
Designating Scenic Bikeways: A Framework for Rural Road Owners

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FOREWARD

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The objective of this project was to develop a resource to help road owners navigate the Oregon Scenic Bikeway Designation Process. In addition to helping road owners in Oregon, it was the intent of the project that the resource be useful to road owners across the country who are similarly involved with bikeway designation. The resulting *Designating Scenic Bikeways: A Framework for Rural Road Owners* is a toolkit intended to assist land management agencies, road owners, and proponent groups to communicate and work together in a positive way to develop bikeways. The project included a literature review covering rural road safety, bikeway designation, and liability of bikeway designation. A Technical Advisory Committee guided the work and participated in three bicycle road safety site visits in Oregon to better understand specific issues facing road owners.

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16. Abstract As bicycle travel continues to grow in popularity across the country, more communities are working to attract bicycle tourists to spend money in their area. These economic benefits of bicycle tourism can be particularly impactful for rural communities. <i>Designating Scenic Bikeways: A Framework for Rural Road Owners</i> presents a toolkit to assist land management agencies, road owners, and proponent groups to work together to develop bikeways. The purpose of the toolkit is to: <ul style="list-style-type: none"> • Encourage road owners to be more involved in bikeway designation processes. • Discuss factors that may be considered in road owners' decisions on bikeway designation. • Address common concerns related to bikeway designation, including safety, liability, funding, and maintenance, and provide resources on these issues. • Provide analysis of the Oregon Scenic Bikeway process as a model for state bikeway designation. • Improve communications and understanding between bicycle proponent groups and road owners. • Provide a conceptual framework for the development of new bikeway designation programs. 			
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Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AADT	Annual Average Daily Traffic
ACA	Adventure Cycling Association
ADT	Average Daily Traffic
BLM	Bureau of Land Management
FOH	Friends of Hyalite
FTCA	Federal Tort Claims Act
MUTCD	Manual on Uniform Traffic Control Devices
ODOT	Oregon Department of Transportation
OIA	Outdoor Industry Association
OPRD	Oregon Parks and Recreation Department
USBRS	United States Bicycle Route System
USDA FS	United States Department of Agriculture Forest Service
USDOT	United States Department of Transportation

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1. Introduction

This toolkit is intended to assist land management and road agencies across Oregon, as well as other states, who are designating and promoting state and national bikeways and bicycle tourism. The toolkit evaluates the Oregon Scenic Bikeway program, describes the United States Bicycle Route System (USBRS), and discusses factors that may be considered during bikeway designation.

As bicycle travel and tourism continue to grow in popularity across the country, more communities and states are working to attract bicycle tourists to spend money in their area. Economic studies have shown that bicycle tourism spending accounts for an estimated \$83 billion nationally ([OIA, 2017](#)). These economic benefits can be particularly impactful for rural communities, which touring cyclists rely on for services like food and lodging along bike routes.

Bikeways offer economic and social benefits to the state's communities, residents, and visitors, especially in rural areas. People who rode Oregon Scenic Bikeways spent approximately \$12.4 million in 2014. Spending by cyclists on Oregon Scenic Bikeways directly supported over 150 jobs with earnings of approximately \$3.4 million. This spending also generated local and state tax receipts (lodging taxes, motor fuel, and travel-generated business and personal income tax of approximately \$450,000 ([Dean, 2015](#)).

There is broad policy support for bicycling. For example, the United States Department of Transportation Policy statement is "to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes" ([USDOT, 2010](#)).

State and national bikeway or bike route designations have been developed to bring people traveling by bike to communities and states and to showcase destinations such as parks, historic or cultural sites, and agricultural attractions. Bikeways are routes on existing facilities that are suitable for bicycling, including paved roads, low-traffic highways, and separated paths. They are typically signed and are officially approved by the road owners along the route or other state or national stakeholders, such as transportation and land management agencies and municipal and county governments.

The original "state" scenic bikeway designation is Oregon's Scenic Bikeway program, which currently includes 17 one-way or loop routes that feature scenic and historical tourism attractions around the state. Other state scenic bikeway programs are also being developed in

Maine, Tennessee, and Washington state. The “national” USBRS designation program is a developing network of interstate bicycle routes that are numbered, signed, and designated by road owners, state transportation agencies, and the American Association of State Highway and Transportation Officials (AASHTO).

1.1. Toolkit Purpose and Organization

Designating Scenic Bikeways: A Framework for Rural Road Owners presents a toolkit for how land management agencies, road owners, and proponent groups may communicate and work together in a positive way to develop bikeways. Within this document, any jurisdiction that owns, operates, or maintains a road with a proposed bikeway will be referred to as ‘road owner.’ This may be a county, State Department of Transportation, Federal Land Management Agency, or local government. The purpose of the toolkit is to:

- Encourage road owners to be more involved in bikeway designation processes.
- Discuss factors that may be considered in road owners’ decisions on bikeway designation.
- Address common concerns related to bikeway designation, including safety, liability, funding, and maintenance, and provide resources on these issues.
- Provide analysis of the Oregon Scenic Bikeway process as a model for state bikeway designation.
- Improve communications and understanding between bicycle proponent groups and road owners.
- Provide a conceptual framework for the development of new bikeway designation programs.

The chapters cover the following topic areas:

Chapter 1 – Introduction Provides background information on the project and process that resulted in this document.

Chapter 2 – Engaging in State and National Bikeway Designations Describes the existing Oregon Scenic Bikeway Program, a statewide program, and the USBRS, a national bikeway program covering multiple states.

Chapter 3 – Considerations for Rural Bikeway Decisions Discusses considerations in making a decision to support or not support a bikeway designation. It describes evaluation tools and a bikeway safety field review to help document relevant information, rationale, and decisions. It provides information on factors affecting bicycle safety on rural roads.

Chapter 4 – Road Owner Liability Discusses liability concerns.

Chapter 5 – Informing Users Discusses ways to keep bikeway users informed of what to expect.

Chapter 6 – Funding Discusses funding challenges and provides a case study describing how one recreation group is raising funds to assist with road maintenance.

References Provides a full list of references cited in this document and includes URLs for many of the cited documents.

Resources Provides full URLs for all websites that are referred to in the document. This section is intended to help readers find information in the case that web links are broken or for readers who do not have an electronic version.

Appendix A Contains an example Bikeway Application Letter of Support

Appendix B Contains guidance on Wisconsin’s Rural Road Bicycle Evaluation method.

1.2. Project Background

In Oregon, many of the Scenic Bikeways include USDA Forest Service (FS) roads. In working through the Oregon Scenic Bikeway Program designation process, the USDA FS discovered that there were limited resources that looked at bikeway designation from the road owners' perspective. Based on this experience, the USDA FS, in partnership with the Oregon Association of Counties, applied for and were awarded a Federal Lands Access Program (FLAP) grant and Federal Lands Transportation Program (FLTP) funds to develop a resource to help road owners navigate the Oregon Scenic Bikeway Designation Process. In addition to helping road owners in Oregon, it was the intent of the project that the resource be useful to road owners across the country who are similarly involved with bikeway designation. This toolkit is the result of that collaborative Oregon FLAP/FLTP project.



Figure 1: Photo. Typical road manager view of a Bikeway is likely to highlight safety concerns such as wide vehicles (WTI)



Figure 2: Photo. Typical bike proponent view of a Bikeway is likely to highlight scenery and quiet roads (Russ Roca)

Although bicycling is already occurring on roads across the country prior to designation, once designated as a bikeway, signs are installed, route information is published, and marketing efforts are undertaken to advertise the cycling experience. In Oregon this includes posting the information on [Oregon State Parks website](#) and the [Travel Oregon website](#).

Challenges Faced on Scenic Bikeways:

- Deteriorating pavement conditions
- Inadequate funding for road maintenance (and no additional funding stream for these designated roads)
- Potential increase in motor vehicle/bicycle conflicts

There are concerns that this level of "encouragement" will attract cyclists and possibly create more frequent motor vehicle-bicycle conflicts. Other concerns include:

- designation may give a false sense of security to cyclists,
- cyclists may be unprepared to navigate the variety of road conditions,
- a mix of motor vehicles, including haul trucks, sharing the road with cyclists.

While resources such as the existing [Oregon Scenic Bikeway Designation Handbook](#) exist to help bikeway proponents, this document emphasizes the need for the road owners to be more involved in the process of bikeway designation. This *Designating Scenic Bikeways*:

A Framework for Rural Road Owners is meant to assist road owners involved with decisions related to liability, engineering, and safety concerns for not only Oregon's Scenic Bikeway program, but also other bikeway designations, including the U.S. Bicycle Route System.

1.3. Project Methodology

The development of this document was informed and guided by a Technical Advisory Committee (TAC) that included professionals with diverse backgrounds and experience. The project team conducted a literature review that covered bikeway planning and designation processes, rural road design/safety, and bikeway designation liability concerns.

The project evaluated two Oregon Scenic Bikeway routes – one designated and one proposed – to serve as case studies representing the safety concerns shared by various road agencies, particularly in rural areas where there is interest in designating bikeways. The first was the Cascading Rivers Scenic Bikeway, a 70-mile-long designated Scenic Bikeway located southeast of Portland, Oregon that runs between the towns of Detroit Lakes and Estacada. The second was a roughly 70-mile long section of rural roads in northeastern Oregon between the communities of Halfway and Joseph, which was proposed as a scenic bikeway, but not designated due to safety concerns by some of the road owners. These on-site bicycle safety evaluations brought together road owners, bicycle tourism proponents, and other stakeholders to experience biking on rural roads and discuss road safety concerns for people on bikes. The TAC for the project identified these two routes as providing a comprehensive sample of the issues facing road owners when a route is proposed for designation as a Bikeway. This toolkit was created primarily from information and insights from the literature review, onsite evaluations, and input from the TAC.

2. Engaging in State and National Bikeway Designations

Oregon is the first state to have an official Scenic Bikeway Program. Oregon's Scenic Bikeways are intended to inspire people to experience Oregon's natural beauty and cultural heritage by bicycle. Oregon established a process to designate Scenic Bikeways in 2010 and there are now 17 designations across the state.

At the national level, the USBRS connects over 13,000 miles of approved routes in 26 states. The USBRS is a developing national network of bicycle routes, connecting urban, suburban, and rural areas using roads, trails, and other facilities appropriate for bicycle travel. Routes are numbered and may be signed.

Section 2.1 describes the existing Oregon Scenic Bikeway program designation process and points out (*in bold italicized blue text*) opportunities for road owners to engage in the process. Section 2.2 describes the USBRS designation process used in various states across America.

2.1. State Designations: Oregon's Scenic Bikeway Program

The Oregon Scenic Bikeways program is run by the Oregon Parks and Recreation Department (OPRD) in partnership with Travel Oregon, Oregon Department of Transportation (ODOT), and Cycle Oregon. Routes are submitted by local proponents and evaluated by Oregon's Scenic Bikeway Committee.

Oregon's Scenic Bikeway program developed the following list of the ten most important features for a State Designated Scenic Bikeway.

1. Natural scenery with dramatic and diverse views of mountains, forests or deserts, wildlife, lakes and rivers.
2. Human-made scenery with multiple opportunities to experience a variety of points of interest, such as buildings, heritage sites, or expansive agricultural landscapes.
3. Pleasing sounds such as birds, the sound of quiet, moving water, or a vibrant downtown that adds to the experience of the ride.
4. Pleasing smells –such as fresh air, the scent of greenery, or trees. Think of all the pleasing smells you notice on a bike but probably miss in a car.



Figure 3: Screenshot. Oregon Scenic Bikeways Marketing

5. Road conditions that are in good enough shape to qualify for one of the best rides in Oregon. (Gravel routes can be considered!)
6. Roads with light vehicle traffic and not many large trucks.
7. Riding space with a shoulder or bike lane, a paved path, or light traffic that would not warrant for separation).
8. Strong road jurisdiction support including support from City and County Commissions, ODOT, Forest Service, and Bureau of Land Management (BLM). The application must contain letters of support.
9. A dedicated local proponent group who is willing and available to put time and energy into designing the best route, which includes engaging local businesses, inventorying the signs, working with the tourism groups, and sustaining the route over time.
10. A diverse proponent group, which ideally is made up of cyclists, tourism representatives, government representatives, and business owners.

Oregon's Scenic Bikeway designation process consists of three phases: The Application Phase, the Writing Bikeway Plan Phase, and the Implementation and Review Phase ([OPRD, 2017](#)).

Oregon's Bikeway Application (Phase I)

Oregon Parks and Recreation Department (OPRD) announces a request for bikeway proposals approximately every two years. After proposals are announced, the application process described below can be initiated. The four steps below and the characteristics described in Table 1 and Table 2 were summarized from [OPRD Scenic Bikeway Program information](#).

1. The proponent submits a scenic bikeway application including the proposed route and initial letters of support from governing bodies of road management and adjacent public land management agencies. Proponents should understand that a route cannot be designated as an Oregon Scenic Bikeway without the consent of all parties having legal jurisdiction over the roads and trails comprising the route. It is recommended that proponents consult with these jurisdictions early and often. ***There is opportunity for road owners to engage*** (see Initial Letter of Support in Section 3.1).
2. The OPRD Scenic Bikeway Coordinator reviews the application for completeness. The Scenic Bikeway Coordinator forwards completed applications to the State Bikeway Committee or sends written feedback to the proponent explaining why it was not advanced.
3. The State Bikeway Committee reviews the completed application and rides the proposed route to assess scenic qualities and road conditions based on the criteria in Table 1 and Table 2 below. Based on the evaluation of the proposed route the Committee can reject the application or return it to the proponent with suggestions and an invitation to resubmit

after issues are addressed. The numerical rating of a proposed route is for purposes of Committee discussion and should not be construed as a score. ***There is opportunity for road owners to engage*** (see Initial Letter of Support in Section 3.1).

4. Recommendations from the State Bikeway Committee are forwarded to the OPRD director or manager for preliminary approval. The bikeway committee can choose not to forward a well scoring route to the director based on other factors, such as Committee and staff capacity and if it complements the Bikeway Program as a whole. Upon consent by the Director, the bikeway enters the Writing a Bikeway Plan phase.

Table 1 describes the bikeway route characteristics that the Oregon bikeway committee uses to evaluate the route. The committee evaluates natural, human-made, and sensory qualities on a scale from 1 to 5, where 5 is the highest or best rating and 1 is the lowest or worst rating ([OPRD, 2016](#)).

Table 1: Oregon Scenic Bikeway Route Characteristic Criteria (Scenic Qualities)

Best: 5 Points	Moderate: 3 Points	Minimal: 1 Point
Natural Qualities		
The route offers multiple opportunities for viewing natural qualities with a high degree of variation, strong contrast, unique shapes, dramatic settings and unusual combinations of interesting landforms, color, vegetation, wildlife, bodies of water, etc.	The route offers moderate opportunities for viewing natural qualities with some degree of variation, strong contrast, unique shapes, dramatic settings and unusual combinations of interesting landforms, color, vegetation, wildlife, bodies of water, etc.	The route offers minimal opportunities for viewing natural qualities with little degree of variation, strong contrast, unique shapes, dramatic settings and unusual combinations of interesting landforms, color, vegetation, wildlife, bodies of water, etc.
Human-made Qualities		
The route offers multiple opportunities to view, visit and/or experience a variety of points of interest such as buildings, structures, objects, sites, heritage sites, whole districts or expansive agricultural landscapes.	The route offers moderate opportunities to view, visit and/or experience human-made qualities of interest. The route may intersect subdivisions or other forms of block and strip development for distances of less than 2 miles.	The route offers minimal opportunities to view, visit and/or experience human-made qualities of interest. The route travels through subdivisions or other forms of block and strip development for distances of 2 miles or greater.

Sensory Qualities		
Most of the route offers an engaging variety of sensory experiences including a mix of pleasant sounds, odors and tactile opportunities.	Some of the route offers a moderate variety of sensory experiences. Some portions of the route may travel through areas that are drab, noisy and smelly.	Large portions of the route travel through areas that are drab, noisy and smelly.

Table 2 describes the bikeway route conditions criteria. The bikeway committee evaluates the route surface, traffic volume, traffic speed, and separation on a scale from 1 to 5, where 5 is the highest or best rating and 1 is the lowest or worst rating (OPRD, 2016). It is important to note that some of the conditions criteria in Table 2 are somewhat subjective.

Table 2: Oregon Scenic Bikeway Route Conditions Criteria

Best: 5 Points	Moderate: 3 Points	Minimal: 1 Point
Route Surface		
Smooth surface. Surface regularly maintained clear of debris.	Smooth surface, with some cracking. Surface generally clear of debris.	Rough surface or surface in need of serious repair. Debris frequently encountered.
Traffic Volume		
(Include subjective rating and actual traffic counts where available.) Motor vehicle traffic volume is low with few or no large trucks.	Motor vehicle traffic volume is moderate with some large trucks.	Motor vehicle traffic volume is high, consisting of large trucks and cars.
Traffic Speeds (posted & actual)		
The posted and actual speed limit are low; less than 30 mph.	The posted and actual speed limit are moderate; 40- 45 mph.	The posted and actual speed limit are above 55- 65 mph.*

Route Separation		
Bicycle traffic is separated from vehicle traffic by a separate path, bike lane, or wide shoulder.	Bicycle traffic is separated from vehicle traffic by a moderate shoulder.	There is little separation between bicycle and vehicle traffic.

* For roads that do not have posted speed limits, such as some Forest Service roads, operating speeds can be estimated or measured.

Oregon’s Writing Bikeway Plan (Phase 2)

Details regarding the process of writing a bikeway plan are provided on [OPRD’s Bikeway Program Information page](#). Included on this page is a link to a document titled *Guide to Writing an Oregon Scenic Bikeway Plan*. This guide describes how the proponent group will plan and manage the bikeway. This document does not describe road maintenance or management, but instead discusses a bike tourism workshop, bike plan preparation and submittal, the public comment process, and other details. The steps outlined may overlap, but generally flow in the order presented here. The *Bikeway Plan Template* can also be found on the Bikeway Program website.

1. Proponent and OPRD staff hold public meetings to inform communities of possible bikeway designation and gather concerns, opposition, and support.
2. The proponents draft a Bikeway Plan. The Plan describes how the proponent group will manage the Bikeway concept, but it is not about roadway management. ***There is significant opportunity for road owners to engage during this formative stage*** (see Phase 2: Developing a Bikeway Plan. in Section 3.1). This is the step in the designation process where communication between proponents and road owners is most critical.

