JENNIFER GALLAGHER
Director

THE CITY OF
COLUMBUS
ANDREW J. GINTHER, MAYOR

DEPARTMENT OF
PUBLIC SERVICE

DESIGN MEMO 6.02

To: Designers, Contractors, and City Departments

Date: January 10, 2023

Subject: Shared Use Paths

Category: Pedestrian and Bicycle Facilities

Table of Contents

1 Purpose

This design memo provides guidance for shared use paths used by bicyclists and pedestrians, including those with disabilities. Shared use paths are physically separated from motor vehicle traffic by an open space or barrier.

2 Applicability

Until further notice, this direction will be used for scoping, design, and construction of any shared use path being proposed and/or constructed within the City of Columbus right-of-way.

3 Definitions

Definitions of key terms in this memo are provided in City of Columbus Design Memo 1.00: Introduction.

4 Planning

Planning guidance related to the provision of bike facilities, including shared use paths, is provided in City of Columbus Design Memo 6.01: On-Street Bike Facilities.

5 Design Guidance

Shared use paths should be thought of as a system of off-road transportation routes for pedestrians, bicyclists, and other nonmotorized users that extend and complement the on-road bicycle network. A shared use path can supplement a network of separated bike lanes, on-street bike lanes, shared roadways, and bicycle boulevards. Shared use paths are typically designed for two-way travel. Design guidance provided herein assumes a two-way facility is planned unless otherwise stated. The presence of a shared use path should not be used as a reason to preclude on-street bikeways where appropriate.

Shared use path design for bicyclists is similar to roadway design for motor vehicles, following many of the same core design precepts but on a different scale and typically with lower design speeds.

5.1 Widths and Clearances

5.1.1 Minimum Path Width

The appropriate paved width for a shared use path is dependent on the context, volume, and mix of users. When determining an appropriate shared use path width, it is also important to consider the natural behavior of people operating on paths. People traveling want the ability to have conversations with companions, thus they will walk and bicycle side-by-side regardless of the width provided.

The minimum shared use path width shall be 10 feet. However, paths less than 11 feet in width do not provide space to allow people to travel side-by-side one direction while being passed by other users approaching from the opposite direction. Where space permits, a minimum path width of 11 feet should be considered.

For the minimum path width where the shared use path is placed at the back of curb, see Section 5.1.5.

The inherent speed differential between wheeled users and people walking, and the anticipated volume of each type of user, should be considered when determining appropriate path width. For guidance on where wider paths may be necessary based on the desired volume, user mix, and operational conditions for the path, see ODOT Multimodal Design Guide Section 5.3.1.

5.1.2 Constrained Path Width

Path widths less than 10 feet may be used for a limited distance to accommodate a physical constraint such as an environmental feature (e.g., a wetland or rock outcropping), bridge abutment or pier, utility structure, property fence, or building where a wider path is not practical or where negative environmental impacts associated with minimum path widths cannot otherwise be mitigated. In these situations, the constrained path width shall be no less than 8 feet wide for a distance equivalent to the physical constraint. Where the path width would be less than 10 feet wide for a distance greater than 500 feet, approval from the Department of Public Service is required.

Path users should be notified in advance of narrowed path when user volumes are likely to result in conflicts or where sight distance to the narrowed path condition is insufficient. See Section 5.8.2.

Changes in the width of the path shall use the shifting taper rates in Section 5.3.2.

5.1.3 Pedestrian Access Route

The Pedestrian Access Route (PAR) shall be provided for the full width of shared use paths.

5.1.4 Horizontal Clearances

A graded shoulder width of at least 2 feet with a maximum cross slope of 6:1 shall be provided on each side of a shared use path. Where space permits, graded shoulder widths of 3 to 5 feet are preferred. See **Figure 1** for a typical cross-section of a shared use path.

Where paths are adjacent to intermittent vertical elements (e.g. signs, street lights, utility poles, fire hydrants), a shy distance of 2 feet should be provided. In constrained conditions, this shy distance may be reduced to a minimum of 1 foot except for post mounted signs which must meet the minimum OMUTCD 2-foot clearance requirement.

Where paths are adjacent to continuous vertical elements (e.g. bicycle railings, fences, planters, or barriers), a shy distance of 2 feet should be provided. In constrained conditions, this shy distance may be

reduced to a minimum of 1 foot; however, the use of reduced shy distances can result in the effective operating space being narrowed where users are not comfortable operating close to a vertical element.

