Chapter 1520  Roadway Bicycle Facilities

1520.01 General
The Washington State Department of Transportation (WSDOT) encourages bicycle use on its facilities. Bicycle facilities (bike lanes and shared roadways), or improvements for bicycle transportation, are included in the project development and highway programming processes.

This chapter is a guide for designing bicycle facilities within state highway right of way or between the curb lines on city streets designated as state highways when the design matrices (see Chapter 1100) indicate full design level for bicycle and pedestrian design elements. Bike lanes and shared roadways are presented.

When designing facilities outside of state highway right of way or beyond the curb on city streets designated as state highways, use the latest edition of AASHTO’s Guide for the Development of Bicycle Facilities.

These guidelines apply to normal situations encountered during project development. Unique design problems are resolved on a project-by-project basis using guidance from the region’s Bicycle Coordinator or bicycle and pedestrian expert.

1520.02 References

(1) Federal/State Laws and Codes

Americans with Disabilities Act of 1990 (ADA)


Revised Code of Washington (RCW), Chapter 35.75, Streets – Bicycles – Paths

http://apps.leg.wa.gov/rcw/default.aspx?cite=35.75

RCW 46.04, Definitions


RCW 46.61, Rules of the road

http://apps.leg.wa.gov/rcw/default.aspx?cite=46.61
RCW 46.61.710, Mopeds, electric-assisted bicycles – General requirements and operation
http://apps.leg.wa.gov/rcw/default.aspx?cite=46.61.710

RCW 47.26.300, Bicycle routes – Legislative declaration

(2) Design Guidance

Manual on Uniform Traffic Control Devices for Streets and Highways, USDOT, FHWA; as adopted and modified by Chapter 468-95 WAC “Manual on uniform traffic control devices for streets and highways” (MUTCD)
www.wsdot.wa.gov/publications/manuals/mutcd.htm

Selecting Roadway Design Treatments to Accommodate Bicycles, USDOT, Federal Highway Administration (FHWA), 1994

Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans), M 21-01, WSDOT
www.wsdot.wa.gov/publications/manuals/m21-01.htm

Understanding Flexibility in Transportation Design – Washington, WSDOT, 2005
www.wsdot.wa.gov/research/reports/600/638.1.htm

(3) Supporting Information

A Policy on Geometric Design of Highways and Streets (Green Book), AASHTO, 2004


1520.03 Definitions

bicycle Any device propelled solely by human power upon which a person or persons may ride, having two tandem wheels, either of which is 16 inches or more in diameter, or three wheels, any one of which is more than 20 inches in diameter.

bicycle route A system of facilities that are used or have a high potential for use by bicyclists or that are designated as such by the jurisdiction having the authority. A series of bicycle facilities may be combined to establish a continuous route and may consist of any or all types of bicycle facilities.

bike lane A portion of a highway or street identified by signs and pavement markings as reserved for bicycle use.

shared roadway A roadway that is open to both bicycle and motor vehicle travel. This may be a new or existing roadway/highway, a street with wide curb lanes, or a road with paved shoulders.

signed shared roadway A shared roadway that has been designated by signing as a route for bicycle use.

shared-use path See Chapter 1515.

wye (Y) connection An intersecting one-way roadway, intersecting at an angle less than 60°, in the general form of a “Y.”
1520.04 Facility Selection

(1) Facility Location

Provide bicycle facilities on routes that have been identified as local, state, or regional significant bike routes. Fill gaps in the existing network of bicycle facilities when the opportunity is available. For other roadways, provide full design level shoulders for bicycle needs unless:

- Bicyclists are prohibited by law from using the facility.
- The cost is excessively disproportionate to the need or probable use.
- Other factors indicate there is no need.

Refer to Understanding Flexibility in Transportation Design – Washington for further information.

(2) Selection of the Type of Facility

Selection of the facility type includes consideration of community needs and safe, efficient bicycle travel. Exhibit 1520-1 provides a generalized method of assessing the type of bicycle facility needed.

