated at 1800 miles). That total length was multiplied by 37 percent for an estimated total baseline of 670 miles of sidewalk.

Intersection crossings level of traffic stress

Using the WSDOT GIS baseline network and population center boundaries the total number of intersections on WSDOT-owned infrastructure in population centers where pedestrians or bicyclists are permitted was determined. There are 5,040 non-signalized intersections in population centers on WSDOT-owned infrastructure and there are 1,201 signalized ones. The goal is for 100 percent of these intersections to have the right crossing treatment based on the roadway characteristics, vehicle volumes, and traffic speeds at the location. Baseline data was not available for this metric at the time of publication.

Ramp crossing level of traffic stress

Using the WSDOT GIS baseline network and population center boundaries the total number of on/off ramp locations on WSDOT-owned infrastructure in population centers where pedestrians or bicyclists are permitted was determined. There are 1,206 non-signalized ramp locations and 117 signalized ones. The goal is for 100 percent of the locations to have the right crossing treatment based on roadway characteristics, vehicle volumes, and traffic speeds. Baseline data was not available for this metric at the time of publication.

Miles of multi-use paths/trails

This connectivity performance metric applies to all jurisdictions and is not specific to WSDOT-owned infrastructure or rights of way. Most of the data was provided to WSDOT by Manastash Mapping LLC. Other data was collected from a variety of source jurisdictions. The dataset is robust and generally well-vetted but is likely incomplete. As part of the Statewide Trails Plan, RCO is leading the effort to develop and maintain a statewide trails database that would serve as an official record. Discussion for that database includes having local agencies confirm/update data on the trails they manage.

The following data use rounded estimates. Some values such as existing trail miles are known with greater precision, but conceptual trails provide much less certain mileage estimates. Based on data available as of December 2020, WSDOT used an estimate of 1,600 miles to represent existing multi-use paths/trails in Washington state. Over 400 additional miles of existing trail are primitive. Most of the trails are owned and managed by jurisdictions other than WSDOT (records indicate that 38 miles of trail are managed by WSDOT, although other trails may exist in WSDOT rights of way that are managed by other jurisdictions). About 800 miles of trail have been proposed or planned by various local agencies. Putting the existing and proposed trials together totals 2,800 miles. By mapping the locations of the existing and proposed trails and overlaying WSDOT's conceptual United States Bicycle Route network, an array of conceptual trail connectors were identified. Those connectors totaled about 1,300 miles. Combining everything would produce a statewide conceptual trail network that would cross the state and connect larger population centers. The total mileage of that statewide conceptual network would be 4,100 miles and was used as the goal for this plan. The existing 1,600 trail miles were used as the baseline (this excludes the primitive trail miles). Chapter 3 provides more information on the data sources used to identify this number.

Safety Goal Metrics

All of the performance metrics for safety except the one dealing with injury minimization speed limits apply to all roads (city, county, state, other) in Washington state. They are from enforcement officer reports of crashes that involve at least one motorized vehicle. The data was provided by the WSDOT Transportation Data, GIS and Modeling Office in 2020.

Eliminate fatalities from traffic crashes

The baseline for this metric is the total number of pedestrian fatalities (107) and bicyclists' fatalities (9) reported for 2019 at the time that the data was provided in 2020. The accepted state goal as published in the Washington State Target Zero Plan and used here is 0. Reporting this metric is required under the federal Fast Act law.

Eliminate serious injuries from traffic crashes

The baseline for this metric is the total number of pedestrian serious injuries (358) and bicyclist serious injuries (103) reported for 2019 at the time that the data was provided in 2020. The accepted state goal as published in the Washington State Target Zero Plan and used here is 0. Reporting this metric is required under the federal Fast Act law.

Eliminate fatal and serious injury traffic crashes involving people 65 years or older

The baseline for this metric is the total number of pedestrian/bicyclists 65 years or older that die (28) or are seriously injured (54) in a traffic crash as reported for 2019 at the time that the data was provided in 2020. The accepted state goal as published in the Washington State Target Zero Plan and used here is 0. Reporting this metric is required under the federal FAST Act law.

Injury minimization speed limits

The baseline for this metric is the total linear length (miles) of WSDOT-owned infrastructure in population centers where bicyclists or pedestrians are permitted and where the posted speed is 25 mph or less (90 miles). This was determined using Arc GIS tools and data from the WSDOT workbench. The total linear length (miles) of WSDOT-owned infrastructure in population centers where bicyclists or pedestrians are permitted is 1,930 miles. This was recorded as the goal.