Where paths are adjacent to vertical curbing, a shy distance of 1 foot should be provided. In constrained conditions, this shy space may be reduced to a minimum of 6 inches. This applies to curbs located along the path as well as pass-throughs in raised median islands.

Where barrier or vertical curbing is directly along the edge of the path (e.g. across a bridge), the effective width of the shared use path is reduced due to the minimum shy distance requirements. The minimum path width (Section 5.1.1) and constrained path width (Section 5.1.2) shall be increased by at least the minimum shy distance (1 foot for barrier, 6 inches for vertical curbing) on each side where path is directly adjacent to barrier or vertical curbing.

Figure 1 depicts a typical shared use path section with the above shy distance requirements.

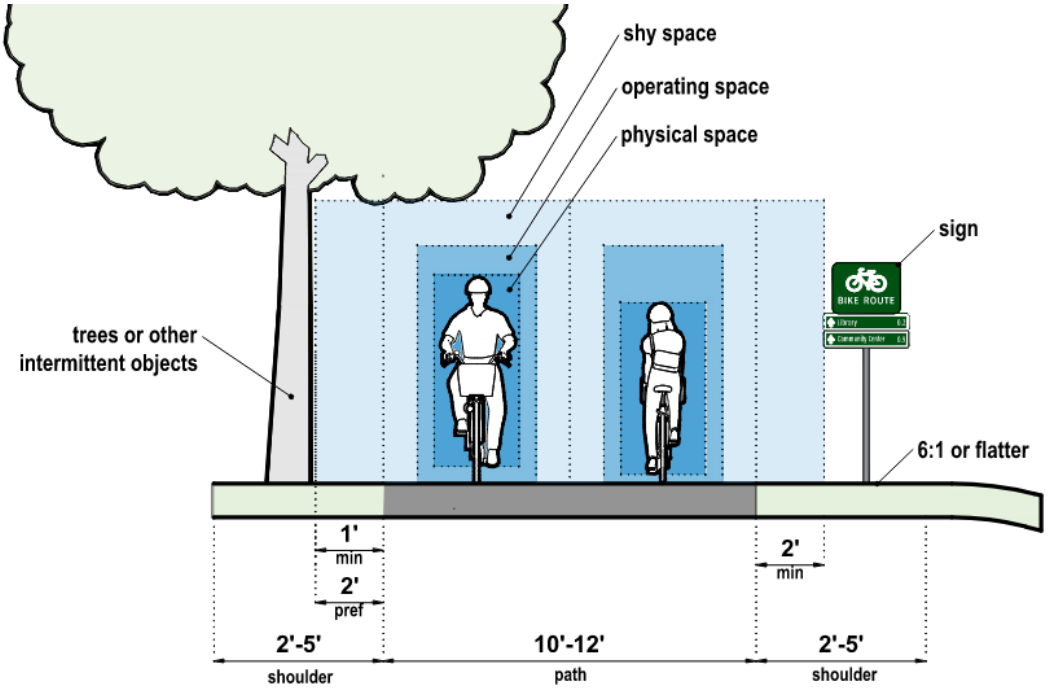

Figure 1: Typical Shared Use Path Section

Where paths are adjacent to parallel bodies of water or downward slopes of 3:1 or steeper, a 5-foot separation from the edge of path pavement to the top of the slope should be provided. Depending on the height of the embankment and condition at the bottom, a physical barrier, such as dense shrubbery, railing, or fencing may be required.

Where the distance between the edge of the path pavement and the top of the slope is less than 5 feet, physical barriers shall be provided in the following situations (see **Figure 2**):

- Slope 3:1 or greater, with a drop of 6’ or greater
- Slope 3:1 or greater, adjacent to a parallel body of water or other substantial object
- Slope 2:1 or greater, with a drop of 4’ or greater
- Slope 1:1 or greater, with a drop of 1’ or greater

The barrier shall begin prior to, and extend beyond, the area of need similar to the implementation of guardrail with shy spaces per ODOT Multimodal Design Guide Section 3.6.2. The ends of the barrier should be flared away from the path edge, particularly if constrained dimensions are used.

It is not desirable to place the pathway in a narrow corridor between two fences for long distances, as this creates personal security issues, prevents users who need help from being seen, prevents path users from leaving the path in an emergency, and impedes emergency response.