The bikeway plan includes the following sections:

Bikeway Proponent Group Information: This section identifies bikeway proponent group members and contains a table to assign a member to the following roles:

- a. Convener. Periodically convene key volunteers and supporting organizations to coordinate promotion and improvement of the bikeway.
- b. Signs Coordinator. Monitor bikeway directional signs and report missing or down signs to the appropriate road jurisdiction. Work with the OPRD Bicycle Coordinator as necessary to obtain replacement signs.
- c. Social Media Coordinator. Post information and updates about the bikeway to the Travel Oregon website. Advise the State Parks and Recreation Department Bicycle

- Coordinator of route closures and other significant events affecting use of the bikeway.
- d. Bicycle Friendly Business Recruiter. Coordinate identification of members of the local business community who can provide services to bikeway users and assist them in improving and expanding their services.
 - e. Local Government Liaison. Maintain contact with each affected road jurisdiction to ensure their continued support of the Scenic Bikeway.

Bikeway Description: This section describes the bikeway in 300 words or less and includes photos.

Map Information: This section includes a table identifying mile marker locations of amenities such as campgrounds, parks, public restrooms, public water stops, and other publicly available amenities. *There is opportunity for road owners to engage.* (see Route Specific Information in Section 5.2)

Bikeway Goals: This section contains activities that bikeway proponents intend to pursue to enhance the experience of riding a bikeway, such as improving riding conditions or providing amenities and information for bicyclists. *There is opportunity for road owners to engage.* While it is acknowledged that infrastructure improvements listed here are often beyond the control of proponent groups, Section 6.4 discusses how partnerships between road owners and proponents may provide opportunities for improvements.

Business and Outreach Services: This section contains activities proponents intend to pursue to increase the number and quality of bicycle friendly businesses and build awareness of the Bikeway and its economic benefits.

Marketing and Communications: This section contains activities proponents will pursue to promote the Bikeway, provide opportunities for bicyclists to participate in group rides of the route, ribbon cutting/media events and to provide timely information to the Parks and Recreation Department and Travel Oregon (via traveloregon.com), and to assist the local Destination Marketing Organization in marketing the Scenic Bikeway. *There is opportunity for road owners to engage.* (see Route Specific Information in Section 5.2)

Record of Community Outreach and Public Meetings: This section provides a list of dates of outreach events where community members and the public were given opportunities to provide input into proposed Scenic Bikeway plans.

Bikeway Sign Location Tables: Oregon Scenic Bikeway Signs are installed on the right side of the road where cyclists look for and expect signs and approximately 25 feet before an intersection to give the cyclist time to anticipate the turn. This section of the plan contains a table listing sign locations and related information (road name, intersection, arrow direction, sign size and road jurisdiction contact information). Bikeway proponents work with road

owners to complete this sign table. Signs are installed by the road jurisdictions, with costs paid by OPRD and other funding sources.

Final Bikeway Letter of Support: This section requests final letters of support for each agency and road jurisdiction that the Scenic Bikeway goes through. By this point, road owners and proponents have likely had various communications regarding any concerns road owners may have.

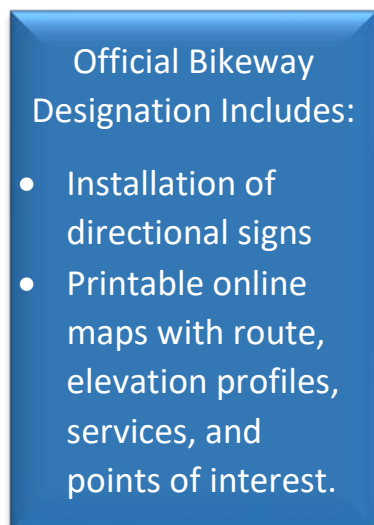
3. Proponents submit a draft of Scenic Bikeway Plan for feedback from OPRD staff and State Bikeway Committee.
4. The Oregon State Bikeway Committee votes on approval of the final Bikeway Plan.

Following the State Bikeway Committee approval of the final Bikeway Plan, OPRD staff forwards the plan to Oregon Recreation Trails Advisory Council. OPRD will hold a public meeting and comment period on the recommendation to designate. After positive recommendations from Oregon Trails Advisory Council and the OPRD Director, the Director delivers the recommendation to the Parks and Recreation Commission for final consideration. Once the Commission votes to approve the designation, the Bikeway enters the Implementation and Review phase.

Oregon's Bikeway Implementation and Review (Phase 3)

After designation, OPRD and the proponents begin work on implementing the Bikeway Plan. This includes, OPRD and the proponents entering into a Cooperative Agreement that will include a written list of the tasks for the proponent group and for OPRD. This Cooperative Agreement will represent a commitment by each of the involved organizations to diligently perform the tasks outlined in the Designation Handbook and Bikeway Plan. While the approved Bikeway Plan guides the implementation of the route, changing conditions may require either a revision of the plan or a rerouting of the bikeway. Any changes in the route must be approved by the OPRD Bicycle Recreation Specialist. Depending on the significance of the change, the Scenic Bikeways Committee may also be involved in reviewing the proposed change.

1. Proponents implement Bikeway Plan. The proponent and OPRD will work with road jurisdictions to have signs installed and OPRD will post maps and other information to [OPRD Scenic Bikeways webpage](#) in conjunction with postings on [Travel Oregon's Bicycling webpage](#).
2. Each fall, the proponent group will complete an annual review using a form supplied by OPRD. The review is the opportunity to adjust goals and renew contact with governing bodies of the road jurisdictions. ***There is opportunity for road owners to engage.*** (see Bikeway Implementation and Review in Section 3.1)



Official Bikeway Designation Includes:

- Installation of directional signs
- Printable online maps with route, elevation profiles, services, and points of interest.

3. OPRD staff holds five-year review with Bikeway Committee input.

In summary, Oregon established a process to designate scenic bikeways in 2010, which has resulted in 17 designated bikeways around the state. Oregon's scenic bikeway designation process considers various issues that affect the safety of people riding bikes. These include road surface conditions, traffic volumes, traffic speed, and level of separation between bicycle and motor vehicle traffic. Other resources have focused on the steps the proponent groups needed to take. This new toolkit will help road owners understand when and how to be more engaged in the process. Having road owners more engaged with proponents throughout the designation process can help ensure that safety and other concerns are addressed.

2.2. National Designations: United States Bicycle Route System (USBRS)

The USBRS is a developing national network of numbered bicycle routes that follow existing facilities suitable for bicycle touring, including low-traffic roads, paved paths and bicycle lanes. The vision is that anyone can get to their destination by bicycle using a numbered U.S. Bicycle Route, whether it's across town or across the country. U.S. Bicycle Routes connect urban and rural destinations and attractions to create what will eventually be the largest network in the world, with 50,000 miles of bicycle routes. As of early 2018, 13,114 miles of U.S. Bicycle Routes have been established in 26 states ([Adventure Cycling Association, 2018](#)).

The USBRS numbering system can integrate and be co-branded with local, regional, and national bike routes and trails, including the Adventure Cycling Route Network, East Coast Greenway, Oregon Scenic Bikeways, Mississippi River Trail, the Katy Trail, and many others. Figure 4 shows the [USBRS National Corridor Plan](#), which displays how all of the route corridors interconnect between states for planning purposes. Corridors are 50-mile wide areas that are used as templates to show planners where a U.S. Bicycle Route could be developed.

However, until corridors are developed and designated as routes, they can be easily shifted or added. The solid black lines indicate where over 13,000 miles of U.S. Bicycle Routes have already been designated. Lighter colored lines indicate corridor connections for future route development ([Adventure Cycling Association, 2018](#)).

The USBRS designation process varies significantly between states, depending on which stakeholders get involved, how many road jurisdictions need to be contacted, whether the process is prioritized, and deadlines are met, and whether there are additional internal agency requirements that need to be met. Despite these varied conditions and timelines, all states must submit an application to AASHTO, signed by the head of the State Department of Transportation, in order for a route to be designated. AASHTO approves the route numbering at its spring or fall meeting each year. For a route to receive official designation as a U.S. Bicycle Route, it must connect two or more states, a state and an international border, or other U.S. Bicycle Routes.



Figure 4: Map. U.S. Bicycle Route System National Corridor Plan

There are typically three phases to implement a U.S. Bicycle Route, which are described below and in more detail on [Adventure Cycling's website](#).

U.S. Bicycle Route Implementation Process

USBRS Planning (Phase 1)

First, stakeholders express interest in designating a U.S. Bicycle Route, define each stakeholder's role in the designation process, select which section of a numbered 50-mile-wide corridor they plan to work on, and determine a route evaluation method. The effort is typically led by and/or includes various types of stakeholders:

- State bicycle and pedestrian coordinator or other representatives from the state transportation agency
- State or local bicycle or trail advocacy groups, coalitions, or councils
- One or more volunteers
- Adventure Cycling Association

USBRS Designation (Phase 2)

Next, the route is drafted following the corridor and the established route criteria. Maps and turn-by-turn directions document the route. The adjoining state(s) must agree to the connection point(s). Road owners are identified along the route and are asked to support the route designation through a letter or resolution of support. Road owners could include:

- State Departments of Transportation
- Municipalities
- Counties
- Townships
- Metropolitan Planning Organizations (MPOs)
- Federal Land Management Agencies
- Tribal Governments
- Other types of road owners

The application is prepared and sent to the head of the State Department of Transportation for a signature, then sent to AASHTO in time for the spring or fall meeting deadline.

USBRS Signing and Promotion (Phase 3)

Once AASHTO has approved the route numbering designation, the route is ready to be signed and promoted. The standard green U.S. Bicycle Route sign can be found in the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control devices. A black version was originally used but is no longer recommended. Funding for signs can come from a variety of sources, depending on each state, and Adventure Cycling provides resources to support signing efforts.

Promotion is a key part of attracting people to bike the route and requires the involvement of state and local tourism to be successful. Adventure Cycling Association provides digital maps of U.S. Bicycle Routes for navigation and is currently the only entity promoting the USBRS nationally. The organization's website provides a checklist of ways that local and state stakeholders can promote their U.S. Bicycle Routes.

For each of the three phases, [Adventure Cycling Association's website](#) provides links to a significant number of resources to assist users with each step.

Route Evaluation Criteria for Designating U.S. Bicycle Routes

There are no single route evaluation criteria for all states to use for U.S. Bicycle Route designation; however, AASHTO does recommend considerations for choosing corridors and routes. The [Corridor and Route Criteria for U.S. Bicycle Route System](#) states that "while the following criteria provide a guide for consistency, they are not intended to supersede state and local agencies' policies on designing cycling facilities nor are they intended to create a uniform approach which might be determined unfeasible, given the expanse and varying terrain and population densities across the U.S. When choosing a corridor/route and the specifics of a given route implementation, the totality of the route must be considered. It may well be that portions of a route do not meet these criteria but that when taken all together, they represent the best choice to achieve the goal of the route." ([Adventure Cycling Association, 2006](#))

AASHTO recognizes that each state has unique conditions that may affect the bicycling experience differently, so State Departments of Transportation determine the criteria for evaluating the safety, comfort, and attributes of U.S. Bicycle Routes in their state. Ultimately, it is the State Department of Transportation that is responsible for setting these standards, verifying them, and signing off on them before submitting their application to AASHTO. The following criteria generally address concerns of connectivity, access to key destinations, geographic coverage, and inclusion of existing routes. From a road owner perspective, these criteria address shoulders, traffic volumes, and speed. Chapter 3 of this toolkit will provide additional considerations and resources for road owners to use in evaluating route designation.

USBRS Corridor Criteria - considerations when choosing corridors

Primary Considerations - Corridors should meet as many of the following as practicable:

1. Meet the planning, design, and operational criteria in the AASHTO Guide for Development of Bicycle Facilities.
2. Access destinations and regions with high tourism potential, including routes that incorporate important scenic, historic, cultural, and recreational values.
3. Link major metropolitan areas to connect key attractions and transportation nodes.
4. Reasonably direct in connecting cities or attractions.
5. Make natural connections between adjoining states, Canada, and Mexico when possible.
6. Have even distribution north to south, east to west, though route density will need to consider both population density (greater populations may equal higher route densities) and available, suitable roads.
7. Include major existing and planned bike routes, including both on-road facilities and off-road shared use paths and trails that are suitable for road bikes.

Secondary Consideration

8. Offer services and amenities such as restaurants, accommodations, camping, bicycle shops, and convenience/grocery stores at appropriate intervals.

USBRS Specific Route Criteria - considerations when choosing roads and trails

Primary Considerations- Specific Routes should meet as many of the following as practicable:

1. Meet the planning, design, and operational criteria in the AASHTO Guide for Development of Bicycle Facilities.
2. Offer services and amenities such as restaurants, accommodations, camping, bicycle shops, and convenience/grocery stores at appropriate intervals.
3. Go into the centers of metropolitan areas, using low-traffic and/or off-road bikeways when possible. Bypass routes could be considered to accommodate users who don't wish to enter the city or who are seeking a less urban experience.
4. Include spurs to target destinations (universities or other educational institutions, recreational areas, or other attractions) and to multimodal nodes such as airports and rail, bus, and transit stations.
5. Follow natural corridors and provide terrain suitable for cycling, avoiding extremely hilly and limited visibility winding roads when feasible.
6. **Consider appropriate combinations of low daily traffic, low truck traffic, wide paved shoulders, lane striping, adequate sight distance, and traffic speed in order to be**

bicycle friendly. Chapter 3 provides resources for road owners when evaluating these considerations.

7. In urban areas, be suitable for utility cycling (commuting, access to shopping, schools and universities, recreation centers, etc.). Consideration should be given to bicycle routes that can be used as evacuation routes for emergency situations.
8. Include major existing and planned bike routes, including both on-road facilities and off-road shared use paths and trails that are suitable for road bikes.

Secondary Consideration

9. May include short stretches of high-quality unpaved roads if needed to connect highly desirable paved road sections. (These roads should maintain the standard of road bike suitability).

U.S. Bike Route System proponents may use a variety of evaluation methods and criteria to determine the best route. On their [Implementation Resources webpage](#), Adventure Cycling Association provides links to several documents that provide various route evaluation methods that states may choose. These include various bike route criteria from Florida, Wisconsin, Pennsylvania, Rhode Island, Michigan and Kentucky.

In summary, the USBRS designation process varies significantly between states. The State Department of Transportation is a key stakeholder in the establishment of USBRS routes within each state and often set the specific criteria for route designation per state. Other road owners that want to engage more in the USBRS designation process can do so by becoming familiar with the many online resources available, developing relationships with proponent groups, and communicating concerns or issues early and often throughout the planning and designation process.

2.3. Summary

Both the Oregon Scenic Bikeway Program and the USBRS provide a framework for designation of bikeways. These programs take into consideration the tourism and economic aspects of bikeway designation. Both systems emphasize safety as a primary consideration of route selection and require support from the road owner, though there is little information on assessing bicycle safety. For states and regions that are looking to develop a designation process, these two programs provide opportunities to tailor the process to meet the needs of the state or region. For the best outcome to create a bikeway that meets riders' expectations and satisfies road owners concerns about safety, road owners need to have a deep level of involvement throughout the designation process. Chapter 3 of this toolkit provides resources for road owners in evaluating the safety of specific roadway segments for people on bicycles.

3. Considerations for Rural Bikeway Decisions

Chapter 2 described Oregon’s Scenic Bikeway Designation process and identified opportunities throughout the process for road owners to engage with proponents. It also provided an overview of the national USBRS designation process which includes general bike route evaluation criteria such as traffic volumes, truck traffic, paved shoulders, lane striping, adequate sight distance, and traffic speed, to assess suitability for bicycles.

This chapter is intended to assist road owners as they are evaluating whether to support a bikeway designation and to ensure their concerns are heard and addressed in a meaningful way.

For this project, researchers analyzed Oregon’s existing bikeway program, looking for opportunities for road owners to engage in the process. Based on that analysis, Section 3.1 proposes a revised bikeway designation process. While much of this follows Oregon’s existing process, additional steps are intended to address safety concerns and engage road owners. Though this section is based on the Oregon Scenic Bikeway designation process, similar ideas and opportunities for engagement exist in the designation of USBRS routes and may be applicable to bikeway designations in other states.

Section 3.2 proposes some tools that may be useful to evaluate and document relevant information, rationale, and decisions. Section 3.3 discusses bikeway safety field visits. Section 3.4 gives an overview of additional factors that may affect safety of cyclists.

3.1. Proposed Bikeway Designation Process to Address Road Owners Concerns

This section describes three phases for bikeway designation and offers insights into how road owners can engage in the bikeway designation process to ensure their concerns are addressed.

Phase 1: Bikeway Application

In general, any bikeway designation will start with an application process. This often will start with a proponent group bringing the idea forward. In Oregon, there is a well-defined process. Figure 5 shows the key components of Oregon’s bikeway application phase and where the initial letters of support from road owners fit into the process. Oregon requires an initial letter of support from each road owner along a proposed Bikeway as part of the application for a Scenic Bikeway Designation. This early phase is a good time for road owners to engage in conversations with proponents about the proposed route and to discuss any concerns they may have about the route. The goal of the initial letter of support is to ensure the road owner is aware of and generally supports the bikeway concept. It is advantageous for road owners to communicate information about a proposed bikeway to the appropriate personnel within their organization early in the process. Appendix A. Example Bikeway Application Letter of Support

contains an example initial letter of support. Road owners may express concerns in this initial letter, while still supporting a bikeway designation. Concerns that remain after these initial discussions can be addressed through the process of developing and writing the bikeway plan. It is recommended that the Bikeway Coordinator contact the road owners to ensure they understand they can list concerns in the initial support letter and to encourage more of a dialogue throughout the designation process.

After these initial conversations and review of the proposed bikeway route, road owners will:

- write an initial letter of support for the bikeway concept,
- write an initial letter of support that identifies potential concerns, or
- write an initial letter of no support.