<table>
<thead>
<tr>
<th>Roadway Classification, Land Use, Speed, and ADT</th>
<th>Facility Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural and suburban highways and streets (less than four dwelling units per acre), speeds above 25 mph, and ADT above 2,000.</td>
<td>Full design level shoulder (see Chapter 1140) on both sides (4 ft minimum width), or shared-use path (see Chapter 1515).</td>
</tr>
<tr>
<td>Major arterial in residential area, school zones, or streets in commercial or industrial areas.</td>
<td>Bike lanes on both sides (see 1520.07), or shared-use path (see Chapter 1515).</td>
</tr>
<tr>
<td>Local street in residential area where speed is 25 mph or below, or ADT is 2,000 or less. Rural highways and streets where passing sight distance is available and speed is 25 mph or below, or ADT is 2,000 or less. Collector or minor arterial where speed is 25 mph or below, or ADT is 2,000 or less.</td>
<td>Shared roadway.</td>
</tr>
</tbody>
</table>

Bike Facility Selection

Exhibit 1520-1

An important consideration is route continuity. Change facility types at logical locations. For additional information, see Understanding Flexibility in Transportation Design – Washington.
1520.05 Project Requirements

For urban bicycle mobility Improvement projects (see Bike/Ped connectivity projects in the matrices, Chapter 1100), apply the guidance in this chapter to the bicycle facility.

For highway design elements affected by the project, apply the appropriate design level from the matrices (see Chapter 1100) and as found in the applicable chapters.

For highway design elements not affected by the project, no action is required.

1520.06 Shared-Use Path Design

Shared-use paths are facilities physically separated from motorized vehicular traffic within the highway right of way or on an exclusive right of way with minimal crossflow by motor vehicles. Primarily used by pedestrians and bicyclists, shared-use paths are also used by joggers, skaters, wheelchair users (both nonmotorized and motorized), equestrians, and other nonmotorized users. Chapter 1515 provides design guidance for shared-use paths.

1520.07 Shared Roadway Bicycle Facility Design

Generally, lower-speed/lower-volume streets can provide for bicycle travel without additional signing and pavement markings for bicycles (see Exhibit 1520-2).

The region Traffic Engineer is responsible for determining which sections of state highways are inappropriate for bicycle traffic. The State Traffic Engineer, after consultation with the Bicycle Advisory Committee, prohibits bicycling on sections of state highways through the traffic regulation process. Contact the region Traffic Office for further information.
Bicyclists traveling between cities or on recreational trips may use many rural highways. Providing and maintaining paved shoulders, with or without an edge stripe, can significantly improve convenience for bicyclists and motorists along such routes.

A shared roadway bike route with improvements for bicycles can offer a greater degree of service to bicyclists than other roadways. Improvements on shared roadways to facilitate better bicycle travel include widening the shoulders to full design level width (a minimum of 4 feet), adding pavement markings, improving roadside maintenance (including periodic sweeping), and removing surface obstacles such as drain grates that are not compatible with bicycle tires.

Where public transport and cycling facilities meet, an integrated design that does not inconvenience either mode is desirable. When buses and bicyclists share the same roadway, consider the following:

- Where bus speeds and volumes are high, separate facilities for buses and bicyclists are desirable.
- Where bus speeds and volumes are low, consider a shared-use bus/bicycle lane.

Consider providing bicycle parking facilities near public transportation stops.

**1520.08 Signed Shared Bicycle Roadway Design**

Signed shared roadways are shared roadways that have been identified as preferred bike routes by the posting of “Bike Route” signs (see Exhibit 1520-3). They provide connections for continuity to other bicycle facilities and designate preferred routes through high-bicycle-demand corridors. Signing shared roadways as bike routes indicates to bicyclists that there are advantages to using these bike routes as compared with alternative routes. (Signing also alerts motorists that bicycles are present.) Provide improvements to make these routes suitable as bike routes, and maintain them in a manner consistent with the needs of bicyclists.
Use the following criteria to aid in determining whether to designate and sign a bike route:

- The route offers a higher degree of service than alternative streets.
- The route provides for through and direct travel in bicycle corridors.
- The route connects bicycle facilities.
- Traffic control devices have been adjusted to accommodate bicyclists.
- Street parking is prohibited where lane width is critical.
- Surface obstacles to bicyclists have been addressed.
- Maintenance of the route, such as more frequent street sweeping and repair, is at a higher level than comparable streets.

Establish a signed shared roadway bike route by placing MUTCD Bicycle Route signs or markers along the roadways. When the signed shared roadway designates an alternate route, consider destination signing.

1520.09 Bicycle Lane Design

Bicycle lanes are established along streets in corridors where there is current or anticipated bicycle demand and where it is desirable for bikes to be better separated from motor vehicle lanes. Provide bike lanes where it is desirable to delineate available road space for preferential use by bicyclists (see Exhibit 1520-4). Consider bike lanes in and around schools, parks, libraries, and other locations where young cyclists are present.

Bicycle lanes delineate the rights of way assigned to bicyclists and motorists and provide for movements that are more predictable by each. Bike lanes can be provided on existing roadways by reducing the number or width of lanes or prohibiting parking. Design considerations include the impacts to motor vehicle traffic and the loss of parking for nearby land uses.

