BRIDGE DESIGN

Bridge crossings are significant investments and therefore often occur infrequently. Thus, it is critical that they accommodate pedestrians and bicyclists. A bridge without walking and bicycling access can result in a lengthy detour that makes the entire trip impractical.

Federal law states: "In any case where a highway bridge deck being replaced or rehabilitated with Federal financial participation is located on a highway on which bicycles are permitted to operate at each end of such bridge, and the Secretary determines that the safe accommodation of bicycles can be provided at reasonable cost as part of such replacement or rehabilitation, then such bridge shall be so replaced or rehabilitated as to provide such safe accommodations" (23 USC §217(e)).

Safe pedestrian access can often be included at the same time as bicycle accommodations and should be provided on bridges whenever possible, regardless of funding source. Bridges should also accommodate bicyclists and pedestrians traveling under them so they do not create a barrier. Providing pedestrian and bicycle accommodation during initial construction generally costs less than retrofitting.

While Federal policy, in many cases, requires safe accommodation of pedestrians and bicyclists, design guidance provides adequate flexibility on how to accommodate these users.

KEY POLICY

U.S. DOT recommends transportation agencies and local communities to go beyond minimum design standards and requirements to create safe, attractive, sustainable, accessible, and convenient walking and bicycling networks. Such actions include:

"Integrating bicycle and pedestrian accommodation on new, rehabilitated, and limited-access bridges: DOT encourages bicycle and pedestrian accommodation on bridge projects including facilities on limited-access bridges with connections to streets or paths."

U.S. DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations 2010

OTHER RESOURCES

"Bridges, viaducts, and tunnels should accommodate bicycles… there are numerous examples of limited access highway bridges that cross major barriers (such as wide waterways) that incorporate a shared use path for bicyclists and pedestrians. The absence of a bicycle accommodation on the approach roadway should not prevent the accommodation of bicyclists on the bridge or tunnel."

AASHTO Bike Guide 2012, p. 4-41

"Provisions should always be made to include some type of walking facility as a part of vehicular bridges, underpasses, and tunnels, if the facility is intended to be part of a pedestrian access route."

AASHTO Ped Guide 2004, p. 63

"It is more effective to plan for increased usage than to retrofit an older facility. Planning projects for the long-term should anticipate likely future demand for bicycling and walking facilities and not preclude the provision of future improvements."

U.S. DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations 2010

APPLYING DESIGN FLEXIBILITY

PEDESTRIAN AND BICYCLE ACCOMMODATION

Both sides of bridges should accommodate travel for pedestrians and bicyclists. 1 Where bidirectional travelways can be provided, they may reduce conflicts if they limit the number of roadway crossings. Similarly, facilities for current and anticipated people who will walk and bicycle to the bridge as well as travel under the bridge should be considered. 2 Designers should consider whether to combine pedestrians and bicyclists on a shared use path or to separate them. Refer to the design topic on **Shared Use Paths** for more information.