If a letter of support is given, the application moves on to the State Bikeway Committee for review. As described, Step 3 of the Application Phase involves the State Bikeway Committee riding the proposed route to evaluate it. The Bikeway Committee has traditionally invited road owners on this ride, though they do not always participate. Initially, the applicant was not invited on this ride because the Bikeway Committee did not want to be influenced. After learning that the ride must be open to the public due to open meeting laws, the Committee invited the applicant and found it helpful to have them there to provide more information. The primary purpose of this ride is for the Bikeway Committee to evaluate the route for its scenic amenities and bicycle tourism potential. The route may not be recommended if it doesn't meet these criteria. If road owners choose to participate in this ride, they can help inform the designation process with differing perspectives based on their experience operating and maintaining the road. Section 3.2 provides information that may be useful to review prior to this ride to inform bicycle safety evaluation and discussion.

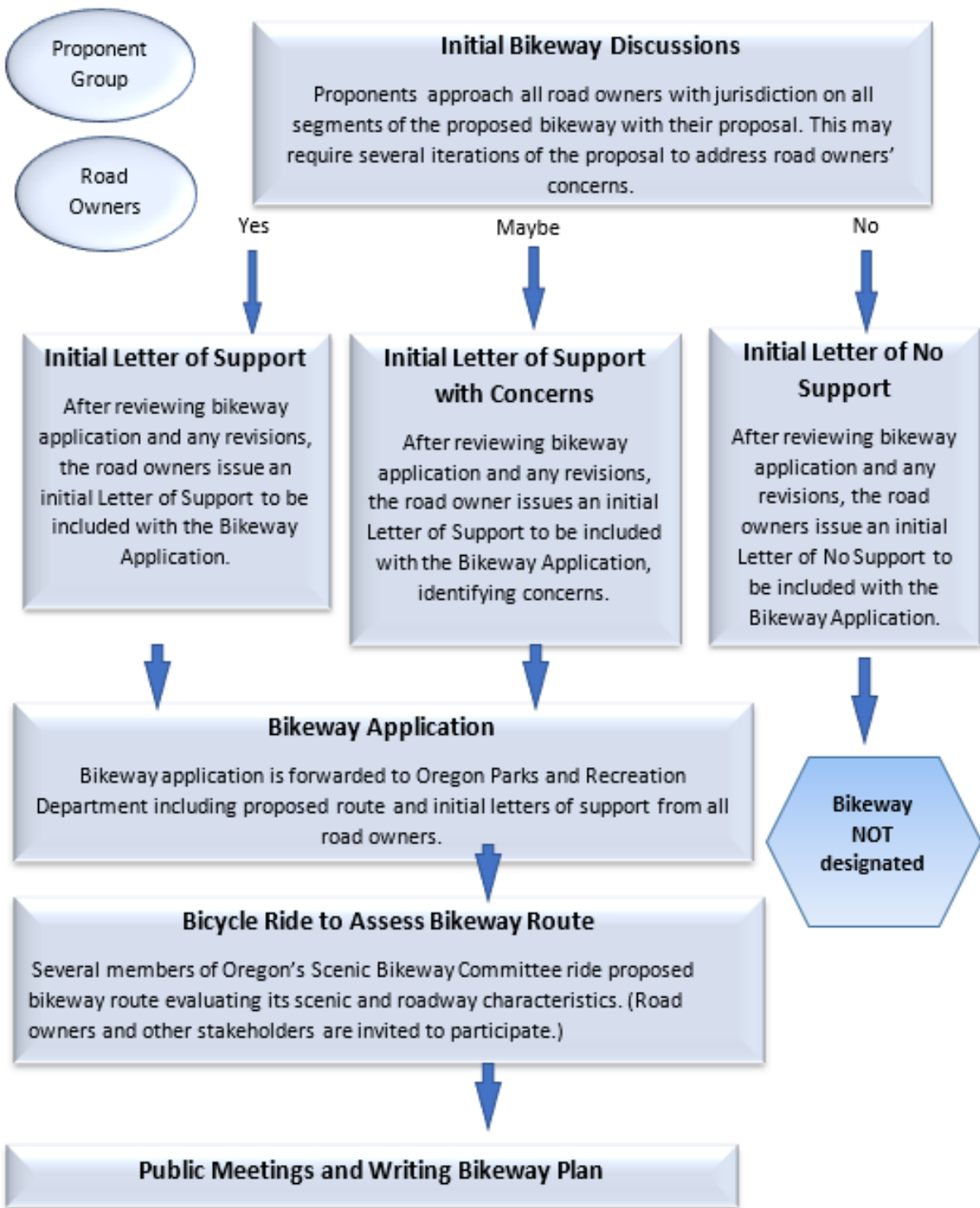


Figure 5: Schematic. Proposed Scenic Bikeway Application Process (Phase 1)

Phase 2: Developing a Bikeway Plan

For Oregon Scenic Bikeways, the Bikeway Plan guides its success and sustainability. In Oregon's existing process, the Bikeway Plan is focused on managing the bikeway from a marketing perspective. The revised process proposed in Figure 6 incorporates more interaction between proponents and road owners during this phase and provides a proposed process for how road owners should engage during Phase 2, developing a Bikeway Plan.

Though the Plan describes how the proponent group will manage the Bikeway concept, and is not about roadway management, there are significant opportunities for road owners to be involved and have input into the plan. One of the plan requirements is a final letter of support from all road jurisdictions on the bikeway. In Oregon, a bikeway will not be implemented without these final letters of support from all road owners. Therefore, it is during this Writing of the Bikeway Plan phase that road owners and proponents will need to work together to address any concerns that road owners have regarding designation. Figure 6 indicates where bikeway safety evaluations and/or a safety field visit could help road owners and proponents work through concerns.

A few examples of concerns from Oregon road owners include variations in traffic volumes, large vehicles and speed and/or crashes. This information should be discussed with proponents and documented during the designation process.

- Traffic volume may vary by time of day, day of week, season of the year or during special events. For example, bikeways that see drastically higher weekend traffic volumes or specific times of the year when livestock trailers use the roadway.
- Information about what types and how many large vehicles are typical on a bikeway, such as the location and duration of logging operations.
- Areas where speeding is common or where there have been multiple crashes resulting in fatalities.

Chapter 5 provides further information regarding informing bikeway users of what to expect.

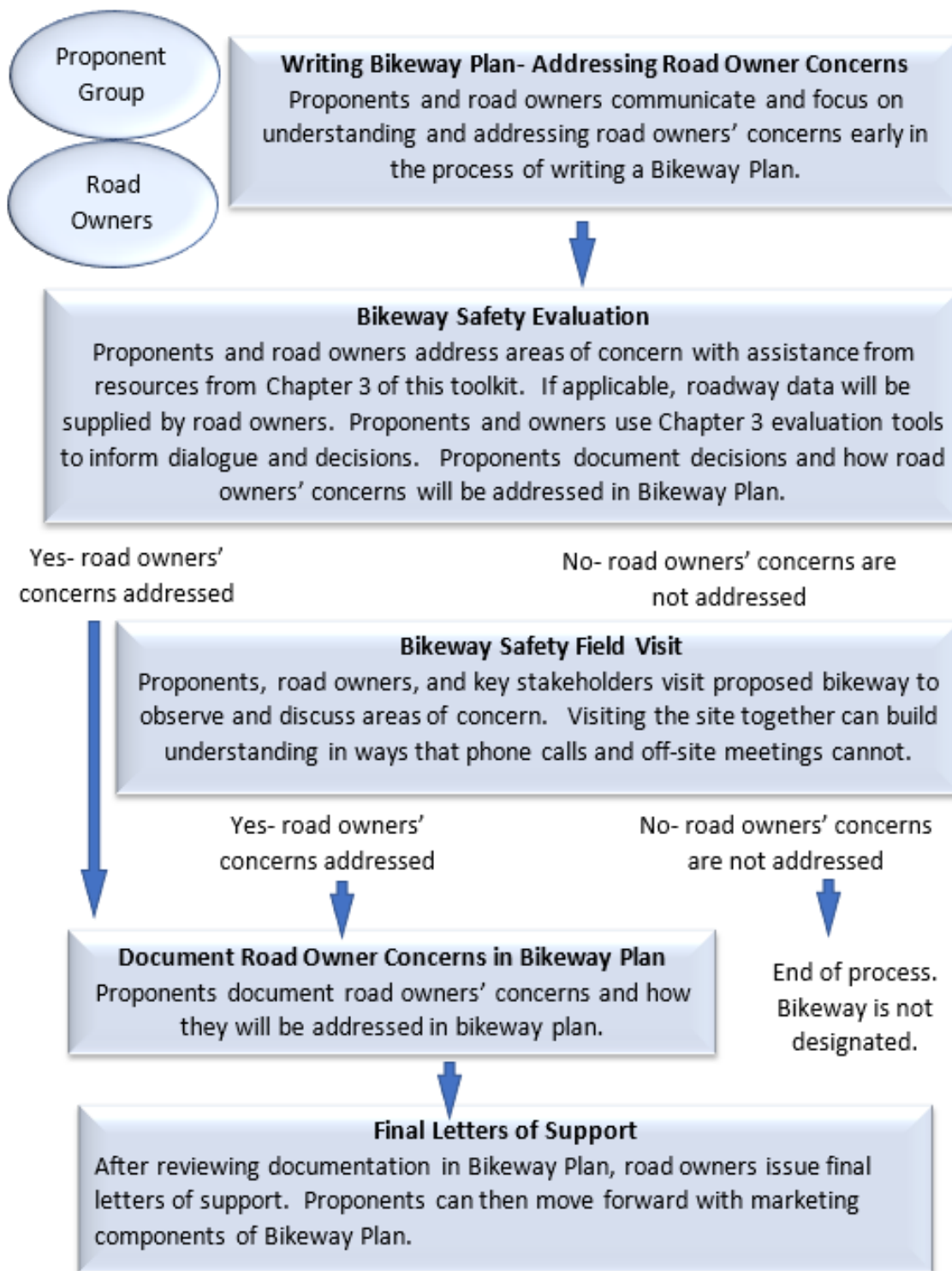


Figure 6: Schematic. Proposed Process for Writing a Bikeway Plan (Phase 2)

Chapters 3 and 4 provide information for road owners and proponents to consider and discuss during this process. Section 3.2 gives more details on safety evaluations. Section 3.3 describes a Bikeway Safety Field Visit, which is similar to the on-site evaluation that the Scenic Bikeway Committee undertakes but is focused on the safety of people on bicycles and on areas of specific concern. These safety evaluations and the bicycle safety field visit can be useful not only in Oregon, but also for any jurisdiction interested in bikeway designation. There are several components of the Bikeway Plan for which road owners may want to provide specific input.

1. In the Bikeway Goals section, the proponent group must identify goals and first steps or action items that will help maintain and improve the Bikeway over time, resulting in positive cyclists’ experiences, and in turn, more economic benefits to the community and local businesses. This section provides an opportunity for road owners to communicate with proponents about goals or issues for infrastructure or maintenance that will affect conditions for bicyclists. This is the time for open and frank conversation about funding realities. It also provides the opportunity to explore opportunities for partnerships that can support the bikeway goals.

2. On the map and cue sheet, the proponent group will list services, locations, and sites that are important components of the Bikeway. For the proponent group, this will focus on the tourism and visitor aspects of the route. The road owner should provide a list of information they want to be included on the map or in the route information that users will use to plan their trip. Table 3 shows an example of potential information road owners (highlighted in bold blue) may want to convey to people biking.

Table 3: Example Bikeway Cue Sheet with Safety Information

Mile point	Directions	Notes/Points of Interest
15.2	Continue on NF-99	Summit - 3,583 feet
16.5	Continue on NF-99	Begin steep descent, roadway may be slick
21.8	Continue on NF-99	Gorgeous Mountain Resort area 13 miles right on gravel NF-9999
36.5	Continue on NF-99	Lovely Place Campground - restrooms, no water
38.0	Continue on NF-99	Potential rockfall on roadway
39.7	Continue on NF-99	Delightful Hot Springs parking area and trailhead
43.4	Continue onto OR-99	Highway Junction
50.2	Continue on OR-99	Town of Paradise - restrooms, water, camp store, campground, picnic area

3. The marketing and communication plan for the bikeway is another opportunity for road owners to include route information they view as important. Locations of hazards or information about logging operations are examples of the kind of information that road owners could request be added to the map, cue sheets, or marketing materials. Section 5.2 includes additional discussion of this idea.
4. The proponent group will be working directly with road owners to develop the Bikeway Sign Location tables. While these tables are aimed at bikeway wayfinding signs, road owners may consider the need to add warning signs for areas where they may have specific concerns for the safety of people on bikes.

These opportunities for road owners to work with proponents to address their concerns as part of the bikeway plan can improve the safety and quality of bikeways. In addition, by working with the proponents on the Bikeway Plan, hopefully road owners' concerns will be addressed in a way that enables them to write a final letter of support for the Bikeway.

Phase 3: Bikeway Implementation and Review

This section is based entirely on Oregon's existing process; no changes are proposed. Bikeway implementation includes installation of Bikeway signs. The road owners are directly involved with this process. Other implementation steps are generally the responsibility of the proponents. As marketing and communications are developed and implemented, road owners should ensure they provide the relevant information to the proponents for inclusion.

Each fall the Bikeway will have an annual review. This review includes proponents answering a questionnaire from OPRD. This is an annual opportunity for road owners to communicate with proponents. Road owners may want to discuss ongoing maintenance issues and challenges, opportunities for proponents to partner on projects or maintenance, share any public feedback given to the road agency, or discuss planned future investments. This could include the need to update the map and cue sheets or marketing and communication about new or changing concerns.

The State Bikeway Committee is required to complete a 5-year review. This is an opportunity for road owners to communicate with the Bikeway committee, OPRD, and proponents about bikeway support and/or concerns. Road owners can discuss how implementation of the plan has gone and if there are changes or new issues that they feel need to be addressed.

3.2. Bikeway Safety Evaluations

This section provides a framework for road owners to consider in evaluating proposed bikeway designations. It outlines key factors to consider and provides methods for evaluating the safety of rural roads with bicycle use. The tools described here may be helpful both in assessing safety concerns, and in organizing and documenting the facts and reasoning underlying road owner decisions about whether to support bikeway designation.

Safety evaluations for bicycle use on rural highways may consider factors such as traffic volumes, large vehicles, operating speed, roadway width, shoulder width, pavement conditions, vertical/horizontal curves (sight lines) and crash data. Because road safety is dependent on many factors including human behavior, there is no simple formula to determine what combination of these factors is considered safe enough for biking on rural roads. While this process may not yield a definitive answer regarding safety, it should provide a basis for decisions regarding bikeway designation. The following paragraphs describe key factors that should be considered when evaluating bike safety on rural roads. Section 3.4 introduces additional factors that may be considered.

Traffic volume – One of the nuances when considering traffic volume is its variable nature. Average Daily Traffic (ADT) or Annual Average Daily Traffic (AADT) are the two measures of traffic volume that are most often used to understand the potential for conflicts. ADT is average daily traffic volume for a time period greater than a day, but less than one year, divided by the number of days counted. AADT is the total yearly traffic volume divided by the number of days in a year. For regions with seasonal differences in traffic volumes, ADT during the season when most people are biking should be used. Traffic volumes may vary considerably by time of day, day of the week, season of the year, or during special times such as hunting seasons. The timing, duration, and magnitude of these variations will influence bicycle safety. Some questions road owners may ask about volume are:

Are traffic volumes higher during hunting season, summer weekends, or special events?
Are they higher during certain times of the day?

How will information about when to expect higher traffic volumes be conveyed to bicyclists?

Section 3.1 describes the bikeway plan, a good place to document information on traffic volume variations.

Large vehicles - The number of large vehicles such as logging trucks, RVs, camping and boat trailers, or busses is a component to traffic volume that should have special consideration. In addition, because of their large size, many of these vehicles have different turning requirements and large blind spots that pose increased risk for people on bicycles. On higher

speed roads, the wind blast from these large vehicles can cause difficult bike handling conditions. As with seasonal variations in traffic volume, the impact on safety of the timing, type, and number of large vehicles on the road should be assessed. For example, a logging operation that is prohibited from hauling on the weekends may have a lower impact on safety if much of the bicycle use is expected on weekends.

Speed - Motor vehicle speeds are a significant factor in the safety of all road users. Operating speed is the speed at which an average vehicle travels on the roadway, which may be different from the posted speed limit. Roads with slow operating speeds are safer for all road users but especially for those riding motorcycles or bicycles and those walking (Austroads, 2012). There is overwhelming evidence that as vehicle speeds increase, injuries sustained in a crash tend to become more severe. Results from a AAA study show that the average risk of severe injury for a pedestrian struck by a vehicle reaches 10% at an impact speed of 16 mph, 25% at 23 mph, 50% at 31 mph, 75% at 39 mph, and 90% at 46 mph. The average risk of death for a pedestrian reaches 10% at an impact speed of 23 mph, 25% at 32 mph, 50% at 42 mph, 75% at 50 mph, and 90% at 58 mph (Tefft, 2011). Some of the factors that combine to influence the operating speed that people choose when driving are roadway geometry, roadway surface, and the presence of law enforcement.

Pavement width – Narrow roads without paved shoulders or bike lanes, like many Forest Service roads, may be acceptable bike routes, depending on factors such as traffic speed, volume and percent large vehicles. The quote shown below from AASHTO supports this shared road concept. Generally, as traffic volumes and speed increase, the need for shoulders increases to provide people on bikes a safe space, separate from motor vehicles. The [Wisconsin Bicycle Facility Design Handbook](#) recommends using a rating index when traffic volumes are more than approximately 500 vehicles per day to help determine if paved shoulders are necessary on rural highways to accommodate bikes (Wisconsin Department of Transportation, 2004). In cases where funding is available for road projects, Section 3.4 provides more information about shoulders and appropriate widths for various contexts.

“Rural roadways with good sight distance that carry low volumes of traffic and operate at speeds of 55 mph (89 km/hr) or less may be suitable as shared lanes in their present condition. Such roads often provide an enjoyable and comfortable bicycling experience with no need for bike lanes or any other special accommodations to be compatible with bicycling”. (AASHTO Guide to the Development of Bicycle Facilities, 2012, Section 4.3)

Crash Data – Should be reviewed to understand if there are problematic areas. Crash data can be difficult to find and compile. Engaging the people who respond to crashes, such as local law enforcement, in the planning process is valuable to understanding and addressing potential problem areas.