Opportunity Goal Metrics

The first three performance metrics for the opportunity goal are specific to state highways and WSDOT-owned infrastructure.

Provide ADA-accessible active transportation facilities

ADA-accessible active transportation facilities include sidewalks, curb ramps, multi-use paths, transit connections, road crossing treatments, etc. The baseline for this metric has yet to be determined. It has started with an inventory of WSDOT managed sidewalk within WSDOT-owned rights of way in smaller cities and local agency managed sidewalk within WSDOT-owned rights of way in larger cities. Once the locations of sidewalk and curb ramps are known they will need to be assessed for ADA accessibility. The intention is to provide a baseline for this metric in the next update of the plan. The goal is that 100 percent of WSDOT-owned active transportation infrastructure in population centers be ADA-accessible.

Eliminate transportation disparities in walk/bike facilities in places with higher percentages of Black, Indigenous, and people of color

A GIS analysis was used to determine that 600 miles of WSDOT-owned infrastructure in population centers pass through or are adjacent to census block groups where the percentage of the population that is Black, Indigenous, or people of color is higher than the state average. The baseline will be the number of those miles that rate as an LTS 1 or 2. This will be determined when the LTS ratings are updated on the WSDOT GIS workbench. The goal is for 100 percent of the 600 miles of WSDOT-owned infrastructure in population centers with a higher percentage of BIPOC population than the state average to be rated as an LTS 1 or 2.

Eliminate transportation disparities in walk/bike facilities for places with higher percentages of low-income people

A GIS analysis was used to determine that 1,060 miles of WSDOT-owned infrastructure in population centers pass through or are adjacent to census block groups where the percentage of the population living at or below 200 percent of the federal poverty level is higher than the state average. The baseline will be the number of those miles that rate as an LTS 1 or 2. This will be determined when the LTS ratings are updated on the WSDOT GIS workbench. The goal is for 100 percent of the 1,060 miles of WSDOT-owned infrastructure in population centers where the percentage of people living in poverty is higher than the state average to be rated as an LTS 1 or 2.

Air pollution emissions prevented

This metric is for all of Washington state. This calculation uses the total estimated Pedestrian Miles Traveled (PMT) and Bicyclist Miles Traveled (BMT) to generate a measure of total emissions in millions of metric tons avoided from active travel. These avoided emissions from active travel were added to the estimate of vehicle emissions. The emissions for PMT and BMT were divided by this sum to calculate the percentage of emissions avoided as a result of walking and bicycling. WSDOT used a series of data sources to develop this measure:

- Statewide light duty (cars, vans, SUVs, motorcycles, and pickup trucks) vehicle miles traveled (VMT) estimates from WSDOT for 2015.[308]
- An emission factor of 364 grams per mile for light duty vehicles traveling at 25 miles per hour from Puget Sound Regional Council's (PSRC) 2015 MOVES analysis.[309]
- Total on-road gasoline greenhouse gas emissions from the Washington State GHG inventory produced by the Department of Ecology.

The total greenhouse gas emissions avoided by PMT and BMT are expressed in millions of metric tons (MMT). A direct offset of one active transportation mile for one vehicle mile was assumed. An estimated 0.08 million metric tons (MMT) not created due to bicycle travel and 0.34 MMT not created due to pedestrian travel were determined. Combined, a total of 0.42 MMT of CO_2 was avoided. In 2015, about 2 percent of miles traveled was by biking or walking. An estimated 0.4 percent of potential total emissions were eliminated by bicycling, while 1.6 percent of potential total emissions was eliminated by walking. Therefore, the baseline measure for CO2 emissions averted due to travel by active modes is 0.42 MMT.

The proposed goal is to increase the amount of CO_2 avoided to 1 MMT annually. This is based on the participation goal below that would increase all walking and biking trips by 150 percent. This would result in an increase from 0.42 MMT to 1.07 MMT of CO_2 emissions averted annually.