CONNECTION TO CROSSING FACILITIES

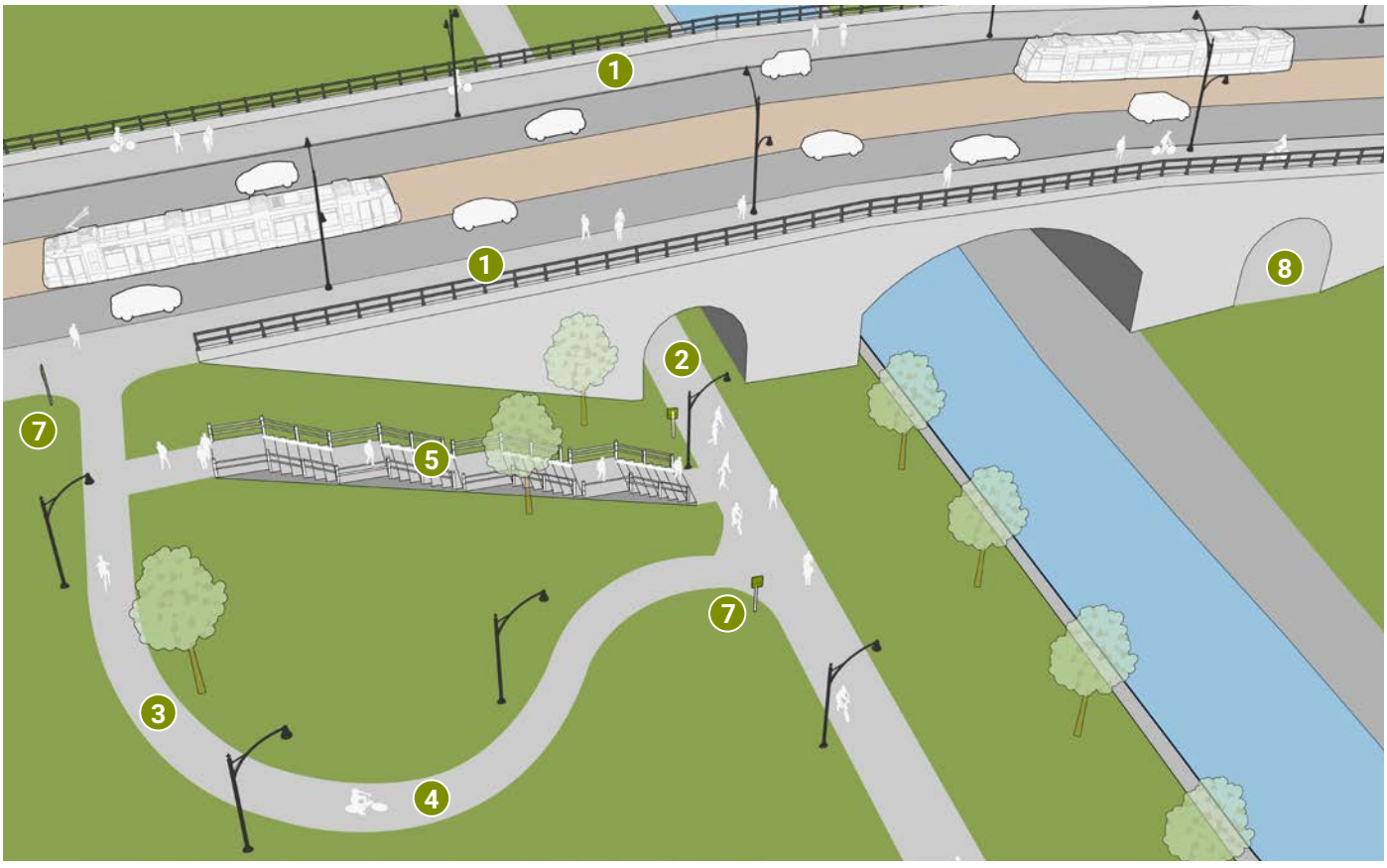
Connections from bicycle and pedestrian facilities on a bridge to related features below, such as shared use paths, sidewalks, or other infrastructure, are a key component of connected networks. Any connection for use by pedestrians must be accessible to people with disabilities. 3 The design should consider the desired route of pedestrians and bicyclists. Common practice is to install switchbacks which may be the only option in a confined space. However, designs without switchbacks often create a more direct route for the majority of users. Grades must meet accessibility standards and ramps may be required. Where bicyclists are permitted to use the connection, the ideal design should not require bicyclists to dismount **(AASHTO Bike Guide 2012, p. 5-14)**. Where switchbacks are required, the ramp turns should provide generous width to better accommodate turns by bicyclists. 4

STAIRS WITH BIKE CHANNELS

Stairs may be built to provide a more direct connection for pedestrians and bicyclists, but the accessible route may not be significantly longer. 5 Stairs can accommodate bicycles by including a bike channel—a flat ramp parallel to the stairs on which to roll a bicycle. 6 Handrail designs must meet current accessibility standards. Specifically, the handrail on stairs with a bike channel needs to project out from the wall with at least the minimum clearance required by the ADA Accessibility Guidelines, and the handrail must be aligned above the stair nosing where people are walking. Pedestrians must be able to easily reach the railing and the bike channel must not present a tripping hazard for people with visual disabilities.

WAYFINDING TO BRIDGE ENTRANCES

Pedestrians and bicyclists may find it difficult to locate bridge access points from the connecting street grid. In some cases, access points for people on foot, in wheelchairs, or on bicycles are different and more difficult to locate than vehicle access points. Wayfinding signs and markings should direct people to bridge access points. 7



DESIGNING FOR FUTURE TRAILS

While including facilities for pedestrians and bicyclists on bridges increases access, the bridge design itself may reduce future connectivity. Waterways, railroads, and highways may be desirable corridors for shared use paths. Whether or not there is a current plan to build a path along one of these corridors, bridge design should consider future accommodations for pedestrians and bicyclists under the bridge. 8

CLEAR WIDTH/USABLE WIDTH

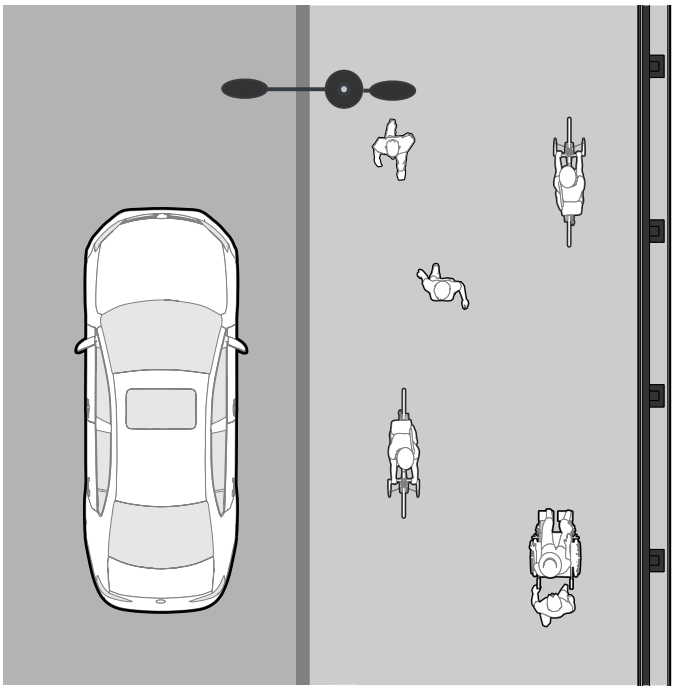
Bridge designs should provide adequate width for current and anticipated pedestrian and bicycle use. Sufficient clear width and usable width should be provided. Clear width 9 is a travelway clear of obstructions such as railings, light poles, signs, etc. **(HCM 2010, p. 17.48)**. The usable width 10 recognizes that pedestrians and bicyclists will not travel at the very edge of a travelway or immediately against a railing, but need at least 1.5 feet of shy distance from vertical objects **(HCM 2010, p. 17.48)**. For more information, refer to the design topic on **Shared Use Paths**.