Framework for Evaluating Existing Road Conditions for Bicycle Safety

The following steps are intended to assist road owners in considering what combinations of traffic volumes, speed, and road width may be appropriate for people biking and driving to share a lane. These steps are intended to assess existing conditions on a road for their suitability for bikes.

This process draws from existing methods from Oregon and Wisconsin DOTs for evaluating safety based on the factors described above. The Oregon method considers speed and volume to assess a road's suitability for a shared lane for bikes and motor vehicles. The Wisconsin method considers that the number of motor vehicles on the road determines the frequency of potential conflicts. The [Wisconsin Rural Bicycle Planning Guide](#) identifies that conflict is most likely to occur when two motor vehicles and a bicycle are trying to occupy the same section of road at the same time, a triple pass. The methodology outlined in that guide defines the relationship between ADT and triple passes. "The incidence of triple pass occurrences can be calculated mathematically by using a road section's average daily traffic (ADT). Interestingly, as the ADT increases the incidence of triple passes progresses geometrically. This means that a road section with 5,000 ADT will have 100 times as many triple passes as a road with 500 ADT." (Wisconsin DOT, 2006). Wisconsin's method to assess rural roads for bicycling conditions is used here because it is relatively straightforward and is sensitive to rural roads with very low traffic volumes. Route evaluation methods used by other states are listed on [Adventure Cycling Association's Implementation Resources webpage](#).

Step 1: Break down proposed bikeway into road segments

Select road segments that have a relatively consistent character, that will each be evaluated separately for biking suitability. The road may be segmented based on differing characteristics or where there are changes to traffic volumes, operating speed, width, general roadway alignment including roadway grades, and/or jurisdictional boundaries (local, county, state, federal). State DOT, county and forest service roads are likely to have different design and operating characteristics. In addition, these different jurisdictions have potentially different resources and directives for roadway maintenance.

Step 2: Assess suitability for biking based on volume and speed

Figure 7, from the Oregon Department of Transportation [Bicycle and Pedestrian Design Guide](#), provides information about when it may be appropriate for people on bikes and in motor vehicles to share a travel lane (area shown in white), when bike lanes may be appropriate (area shown in black) and when something else such as shoulders may be appropriate (area shown in grey). Figure 7 uses traffic volume and speed, assuming operating speeds are similar to posted speed limits. If they differ, operating speed should be used. This guidance from ODOT is for the urban context. It is referenced here because it is one of a limited number of resources that provide guidance on evaluating existing roadways for bicycle use. ODOT clearly states that in situations that are not clear-cut, many other factors should be considered and weighed, along with good judgment. Further factors will be discussed that help to translate this guidance to the rural context.

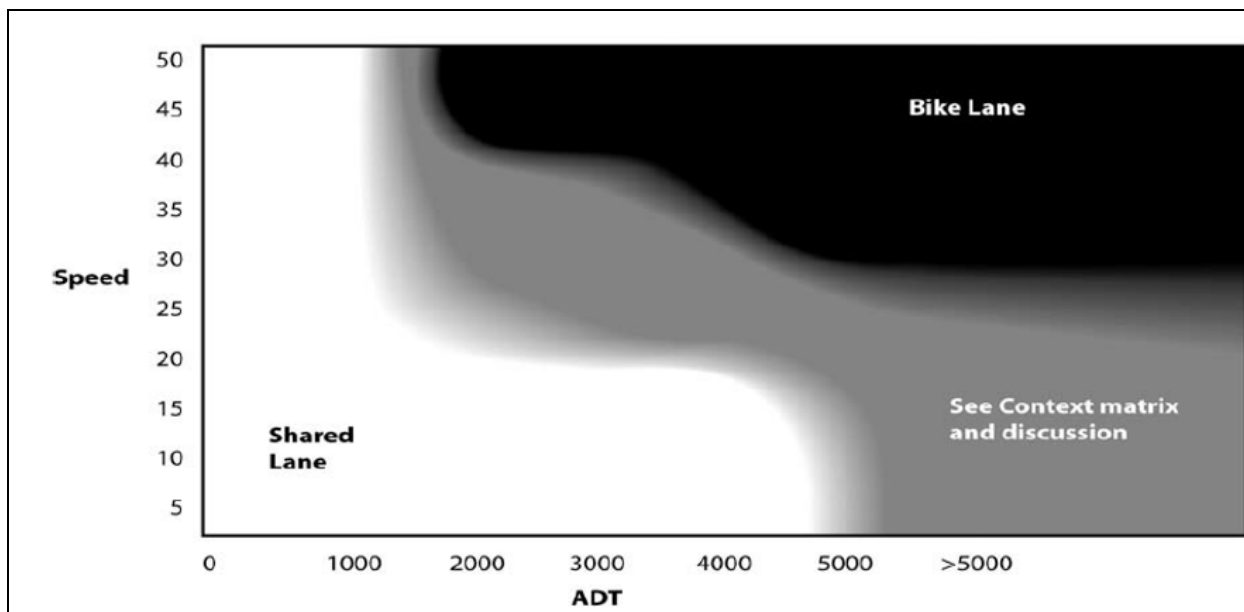


Figure 7: Graph. Traffic Speed and Volume Guidance on Shared Lanes (urban context, ODOT)

The following text attempts to articulate Figure 7 traffic speed and volume information.

White area- generally suitable for a shared lane bikeway:

- Roads with traffic volumes less than about 1200 ADT may be suitable for shared lane bikeways, even with high speeds of 45+ mph.

- Roads with traffic volumes between 1200 and 4000 ADT may be suitable for shared lane bikeways when operating speeds are less than about 20 miles per hour.

Grey area- may be suitable for a bikeway, though requires consideration of other factors (shoulders are recommended for these higher volume/speed roads):

- Roads with traffic volumes between about 1200 and 1800 ADT and speeds up to 50 mph may be suitable for a bikeway.
- Roads with traffic volumes between about 1800 and 4000 ADT and speeds between about 20 mph to about 35 mph may be suitable for a bikeway.
- Roads with traffic volumes above about 4000 ADT and operating speeds below 30 mph may be suitable for a bikeway.

Black area- generally not suitable for a bikeway (unless there is a dedicated space. e.g., bike lane, shoulder or separated path)

- Dedicated spaces are preferred for roads with traffic volumes between about 1800 and 3500 ADT and speeds above 40 mph.
- Dedicated spaces are preferred for roads with traffic volumes above about 3500 ADT and speeds above 30 mph.

If most road segments assessed fall within the white or grey areas of Figure 4, road owners should continue to step 3.

If most road segments fall within the black area of Figure 4, the road may not be considered safe for biking in its existing condition. Given this document is aimed at evaluating rural roads in their existing condition for bikeway suitability, it is likely that road owners would write a letter of no support for a bikeway (see Section 3.3).

If some road segments fall within black and grey areas, then further evaluation is recommended. Short sections of road may be addressed by rerouting or other methods. Road owners should continue to step 3.

In 2019, the FHWA released the [Bikeway Selection Guide](#) (FHWA, 2019). This document contains guidance for rural roads regarding preferred shoulder widths. As can be seen in Figure 8, this guidance suggests that shared lanes may be appropriate for roads with about 1200 vehicles per day at speeds up to 60 mph. Shoulders are recommended for roads with traffic volumes above about 1200 vehicles per day. This is generally consistent with ODOT’s guidelines for low speed and volume roads. However, this guidance suggests that shoulders should be provided on rural roads with volumes above about 1200 vehicles per day, even when speeds are low.

Both the ODOT and FHWA guidance are intended for consideration in the design of new construction or major reconstruction but can serve to inform the evaluation of existing roadways.

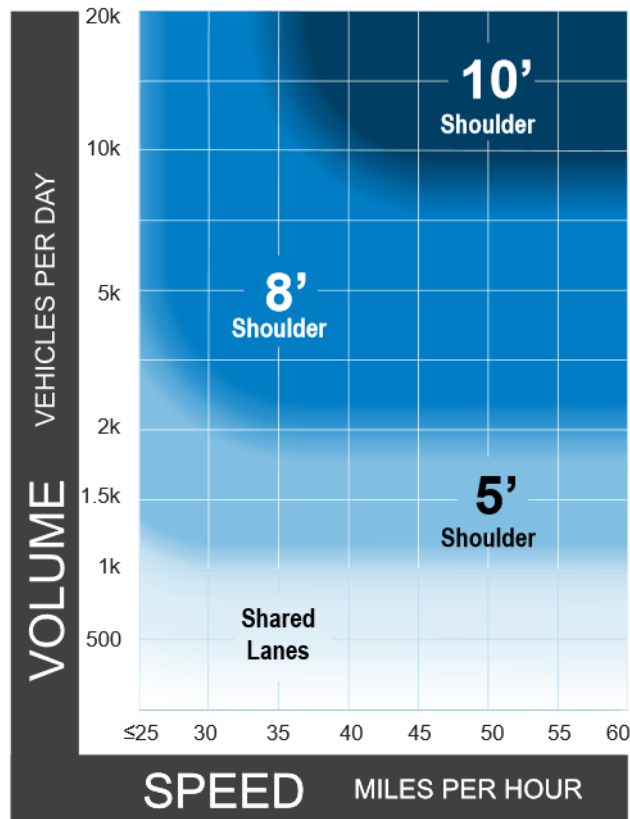


Figure 8: Graph. Preferred shoulder widths for rural roads based on volume and speed (FHWA, 2019)

Table 6 in [Highway Route Designation Criteria for Bicycle Routes: Final Report](#) (Wilkinson III, 1986), compiles traffic volume criteria deemed suitable for rural cycling routes from several different sources. The cited volumes range from under 1000 for roads with no shoulder to 3000, with two sources suggesting ADT should not exceed 1200 on rural roads with shared lanes. These cited criteria for rural roads generally align with the ODOT figure. Wilkinson summarizes by stating “Based on the foregoing discussion, it is not deemed possible to identify a single absolute value for ADT for rural routes, when ADT is being used as a qualitative, or alignment factor. For efforts designed to identify a specific touring route, lower ADT should be viewed as a desirable condition, but not a restrictive one.” (Wilkinson, 1986)

Step 3: Assess suitability for cycling on rural roads based on width, traffic volume, large vehicles and areas of limited sight distance

This step highlights the method outlined in [Wisconsin Rural Bicycle Planning Guide](#) to assess rural roads for bicycling conditions because it is relatively straightforward and is sensitive to rural roads with very low traffic volumes.

It is one of only a few methods focused on bicycling conditions on existing rural roads, making it relevant for many bikeway locations. Results of this method are not intended to provide a definitive yes or no answer to whether a bikeway is safe enough. Rather, they show suggested thresholds for good, moderate and poor cycling conditions that can inform decisions and discussions between road owners and proponents.

Wisconsin's method has been used for the Wisconsin Bike Map, with slight modifications for many years. This method uses traffic volumes and road widths as the primary variables, with adjustments for the percent solid yellow line and the percent of ADT that is heavy vehicle/truck traffic. The solid yellow line refers to areas of no passing where sight distances are restricted due to hills or curves. For roads without centerline markings, the percent limited sight distance can be estimated based on local knowledge or field review.

The steps in the Wisconsin model are shown below with examples provided in Table 4 and Table 5. A full copy of this method is provided in Appendix B. Wisconsin Rural Road Bicycle Evaluation Guidance.

1. Identify the ADT for the road segment. In Wisconsin, ADT thresholds developed for determining the bicycling condition of a road segment have adjustment factors that consider an increase in seasonal and weekend traffic. Consider if seasonal or weekend adjustments are appropriate on your road segment. It is understood that ADT data is not always available. Road owners should use their best judgement to estimate a reasonable range for this data.
2. Identify the percent of the segment that has limited sight distance (or % solid yellow line) where it is not considered safe to pass. An adjustment to the ADT will be made based on the percent of the road with limited sight distance. Limited sight distance is considered as it may impact the safety of the road for people on bicycles.
3. Identify the percent of the ADT that is large vehicles (trucks, RVs, large trailers...) traffic. If data or local knowledge does not provide a value, a general assumption that 10% of traffic is large vehicles can be used.

- Identify the road segment's pavement width. If the road has paved shoulders, add the paved shoulder width to the overall pavement width. For example, a 24-foot wide road with a pair of 3 feet paved shoulders would have a total paved width of 30 feet.

Figure 9 shows generalized bicycling conditions based on traffic volume and roadway widths used for the Wisconsin Bike Map. The secondary factors- truck traffic and limited sight lines (percent solid yellow) – are not represented in this figure but are part of Wisconsin's model (Wisconsin DOT, 2006). How all these factors are considered will be illustrated in the examples that follow.

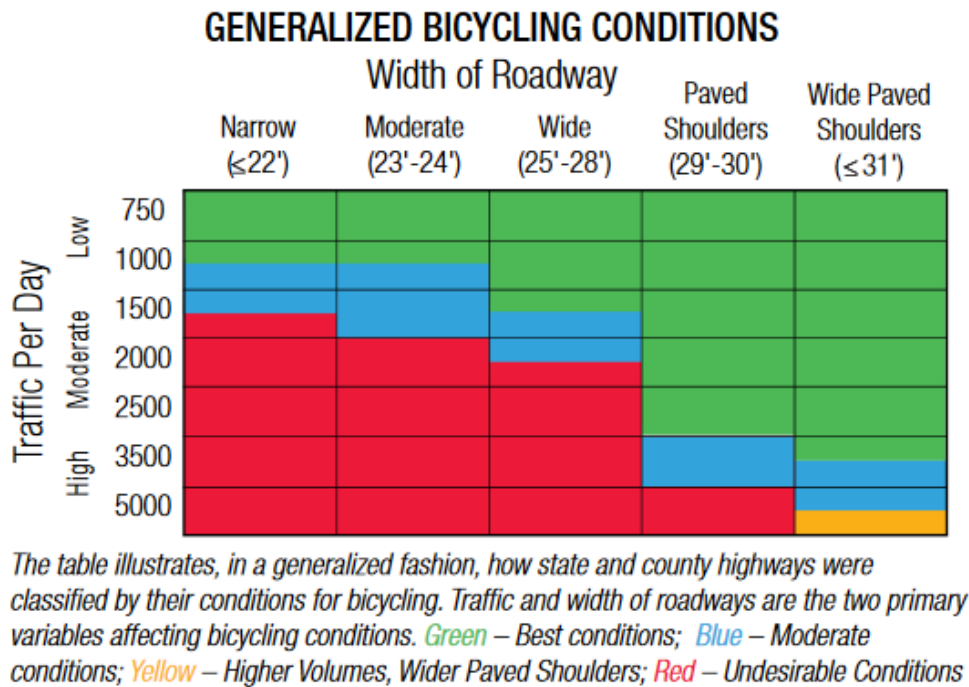


Figure 9: Screenshot. Wisconsin Rural Roadway Traffic Volume/ Roadway Width Chart

Example 1: Assessing Bicycling Conditions on Rural Roads using ADT and Pavement Width

As an example, for reference, using the Wisconsin method, a county highway with a volume of 1550 ADT, pavement width of 24 feet, 8% truck traffic, and 15% of road segment with limited sight distance (solid yellow line) would receive a Moderate rating for bicycling conditions. Table 4 demonstrates how this data is used in Wisconsin's model, with results highlighted in yellow.

Table 4: Example to Assess Bicycling Conditions on Rural Roads (Wisconsin DOT, 2006)

Road Name/ Segment start and end points	ADT	% Solid Yellow line per segment	Volume of heavy trucks (% of ADT)	Pavement width including shoulder (feet)	Shoulder width (feet)	ADT (Adjusted for % yellow line)	Wisconsin Bicycle Rating Results
Hwy 100/ Milepost 5 to 6	1550	15%	8%	24	0	1550	Moderate

23 to 24-Foot-Wide Adjusted Pavement

Time saver: Any road section with an ADT greater than 1860 is not desirable for cycling.

If the ADT falls below 1860, use Table 5 to make an adjustment based on the percent yellow line (or percent with limited sight distance), and use Figure 10 to determine the rating.

Table 5: ADT Adjustment Based on % Limited Sight Distance

% limited Sight Distance (or % yellow line)	ADT Adjustment
0-20%	0
21-40%	+ 100
41-60%	+ 200
61-80%	+ 400
81 % or more	+ 800

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 9%	GOOD	< 1350 <	MODERATE	< 1860 <	POOR
10%		< 1215 <		< 1670 <	
11%		< 1105 <		< 1515 <	
12%		< 1015 <		< 1395 <	
13%		< 930 <		< 1280 <	
14%		< 870 <		< 1195 <	
15%		< 805 <		< 1110 <	

Figure 10: Screenshot. Rural Road Bicycling Condition Rating thresholds (Wisconsin, 2006)

Example 2: Assessing Bicycling Conditions on Rural Roads - Adding Paved Shoulders

If 3-foot-wide paved shoulders were added to this roadway, the new width would be 30 feet, which would shift the road into the Good category. Table 6 demonstrates how the Wisconsin model works using this new pavement width of 30 feet. It can be seen in this example that adding shoulders shifted the threshold between the Good and Moderate bicycle condition from a maximum of 1350 to a maximum of 3,450 vehicles per day (ADT), depending on truck traffic.

Table 6: Example of Bicycle Conditions Revised with Shoulders added (Wisconsin DOT, 2006)

Road Name/ Segment start and end points	ADT	% Solid Yellow line per segment	Volume of heavy trucks (% of ADT)	Pavement width including shoulder (feet)	Shoulder width (feet)	ADT (Adjusted for % yellow line)	Wisconsin Bicycle Rating Results
Hwy 100/ Milepost 5 -6	1550	15%	8%	30	3	1550	Good

29 to 30-Foot-Wide Adjusted Pavement

Time saver: Any road section with an ADT less than 1490 is considered good for cycling. Any road section with an ADT greater than 4740 is not desirable for cycling.

If the ADT falls between 1490 and 4740, use Table 5 to make an adjustment based on the percent yellow line (or percent with limited sight distance), and use Figure 11 to determine the rating.

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 9%	GOOD	< 3450 <	MODERATE	< 4740 <	POOR
10%		< 3435 <		< 4720 <	
11%		< 3125 <		< 4295 <	
12%		< 2860 <		< 3935 <	
13%		< 2640 <		< 3630 <	
14%		< 2455 <		< 3375 <	
15%		< 2290 <		< 3150 <	

Figure 11: Screenshot. Bicycle Condition on Rural Road Rating thresholds (Wisconsin, 2006)

Step 4: Making sense of the results

For road owners wishing to understand what other evaluation criteria exist, [Adventure Cycling Association's Implementation Resources website](#) provides links to other methods.