Increase participation in agency grantmaking by high-need communities

This metric focuses on the Pedestrian and Bicycle Program (PBP) and Safe Routes to School (SRTS) programs which are open to all public agencies and tribes in Washington state. High-need locations were defined as those with higher than the state average of low-income populations, BIPOC, and/or people with disabilities. An analysis of the 2020 applications was used to determine the percentage of applications submitted that would serve high-need populations. The analysis found that 38.4 percent of SRTS applications and 16.8 percent of PBP applications were for improvements in high-need locations. This was recorded as the baseline for this

308 Annual Mileage & Travel Information, WSDOT, 2015.

309 This is based on the assumption that most pedestrian and bicycle travel is replacing in town driving. The calculation assumes that one mile of PMT or BMT directly offsets one mile of VMT.

metric. In 2022, WSDOT plans to modify the application and selection process to motivate a greater percent of applicants to submit projects that would serve high-need locations. The goal is to increase the percent of high-need applications for each program to 40 percent (consistent with legislative direction in the Healthy Environment for All Act).

Participation Goal metrics

Unless otherwise noted, the performance metrics for participation are for all of Washington state.

Share trips

Mode share calculates the proportion of trips made by each mode of transportation. A review of potential data sources to track the percentage of trips made by walking and bicycle included a suitability assessment of the WSDOT Pedestrian and Bicycle Count Program and the National Household Travel Survey conducted by the FWHA. The former data source had limited coverage statewide. Therefore, the National Household Travel Survey is used for this metric.

Based on the 2017 National Household Travel Survey an estimated 12 percent of all trips were made on foot or by bicycle.[310] This is the baseline for this metric. That same survey found that about 30 percent of trips are 1 mile or less, which is a reasonable walk or bike distance. Therefore, the goal for this metric is that 30 percent of trips taken are by either walking or bicycling.

Access to multimodal transportation connections

Using the baseline network and population center boundaries the total length (miles) of WSDOT-owned infrastructure or other connection identified as a parallel local facility within a given distance (3 miles for bicyclists and 1 mile for pedestrians) of a modal connection (transit, ferry, commuter rail, and air) was determined using WSDOT data and Cube data. The length (miles) of bicyclist level of traffic stress and pedestrian level of traffic stress 1 or 2 was determined (19 and 13 miles respectively). These were recorded as the baseline. The goal is that 100 percent of state highways near modal connections (779 miles for bicyclists, and 237 miles for pedestrians) will have active transportation facilities that allow the road to function as LTS 1 or 2. A suitable parallel local facility may also be identified to fill the gap.

Transit access by walking/biking

The 2017 National Household Travel Survey indicates that 85 percent of public transportation users in Washington reported walking or bicycling to access transit. This was reported as the baseline for this metric. The goal is to be determined and will be based in part on the next update of the Washington State Public Transportation Plan.

[310] Rates of walking and bicycling continue to increase throughout Washington. WSDOT Gray Notebook 71, Sept. 2018. As described in Chapter 2, the data are not complete and this detailed survey has not been repeated since 2017.

Walk-on or bike-on ferry trips

Total walk-on and bicycle-on[311] passengers using Washington State Ferries was also used to provide a measure of passengers using active modes to cross the various coastal and inland waterways around the state.[312] Figure L-4 provides a listing of the Washington ferry service and data availability for walk-on and bicycle-on ridership. Most non-WSF ferry service collected ridership information; however for some, walk-on passengers and passengers that travel with vehicles were not easily distinguished.

Ferry Service	Service Provider	Service Type	Type of Crossing	Operator Type	Data Available[313]
Puget Sound Routes	Washington State Ferries (WSF)	Vehicle/Passenger	Coastal[314]	Public	Yes
Seattle-West Seattle-Vashon Ferry	King County Marine Division	Passenger Only	Coastal	Public	Yes
Bremerton-Kingston-Seattle	Kitsap Transit	Passenger Only	Coastal	Public	Yes
Steilacoom-Anderson Island-Ketron Island Ferry	Pierce County	Vehicle/Passenger	Coastal	Public	Yes
Guemes Island Ferry	Skagit County	Vehicle/Passenger	Coastal	Public	No
Lummi Island Ferry	Whatcom County	Vehicle/Passenger	Coastal	Public	No
Wahkiakum County Ferry	Wahkiakum County	Vehicle/Passenger	Inland	Public	No
Gifford-Inchelium Ferry	Colville Confederated Tribes	Vehicle/Passenger	Inland	Public	No
Keller Ferry (Clark)	Washington State Ferries (WSF)	Vehicle/Passenger	Inland	Public	No
Port Angeles-Victoria Ferry	Black Ball Transport	Vehicle/Passenger	Coastal	Private	No
Seattle-Victoria	Victoria Clipper	Passenger Only	Coastal	Private	No

Figure L-4: Walk-on and bicycle-on passenger data availability for ferry service in Washington.