Additional information on horizontal and vertical shy space is provided in ODOT Multimodal Design Guide Section 3.6.2.

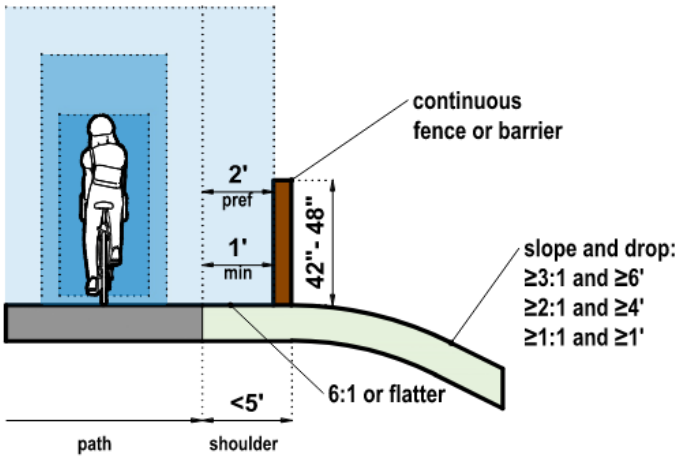

Figure 2: Steep Slope Edge Treatment

5.1.5 Buffer Zone

The Buffer Zone is the area between the back of curb or edge of pavement and the shared use path (see City of Columbus Design Memo 6.03: Sidewalks). The separation between the shared use path and the adjacent roadway should be maximized to the greatest extent possible. The Buffer Zone should be a minimum of 5 feet unless in a constrained section where a minimum of 3 feet shall be provided. Where a paved shoulder is present, the Buffer Zone begins at the outside edge of shoulder.

In the most constrained conditions along low-speed streets (30 mph or less) that do not include on-street parking along the bikeway, the shared use path may be placed at the back of the curb with no buffer. These designs will reduce the safety and comfort for bicyclists. These designs should only be considered where the value of providing the separated bikeway outweighs the option of providing a different facility type that would not accommodate the desired design user profile and where all travel and parking lane widths have been reduced to the minimum width. Where the shared use path is placed at the back of curb, the minimum width of the shared use path shall be 13 feet.

5.1.6 Obstructions

Obstructions should not be located within the clear width of a shared use path because they present a crash hazard to bicyclists and other shared use path users. Where an obstruction that impacts the path cannot be avoided, and the path cannot be shifted to avoid the obstruction, the shared use path width is reduced around the obstruction. Shifting the path is preferred to reducing the path width (see **Figure 3**); the path width may only be reduced below the minimum width if the obstruction cannot be avoided by

changes in the path's alignment (see **Figure 4**). The Buffer Zone may be reduced to a minimum of 3 feet to avoid obstructions.

If the shared use path is reduced to a width less than 10 feet at an obstruction, the requirements for constrained path widths in Section 5.1.2 apply. Changes in the width of the path at obstructions shall use the shifting taper rates in Section 5.3.2.