After completing the above evaluations for bicycle safety on rural roads, road owners should have a better sense of which proposed bikeway segments rate good, moderate or poor. Speed, volume and other data isn't always readily available for rural roads. Road owners should consider how data may be estimated, or if federal, state, or county agencies have portable counters or radar units that may supplement incomplete data sets. When viewing the results of these evaluation methods it is important to consider the relative accuracy of the data used in the analysis and the ranges in values used in the tables and charts. Both the methods and the data are inherently soft. So, while the process may not yield a definitive answer regarding safety, it should provide a basis for decisions regarding bikeway designation. Road owners should use the safety evaluation results to inform their discussions within their agencies and with proponents.

The methods presented here are the quantitative aspect of evaluating the safety of a roadway segment. The qualitative aspects of the safety evaluation need to be factored into the decision as well. For example, comfort levels of bicyclists vary: People on bikes can become conditioned to traffic and road conditions they experience daily. What a person from a rural area considers high traffic may seem like a low traffic, comfortable ride to a person from an urban or suburban area. Designating a road as a bikeway does not mean that the road has ideal or perfect conditions everywhere for everyone that bikes. People who choose to ride bikeways such as Oregon's Scenic Bikeways and longer distance bike routes across America are likely accustomed to biking in less than perfect conditions. People that are uncomfortable biking in traffic, near vehicles and on roads that have poor pavement conditions or other less than ideal conditions will choose not to ride if they are given the right information. Roads that rate good or moderate for biking that may have poor pavement condition in places, limited sight distances, some truck traffic or other conditions that make them less than ideal should not be automatically disqualified from bikeway designation. Rather, road owners must feel comfortable that the information people need to know about the road is readily available and that proponent groups are willing and able to convey that information through their marketing materials. Chapter 5, Informing Users, discusses the types of information and potential methods for relaying that information to potential users.

3.3. Bikeway Safety Field Visit

If road owners are still generally supportive but have lingering concerns such that they are uncomfortable writing a final letter of support after working with proponents and considering

the safety evaluation tools presented, then they should consider a bikeway safety field visit. While a Bikeway Safety Field Visit requires significant effort and should not be considered as a required step in any bikeway designation process, it is an extremely valuable tool for: building understanding, fostering conversations, and developing partnerships. The following process is based on [FHWA's Bicycle Road Safety Audit Guidelines](#) (FHWA, 2012). However, it has been adapted to fit the context of rural roads where motor vehicles and bicycles typically must share a lane. This bikeway safety visit is less formal than, and should not be misconstrued as, a formal road safety audit.

What are typical objectives of a Bikeway Safety Field Visit?

- Bring together road owner personnel, bikeway proponents and key stakeholders to discuss safety concerns and identify potential solutions onsite.
- Explore the balance of bicyclist safety concerns and bicyclist tourism perspectives.
- Recommend and document short, medium, and long-term actions to address bicycle safety concerns.
- Assist road owners in whether to issue a final letter of support for a bikeway designation.
- Explore partnerships that will support the goals of the bikeway. Section 6.4 highlights one such partnership.
- Get road owners and other stakeholders to experience the road on a bicycle to see it from a different perspective than from inside a motor vehicle.

Bringing people from different areas of expertise and interest together can lead to a better understanding of the issues by proponents, road owners, and key stakeholders. It can improve understanding about topics such as:

- History and purpose of the road and how a bikeway fits into that context,
- Current maintenance practices and how might they impact bikeway users,
- Plans for road maintenance or projects that may impact bikeway users,
- Knowledge and perspectives from law enforcement and other personnel that experience the road on a regular basis,
- Realistic expectations about roadway funding for maintenance and road improvement projects.
- Rumble strip policies and chip seal, mill, and overlay practices that keep bicycle use in mind.

Step 1: Identify Bikeway Safety Visit Location(s)

If possible, the Bikeway Safety Field Visit Team should experience the entirety of the proposed bikeway. Given the overall length of most bikeways, this will require that most of the review

happen in motor vehicles. The road owner should identify locations for focused review based on their concerns when considering the safety of people riding bikes. This could be a specific location where there is concern for bicyclist safety, or it could be a longer segment where there are concerns about sight distances, logging trucks, or other issues. Different sections of a bikeway may be operated and maintained by different agencies such as a State Department of Transportation, a National Forest, and/or a County. Some factors to consider when choosing a segment(s) for focused review include:

- Road segments that rated moderate or poor on bicycle safety evaluation process outlined in Section 3.1.
- Concerns from different jurisdictions
- Different contexts and road characteristics (long, straight segments versus curvy, winding segments)
- Locations with specific safety issue (such as a curve or intersection with high crash rates)
- Consider how to have as many road owners and stakeholders experience the road on a bicycle as possible. For example, selecting sections that are relatively short (3 to 5 mile) segments and riding in the downhill direction in areas of significant grades can make the field reviews more accessible to inexperienced cyclists.

Step 2: Select who will be members of the Bikeway Safety Visit Team

The bikeway safety team should possess a combined set of skills that address the most critical aspects of the project. Team members should be aware of constraints and issues that affect cyclists on rural roads and have backgrounds in:

- road safety
- traffic operations
- road design
- road maintenance
- bicycling safety, operations, or planning professional
- someone who understands the skills needed for cycling on the road with traffic
- law enforcement with experience on the bikeway segment of interest

- bikeway proponent leading the application
- Scenic Bikeway Program manager

The size of the team may vary. As an example, for a bikeway safety visit in Oregon, it is anticipated at a minimum a team would consist of Oregon's Scenic Bikeway Program Manager,

one or more road owner personnel, and the bikeway proponent leading the application and/or bikeway planning efforts. It is important to ensure that all stakeholder perspectives are represented. The field safety visits can be an effective tool for building understanding and consensus between the often-diverse stakeholder groups. It is also important to consider safety and logistics when assembling the team for the field safety visit. These visits include spending time on active roadways, often in places with existing safety concerns. Large groups can present challenges to ensuring the safety of the group. Selecting the appropriate team should consider both inclusion and safety. There may be opportunities to include a larger group in the start-up meeting and/or the follow up discussions. This can allow for inclusion while reducing the number of people participating in the field portion.

Step 3: Conduct Start-up Meeting to Exchange Information

A meeting should be conducted prior to the bikeway safety field visit to ensure all team members understand the scope, purpose, schedule, and roles and responsibilities of all participants. At the end of the meeting, each team member should have a clear understanding of the scope of the bikeway safety visit and each of their responsibilities. This start-Up meeting can be conducted via phone/webinar. Specific topics of discussion may include:

1. Overview of the *Framework for Bikeway Designation on Rural Roads* toolkit
2. Select a date when all team members can attend. Plan to have as many team members as possible drive and bike portions of the proposed bikeway. Viewing a roadway from behind the handlebars of a bicycle is a different experience than viewing it from behind the windshield of a motor vehicle.
3. Bikeway safety visit location/areas of concern, purpose and main objectives
4. Bikeway safety evaluation information and results (from Section 3.1)
5. Findings of previous studies, future road plans
6. Logistics for driving and biking parts of the bikeways.
 - Are bikeway safety team members able and comfortable riding a bike?
 - Discuss safety protocols for biking through area of concern.
 - Do team members have access to the type of bike that is typically used on the proposed bikeway?
 - How will bikes be transported to/from bikeway location of concern?
 - Identify safe locations off road to park and ride and convene for observation and discussion during bikeway safety field visit.
7. Designate a team member to take responsibility as:
 - a. Notetaker - to document discussion, issues, potential solutions, next steps. A good practice is for each team member to take notes of their personal observations and submit to official notetaker as well.
 - b. Photographer - to document issues and site conditions.

- c. Task master- to keep field visit on schedule and ensure discussion is focused on objectives of visit.

Items to prepare prior to start up meeting

If possible, road owners and proponent should provide data related to the area of concern. Ideally, this data will help describe the overall cycling characteristics of the location(s) being assessed. A good starting place is to review data that was compiled during the previous bicycle safety evaluation process, which may include:

- Motor vehicle traffic volumes (ADT)
- % of road segment with limited sight distance (or % solid yellow line)
- Volume of large vehicles/ heavy trucks (% of ADT)
- Roadway pavement width (lane width and shoulder width)
- Motor vehicle speed data (speed limits and measured speeds)

Other useful data could include:

- Motor vehicle crash data (individual crash reports, hospital crash/injury data, reference/summary crash statistics, crash pin maps)
- Bicycle crash data
- Warning or other signage
- Pavement markings (are there centerline or edge lines)
- Surface condition
- Maintenance practices (what are they, how often do they typically occur...)
- Locations of key cyclist attractions (such as campgrounds, visitor centers, parking areas...)
- Agency and citizen correspondence pertinent to proposed bikeway (stakeholder requests, and complaints).

It is understood that volume, speed and other data may not be available. Road owners should document reasoning for any estimated data. Preferably, available data should be provided prior to the start-up meeting to enable the team to become more familiar with the location and potential safety issues. It is anticipated that the bikeway proponent will coordinate the effort of finding and distributing the available data before the meeting with support from road owners.

Step 4: Perform Bikeway Safety Field Visit

On the day of the field visit, all participants should attend the kick off meeting. The kick off meeting provides an opportunity for everyone to meet in person, to review goals and logistics of the field visit and to discuss important safety considerations related to being on active roadways. Additionally, remind team members of their assigned roles during the field visit for:

- Notetaker to document discussion, issues, potential solutions, next steps. (A good practice is for each team member to take their own notes as well).
- Photographer to document site conditions.
- Task master- to keep field visit on schedule, bring a copy of relevant data and field visit objectives, and ensure discussion/outcomes are focused on objectives.

The bikeway safety team should review the entire area(s) of concern. Team members should experience the relevant portions of the bikeway from within a motor vehicle and by bicycle. Team members should observe each selected site, document potential safety issues, take photographs, and identify constraints (e.g., available right-of-way, impact on adjacent land, etc.). Issues identified during the review of the supplied data should be verified in the field. Key elements to observe include:

- Site characteristics (road geometry, sight distance, clear zones, drainage, surface condition, signing and marking, lighting, barriers, etc.).
- Traffic characteristics (traffic/pedestrian/bicycle volumes, movements, speeds, interactions, etc.).
- Human factors issues (such as road user expectancy, reactions, and other behaviors).
- Surrounding land uses (including bicycle, pedestrian, and vehicle generators).

Depending on the location and concerns, [FHWA's Bicycle Road Safety Audit Guidelines and Prompt Lists](#) may be relevant to identify potential safety issues. The bicycle safety prompt list starts in Chapter 4 on page 35 of that document.

Reserve time at the end of the field visit for discussion to brainstorm ideas for short, medium and long-term actions that may address concerns. For each identified safety issue, the team will generate a list of possible measures to mitigate the crash potential and/or severity of a potential crash. Measures should consider engineering, education, enforcement, and emergency medical services, or any other actions that may be beneficial to user safety on the bikeways.

The notetaker should compile notes and photos documenting concerns, a brief description of the road section, a listing of the team members and agencies participating in the field visit, key

discussion items, and potential solutions and email to all team members within two weeks of the field visit.

Step 5: Follow up Discussion(s) and Memo Documenting Bikeway Safety Field Visit

Depending on the situation, the bikeway safety team may require follow up discussions to work through issues and ensure road owners are satisfied that their concerns will be addressed. Meeting notes should be completed for each conversation to document key discussion items and decisions. If road owners are satisfied that their concerns will be addressed, they may issue a final letter of support to be included in the bikeway plan.

In the case that a bikeway designation is not supported by the road owner, a letter of no support can be issued and submitted to the Bikeway Coordinator along with the bikeway visit meeting notes.

In the case that road owners' concerns are addressed, the bikeway safety team will decide how best to document these decisions in a memo by the proponent or, if appropriate, by the road owner. Much of the information has already been completed as part of meeting notes. This memo may include:

- a brief description of the road section,
- a listing of the team members and agencies participating in the field visit,
- a listing of the data and information used in conducting the field visit,
- a summary of relevant input gathered, and
- proposed safety measures.

Step 6: Incorporate Bikeway Safety Measures into the Bikeway Plan document

The final step is to incorporate measures to address road owner concerns into the bikeway plan. The [FHWA's Bicycle Road Safety Audit Guidelines and Prompt Lists](#) provides more information on bicycle policy and legislation to accommodate bicyclist, basic principles of bicycle safety and how to use bicycle prompt lists.

3.4. Additional Factors Affecting Safety of People on Bikes

Many factors combine to affect the overall safety of users on a roadway, including roadway geometry, maintenance, traffic conditions and user behavior. Section 3.1 introduced tools for evaluating roadway safety for people bicycling on rural roads based on traffic volume, speed and road width. This section provides road owners with more detail and some additional considerations that affect safety for people on bikes.

This guide attempts to distill key information for road owners. Many of the topics related to bikeway designation are multi-faceted and are difficult to generalize. For those interested or in need of more information these sections provide links to additional resources. One such resource is the Federal Highway Administration Safety website. The [Local and Rural Road Safety Program webpage](#) includes specific resources on training, tools, and countermeasures.

Most of this document, including the evaluation framework presented in section 3.1, focuses on evaluating existing roadway conditions. In addition to discussing factors that affect safety, this section introduces some best practices for mitigation of potential safety concerns. Mitigation is not a necessary component of bikeway designation. It is understood that bikeway designation does not come with additional resources to improve or maintain the road. In many cases, capital projects for rural roads are infrequent and subject to funding that is often unpredictable. The best practices in this section include both maintenance and operations suggestions as well as items that could be included if capital improvements are being undertaken.

The following sections discuss the influences that these factors may have on safety for people on bicycles.

Road geometry with limited sight distance

While it is acknowledged that not all people drive at appropriate speeds for the conditions, the character or “feel” of a roadway affects how fast people drive. Roads with tight horizontal and/or vertical curves that create a sense of uncertainty tend to slow operating speeds while straight, flat, open roads tend to increase operating speeds. This is important because slower speeds allow drivers more time to react if they encounter a slower moving vehicle such as a bike, which can lead to a safer environment for all road users. A road that encourages slow travel speeds may or may not be a road where the sight distance is adequate for safety. Ensuring that there is adequate stopping sight distance for the desired or expected operating speed is important for the safety of all road users.

Warning signs are intended to raise awareness regarding potential hazards and slow down traffic, making the road safer for all users. Curve or other warning signs may already be in place on many rural roads where there are specific areas of concern such as where sight distance is limited by horizontal or vertical curves. If there are areas of specific concern for the safety of bicyclists, the installation of warning signs could improve safety. Curve warning signs that include a speed advisory plaque such as the one shown in Figure 12 will help drivers to operate at a speed that is safe for the sight distance and road alignment.



Figure 12: Photo. Curve warning sign with speed advisory plaque (WTI)

Many rural roads are narrow and opportunities to pass slow moving vehicles including people on bicycles are limited. This can lead to frustration and risky passing behaviors. Look for opportunities to create paved pullouts that can provide a safe location for slower moving vehicles including people on bicycles to pull over and allow passing. Consider focusing pullouts on the uphill direction where there is a greater speed differential between bikes and motor vehicles.

Rumble strips

Special consideration should be given to using rumble strips on shoulders used by people on bicycles because they:

- Take up space to the right of the edge line reducing the space available to cyclists.
- Tend to increase the build-up of debris on the section where cyclists ride.
- Confine bicyclists to the section of the shoulder that deteriorates fastest and collects the most debris (sand, gravel, broken glass, etc.)
- Make it difficult to cross into the traffic lane to avoid obstacles such as cars stopped on the shoulder, potholes, debris, etc. (Velo Quebec Association, 2010).

In contrast to signs or pavement markings, there are no national standards of practice for rumble strips, so their lengths, widths, gaps, applicable locations, and general maintenance can vary widely (National Academies, 2016). If rumble strips are planned, they can be designed to be more tolerable to people on bicycles as follows:

- Provide a minimum of four feet of usable shoulder to the right of a rumble strip.
- Place rumble strips on edge line to maximize useable shoulder space for bicyclists.
- Use a gap pattern so bicyclists can safely move between the shoulder and travel lane. A typical gap pattern consists of a 10- 12 feet clear gap, followed by rumbles every 40-60 feet (National Academies, 2016).
- Reduce dimensions of rumble strips to allow more maneuvering space for cyclists. Reduced depth can also reduce jarring effect for cyclists.
 - 12-inch spacing center to center
 - 6-8 inches long, perpendicular to roadway
 - 6 inches wide, measured parallel to roadway
 - 3/8 inches deep (FHWA, 2016)

In addition Adventure Cycling Association provides [best practices for bike friendly rumble strips](#) and the [FHWA Rumble Strip webpage](#) provides more information on bicycle accommodation.

Narrow bridges

On many rural roads, bridges are often narrower than the typical road section. Because of the high cost of bridge construction, bridges were often constructed at a minimum width. These narrow bridges can present a hazard to all road users. Widening or replacing bridges does not occur very often. Providing appropriate warning to all road users can help reduce the risk. On roads that do have shoulders, the shoulders often disappear at narrow bridges. This presents a specific safety issue for bicyclists. For these locations, striping and signage that indicate the end of the shoulder and the presence of bicyclists in the travel lane can improve safety for all road users. If changes to a bridge are being considered, Chapter 5 of the [Small Town and Rural Multimodal Network guide](#) provides guidance and examples of retrofits and reconfigurations of bridge decks and structures to better accommodate bicycles.

Existence of Shoulders

While motor vehicles and bicycles sharing a lane may be appropriate on low volume rural roads, shoulders are desirable on higher volume and/or higher speed roads to provide a separate space for bikes. Generally, as motor vehicle volumes and speed increase, more separation is required for people on bikes. Paved shoulders not only provide space for people biking, they also provide recovery room for drivers who fail to maintain their lane, a place for pedestrians and a buffer space for rock fall or overgrown vegetation. Other benefits of paving road shoulders include reducing maintenance, extending the life of the road, controlling the amount of moisture under

the pavement, removing the drop off at the edge of the traffic lane and providing space for slower road users such as tractors (Austroads, 2012). It is understood that bikeway designation does not come with additional resources to improve or maintain the road.