![Bike Lane](Exhibit 1520-4)
Where street improvements are not possible, improve the bicyclist’s environment by providing shoulder-sweeping programs and special signal facilities.

(1) Widths

The minimum width for a bike lane is 4 feet. Some typical bike lane configurations are illustrated in Exhibit 1520-5 and described below:

• **Design A** depicts bike lanes on an urban-type curbed street where parking stalls (or continuous parking stripes) are marked. Locate bike lanes between the parking area and the traffic lanes. Minimum widths are shown. When the combined width of the bike lane and the parking lane is less than 15 feet, an increased probability of bicycle/car door collisions exists. When wider widths are not available, consider eliminating bike lane marking and signing.

Do not place bike lanes between the parking area and the curb. Such facilities increase the potential conflicts for bicyclists, such as the opening of car doors and poor visibility at intersections. Also, they restrict bicyclists leaving the bike lane to turn left and they cannot be effectively maintained.

• **Design B** depicts bike lanes on an urban-type curbed street where parking is permitted without pavement markings between the bike lane and the parking lane. Establish bike lanes in conjunction with the parking areas. 12 feet (15 feet desirable) is the minimum total width of the bike lane and parking lane. This design is satisfactory where parking is not extensive and where the turnover of parked cars is infrequent. However, an additional width of 1 to 2 feet is desirable if parking is substantial or the turnover of parked cars is high. Delineated parking lanes are desirable.

• **Design C** depicts bike lanes along the outer portions of a roadway, with and without curb, where parking is prohibited. This configuration eliminates potential conflicts (such as the opening of car doors) with motor vehicle parking. Minimum widths are shown. With curb, guardrail, or barrier, the minimum bike lane width is 5 feet. When a gutter is present, the width may need to be increased to provide a minimum width of 3 feet from the edge of the gutter. Additional width is desirable, particularly where motor vehicle operating speeds exceed 40 mph.

Increase shoulder widths to accommodate bicycle traffic when truck, bus, or recreational vehicle traffic makes up 5% or more of the daily traffic.

Bike lanes are not advisable on long, steep downgrades where bicycle speeds greater than 30 mph can be expected. As grades increase, downhill bicycle speeds increase, which increases the handling difficulty if bicyclists are riding near the edge of the roadway. In such situations, bicycle speeds can approach those of motor vehicles, and experienced bicyclists will generally move into the motor vehicle lanes to increase sight distance and maneuverability. However, less experienced bicyclists may not choose this position. When steep downgrades are unavoidable, provide full design-level shoulder width and signing in accordance with the **MUTCD** to alert bicyclists of the grade and the need to control their speeds.

Bike lanes are usually placed on the right side of one-way streets. Consider placing the bike lane on the left side when it produces fewer conflicting movements between bicycles and motor vehicles.
Design A: Marked Parking

- Parking stalls or optional line
- Bike lane line

Motor vehicle lanes

Parking 5' min
Bike Lane

Design B: Parking Permitted Without Parking Line or Stall

- Bike lane line

Motor vehicle lanes

12' min

Bike lane

Design C: Parking Prohibited

- Post NO PARKING signs as required.

Notes:
[1] The optional line between the bike lane and the parking lane might be advisable where stalls are not needed (because parking is light), but there is concern that motorists might misconstrue the bike lane to be a traffic lane. (See the MUTCD and the Standard Plans for pavement marking.)
[2] For parking lane width, see Chapter 1140. Consider a combined bike lane/parking lane width of 15 ft to reduce the risk of bicycle/car door collisions.
[3] 6 ft is the minimum width when parking lane is less than 10 ft.
[4] 13–14 ft width is desirable where there is substantial parking or the turnover of parked cars is high. Consider a width of 15 ft to reduce the risk of bicycle/car door collisions.
(2) **Intersection Design**

Design bike lanes at intersections in a manner that minimizes confusion for motorists and bicyclists and permits both users to operate in accordance with the Rules of the Road (RCW 46.61).

**Exhibit 1520-6** illustrates a typical intersection of multilane streets with bike lanes on all approaches. Some common movements of motor vehicles and bicycles are shown.

**Exhibit 1520-7** illustrates options where bike lanes cross a channelized right-turn-only lane. When approaching such intersections, bicyclists merge with right-turning motorists. Since bicyclists are typically traveling at speeds lower than motorists, they can signal and merge where there is a sufficient gap in right-turning traffic, rather than at any predetermined location. For this reason, it is most effective to end bike lane markings at the approach of the right-turn lane or to extend a single dotted bike lane line across the right-turn lane.