Washington State Ferries (WSF) publishes walk-on and bicycle-on passenger information for all Puget Sound-based routes. Among non-WSF service, only three operators published walk-on only data: 1) King County Marine Division (Seattle-West Seattle ferry, Seattle-Vashon Island ferry), 2) Kitsap Transit (Bremerton-Seattle

311 Data for bicycle-on passengers are only recorded for WSF service.
312 It should be noted that it is assumed that walking and bicycling transportation modes were used as the primary method of travel to and from ferry terminal destinations. However, these passengers may have driven and used park and ride facilities or were dropped off at ferry terminals.
313 Public data available through online resources.
314 Puget Sound and Salish Sea only.

ferry and Kingston-Seattle ferry[315]) and 3) Pierce County (Steilacoom-Anderson Island Ferry, Steilacoom-Ketron Island Ferry). Some ferry routes only charge going one way. In these cases, total ridership was estimated for return trips based on one-way travel.[316] Ridership was aggregated for all Puget Sound-based WSF service, as well as non-WSF service where data were available, refer to Figure L-5. Over eight million walk-on and bicycle-on passengers were counted in 2018. This was recorded as the baseline for this metric. A majority (88.7 percent) of walk-on and bicycle-on passengers traveled on the ten WSF routes. The vehicle and passenger Steilacoom-Anderson Island-Ketron Island Ferry serviced just over 100,000 (1.3 percent) passengers in 2018. The passenger-only King County Water Taxi and Kitsap Fast Ferry recorded over 660,000 (8.1 percent) and 160,000 (2.0 percent) respectively.

Ferry Operator	Ferry Service	Total Passenger Count (2018)			
		Passenger Type		Total	Percentage
		Walk-On	Bicycle-On[317]		
Washington State Ferries	Puget Sound Routes	6,975,555 (96.1%)	286,841 (3.9%)	7,262,396	88.7%
King County Marine Division	Seattle-West Seattle-Vashon Ferry	664,365	-	664,365	8.1%
Kitsap Transit	Bremerton-Kingston-Seattle	160,188	-	160,188	2.0%
Pierce County	Steilacoom-Anderson Island-Ketron Island Ferry	103,723	-	103,723	1.3%
Total		**7,903,831**	**286,841**	**8,190,672**	**100.0%**

Figure L-5: Total walk-on and bicycle-on passengers on ferry services in the Puget Sound in 2018. Source: Washington State Ferries, WSDOT, 2019; King County Marine Division, 2019; Kitsap Transit, 2019; Pierce County, 2019.

Counts for ferries operated by other jurisdictions such as Port Angeles-Victoria Ferry, and other local ferry systems may be added in future as available. The Washington State Ferries long-range plan calls for a significant increase in the total number of walk-on and bicycle-on ferry passengers. The term "significant increase" was not defined as a number or percentage at the time of this document's publication. The updated ATP will include that number as the goal when it has been determined.

Children walking/biking to school

Each school day in 2019, over 1.1 million students across Washington State traveled to and from their elementary, middle, and high school. Of those in elementary and middle school, about 11 percent walked and 1 percent biked to school, according to results of the 2019 Washington State Student Travel Survey. That represents a decrease of about 50 percent from the 2016 survey, which indicated that 17 percent of children walked and 1.4 percent biked to school. This difference was attributed to the differences in the school districts that participated in 2019 verses 2016. As a conservative estimate the 2019 number of 11.7 percent was recorded as the baseline for walking and biking to school in this plan.

[315] Kingston-Seattle ferry service began in fall 2018, so information for the entire year was not available when the initial data were compiled.

[316] Riders who boarded by bicycle on westbound trips are also assumed to have returned by the same mode.

[317] Data for bicycle-on passengers are only recorded for WSF service.