Given the safety benefits to all road users, building or upgrading shoulders should be considered during roadway resurfacing, rehabilitation, or reconstruction projects where possible. Information found in the literature review regarding appropriate shoulder widths for bicycle use is summarized below.

In the [Pedestrian and Bicycle chapter \(Chapter 13\)](#) of their 2012 Highway Design Manual, ODOT provides guidance on paved shoulder widths and bicycle accommodations for rural highways.

The ODOT guidance is dependent on the type of project work being planned. Table 7 is adapted from Table 13.1 of the 2012 Highway Design Manual and is for 4R projects. These are new construction or major reconstruction projects and generally upgrade the road to current geometric standards.

Table 7: ODOT 4R Minimum Shoulder Widths for Bicycle Accommodations

Highway Characteristic	Minimum Shoulder Width
Collector – less than 400 ADT	2 feet
Arterial – less than 400 ADT	4 feet
Collector – 400 to 1500 ADT	5 feet
Arterial 400-1500 ADT	6 feet
1500- 2000 ADT	6 feet
Mountainous 4-lane Expressway	8 feet
Other expressways	10 feet

Table 8 is adapted from Table 13.2 of the 2012 Highway Design Manual and applies to projects developed under the ODOT 3R standards. ODOT (3R) projects are intended to preserve and extend the service life of existing highways. While the primary focus of these projects is pavement preservation, consideration of improvements to safety features is an essential design element.

Table 8: ODOT 3R Minimum Shoulder Widths for Bicycle Accommodations

Average Running Speed	Design Year Volume (ADT)		
	Less than 750 ADT	750-2000 ADT	Greater than 2000 ADT
50 mph or over	2 feet	3 feet	4 feet
Under 50 mph	2 feet	2 feet	4 feet

The recommendations in Table 9 come from a document that was developed specifically for consideration of bicycles and pedestrians in the design of roads. The [Small Town and Rural Multimodal Networks](#) (FHWA, 2016) document states that any amount of clear paved shoulder width can benefit cyclists and pedestrians. This document recommends a minimum of 4-foot-wide shoulder adjacent to a road edge, exclusive of any buffer or rumble strip. As with the ODOT 4R standards, these recommendations are for major construction projects where the intent is to upgrade the road to current geometric standards.

Table 9: Recommended Minimum Paved Shoulder Width (FHWA 2016)

Volume (AADT)	Speed (miles per hour)	Recommended Minimum Paved Shoulder Width
Up to 1,100	35 (55 km/h)	5 ft (1.5 m)
Up to 2,600	45 (70 km/h)	6.5 ft (2.0 m)
Up to 6,000	55 (100 km/h)	7 ft (2.1 m)
Up to 8,500	65 (100 km/h)	8 ft (2.4 m)

Finally, a graph showing preferred shoulder widths on rural roads based on speed and volume, was shown previously in Figure 8 in Section 3.2 ([Bikeway Selection Guide](#) FHWA, 2019).

It is understood that many roads will not see major rehabilitation or reconstruction projects. Without adding width to the pavement, shoulders can be created and/or widened during resurfacing projects by reallocating the roadway space. Travel or turn lanes may be able to be narrowed, with the remaining space adding width to the shoulder. These narrower travel lanes may have an added benefit of slowing travel speeds. “Lanes 3.0 m [10 ft] wide are acceptable on low-speed facilities, and lanes 2.7 m [9 ft] wide are appropriate on low-volume roads in rural

and residential areas. For further information, see *NCHRP Report 362, Roadway Widths for Low-Traffic Volume Roads.*” (AASHTO, 2011) If it is not possible to pave shoulders along the entire length of a road, critical sections may be prioritized such as horizontal or vertical curves that restrict the sight distance and uphill segments where bicycle traffic will be traveling slower. If there is an opportunity for paved shoulders, Chapter 3 of the [Small Town and Rural Multimodal Networks](#) contains more information on bike friendly rumble strips, pavement markings, and intersections.

It is worthwhile noting that these different documents all provide different recommended shoulder widths. This is indicative of the variability in opinions regarding what constitutes safe facilities for bicycle use. What is appropriate for a given location may depend on context as well as project scope. It should be remembered that any amount of clear paved shoulder width can benefit cyclists and pedestrians.

Maintenance

Maintenance issues that can impact safety for people on bikes include:

- Vegetation encroaching on road
- Gravel and debris on road
- Road surface condition
- Pavement markings/stripping
- Signage that requires maintenance or replacement
- Inconsistent bikeway signage

An overall lack of funding to perform maintenance was reported for many Forest Service roads in Oregon. Road owners may consider collaborating with “friends” or partner groups outside of the agency that may help raise funds for critical maintenance activities. Section 6.4 provides a case study of how partner groups are helping fund some winter road maintenance on a road running through Forest Service lands in Gallatin County, Montana.

The following sections provide further discussion of these subjects and some best practices if funding is available. Consider how partnerships with proponent groups might be developed to help address these issues.

Vegetation encroaching on road

Overgrown vegetation reduces sight lines and forces people on bikes toward the center of the lane. In addition to obscuring sight distance and reducing usable road space, vegetation often blocks the visibility of signage. Between larger brushing operations attention should be given to keeping signs visible. Developing a robust brushing program as part of regular maintenance programs can create safer conditions for bikes.



Figure 13: Photo. Overgrown vegetation on a Forest Service Road in Oregon (photo: WTI)

Coordinating with adjacent road

owners to accomplish this can provide more consistency across jurisdictional boundaries and may provide opportunities for cost sharing.

Gravel or debris on road

Gravel on roadways can present a hazard to people on bicycles. Dispersed gravel is a common occurrence, particularly on rural roadways, and is not prohibitive to bicycle travel. Larger areas of gravel or other debris such as those that accumulate at intersections with gravel roads or pull outs, chip sealing, rockfall, and winter operations are a more serious concern. While broad sweeping operations are unlikely on many rural roads, spot cleaning of locations that regularly accumulate larger areas of gravel and debris should be considered. Locations with regular rockfall are candidates for warning signs to alert all road users to the potential hazard.

One capital improvement to reduce gravel on the road is adding paved approaches to gravel roads that intersect the paved road. This can improve safety for people on bikes and motorcycles. These locations may also serve as safe places for slow moving vehicles to pull over to let faster moving vehicles pass. These paved approaches can be added at relatively low cost as part of planned resurfacing or other adjacent improvements. AASHTO's Guide to the Development of Bicycle Facilities states "Paving at least 10 ft (3m) on (low -volume) driveway connections, and 30 ft (9 m) or to the right of way line, whichever is less, on unpaved public road connections, can mitigate the worst effects of loose gravel." (AASHTO, 2012)

Road surface condition

Surface conditions such as potholes, edge drop offs, moss growth, or cracking can be more of a hazard to people on bicycles than motor vehicles. Maintenance of the roadway surface is an

ongoing consideration and bikeway designation does not imply that the roadway must remain free from these hazards. However, attention to these conditions is important to address as part of the regular maintenance of the roadway. Section 5 includes information regarding ways to inform users of expected roadway conditions.

When chip or spray sealing, it is important to take care that there are not inconsistencies in the surface or ridges along the edge line or in the shoulder that can result in loss of control for a bicyclist. When chip or spray sealing, consider using a smaller stone size. Large aggregate can create rough riding surfaces that cause vibrations and are uncomfortable to ride a bike on. Traditional 0.5-inch stone size for chip sealing can also result in more broken windshields, higher road noise, and reduced gas mileage. Wyoming and Idaho road engineers have been working with biking proponents on new approaches to chip-sealing using smaller sized aggregates and different oil top coats. Wyoming Pathways recommends using the smaller, 0.25-inch aggregate on all roads where bicycle use can be expected (Wyoming Pathways, 2013). Colorado DOT has been working on more bicycle friendly chip seal practices including a 25 percent reduction in aggregate size (Bicycle Colorado, 2014).

In rural areas, roads and shoulders are often sealed using a sprayed seal. A report focused on cycling safety suggests the use of a 0.39-inch (10mm) aggregate in areas where cyclists are expected (Austroads, 2012). However smaller aggregates are more expensive and may be unsuitable along high-volume truck routes. Australian and New Zealand road authorities are finding other options to avoid sealing the entire roadway with 0.39-inch aggregate but still improving the shoulder for cyclists. These include:

- using a smaller aggregate size on the shoulders than in the traffic lanes
- using sand seals in the shoulder when only the traffic lanes are resurfaced to fill voids and improve the surface quality
- using a mix of smaller sized aggregates to make a smoother surface
- using a double spray seal with a larger stone for the base (e.g. 0.55 in or 14 mm) and a smaller stone size for the top layer (e.g. 0.28 in or 7 mm)
- alternating between aggregate sizes in subsequent seals (e.g. use 0.55 in or 14 mm one year and then 0.39 in or 10 mm for the next resurfacing). (Austroads, 2012)

Another best practice is for road owners to publish a list of upcoming chip seal projects and make this readily available to the public and bike proponent and tourism groups. This list should include project dates, route numbers, mileposts and which sections are on scenic bikeways. This will allow people to make a more informed decision about where they plan to ride. In 2016, for the first time, the Oregon Department of Transportation published their list of upcoming chip seal projects specifically with bicyclists in mind (Maus, 2016).

Signage

Bike route guide signs (also called wayfinding signs) are used to let bicyclists know they are on a designated bikeway and help raise awareness for people driving that there may be bikes on the roadway. These signs are often placed at the beginning of the bikeway and at critical decision points on the route. They can also be placed after key intersections where motorists are entering the bikeway for the first time. A National Cooperative Highway Research Program report [U.S. Bicycle Route Guide Signing](#) provides recommendations for marker and guide signs for the U.S. Bicycle Route System and other bike routes (Petritsch & Fellerhoff, 2014). In addition to bike route signs, other signs (warning and regulatory) may be installed to increase safety for bicyclists.



Figure 14: U.S. Bicycle Route System Wayfinding Sign.

Warning signs call attention to unexpected conditions on or adjacent to roads and to situations that might not be apparent to road users. Warning signs are diamond-shaped with a black legend and border on a yellow background. Figure 15 shows examples of warning and regulatory signs. Regulatory signs, such as the bicycle “may use full lane” inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements and are installed at or near where the regulations apply (FHWA, 2009a).



Share the Road Warning Signs are being phased out in many jurisdictions

Bicycle on Roadway Warning Signs are preferred in many rural jurisdictions

Bicycle may use full lane Regulatory Signs are more common in urban settings

Figure 15: Bicycle Warning and Regulatory Signs (MUTCD)

The “share the road” warning sign was introduced into the Manual on Uniform Traffic Control Devices (MUTCD) in the context of slow-moving farm equipment with no associated mention of bicyclists. Since that time, it has become prevalent in conjunction with the bicycle symbol with the intent of warning drivers of the presence of bicyclists and warning drivers to pass safely. Research has shown that the “share the road” message when applied to bicyclists does not adequately communicate the responsibilities of either user group on the roadway. Road users are unclear whether “share the road” means that drivers should give space when passing or that bicyclists should pull to the side to allow drivers to pass (FHWA, 2009b).

When using the Bicycle warning symbol, many jurisdictions are phasing out “share the road” in favor of “on roadway” plaque, more clearly indicating the condition ahead (FHWA, 2009b), including Oregon and Delaware.

For rural roads, bicycle “on roadway” signs are preferred. There is concern that “bicycles may use full lane” signs will lead to more bicyclists riding in the center of the lane or two abreast on curvy, high speed roads and lead to more conflicts with motor vehicles. In more urban settings where bicyclists are expected or preferred to use the full lane, that message is more clearly communicated with the “Bicycles May Use Full Lane” sign.

A 2015 study compared comprehension of “share the road,” sharrow pavement markings (a bicycle symbol and double arrow indicating where bikes and cars share a lane) and “bicycles may use full lane” signs. That study reports “bicycles may use full lane” signs were the most consistently comprehended for communicating the message that bicyclists may occupy the travel lane and increased perceptions of safety. “Share the road” signs did not increase comprehension or perceptions of safety. Shared lane markings fell somewhere between (Hess & Peterson, 2015). Shared lane markings are generally not appropriate on streets that have a speed limit above 35 mph.

Decisions about bikeway wayfinding sign use and other regulatory and warning signs must be balanced with budget, sign clutter concerns and the need to maintain signs over time. Road owners are encouraged to create annual sign repair and replacement budget and reach out to partner groups to help fund if needed.

“Although there may be no general duty to provide signs, signals, guardrails, and other traffic safety features, in most jurisdictions a public entity may be held liable for the failure to install or provide such features or devices after the public entity has actual or constructive notice of a dangerous condition of the highway or bikeway. Furthermore, after a public entity installs or provides such safety features, the public entity usually is held to a duty of maintaining them in good repair such that the highway or bikeway is reasonably safe for its intended use.” (Thomas, 2010)

User Behavior

Many of the issues affecting the safety of road users stem from human factors, such as speeding and impaired driving. In addition, this section discusses trip purpose and how it may affect safety. Often these user behaviors can be influenced through enforcement and education efforts.

Speeding

As was introduced previously, motor vehicle speed is an important factor in roadway safety. Speeding has two important components: exceeding a posted speed limit and driving too fast for the current conditions. In Oregon, the speed law is governed by the ‘basic rule.’ “The basic rule states you must drive at a speed that is reasonable and cautious for existing conditions. The basic rule applies on all roads at all times” (Oregon DMV, 2018). In many of the locations where bikeways are proposed, the existing conditions can change over the length of the bikeway. Differing maintenance practices between road owners and changes in topography are two examples of how the existing conditions may change along the length of a bikeway. These and other changing conditions will affect what is a “reasonable and cautious” speed. In some locations, road users may be generally unaccustomed to the conditions that may be present on these rural roads and what is a reasonable operating speed for the conditions.

While it is noted that changing posted speed limits may have limited impact on operating speeds, posting an appropriate speed limit can inform road users regarding what is reasonable and cautious under good conditions. In addition, adding advisory speed plaques to warning signs can help inform users of location or conditions that have a lower reasonable and cautious speed. For curvy roads, where speeding is an issue, the [FHWA Proven Safety Countermeasures webpage](#) includes information on enhanced delineation for horizontal curves.

Law enforcement presence can be an effective approach to reducing speeding. While actual enforcement action is often needed, many times obvious presence of law enforcement alone can reduce the incidence of speeding. High Visibility Enforcement is included in the [National Highway Traffic Safety Administration’s \(NHTSA\) Counter Measures that Work](#).

Warning signs are one standard approach to notifying road users of specific situations or locations where excessive speed is particularly dangerous. Curve warning signs may be important to people on bicycles in steep downhill situations, particularly if they are touring cyclists carrying heavy loads. Signs indicating that drivers should expect to see bicycles on the roadway can help to alert users to the possible presence of cyclists and the need to adjust their speed.

In locations where there is a posted speed limit, these limits can be reviewed to ensure they are appropriate for the conditions and for the desired operating speed. It should be noted that changes to the posted speed limit often have a limited influence on the operating speed. “For example, speed limit is reduced by 20 km/h, the mean speed of traffic will be reduced by about 8 km/h.” (International Transport Forum, 2018)

One of the tools available through [FHWA’s Proven Safety Countermeasures webpage](#) is [USLIMITS2](#). “USLIMITS21 is a free, web-based tool designed to help practitioners assess and establish safe, reasonable, and consistent speed limits for specific segments of roadway. It is applicable to all types of facilities, from rural and local roads and residential streets to urban freeways.”

Impaired/Distracted Driving

Impaired and distracted driving are ongoing user behaviors that have a significant effect on the safety of all road users. The dangers of these behaviors are compounded for people on bicycles. As already vulnerable road users, cyclists can also be less visible. Impaired or distracted drivers have a reduced ability to perceive hazards. This is a combination that can have poor outcomes. Law enforcement activities such as high visibility enforcement and checkpoints (where legal) can help to reduce the incidents of impaired and distracted driving while also helping to inform road users of the hazards. These measures are also included in [NHTSA’s Countermeasures That Work](#).

Trip Purpose/Road User Knowledge

The purpose of the trip and the understanding that a person has about the road can influence their driving behavior and safety. Because they tend to be more familiar with the road and may be more focused on getting to their destination, commuters may choose a higher operating speed than someone on a recreational trip. Conversely, the familiarity with the road could mean that they are aware of the possibility of encountering people on bicycles. Some locations draw recreational users for the purpose of driving fast. Scenic, mountainous roads can be proving grounds for sports car and motorcycle enthusiasts. These users often pose a significant risk to themselves and all other users on the road. People on bicycles are similarly influenced by their knowledge of local conditions, laws, or safe cycling practices.

4. Road Owner Liability

While this document is not intended to nor does it provide legal advice and the authors are not attorneys, this toolkit included the review of resources that specifically address the subject of liability related to bikeways and consultation with the diverse resources available through the Technical Advisory Committee. This enabled the inclusion of basic information related to liability and bikeway designation. This section is intended to frame the issues and highlight several ideas to consider throughout the process of bikeway designation. Road owners should consult their legal counsel for information and advice about the concepts discussed in this toolkit, including the legal standards in particular jurisdiction(s) and/or other specific concerns.

Several resources are available that deal specifically with this topic were included in the literature review for this project. The following two documents in particular are cited extensively in this section.

[*Liability Aspects of Bikeway Designation, John W. English, 1986*](#)

[*NCHRP Legal Research Digest 53: Liability Aspects of Bikeways, Larry W. Thomas, 2010*](#)

4.1. Tort Law

A tort is a wrongful act or an infringement on a right that carries civil penalties. Tort law addresses cases where injury to one party is alleged to have been the result of another party's action or inaction and where no contract exists that outlines the duties and rights of the two parties. "The most common remedy afforded in tort law cases is a judicial judgement holding the **defendant**, the wrongdoer, liable to compensate the **plaintiff**, the injured party, for the monetary value of the plaintiff's injuries. This would be called a judgement of **tort liability**." (English, 1986) Tort law varies significantly from state to state.

Black's Law dictionary defines liability as "The state of being bound or obliged in law or justice to do, pay, or make good something; legal responsibility." (Black's Law Dictionary, n.d.)