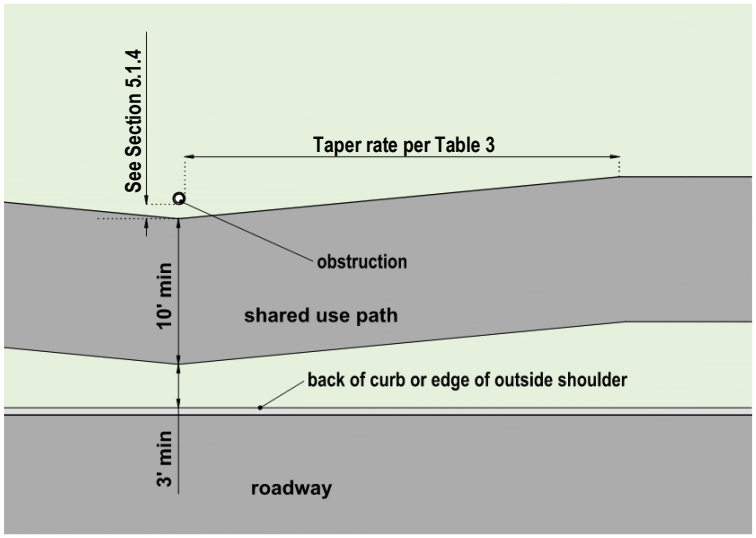

Figure 3: Shifting Path to Avoid Obstruction

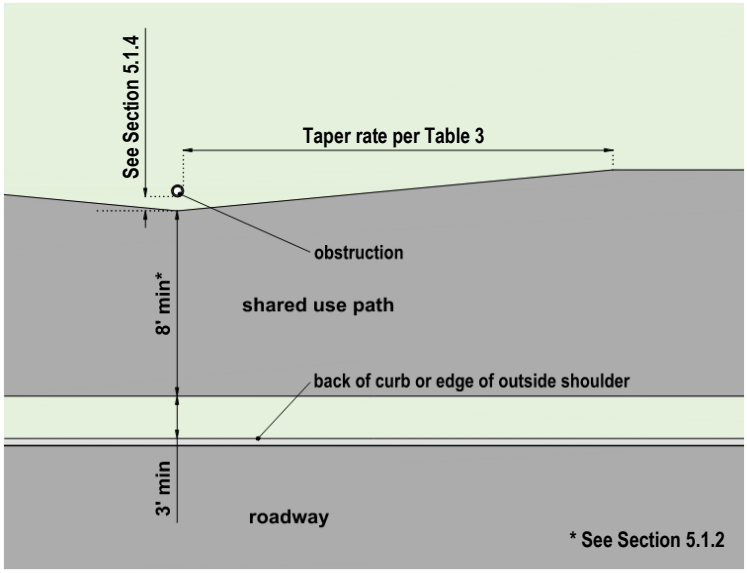

Figure 4: Reduced Path Width at Obstruction

5.1.7 Vertical Clearances

Where continuous vertical elements are located above the shared use path, such as overhanging trees, overhead signs, bridges, tunnel roofs, or other appurtenances, a minimum of 10 feet of clearance to the overhead obstruction should be provided. In constrained areas, this may be reduced to a minimum of 8 feet where it is not practical to increase the clearance (e.g. a path undercrossing of an existing bridge). In some situations, vertical clearances greater than 10 feet may be needed to permit passage of maintenance and emergency vehicles.

5.2 Design Speed

Shared use paths should be designed for a design speed that is comfortable and appropriate for the design user profile in a given context. There is no single design speed recommended for all shared use paths, and design speeds may change along portions of shared use paths as they travel through different contexts. See **Table 1** for design speeds based on shared use path context.

At locations where a design speed changes, it is preferable to provide an adequate sight line to the condition that causes the change. Where sight distance is limited and cannot be corrected, traffic control devices should be considered to provide advanced warning of upcoming conditions. Example situations include intersections where buildings are located close to the bikeway or where shared use paths must navigate around natural obstructions that limit sight lines approaching sharp curves or areas with reduced operating width.

Table 1: Shared Use Path Design Speeds

Design Speed	Shared Use Path Context	Considerations
10 mph	Intersection approach speed	Bicyclists are generally expected to slow as they approach intersections. Ensure adequate sight lines and sight distances are provided to enable people walking, bicycling, and driving to slow, stop, or maneuver to avoid a conflict at intersections. Refer to ODOT Multimodal Design Guide Section 3.5.
15 mph	High volumes with diverse users	For most shared use paths with higher volumes of users in relatively flat areas, a design speed of 15 mph is generally appropriate due to the mixed-use operation with pedestrians on the facility.
18-30 mph	Low volume of users, especially pedestrians	For shared use paths with lower volumes of users, where pedestrian volumes are low (less than 30 percent of path users), where the primary purpose of the shared use path is to provide a higher speed bicycling opportunity between destinations, or on wider paths where bicycles are provided separate spaces from pedestrians, a design speed of 18-30 mph may be appropriate.
18-30 mph	Rolling terrain / steep grades	On shared use paths with rolling terrain and/or sustained steeper grades (greater than 5 percent), the appropriate design speed should be selected based on the anticipated travel speeds of bicyclists going downhill; however, design speed should not exceed 30 mph.

5.3 Horizontal Alignment

5.3.1 Minimum Radius

Table 2 shows minimum inside radii of curvature for a shared use path using a 20-degree lean angle.

Table 2: Minimum Radii for Horizontal Curve on Paved Shared Use Path at a 20-degree Lean Angle

Design Speed (mph)	Minimum Inside Radius (ft)
10	18
12	27
14	36
16	47
18	60
20	74
25	115
30	166

5.3.2 Tapers

Tapers can also be used to shift a path's horizontal alignment. Tapers should generally occur gradually, with a minimum length determined using the shifting taper equation in **Table 3**. When using tapers to shift a path's horizontal alignment, designers may add a radius to the beginning and end of the taper to mimic a bicyclist's natural path.