Researchers Anne Vernez-Moudon and Xiao Shi used information from the 2016 Student Travel Study to better understand walkability around schools and the potential for walking to school. The researchers found that over half (55 percent) of elementary and middle schools in Washington are walkable, receiving either a medium-high or high walkability score as illustrated in Figure L-6.[318]

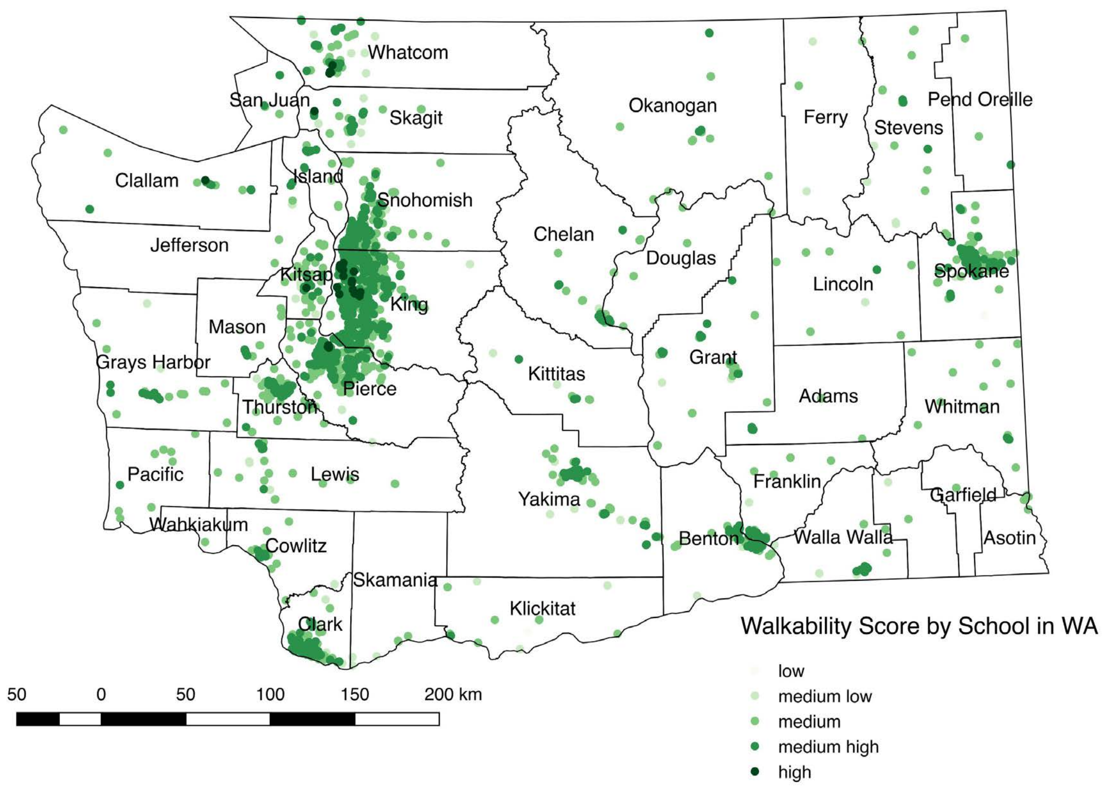

Figure L-6: Walkability score by school in Washington State 2020.[319]

They also found that the percentage of children who walk to school varies greatly by the school districts that participated in the study. Using that data, built environment factors, and socioeconomic characteristics of the school districts across the state they were able to extrapolate and estimate the percentage of children walking to school for all school districts.

[318] Vernez Moudon, Anne, Xiao Shi, and Yefu Chen. 2020. Washington State School Walk Score. Pacific Northwest Transportation Consortium in cooperation with USDOT.

[319] Vernez Moudon, Anne, Xiao Shi, and Yefu Chen. 2020. Washington State School Walk Score. Pacific Northwest Transportation Consortium in cooperation with USDOT.