John Bouvier provided this definition of liability in [*A Law Dictionary, Adapted to the Constitution and Laws of the United States*](#), "LIABILITY. Responsibility; the state of one who is bound in law and justice to do something which may be enforced by action. This liability may arise from contracts either express or implied, or in consequence of torts committed." (Bouvier, 1856)

In the case of roads, tort claims often take the form of a road user suing the roadway owner for an injury suffered while using the road.

Elements of a Tort Claim

Most frequently negligence is the tort for which a road owner is alleged to be liable. Broadly speaking, “[n]egligence is conduct which creates an unreasonable risk of harm to others.” (English, 1986) Liability for negligence generally requires a finding of four elements: duty of care, breach of duty, causation, and harm:

- **Duty of Care:** generally, a duty on the part of a defendant “to conform to a particular standard of conduct for the protection of the plaintiff against unreasonable risk” (English, 1986) or “[A] duty of reasonable care” (Thomas, 2010).
- A public entity can sometimes be found to have a duty of care with respect to the roadways it owns and/or administers. In Legal Research Digest 53: Liability Aspects of Bikeways, one writer, Larry Thomas, characterized the duty this way: “A public entity has a duty of reasonable care to construct and maintain its public improvements in a reasonably safe condition and to provide adequate warning to a motorist or bicyclist of a dangerous condition of which the public entity has notice or should have had notice.” (Thomas, 2010) **Breach of Duty:** defendant “failed to conform to the required standard of conduct” (English, 1986).
- **Causation:** causal connection between the defendant’s conduct and the plaintiff’s injury. In Legal Research Digest 53: Liability Aspects of Bikeways, one author, Larry W. Thomas, described this element as follows: “Proximate cause is that cause, act or omission which, in a natural and continuous sequence, unbroken by an efficient intervening cause, produces the injury and without which the result would not have occurred, the injury being the natural and probable consequence of the wrongful act.” (Thomas, 2010)
- **Harm:** injury or damage suffered by the plaintiff, possibly including but not limited to “property damage, monetary loss such as lost wages, bodily injury, death, pain and suffering, and mental anguish, or a combination of these. The term “damages” refers to the monetary value of the plaintiff’s injury.” (English, 1986).

4.2. Tort liability of governmental road owners

As noted above, road owners should consult their legal counsel for information and advice about the concepts discussed in this toolkit, including the legal standards in particular jurisdiction(s) and/or other specific concerns. The information provided herein is for general educational purposes only.

Sovereign immunity

Sovereign immunity is a term used to describe the concept that a sovereign government cannot be sued without first giving its permission. Sovereign immunity generally refers to state or national governments, while governmental immunity covers a broader spectrum and includes county and local municipal governments. The laws of each state vary regarding what immunity laws apply to which entities. The law surrounding governmental immunity has changed in recent decades and in most states governmental immunity has been reduced through statutory changes. “In spite of these changes, the general rule remains that one can sue the government for a tort only under terms and conditions specified by the government.” (English, 1986)

Recreational Purposes

The Oregon Public Use of Lands Act, ORS 105.672 et seq., provides immunity from tort liability to private and public owners of land that is made available to the public for recreational purposes. For bicycling and other uses on roads and trails that have both transportation and recreation purposes, courts have distinguished between an invited, recreational use on lands that could otherwise have been closed to such use, and a public road that would be open to the public for such uses already.

Discretionary Function

“The most common pattern in governmental immunity is the distinction between discretionary functions, which are protected by immunity, and ministerial functions, which are not. Discretionary functions involve the exercise of independent judgement, often in a policy-making role. Ministerial functions are governed by established policy and permit a minimum of independent judgement.” (English, 1986) The concepts of discretionary or ministerial function are also sometimes referred to as planning or operational function. “If the decision was made at the planning level of government, the level where policy decisions are generally made, it is probably a discretionary function. Once the planning decision has been made, however, decisions involved in execution of the plan at the operational level are ministerial.” (English, 1986)

Failure to Correct and/or Warn of Hazards

Decisions by public agencies about where and how to expend limited road maintenance budgets are often shielded by the discretionary function exemption. However, road owning agencies may have liability related to correction of or warning about hazards, including sign frequency, placement, and maintenance, especially if the public entity had actual or constructive notice of a dangerous condition early enough to have taken measures to protect against it.

One author, Thomas English, writing in *Liability of Bikeway Designation*, summarized the interplay of the discretionary function and the failure to warn, as follows: “The courts are unlikely to find the agency negligent for failing to make a major renovation or reconstruction of the bikeway to correct the problem. That kind of action would invariably involve a high-level policy decision, a discretionary function. What the courts will generally require is corrective action of the type which can be undertaken at the operational level, the kind of work which can be performed by the agency’s maintenance department. The primary obligation would be to give warning of the hazardous condition to persons using the bikeway.”

In *NCHRP Legal Research Digest 53: Liability Aspects of Bikeways*, Larry W. Thomas has suggested that public entities should “maintain records of their decision-making with respect to bikeways and their safety and condition, so that there will be evidence on the part of the public entity that there was an actual exercise of the entity’s discretion at the time of any decision making.”

Determining tort liability in a given case is highly fact-specific, depending on the roadway, uses, and circumstances, so it is difficult to predict the outcome in a particular bikeway case. This document is not intended as, nor should it be used as, a substitute for seeking the advice of counsel regarding the matters discussed herein and any bikeway or set of circumstances.

Again, a detailed discussion of the application of tort law to publicly owned roads and bikeways may be found in [English 1986] and [Thomas 2010], referenced above.

4.3. What does all this mean for bikeway designation?

The previous sections lay out general concepts of liability for road owners. So how are these concepts applicable to the question of whether to support bikeway designation?

It may be argued that the decision by a governmental road owner whether to support designation of a bikeway is a “planning”-type decision that may be shielded by the discretionary function exemption. Deciding whether to support a bikeway involves a significant exercise of judgment by a road owning agency, and that judgment is rooted in considerations of public policy. For example, the agency weighs social factors such as recreation, visitation, and compatible and/or conflicting road uses. The agency also considers economic factors such as how best to allocate budgeted funds for road maintenance and signage, and public policy factors such as public safety and scenic and natural resources.

As noted above, thorough documentation of a public entity’s decision-making with respect to bikeway designation can provide evidence of the entity’s exercise of its discretionary function. *“It is suggested that public entities maintain records of their decision-making with respect to bikeways and their safety and condition, so that there will be evidence on the part of the public*

entity that there was an actual exercise of the entity's discretion at the time of any decision-making.” (Thomas, 2010)

Whether or not a road owner decides to support designation of a particular bikeway, the owner may have a duty to correct or warn road users, including bicyclists, of hazards. As John English broadly summarizes in *Liability Aspects of Bikeway Designation*,

“Highway agencies have a duty to use ordinary care to provide highways which are reasonably safe for highway users who are themselves exercising ordinary care. This includes a duty in maintaining the highway to inspect for defects and hazards, and to either alleviate such hazards or give adequate warning to highway users. ...

Bicyclists clearly have a right to use the highways, and the highway agency owes them the same duty of care. The standard of conduct required to meet that duty will necessarily recognize that bicycles are more susceptible than other highway users to some hazards, and that greater care may be required at some locations because the presence of bicycle traffic there is predictable....

Careful attention by the highway agency to compliance with applicable laws, guidelines, and recommended procedures relating to the design, construction, operation, and maintenance of bikeways will greatly curtail the risk of liability.” (English, 1986)

Bikeway designation may lead to an increase of bicycle use on the designated roads, which may be relevant to the reasonableness of the road owner's actions in the context of duty of care. But it is important to note that where bicycle use already exists (and may be increasing) even without designation, a duty of care toward those bicyclists may already be owed.

Through the process of reviewing a section of roadway from the perspective of someone on a bicycle, existing hazards may be identified, and a plan developed for mitigating the hazard. In many cases, the road owner may be aware of the hazard but may not have viewed it from the perspective of a cyclist. One such example could be areas where gravel accumulates along the edge of a paved road at intersections with gravel roads. For most motor vehicles this could be considered an inconvenience or may pose a mild hazard for vehicle damage while for a cyclist this poses a more significant hazard. Identifying these types of hazards allows the road owner to prepare a plan for how these hazards will be reasonably mitigated. This may be as simple as providing notice to road users or could include planning to install paved approaches as part of a future re-paving project.

For engineers and road owners, documenting decision-making processes can be key in defending against possible claims. Taking the time to document specific issues for bicyclists and identify ways to mitigate them can be used in meeting the duty of care that may be owed.

Again, for those interested in a detailed discussion of liability issues associated with bikeways, including citations from relevant case law, the papers “Liability Aspects of Bikeway Designation” by John English and “Legal Research Digest 53: Liability Aspects of Bikeways” by Larry Thomas that are highlighted at the start of this section are recommended reading.

4.4. Considerations for USDA Forest Service Roads

Federal Land Management Agencies, such as the USDA FS are asked to support bikeway designation on roads under their jurisdiction. This section introduces considerations that are specific to the USDA FS. Other Federal Land Management Agencies may have similar considerations and should consult their counsel when considering liability implications of bikeway designation.

Is there a difference for a federal agency regarding sovereign immunity?

The federal government’s tort liability is limited to claims under the Federal Tort Claims Act (FTCA), which provides a limited waiver of the government’s sovereign immunity from suit. The FTCA allows recovery for personal injury, death, or property damage caused by negligent or wrongful acts or omissions by federal employees acting within the course and scope of their employment, if a private actor would be liable under the laws of the state where the act or omission occurred. The law of the state in which the act or omission occurred governs the US’ liability.

Would the Forest Service be considered to have a discretionary function exemption in its role in owning and maintaining roads?

Like many state tort claims acts, the FTCA contains a discretionary function exception, which shields the federal government from liability for claims based on the exercise of discretionary functions or duties by federal agencies or employees.

4.5. Relevant Case Law

Below are a few legal cases that provide insight into the application of the concepts above.

Cope v. Scott, 45 F.3d 445 (DC Cir. 1995), and Hayes v. United States, 539 F.Supp.2d 393 (DC Cir. 2008), explain the standards applicable to accident claims under the FTCA related to road maintenance and failure to warn/signage. In Cope v. Scott, the National Park Service maintenance of a road in Rock Creek Park in Washington, DC, was found to be discretionary function despite safety issues in a high use area, but claims related to where and how to post signs warning of dangerous road conditions were not found to be exempt discretionary function, because the discretion involved did not implicate policy choices of the sort that Congress intended to protect.

In addition to these case law examples, *NCHRP Legal Research Digest: Liability Aspects of Bikeways* (Thomas, 2010) references many case law examples and Appendix D, of that document, contains a table of bikeway and other relevant bicycle-accident claims against public entities.

5. Informing Users

Efforts to inform all users of road conditions and potential hazards before they use the bikeway are important. Providing adequate warning to road users about conditions and potential hazards is one aspect in reducing liability. Partnerships with the groups proposing and promoting the bikeway are critical to help disseminate this information to potential users.

One of the key aspects of Oregon's Bikeway Plan phase includes outreach, marketing, and promotion of the bikeway. From the perspective of the proponents and the OPRD, these outreach efforts focus on bringing new users to the bikeway and the region. These efforts include:

- producing a map and cue sheet
- adding a bikeway description to the website.
- providing general safety information and warnings about the bikeway.

This section highlights potential opportunities to include additional, route specific safety information that users should know when considering a trip on a bikeway. In addition to the bikeway specific outreach and marketing, there are often other opportunities to leverage existing outreach and marketing efforts to provide information to all road users. These efforts include resources such as local or regional tourism efforts, USDA FS websites and publications, Department of Transportation website and publications, or local media outlets.

5.1. Safety Campaigns

Safety campaigns can be an effective tool to raise awareness of bicycle use of the roads and to educate people riding and driving about laws and behaviors that lead to improved safety for all road users. Safety campaigns can also be effective in addressing user behaviors such as speeding and impaired/distracted driving. Road owners that are familiar with commuter and recreation patterns on a scenic bikeway road can use that knowledge to help develop education/outreach materials that address specific safety issues and identify outlets for the safety campaigns. The message may need to be delivered differently to reach commuters than visitors to the area. One specific opportunity is working directly with logging operations to provide information on bicycle use for drivers and on the logging operations for cyclists. The [National Highway Transportation Safety Administration's \(NHTSA\) Countermeasures that Work](#) includes resources for safety campaigns.

5.2. Route Specific Information

As was mentioned, the [OPRD Bikeways website](#) has general safety information that relates to all bikeways as well as some general information for each individual bikeway. The paragraph below contains a sample of Oregon Scenic Bikeway Trip Planning Information available online.

This information is intended to help visitors make informed decisions about where they will ride.

Excerpt from Cascading Rives Scenic Bikeway promotion

Traffic Notes: Motorized vehicle traffic volume is low to moderate in late spring and fall, but higher on weekends and holidays during summer months. Most of the route through the national forest is narrow, steep and winding with limited to no shoulder. Watch out for truck traffic, fallen rocks or trees, and possible damaged road surface conditions and slippery surfaces during wet or icy weather. In the winter, Road 46 is not maintained for travel. Much of the route is closed by snow in late fall to early spring. Roads are only maintained from late spring to fall. Check Road 46 status with local Ranger District offices. Highway 224 conditions can be found on ODOT's Trip Check website. Cell coverage is extremely limited.

Ranger contact information: Detroit Ranger Station, (503) 854-3366, or Clackamas River Ranger Station, (503) 630-6861

An additional consideration that could be included with these general route descriptions would be to provide information regarding expectations for maintenance levels based on the jurisdiction of the road. State DOTs, rural counties and Federal Land Management Agencies all have different maintenance objectives for their roads, and these will impact the condition of the roads in each jurisdiction along a bikeway. Providing information to potential users about these maintenance differences can help potential users understand what to expect.

In addition to this type of broad route information, there may be specific concerns or conditions associated with individual bikeways that potential users should be aware of in preparing to use a bikeway. Collection of this information was one outcome from the Bikeway Safety Field Visit outlined in section 3.4. Examples of this type of information could include:

- location of narrow bridges,
- locations of steep descents,
- presence of range livestock,
- locations of seasonal rockfall,
- presence of logging operations, or
- unusually high-volume traffic events such as annual festivals, hunting seasons, or organized bike rides.

Road owners and proponents can work together to include information about these route specific concerns or conditions in marketing and promotion materials and identify other opportunities to inform potential users.

For example, in Oregon, all designated bikeways have maps and cue sheets that provide more detailed information about the specific bikeway. These are developed during the Writing the Bikeway Plan stage of the process. These have traditionally had information on services or points of interest. These maps and cue sheets are opportunities to provide roadway specific safety information to potential riders. Many first-time riders searching for information on the route will reference these. Including relevant bikeway safety information identified during the site visit in these resources can help riders to make informed decisions when deciding whether a bikeway is appropriate for their experience and comfort.

There is a balance between providing so much information that people will skip over it and highlighting areas of specific concern and providing the crucial information that will help set riders' expectations.

5.3. Enforcement

The presence of law enforcement can be a significant influence on many user behaviors that contribute to unsafe conditions on roadways. As mentioned previously, law enforcement actions are included in the [NHTSA Countermeasures that Work](#) for several important safety concerns for bikeways. Many jurisdictions already utilize existing law enforcement resources to address these issues as they are important to road safety for all users. Law enforcement actions such as high visibility enforcement may require significant personnel and equipment resources.

6. Funding

Funding the construction, maintenance, and operation of road networks, that are experiencing increased use, is possibly the biggest challenge bikeway road owners face. Road owners have an ever-growing list of needs and desires and decisions about how to prioritize available funding may be complicated by politics. In many locations, rural roads on public lands were built with funds from resource extraction operations, in Oregon this meant timber sales. As these sales become less frequent, funds to maintain these roads are harder to find. While there is often a public expectation these roads will be maintained, agencies do not always have a reliable funding source.

Research shows that bicycle tourism can generate significant local and regional economic benefits. The reality is that in many cases, the road budget of the participating road owners does not benefit from the economic boost generated by bicycle tourism. It is understood that bikeway designation does not specifically come with a source of funding to help road owners improve or even maintain the bikeway roads. The following sections highlight some of the funding challenges faced by road owners and present partnership opportunities that may assist with funding.

6.1. Maintenance funding

Depending on the agency responsible for maintaining the road proposed for bikeway designation, the availability of maintenance funding can vary greatly. Road owners are faced with budgets that often fall well short of what is needed to provide the level of maintenance that maximize the life of roads. During bicycle road safety field visits conducted as part of this project, road owners stressed that it is extremely challenging to find funds for replacing warning signs that were missing or riddled with bullet holes, cutting vegetation that was encroaching into the roadway, or repairing cracked and potholed pavement.

6.2. Project Funding

All roads have a fixed life span. This means that road owners plan and budget for their replacement. The diverse range of road owners involved in bikeway designations have different processes for identifying and programming road improvement and reconstruction projects. The unpredictable nature of funding that is regularly diverted due to legislation or delayed budget processes makes planning and programming of road projects extremely challenging. During one of the bicycle safety site visits it was related that one segment of the road has been scheduled for reconstruction for several years, but the funding continues to be unavailable because of budget changes and emergency management costs.

6.3. Grant Funding

There are many grant programs at the state and federal level that could be used for improvements to roads associated with bikeways. Many of these grants are increasingly competitive and many programs have seen cuts to the available funding in recent years. Another challenge with grant funding is that it often does not fund maintenance. This means that the new infrastructure added with grant money adds to the inventory of facilities requiring ongoing maintenance. This additional maintenance burden may be unsustainable. Projects that are proposed through grant funding should include identification of maintenance funding for the life of the facility.

6.4. Partnership Opportunities and Case Study

This section seeks to introduce opportunities to bring additional resources to the road owners. In many cases, bikeway designation is proposed by proponent groups that represent businesses and organizations that wish to use designation of the bikeway as an economic development tool. Bicycle tourism is a large and rapidly growing industry that can bring significant economic growth to an area. The development of a scenic bikeway presents an opportunity for proponents and road owners to work together to develop and maintain the bikeway as an asset to the local economy. The example described below describes one non-profit “friends” group that is raising funds to plow a Forest Service road enabling access to winter recreation. This example could serve as a model for other road owners to help maintain scenic bikeways.