Table 3: Shifting Taper Equation

$L = \frac{WS^2}{60}$		
Where:		
L	=	Lane shift (ft), minimum 20 ft
W	=	Width of offset (ft)
S	=	Target bicyclist operating speed (mph)

5.3.3 Constrained Corners

In retrofit or constrained conditions where the appropriate horizontal curve radius cannot be achieved due to physical or right-of-way constraints, and especially where the shared use path is a 90-degree or larger corner, designers should widen the path at the curve as shown in **Figure 5** to provide more space to maneuver through the curve. The maximized path width is achieved by using the largest constructable radius on the inside of the curve and a smaller radius on the outside of the curve. Where sight distance to the curve is limited, warning signage should be provided (see Section 5.8.1).

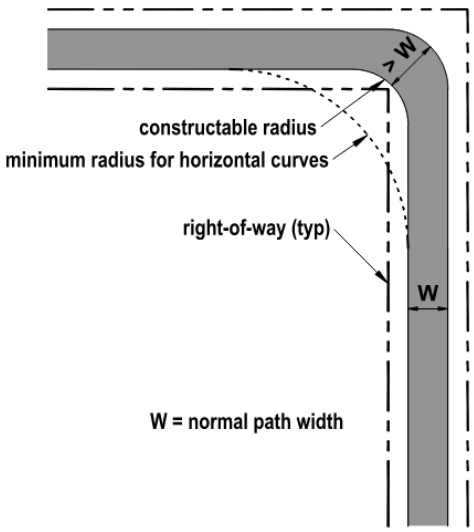

Figure 5: Shared Use Path Horizontal Alignment in Constrained Areas

5.3.4 Horizontal Sightline Offset

In addition to shy spaces for path user comfort and operations, additional horizontal clearances may be needed to accommodate bicyclist sight lines and stopping sight distances along horizontal curves. See ODOT Multimodal Design Guide Section 5.3.1 for more information.

5.4 Vertical Alignment

The maximum grade of a shared use path contained within the roadway right-of-way shall not exceed the general grade established for the adjacent roadway. For more information on options for mitigating excessive grades on shared use paths, see ODOT Multimodal Design Guide Section 5.3.6.

5.4.1 Vertical Curves

The minimum length of a crest vertical curve is based on the distance needed to provide minimum stopping sight distance to see a possible obstruction ahead and come to a stop. See ODOT Multimodal Design Guide Section 5.3.8 for more information on determining the minimum length of crest vertical curves based on stopping sight distance.

5.5 Intersection Design

Intersections should be designed to reduce motorist turning speed, which increases motorist yielding to pedestrians and bicyclists and reduces the severity of crashes. The effective radius of the intersection corner should be minimized to reduce the speed at which motorists turn right. See City of Columbus Design Memo 9.04: Turning Radii for more information.

Channelizing devices such as median islands (see City of Columbus Design Memo 6.05: Pedestrian and Median Islands) may be used to establish a smaller turning radius for left-turning motorists.

At uncontrolled intersections and at signalized intersections where turning vehicles and bicycle through movements are expected, designers should offset the shared use path crossing between 6 and 16.5 feet from the adjacent motor vehicle lane. This treatment creates a yielding space for motorists and has been

shown to reduce crashes at uncontrolled and permissive conflict locations. **Figure 6** shows important elements of the design of shared use paths at intersections.

Shared use paths and the corresponding curb ramps should be designed so bicyclists and pedestrians cross perpendicular to the intersecting street to the greatest degree practicable. This helps to shorten crossing distances and provides directional cues. Minimizing the corner radius can help achieve the preferred alignment through intersections (see City of Columbus Design Memo 9.04: Turning Radii).

Any shared use path intersection design should consider the variable speed between motorists and path users, the available intersection sight distance, and the traffic volumes. Designers should have a firm understanding of mutual yielding behavior as discussed in ODOT Multimodal Guide Section 3.4. There are three primary design objectives to shared use path intersection design:

- Alert the motorists and path users to the crossing
- Communicate who has the obligation to yield to whom
- Enable the motorists and/or path users to fulfill their obligations

Attention should be given to ensuring that people with limited or no vision are given sufficient cues at intersections to prevent them from unintentionally moving into the street or a bike-only facility.