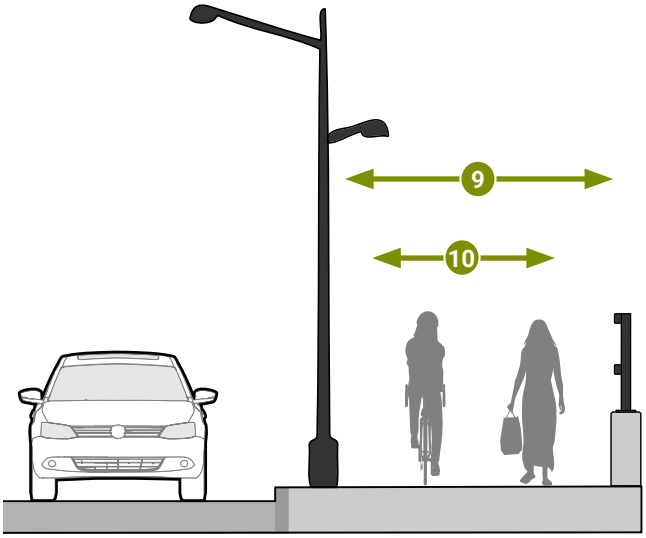
CONSIDERATIONS

- The desirable clear width for a sidewalk on a bridge is 8 feet **(AASHTO Pedestrian Guide 2004, p. 63)**.
- The minimum width for one-way bicycle travel is 4 feet. (See the **AASHTO Bike Guide 2012** for considerations regarding bike lane and shared use path widths.)

BRIDGE RAILINGS

Well-designed bridge railings can contribute to a positive experience on bridges for people who walk or bicycle and can increase safety. Railing designs should consider a 1.5 foot shy distance when determining usable width, and a height that keeps pedestrians and bicyclists safe. As bicyclists have a higher center of gravity, railings should be a minimum of 42 inches high. Where a bicyclist's handlebar or pedal may come into contact with the railing, a smooth wide rub-rail should be installed (**AASHTO Bike Guide 2012, p. 5-27**). On bridges that accommodate both vehicular and pedestrian/bicycle travel, only a crash-tested railing should be installed.





CASE STUDIES

BUILDING TUNNELS FOR FUTURE TRAILS
MINNEAPOLIS, MN

In 2008, the City of Minneapolis, MN completed the reconstruction of the Interstate-35W Bridge crossing the Mississippi River in Minneapolis with careful consideration for future transportation corridors. A large culvert box was constructed under the south end of the bridge to provide a future tunnel connection for pedestrians and bicyclists crossing underneath the interstate. The trail did not exist at the completion of the new bridge and tunnel, as funding for the trail remained unidentified.

The culvert tunnel remained closed for six years, and opened in 2014 as part of the Bluff Street bicycle and pedestrian trail, which provides an important connection between downtown Minneapolis and the University of Minnesota.

Source: John Weeks (large photo)

BRIDGE ACCOMMODATION AND WIDTHS
PORTLAND, OR

In 2015, TriMet completed the Tilikum Crossing Bridge as part of a new light rail alignment in Portland, OR. The Tilikum Crossing is the first major bridge in the U.S. designed for transit vehicles (light rail and buses), pedestrians, and bicyclists but not cars, trucks, or motorcycles. The bridge has two 14-foot pedestrian and bicycle pathways on each side: each with more than 7 feet dedicated to one-way bicycle travel and 6 feet for two-way pedestrian travel. By completing key bicycle and pedestrian connections and expanding the City's bicycle and pedestrian network, the bridge's facilities helped build good will and excitement for the project in the community.

BRIDGE APPROACH RAMPS
WEST PALM BEACH, FL

In 2003, the City of West Palm Beach, FL reconstructed the Royal Park Bridge connecting West Palm Beach with Palm Beach, FL. The design included a pedestrian and bicycle "interchange" on the West Palm Beach side. The interchange features a new pathway under the bridge that connects to the bridge via a ramp and staircase, which allows bicyclists and pedestrians to comfortably travel from the trail to the bridge without conflicts with motorists. The ramp and stair connection is accessible, well lit, and landscaped. The new trail under the bridge includes a 10-foot wide section for bicyclists and a 10-foot wide section for pedestrians with a 4-foot wide textured separator.