Case Study: Hyalite Canyon Winter Plowing, Custer Gallatin National Forest

Hyalite Canyon located in the Custer Gallatin National Forest in southwest Montana has become a winter destination for ice climbing, backcountry and Nordic skiing, ice fishing, sledding, and camping. Prior to 2008, winter access was severely limited because the access road was not plowed. A change in the Forest Travel plan in 2006 and a partnership between the non-profit Friends of Hyalite (FOH) (www.hyalite.org), the Custer Gallatin National Forest, and Gallatin County changed that. Through a cost sharing agreement, Gallatin County uses their equipment and staff to plow the road from mid-November through March 31st each year. FOH, Gallatin County and the Forest split the cost of the plowing which provides better and safer access to winter recreation opportunities on the forest for residents and visitors. Plowed access to ice climbing in Hyalite Canyon has a positive impact on the economy in Gallatin County. For the winter of 2017/18 the cost to provide the plowing was \$21, 649 (19 days of plowing and 183.5 hours of work). Gallatin County contributed 40% of the cost, USDA FS contributed 9%, FOH contributed 35%, and a grant written by FOH contributed the remaining 16%. The Forest Service used Outfitter and Guide fees to pay for their portion. (Friends of Hyalite, 2018)

“Plowing Hyalite Road is a great asset for this community. It provides access to fantastic winter recreation areas and provides families an opportunity to enjoy this beautiful landscape during the winter months,” said Lisa Stoeffler, Bozeman District Ranger. “The agreement to plow the road so we could leave it open during the winter months was made with this community, Gallatin County, and Friends of Hyalite.” (Custer Gallatin Forest, 2014)

FOH was founded in part to ensure that there would be funding to allow this partnership to work. The goal of the organization is to build a wide base of support from all users, and Friends of Hyalite has a much broader mission than plowing, which includes cleanup and restoration. “If the road is going to be open and people are going to be up there, we have to help take care of it,” explains Friends of Hyalite founder Joe Josephson. “With increased access comes increased responsibility.” (Outside Bozeman, 2017). Gallatin County pitches in up to \$12,000 each year for Hyalite plowing, said Erin Howard, office manager at the Gallatin County Road and Bridge Department. (Schattauer, 2014)

While plowing is an operations activity, this is a successful example of advocate and municipal funding being used to help the USDA FS provide enhanced service based on desired use. This idea could be considered for maintenance activities such as brushing, sweeping, pothole repair, or sign replacement.

Road owners and bikeway proponents can explore partnership models with public and private entities to provide funding or labor to enhance maintenance activities, accomplish safety improvements and/or assist with education campaigns. Many businesses, organizations, and individuals benefit or profit from their proximity to National Forests and to scenic bikeways. A partnership case study for alternative transportation systems near Moab, Utah provides insights into a successful model:

http://www.fedlandsinstitute.org/Documents/RepositoryDocuments/Moab_Case_Final.pdf

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Resource List

Adventure Cycling Association

Best Practices for rumble strips <https://www.adventurecycling.org/bicycle-tourism/national-advocacy-projects/rumble-strips/>

Bikeway Implementation Resources <https://www.adventurecycling.org/routes-and-maps/us-bicycle-route-system/implementation-resources/>

Route Evaluation Methods <https://www.adventurecycling.org/routes-and-maps/us-bicycle-route-system/implementation-resources/>

Federal Highway Administration

Bicycle Road Safety Audit Guidelines and Prompt Lists
http://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa12018/

Local and Rural Road Safety Program webpage
https://safety.fhwa.dot.gov/local_rural/training/

Manual on Uniform Traffic Control Devices
https://mutcd.fhwa.dot.gov/hm/2009/html_index.htm

Proven Safety Countermeasures webpage
https://safety.fhwa.dot.gov/provencountermeasures/enhanced_delineation/

Rumble Strip Website
https://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/bike_fs/

Small Town and Rural Multimodal Networks
https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf

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Liability Aspects of Bikeway Designation, John W. English, 1986
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National Highway Traffic Safety Administration's (NHTSA) Counter Measures that Work

<https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/812202-countermeasuresthatwork8th.pdf>

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Oregon State Parks Scenic Bikeways website

https://oregonstateparks.org/index.cfm?do=thingstodo.dsp_scenicBikeways

Oregon Parks and Recreation Department Scenic Bikeways Information

<https://www.oregon.gov/oprd/BIKE/Pages/info.aspx>

Designation Handbook for Oregon Recreation Trails: Oregon Scenic Bikeways

<https://www.oregon.gov/oprd/BIKE/docs/BikewayHandbook.pdf>

Oregon Department of Transportation Bicycle and Pedestrian Design Guide

https://www.oregon.gov/ODOT/Engineering/Documents_RoadwayEng/HDM_L-Bike-Ped-Guide.pdf

Oregon DOT Highway Design Manual – Chapter 13: Pedestrian and Bicycle

https://www.oregon.gov/ODOT/Engineering/Documents_RoadwayEng/HDM_13-Ped-Bicycle.pdf

Travel Oregon website

<https://traveloregon.com/things-to-do/outdoor-recreation/bicycling/road-biking/ride-oregon-scenic-bikeways/>

Wisconsin Rural Bicycle Planning Guide

<https://wisconsindot.gov/Documents/projects/multimodal/bike/rural-guide.pdf>

Appendix A. Example Bikeway Application Letter of Support



Oregon
Theodore R. Kulongoski, Governor

Department of Transportation
District 13
3014 Island Avenue
La Grande, OR 97850
(541) 963-8406
FAX (541) 963-0249

January 11, 2010

Alex Phillips
Bicycle Recreation Coordinator
Oregon Parks and Recreation Department
725 Summer St. NE
Salem, OR 97301

Dear Alex:

The Oregon Department of Transportation has jurisdiction over State Highways OR82 and OR86. These highways traverse some of the most scenic areas of the state and are a part of the Hells Canyon National Scenic Byway, which was designated an All American Road in 2000. These highways are part of a route that is being proposed for incorporation into the Oregon Scenic Bikeway system. The local proponent is the Hells Canyon Scenic Byway Committee.

ODOT has discussed the proposal with Alice Trindle, Hell Canyon Scenic Byway Committee Coordinator, and would like to express our general support of this proposed Scenic Bikeway. One portion of the proposed route, the section on OR86 through the Powder River Canyon, raises some safety concerns due to narrow pavement width, the horizontal alignment, and recreational vehicle traffic during the peak biking season. However, the majority of the route is very suitable for bicycle travel.

Should this route be chosen we will continue to offer support and/or input to the local proponent in the development of the Scenic Bikeway Management Plan.

Should you have any questions for the ODOT, please contact me at (541) 963-8406.

Sincerely,

A handwritten signature in black ink, appearing to read "Mike Buchanan".

Mike Buchanan, PLS
ODOT District 13 Manager

Cc: file

Appendix B. Wisconsin Rural Road Bicycle Evaluation Guidance

The following sections are copied directly from Appendix A of the Wisconsin Rural Bicycle Planning Guide (April, 2006), which can be found at:

<http://wisconsindot.gov/Documents/projects/multimodal/bike/rural-guide.pdf>

ROAD EVALUATION METHOD

The following evaluation method is based on the needs of the casual cyclist, typically age 16 or older with a drivers license. This method of evaluating rural roadways for shared bicycle/motor vehicle use is similar to that developed for the Wisconsin Bicycle Map. The basis for this methodology is the concept that no rural road exists which is not capable of accommodating one bicycle and one motor vehicle occupying the same lateral road section at the same time. A conflict arises, however, when a bicycle, an oncoming, and an overtaking motor vehicle arrive at the same lateral section at the same time. It is possible that paved shoulders will add sufficient width to allow a safe pass for all three vehicles without much variation of speed or deviation from lane of travel.

Of course, any safe passing encounter by any number or type of vehicles is dependent on the prudent judgment and behavior of all involved. At the same time, bicyclists are the most vulnerable of the vehicle operators and will be reluctant to use roadways with a high incidence of three vehicle passing conflicts. In addition, youth bicyclists may lack the skills and physiological development to deal with such situations. Where adequate paved shoulder width does not exist, it is in the best interests of bicyclists to select roads for a route system where the random occurrence of triple passes is minimal.

The incidence of triple pass occurrences can be calculated mathematically by using a road section's average daily traffic (ADT) (*See definitions at the end of this appendix item*). Interestingly, as the ADT increases the incidence of triple passes progresses geometrically. This means that a road section with 5,000 ADT will have 100 times as many triple passes as a road with 500 ADT. This fact clearly favors the use of lightly traveled road sections for shared bicycle/motor vehicle use where adequate paved shoulder width does not exist.

The introduction of truck traffic into the mix creates even more stressful and potentially dangerous triple pass situations. The incidence of these occurrences can also be calculated based on the percent of the ADT which is truck traffic. Triples pass situations where a truck, a car, and a bicycle will be more common than triple passes with two trucks and a bicycle, but at very low ADT counts and at very low truck traffic percentages the potential occurrences are not significant. Wider roads tend to have higher ADT counts and higher percentages of truck traffic. Even when paved shoulders exist, the wind blast from passing trucks cause bike handling problems for youth and casual bicyclists.

Other road section characteristics also have an impact on their suitability for shared use. Seasonal and day-of-week peaking will always produce variations in ADT. This is because seasonal and daily auto volumes are often highest at the same time that bicycle travel is the highest, especially in tourism areas. Overall, autos counts could vary from around 10 percent to over 50 percent. A lack of shoulder width has the effect of narrowing the road section due to the tendency of bicycle riders to ride more towards the center of the pavement.

Hills and curves generally have negative effects on the suitability of roadways for cyclists. To degree to which these conditions have negative impacts can be measured by the percentage of solid yellow line (no passing because of restricted sight lines caused by the hill and/or curve. High percentages tend to be associated with a negative effect on a road section's suitability for shared use. However, in some situations, usually on narrow twisty roads, it has often the effect of lowering the traffic speed, moderating its impact somewhat and often reducing the incidence of triple pass occurrences.

ROAD SECTION EVALUATION

1. The first step in the evaluation process is to identify the **ADT**. The ADT thresholds developed for determining the bicycling condition of a particular road segment have been adjusted to take into consideration an increase in seasonal and weekend traffic. Roads in the following counties may need further ADT adjustments to account for additional tourist traffic:

- Adams, Bayfield, Burnett, Door, Forest, Green Lake, Lincoln, Oneida, Polk, Sauk, Sawyer, Vilas, and Washburn

To account for the increase in tourist traffic, multiply the ADT by 1.224. The result will be the ADT you want to use during the evaluation process.

2. Once you have your ADT, identify the percent of the segment that has a **SOLID YELLOW LINE**. The more solid yellow line on a road segment, the less suitable the road is for cycling due to curves and hills that limit sight lines. An adjustment to the ADT will be made based on the percent of the yellow line that is solid.

3. Identify the percent of the ADT that is **TRUCK TRAFFIC**. If the data is not available, assume 10% of the traffic is trucks.

4. The final piece of data you will need is the road section's **PAVEMENT WIDTH**. If the road section has paved shoulder(s), add the paved shoulder width(s) to the overall pavement width. For example, a 24-foot wide segment of road with a pair of 3 foot paved shoulders would have a total paved width of 30 feet.

Once you have identified the data for those 4 categories, the bicycling condition of a particular road segment can be determined using the following tables, broken down by the adjusted pavement width (including paved shoulders). It is still possible to rate roadway conditions for bicycling while knowing just *ADT* and *pavement width* by using default values or estimates for *percent yellow line* and *percent truck traffic*.

UP TO 22 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 359 is considered good for cycling. Any road section with an ADT greater than 1540 is not desirable for cycling.

If the ADT falls between 359 and 1540, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	- 100
21 - 40%	- 25
41 - 60%	- 25
61 - 80%	+ 100
81 % or more	+ 400

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 10%	GOOD	< 1050 <	MODERATE	< 1440 <	POOR
11%		< 1000 <		< 1380 <	
12%		< 970 <		< 1330 <	
13%		< 930 <		< 1280 <	
14%		< 860 <		< 1190 <	
15%		< 759 <		< 1043 <	

23 TO 24 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT greater than 1860 is not desirable for cycling.

If the ADT falls below 1860, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	0
21 - 40%	+ 100
41 - 60%	+ 200
61 - 80%	+ 400
81 % or more	+ 800

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 9%	GOOD	< 1350 <	MODERATE	< 1860 <	POOR
10%		< 1215 <		< 1670 <	
11%		< 1105 <		< 1515 <	
12%		< 1015 <		< 1395 <	
13%		< 930 <		< 1280 <	
14%		< 870 <		< 1195 <	
15%		< 805 <		< 1110 <	

25 TO 26 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT greater than 2890 is not desirable for cycling.

If the ADT falls below 2890, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	0
21 - 40%	+ 100
41 - 60%	+ 200
61 - 80%	+ 400
81 % or more	+ 800

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
5%	GOOD	< 2105 <	MODERATE	< 2890 <	POOR
6%		< 1930 <		< 2655 <	
7%		< 1800 <		< 2475 <	
8%		< 1690 <		< 2325 <	
9%		< 1560 <		< 2145 <	
10%		< 1400 <		< 1925 <	
11%		< 1275 <		< 1755 <	
12%		< 1165 <		< 1600 <	
13%		< 1075 <		< 1480 <	
14%		< 1000 <		< 1375 <	
15%		< 940 <		< 1290 <	

27 TO 28 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 345 is considered good for cycling. Any road section with an ADT greater than 3630 is not desirable for cycling.

If the ADT falls between 345 and 3630, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	0
21 - 40%	+ 100
41 - 60%	+ 200
61 - 80%	+ 400
81 % or more	+ 800

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
5%	GOOD	< 2640 <	MODERATE	< 3630 <	POOR
6%		< 2380 <		< 3270 <	
7%		< 2180 <		< 2995 <	
8%		< 1910 <		< 2625 <	
9%		< 1805 <		< 2485 <	
10%		< 1715 <		< 2360 <	
11%		< 1560 <		< 2145 <	
12%		< 1435 <		< 1970 <	
13%		< 1325 <		< 1820 <	
14%		< 1225 <		< 1690 <	
15%		< 1145 <		< 1575 <	

29 TO 30 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 1490 is considered good for cycling. Any road section with an ADT greater than 4740 is not desirable for cycling.

If the ADT falls between 1490 and 4740, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	0
21 - 40%	+ 100
41 - 60%	+ 200
61 - 80%	+ 400
81 % or more	+ 800

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 9%	GOOD	< 3450 <	MODERATE	< 4740 <	POOR
10%		< 3435 <		< 4720 <	
11%		< 3125 <		< 4295 <	
12%		< 2860 <		< 3935 <	
13%		< 2640 <		< 3630 <	
14%		< 2455 <		< 3375 <	
15%		< 2290 <		< 3150 <	

31 TO 32 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 2160 is considered good for cycling. Any road section with an ADT greater than 6035 is not desirable for cycling.

If the ADT falls between 2160 and 6035, make an adjustment based on the percent yellow line, and use the second table to determine the rating. A fourth rating, "High Volume, but Wide Shoulders," is used for road sections with widths of 31 feet or greater. This provides some flexibility for road sections that would not be recommended for bicycles due to higher ADTs, but have wider than 3 foot paved shoulders that provide additional safety.

%Yellow Line	ADT Adjustment
0 - 20%	0
21 - 40%	+ 100
41 - 60%	+ 200
61 - 80%	+ 400
81 % or more	+ 800

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 12%	GOOD	< 3450 <	MODERATE	< 4740 <	HIGH VOLUME BUT WIDE SHOULDERS	< 6035 <	POOR
13%		< 3310 <		< 4550 <		< 5860 <	
14%		< 3165 <		< 4350 <		< 5680 <	
15%		< 2960 <		< 4070 <		< 5420 <	

33 FOOT OR GREATER ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 2745 is considered good for cycling. Any road section with an ADT greater than 7325 is not desirable for cycling.

If the ADT falls between 2745 and 7325, make an adjustment based on the percent yellow line, and use the second table to determine the rating. A fourth rating, "High Volume, but Wide Shoulders," is used for road sections with widths of 31 feet or greater. This provides some flexibility for road sections that would not be recommended for bicycles due to higher ADTs, but have wider than 3 foot paved shoulders that provide additional safety.

%Yellow Line	ADT Adjustment
0 - 20%	0
21 - 40%	+ 100
41 - 60%	+ 200
61 - 80%	+ 400
81 % or more	+ 800

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 12%	GOOD	< 4035 <	MODERATE	< 5545 <	HIGH VOLUME BUT WIDE SHOULDERS	< 7325 <	POOR
13%		< 3895 <		< 5355 <		< 7155 <	
14%		< 3750 <		< 5160 <		< 6975 <	
15%		< 3545 <		< 4875 <		< 6715 <	

DEFINITIONS

ADT (Average Daily Traffic) represents the latest measure of annual average daily motor vehicle volume. The annual WisDOT book, *“Highway Traffic Volume Data”* offers a quick but not detailed reference for this data category.

PAVEMENT WIDTH is the total pavement width of the travel lanes and does include paved shoulder width.

PERCENT TRUCK ADT is the percentage of the ADT that is truck traffic (three or more axles). The PERCENT TRUCK ADT is one of the biggest factors affecting a road's suitability for bicycling. Identify generators of truck traffic such as industrial parks, factories, warehouses, areas with logging activity, and quarries that may exist along a road section. Again, local planning agencies and university extension offices are good sources for information on current and future examples. Assume that county roads with 22 foot or wider pavement widths, which connect two state roads with significant truck volumes, also have significant truck traffic. Once identified, field checking is necessary to obtain more exact figures on truck traffic.

PERCENT YELLOW LINE, actually percent solid line, indicates how much of the road section is not available for passing. The PERCENT YELLOW LINE can be roughly estimated from examining United States Geological Survey (USGS) topographical maps in the 1:100,000 to 1:24,000 scale. Road sections which vary greatly in horizontal alignment (twisty) are likely to have high percentages of yellow line as are sections which vary greatly in vertical alignment (hilly). Field checking is necessary to obtain exact figures. On narrower width local roads it is uncommon to have center lines. In this case it may be necessary to estimate the PERCENT YELLOW LINE by comparing the local road's character with that of a road where the PERCENT YELLOW LINE is known.