Illumination of the path/roadway intersection should be provided. Refer to City of Columbus Division of Power Street Lighting Design Guide for more information. Special consideration should be given to the placement of lighting to make sure that path users are not backlit from a driver's perspective.

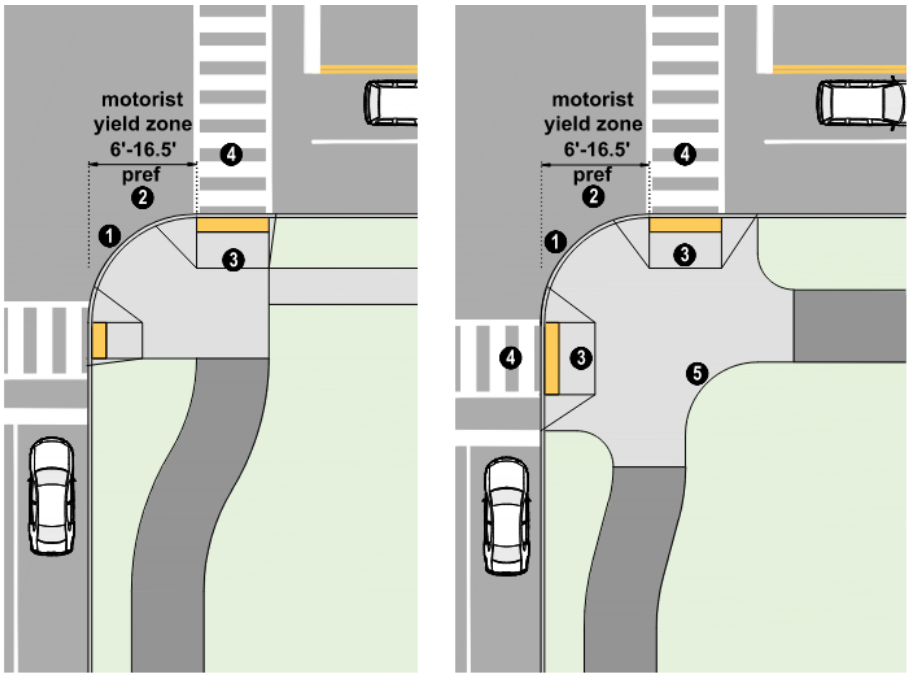

Figure 6: Shared Use Paths at Intersections

5.5.1 Path Curb Ramps

Curb ramps with detectable warnings shall be provided at intersections. Ramps in the cardinal direction of the path shall be the width of the shared use path, including ramps at the beginning and terminus of the path. Ramps not in the cardinal direction of the shared use path may be a minimum 4 feet in width where they do not connect to a shared use path across the street.

If a splitter island is used, the combined shared use path widths on either side of the island shall equal or exceed the width of the shared use path itself (see **Figure 7**). The splitter island may be paint-only or curbed, though paint-only treatments may be less visible, leading to motorist access. Splitter islands may be used where there is a high likelihood of motor vehicles entering the path.

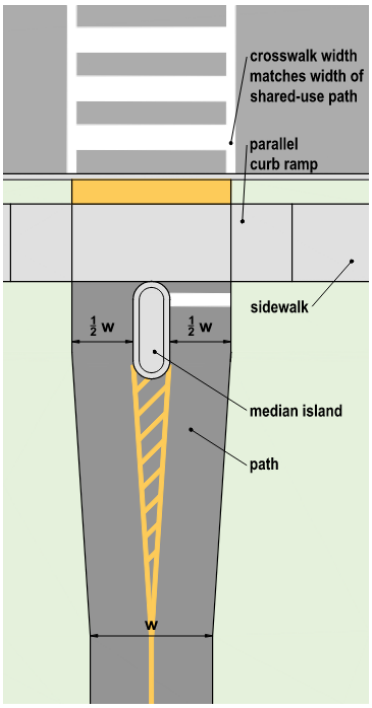

Figure 7: Path Curb Ramp and Apron with Splitter Island

5.5.2 Intersections with Other Shared Use Paths

Where shared use paths intersect with other shared use paths, the edge of pavement at the corners should be designed with small radius curves (e.g. 10 to 15 feet) to facilitate turns from one path to another. Radii may need to be adjusted based on specific site conditions, including the skew of the intersection, volumes, and other site-specific factors.