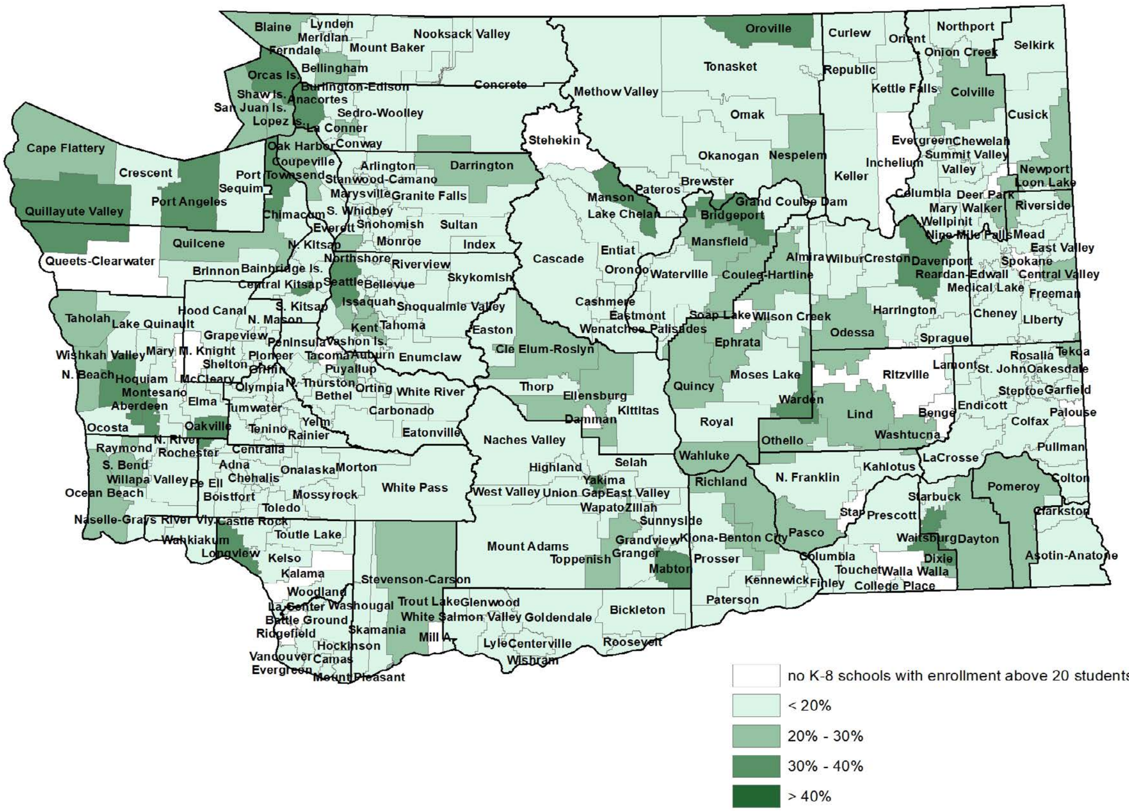

Figure L-7: Map illustrating percentage of children estimated to walk to school at school district level.

Percentage of children walking	# of school districts	# of schools	# of students	Examples
0% - 20%	157	697	317,589	Skykomish school district in King County
20% - 40%	93	512	234,795	Shoreline school district in King County
40% - 60%	18	140	63,165	Mabton school district in Yakima County
Above 60%	2	3	698	Soap Lake school district in Grant County
Total	**270**	**1352**	**616,247**	

Figure L-8: Percentage of children walking to school at school district level.

While many students attend schools in districts where the numbers are not high, this research in combination with the walkability scores above indicate a strong potential for more children to be able to walk and bike to school safely. Where 55 percent of elementary and middle schools are walkable, and only 11.7 percent of children appear to be walking, the potential exists to increase active transportation trips to school. While walkability informs potential for active trips, the decision was made to use proximity to school to set the goal. The 2019 Washington Student Travel Survey indicated that 26 percent of children live within one mile of their schools. Although aspirational, this plan considered that up to 100 percent of children within 1 mile of school could walk or bike if conditions supported those trips. Therefore, the statewide goal for children walking/biking to school was set at 26 percent. This percentage can also be thought of in less aspirational terms—it is achievable considering that some combination of children within one mile and those beyond that distance could walk or bike if conditions were optimized with complete facilities and lower level of traffic stress.

Physical Activity

Both walking and bicycling are excellent forms of utilitarian and leisure physical activity. Engaging in regular bouts of physical activity, especially moderate to vigorous physical activity, is an important component of maintaining a healthy lifestyle. To obtain substantial health benefits, the 2018 Physical Activity Guidelines for Americans recommends that adults get at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity, or an equivalent combination, each week.[320] Self-reported data on physical activity for this project was collected by the Washington State Department of Health (DOH) as part of their annual Behavioral Risk Factor Surveillance System (BRFSS) survey.[321] The measure used to evaluate physical activity is the percentage of adults that have met the national recommendation for physical activity.