- Parallel lines (delineating a bike lane crossing) to channelize the bike merge are undesirable, as they encourage bicyclists to cross at predetermined locations. In addition, some motorists might assume they have the right of way and neglect to yield to bicyclists continuing straight.
- A dotted line across the right-turn-only lane is undesirable where there are double right-turn-only lanes. For these types of intersections, drop all pavement markings to permit judgment by the bicyclists to prevail.

For signing and pavement marking, see the MUTCD and the *Standard Plans*.

Exhibits 1520-8a and 8b illustrate two design options where bike lanes cross off- and on-ramps or wye connections. Option 1 provides a defined crossing point for bicyclists who want to stay on their original course. This option is desirable where bicyclists do not have a good view of traffic. Use Option 2 where bicyclists normally have a good view of traffic entering or exiting the roadway and will adjust their path to cross-ramp traffic. A bike-crossing sign to warn motorists of the possibility of bicyclists crossing the roadway is desirable.

(3) **Traffic Signals**

At signalized intersections, consider bicycle traffic needs and intersection geometry when timing the traffic signal cycle and when selecting the method of detecting the presence of the bicyclist. Contact the region’s Bicycle Coordinator for assistance in determining the timing criteria. In addition to push button actuators, consider the installation of effective loop detectors or other methods of detecting a bicycle within the bike lane (in advance of the intersection) and turn lanes. Select loop detectors sensitive enough to detect bicycles. Bicyclists generally choose not to go out of their way to use push button actuators. For additional guidance on signal design, see Chapter 1330.

(4) **Signing and Pavement Markings**

Use the MUTCD and the *Standard Plans* for signing and pavement marking criteria. (See Chapter 1020 for additional information on signing and Chapter 1030 for information on pavement markings.)
(5) **Drainage Grates and Manhole Covers**

Locate drainage inlet grates and manhole covers to avoid bike lanes. When drainage grates or manhole covers are located in a bike lane, minimize the effect on bicyclists. A minimum of 3 feet of lateral clearance is needed between the edge of a drainage inlet grate and the shoulder stripe. Install and maintain grates and manhole covers level with the surface of the bike lane.

Provide drainage inlet grates on bicycle facilities that have openings narrow enough and short enough that bicycle tires will not drop into the grates. Replace existing grates that are not bicycle-safe with grates designed for bicycles: a WSDOT vaned grate, herringbone grate, or other grate with an opening perpendicular to the direction of travel, 4 inches or less center to center.

(6) **At-Grade Railroad Crossings**

Whenever a bike lane crosses railroad tracks, continue the crossing at least as wide as the bike lane. Use special construction and materials to keep the flangeway depth and width to a minimum. Wherever possible, design the crossing at right angles to the rails (see Exhibit 1520-9). Where a skew is unavoidable, widen the shoulder, or bike lane, to permit bicyclists to cross at right angles (see Exhibit 1520-9).

(7) **Barrier and Rail**

When the edge of the bike lane is within 5 feet of a barrier or railing, provide a barrier height a minimum of 42 inches to reduce the potential for bicyclists to fall over the barrier (see Exhibit 1520-10).

On structures, the bridge railing type and height are part of the structure design. Contact the Headquarters (HQ) Bridge and Structures Office for additional information. (See Chapter 720 for further considerations.)

1520.10 **Documentation**

For the list of documents required to be preserved in the Design Documentation Package and the Project File, see the Design Documentation Checklist:

[www.wsdot.wa.gov/design/projectdev/](http://www.wsdot.wa.gov/design/projectdev/)
Typical Bicycle/Auto Movements at Intersection of Multilane Streets

Exhibit 1520-6
Notes:

[1] If space is available.
[2] Optional dashed line. Undesirable where a long right-turn-only lane or double turn lanes exist.
[3] When optional dashed line is not used, drop all bike lane delineation at this point.
[4] Drop bike lane line where right-turn-only is designated.

Bike Lanes Approaching Motorists’ Right-Turn-Only Lanes

Exhibit 1520-7
Bicycle Crossing of Interchange Ramp

Exhibit 1520-8a
Bicycle Crossing of Interchange Ramp

Exhibit 1520-8b
Notes:
Provide additional width to a maximum total width of 14 ft at railroad crossing to allow bicyclists to choose their own crossing routes.
When pedestrians are provided for, design as a shared-use path (see Chapter 1515).

At-Grade Railroad Crossings
Exhibit 1520-9
Notes:
[1] Height does not apply to bridge rail. On structures, the bridge railing type and height are part of the structure design. (Contact the HQ Bridge and Structures Office for additional information.)

Barrier Adjacent to Bicycle Facilities

Exhibit 1520-10

Bike lane between edge of traveled way and barrier

Bike lane between edge of traveled way and sidewalk