5.6 At-Grade Rail Crossings

Rail crossings can be hazardous to non-motorized users. The following design considerations are important for shared use paths located near tracks:

- Design the crossing of the tracks to be between 60 and 90 degrees, with closer to 90 degrees preferred;
- Provide firm, stable, and slip-resistant pavement near tracks;
- Reduce the flangeway width (where practical);

- Provide clear delineation of crossings with pavement markings that indicate to users where they should travel to cross rail tracks at an optimal location and angle;
- Provide warning signs to alert users of the crossing; and
- Provide adequate sight distances for approaching users to see the crossing ahead.

5.6.1 Skew Angle

The preferred skew angle between the center line of the tracks and the bicycle facility is between 60 and 90 degrees. This reduces the chance of a wheel falling into the flangeway. Where rail tracks crossing a shared use path are skewed, the shared use path alignment should be adjusted to cross as close as possible to 90 degrees and should be no less than 60 degrees. **Figure 8** shows an example of a shared use path alignment altered to cross skewed railroad tracks.

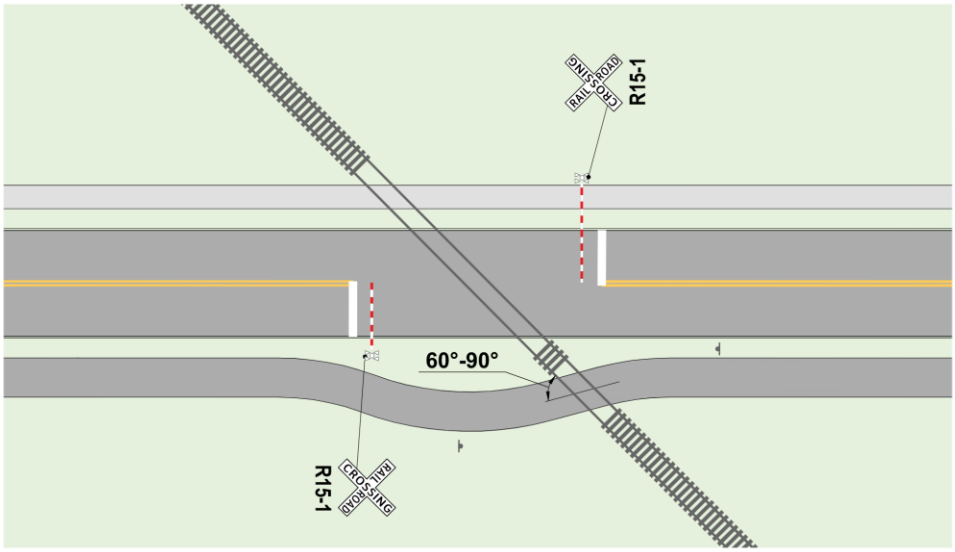

Figure 8: Shared Use Path Rail Crossing Geometry Example

5.7 Bridges and Underpasses for Paths

The clear width of a shared use path on a bridge or in an underpass should account for the necessary operating space and shy spaces (see Section 5.1.4). The paved width of the path (barrier to barrier or wall-to-wall width) should allow 2 feet of shy space on each side of the shared use path in addition to the minimum path width. Under constrained conditions the shy space may be reduced to no less than 1 foot (see ODOT Multimodal Design Guide Section 3.6.2).

Railings, barriers, and fencing are common components of bridges and bridge approaches. Protective railings, fences, or barriers on either side of a shared use path on a stand-alone structure should be a minimum of 42 inches high. There are some locations where a 48-inch high railing may be used to prevent bicyclists from falling over the railing during a crash. This includes bridges or bridge approaches where high-speed, steep angle impacts between a bicyclist and a railing may occur, such as at a curve at the foot of a long descending grade where the curve radius is less than appropriate for the design speed or anticipated speed. If a fence is provided, higher railings may not be needed.

Openings between horizontal or vertical members on railings should be small enough that a 6-inch diameter sphere cannot pass through them in the lower 27 inches. For the portion of railing that is higher

than 27 inches, openings may be spaced such that an 8-inch diameter sphere cannot pass through them. Where a bicyclist's handlebar may strike a railing or other barrier, a smooth wide rubrail may be installed at a height of 36 inches to 44 inches to reduce the likelihood that bicyclist's handlebar will be caught by the railing (see **Figure 9**). The design of railings and rubrail should be coordinated with the design engineer to address the functional design, pedestrian accessibility, and desired aesthetics.