In the 2019 BRFSS, 58.4 percent of Washington adults aged 18 and older met the current physical activity recommendations. This is the baseline for the physical activity performance metric. In the combined 2017 and 2019 BRFSS (Figure L-9), adults identifying their race as white reported the highest percentage of the population achieving recommended amounts of physical activity at 61.3 percent. This was followed by Native Hawaiian/Other Pacific Islanders and those of multi-race backgrounds at 58.0 percent and 57.2 percent respectively. Hispanics or Latinos reported the lowest levels of physical activity at 43.4 percent followed by African Americans/Blacks, Asians, and American Indian/Alaskan Natives at 52.2, 52.3, and 52.5 percent respectively. The percentage was lower in Hispanic, Black, American Indian or Alaska Native, or Asian adults compared to white adults after adjusting for age.

[320] U.S. Department of Health and Human Services. 2018 Physical Activity Guidelines for Americans. Washington, DC: U.S. Dept of Health and Human Services; 2018.

[321] Washington State Department of Health, Center for Health Statistics, Behavioral Risk Factor Surveillance System (BRFSS), supported in part by the Centers for Disease Control and Prevention, Cooperative Agreement NU58/DP006066-03 (2017), NU58/DP006066-05 (2019).

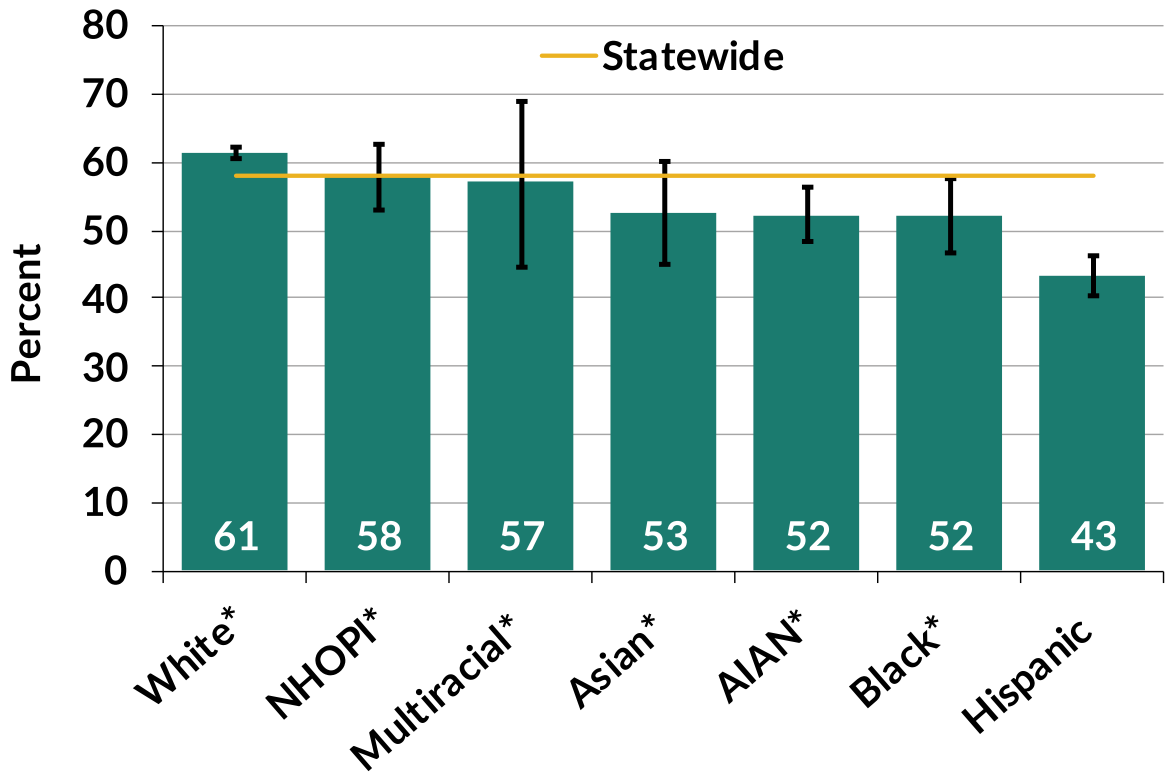

Figure L-9: Percent of adults that have met national physical activity recommendation (150+ minutes of moderate or 75+ minutes of vigorous physical activity each week) Source: Washington State Behavioral Risk Factor Surveillance System Survey, 2017 and 2019 combined. Abbreviations: AIAN, American Indian/Alaska Native; NHOPI, Native Hawaiian/Other Pacific Islander. *Non-Hispanic. Note: Error bars on columns (I) represent the 95 percent confidence interval or spread around the percentage estimate.