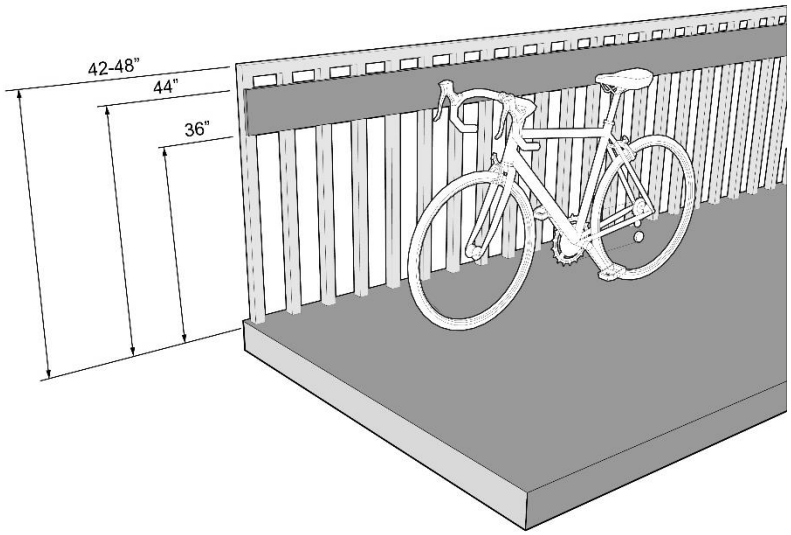

Figure 9: Example Bridge Railing with Bicycle Rubrail

The structural design of shared use path bridges should be designed in accordance with the *ODOT Bridge Design Manual* and the AASHTO *LRFD Bridge Design Specifications for Design of Pedestrian Bridges*.

When transitioning from a shared use path with buffer to a condition where there is concrete barrier between the shared use path and roadway, guardrail may be used between the shared use path and the roadway. Ensure shy distance requirements between the edge of the shared use path and the back of the guardrail posts are met. See Section 5.8.4 for information on pavement markings that should be used in this condition.

5.8 Signing and Marking

Primary guidance for traffic control signs can be found in Chapters 2B and 9B of the OMUTCD; the information presented in this design memo is supplemental to that guidance and is specific to shared use paths.

5.8.1 Warning Signs

The MUTCD provides guidance for the application of warning signs on shared use paths. In general, the use of warning signs should be limited to locations where sight distance to the condition is limited or the condition is otherwise unexpected. Where pavement markings are not included around fixed objects or other physical features which could represent a crash hazard, reflective materials on the object or Type 3 Object Marker plaques in front of the obstruction may be used.

For advance warning sign placements on shared use paths, the sign should be placed to allow adequate perception-response time. A minimum of 2.5 seconds of perception-reaction time is recommended for all path users. The location of the sign should be based on the stopping sight distance needed by the fastest

expected path user; however, the sign should not be located closer than 50 feet from the location warranting the advance warning.

5.8.2 Narrow Path Conditions

At locations where paths must narrow below the minimum widths described in Section 5.1.1, consideration should be given to warning of the narrowed path condition. Advance warning signs may be used where sight distance is restricted to the object or feature including the use of the Path Narrows (W5-4a) sign. Appropriate shifting tapers should be included to effect any changes in shared use path width ahead of the location (see Section 5.3.2). When narrower shared use path widths occur at discrete locations, a marked center line may be used to help separate opposing directions of travel.

5.8.3 Center Line Pavement Markings

A yellow center line stripe may be used to separate opposite directions of travel where passing is inadvisable. On shared use paths, a center line stripe may be used in the following circumstances:

- For shared use paths with high user volumes (continuous stripe)
- On curves with restricted sight distance, or design speeds less than 14 mph (localized stripe)
- Approaching obstructions within the center of the shared use path (localized stripe)
- Where narrower shared use path widths occur at discrete locations (localized stripe)

5.8.4 Edge Line Pavement Markings

A white edge line stripe may be used where it is desired to establish a shy distance from an obstruction or object along or adjacent to the shared use path. For example, a white edge line stripe may be used where a shared use path is adjacent to the back of guardrail to direct bicyclists away from the bolts on the back of the guardrail.