The goal of 62.9 percent comes from the Washington State Department of Health. This is consistent with our state agency partners who track and report this data.

Partnership Goal Metrics

Active transportation plans—regional

One method to measure the extent to which regional government agencies are supporting these modes is to examine whether they have produced any of the following types of plans related to active transportation: bicycle plan, pedestrian plan or active transportation plan. Regional governments are comprised of two types: 1) metropolitan planning organizations (MPOs) and 2) Regional Transportation Planning Organizations (RTPOs) (Figure L-11). MPOs represent urbanized areas, are federally required, and receive federal funding in support of planning activities. RTPOs are created by state legislation to represent smaller urbanized areas and rural areas. Their decision making boards include members from WSDOT, cities, counties, tribes, ports, transportation service providers, and the private sector. A major role of both entities is to prepare regional transportation plans (RTP) and align transportation elements of countywide and local plans with RTPs.

Data supporting the development of this performance measure tracks whether each regional entity has developed a plan related to active transportation. WSDOT conducted an initial inventory that will be updated to determine the baseline. That inventory is included in Appendix G, Plans. The goal is that all 18 or 100 percent of MPOs/RTPOs have active transportation, bicycle and/or pedestrian plans, or include these components in a broader plan, with enough detail to enable alignment of local, regional, and state network plans.

#	Name	Type	Principal City	Counties[322]
1	Benton-Franklin Council of Governments (BFCG)	MPO	Kennewick	Benton, Franklin
2	Chelan-Douglas Transportation Council (CDTC)	MPO	Wenatchee	Chelan, Douglas
3	Cowlitz-Wahkiakum Council of Governments (CWCOG)/Southwest Washington RTPO (SWRTPO)	MPO/ RTPO	Kelso	Cowlitz, Wahkiakum, Pacific, Grays Harbor
4	Island Regional Transportation Planning Organization (IRTPO)	RTPO	Coupeville	Island
5	Lewis-Clark Valley MPO (LCVMPO)	MPO	Lewiston	Asotin
6	Northeast Washington Regional Transportation Planning Organization (NEW RTPO)	RTPO	Colville	Ferry, Stevens, Pend Oreille
7	Okanogan Council of Governments (OCOG)	MPO	Omak	Okanagan
8	Palouse RTPO	RTPO	Pullman	Whitman, Garfield, Columbia, Asotin
9	Peninsula RTPO	RTPO	Bremerton	Kitsap, Mason, Jefferson, Clallam
10	Puget Sound Regional Council (PSRC)	MPO	Seattle	King, Pierce, Snohomish, Kitsap
11	Quad County (QUADCO)	RTPO	Moses Lake	Kittitas, Grant, Adams, Lincoln
12	Southwest Washington Regional Transportation Council (SWRTC)	MPO	Vancouver	Clark, Skamania, Klickitat
13	Skagit Council of Governments (SCOG)	MPO	Mt. Vernon	Skagit
14	Spokane Regional Transportation Council (SRTC)	MPO	Spokane	Spokane
15	Thurston Regional Planning Council (TRPC)	MPO	Olympia	Thurston
16	Whatcom Council of Governments (WCOG)	MPO	Bellingham	Whatcom
17	Walla Walla Valley MPO (WWVMPO)	MPO	Walla Walla	Walla Walla
18	Yakima Valley Conference of Governments (YVCOG)	MPO	Yakima	Yakima

Figure L-10: Summary characteristics of the eighteen MPOs and RTPOs in Washington.

322 Includes all counties in Washington except San Juan County, which is not within an MPO or RTPO.

Extent of reach for regional active transportation plans

When the updated inventory of MPO/RTPO active transportation plans are available this metric can be added. It will be determined based on the size of the population within each MPO/RTPO that has an active transportation plan. The goal is that 100 percent of Washington state population will be served by a regional active transportation, bicycle and/or pedestrian plan directly addressing facility needs.

Active transportation plans—local

The goal is that 39 counties and 281 incorporated cities/towns (100 percent) will have active transportation, bicycle and/or pedestrian plans, or comprehensive plans directly addressing facility needs.

21-12-0292