SECTION 5

Shared-Use Paved Trails

A Minnesota classic. *The Gateway Trail in Washington County sets the contemporary standard for high-value recreational trails. It also illustrates how trail standards continue to evolve, with the two-way, 8-foot-wide sections proving to be too narrow to accommodate the heavy use patterns and increasingly diverse types of users.*

Overview

Shared-use paved trails serve a variety of user groups, including pedestrians (walkers and joggers), in-line skaters, and bicyclists. With hard surfacing, these trails provide a high level of accessibility to users of all abilities. This section considers the general and technical planning and design guidelines for shared-use trails.

Shared-Use Paved Trail Classifications

As defined in Section 4 – Trail Classifications and General Characteristics, shared-use paved trails function at a number of service levels within local, county, regional, and state trail systems. There are five trail classifications of multiuse paved trails:

- Neighborhood Trail
- City Trail
- County Trail
- Regional Trail
- State Trail

The major distinction between these classifications and service levels includes location, types of users being accommodated, levels of use, character, width, and length. As trails serve more people and traverse larger geographical areas, the level of service tends to go up, as do some of the development standards (most notably trail width).

Critical to the development of trails at all levels is maximizing their public value, whether they are following an urban trail corridor or traversing a greenway in a suburban community or the rural countryside. As described in Section 4 – Trail Classifications and General Characteristics, public values include safety, convenience, recreation, fitness, and transportation/commuting. This is an important factor in planning and designing trail systems and should not be overlooked or taken lightly.

General Design Guidelines

The following guidelines provide general design parameters for shared-use paved trails at various service levels. Note that the guidelines are not intended to be a substitute for site-specific design and engineering that responds to local conditions, development requirements, and safety concerns.

Trail Widths and Configurations

Trail widths and configurations vary for each of the listed trail classifications. Even within a given classification, site-specific circumstances often require alternative configurations to accommodate the anticipated types and levels of use. The following provides guidelines for determining the appropriate width and configuration for a given situation.

Basic Physical Interrelationships Between Trail Users

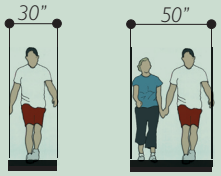
The physical space required for different trail users provides a base-line for determining the optimal width for a given trail. Trail widths increase in line with use levels and the diversity of users being accommodated. The following graphic illustrates the relationships between trail users and trail width.

Relationship Between Trail Users and Trail Widths on Multipurpose Paved Trails

Basic Trail User Space Requirements

The typical space requirements for common trail uses are shown below. The dimensions denote operating space, which includes the physical space needed for basic maneuvering.

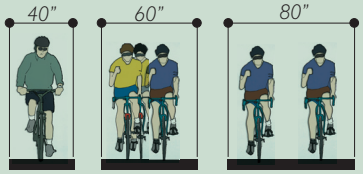
Typical Pedestrian (Walker/Jogger)



Walkers either walk alone or side by side. Typically, they do not have to markedly change position on paths 10 feet or wider when approaching opposing walkers.

Single walker *Side-by-side walkers*

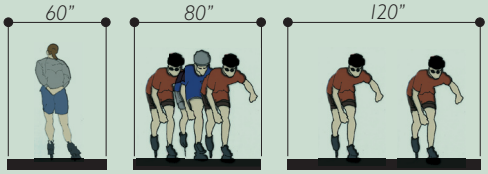
Typical Bicyclist



Single bicyclist *Staggered bicyclists* *Side-by side bicyclists*

Bicyclists ride alone or side by side. It is also very common for bicyclists to ride in a staggered pattern to take up less space and be ready to maneuver for oncoming traffic.

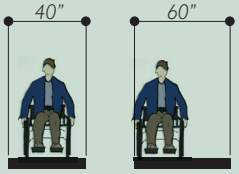
Typical In-line Skater



Single skater *Staggered skaters* *Side-by side skaters*

In-line skaters skate alone or side by side. It is also very common for skaters to use a staggered pattern to take up less space, draft, and be ready to maneuver for oncoming traffic. Note that dimensions are at full stride, with a "passing stride" being closer to 36" when approaching oncoming traffic.

Typical Wheelchair User



In addition to suitable grades, the most critical aspect for wheelchairs is having enough maneuvering spaces on the trail and landings at road crossings and curb cuts.

Single wheelchair *Maneuvering room*

Trail Widths Required to Accommodate Various Combinations of Trail Users

Trail widths should be based on the public values offered and a clear understanding of the type of users that will be drawn to it and accommodated. For example, if the setting is scenic, location convenient, and/or length is suitable for elite users, the trail will likely attract many types of users with various skill levels. The trail's width *must* be based on these realities if the trail is to be successful. Doing otherwise could lead to higher levels of conflict, an increased propensity for accidents, and general visitor dissatisfaction – none of which is a desirable end.

Typical Two-Directional Trails at Various Widths

8-foot trail *10-foot trail* *12-foot trail*

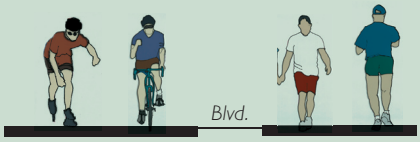
As trails widen, people begin to use them differently. Understandably, the most successful trails are those that accommodate the patterns of use people are inclined toward. At a neighborhood level, a "strolling width" is appropriate. On a major trail, the expectations of more specialized users and higher volumes of use should rightfully be accommodated.

Typical Shared-use Separated Trails

8- to 10-foot trail *8- to 10-foot trail*

The first level of separated directional trails has shared uses going in a common direction, as illustrated. This is most common in wide-open areas with moderately heavy use patterns.

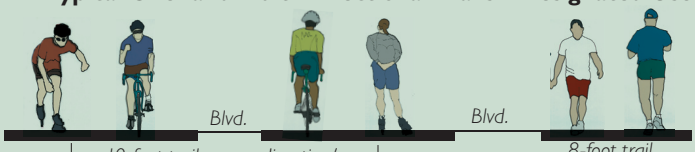
Typical Designated Use and Direction Trails



10-foot trail – one direction (bicyclist and inline skaters) *8-foot trail – two direction (pedestrians)*

The second level of directional trails separates bicyclists and in-line skaters from walkers and joggers. Bicyclists and in-line skaters are limited to one direction. This is most common around an urban recreational lake or loop within a popular park where users can return to their starting point.

Typical One- and Multi-Directional Trails – Designated Use



10-foot trails – one direction/ (bicyclist and in-line skaters) *8-foot trail (pedestrians)*

The third level of directional trails continues to separate bicyclists and in-line skaters from walkers and joggers. Bicyclists and in-line skaters are separated but can go both directions. This is typically used to create a bicycle "freeway" in major urban areas where use levels are high and space is less limited.

Trail Widths Relative to Classifications

Trail widths are one of the distinguishing features between trail classifications, as the guidelines on this page highlight.

However, Section 4 – Trail Classifications and General Characteristics considers other factors that distinguish one trail class from another, including the size of the service area, the length of the trail, and the context relative to local, county, regional, and state trail plans.

Trail Corridor Widths Relative to Classifications

Given the vast array of trail settings – from narrow urban retrofits to wide open greenways and parks – no minimum or maximum optimal standard is provided for trail corridor width.

In retrofit situations, the trail corridors can be as narrow as 20 or 30 feet as long as safety is not compromised. In greenways, trail corridor widths should respond to the recommendations defined in Section 3 – Principles of Ecological Sustainability.

Trail Widths Associated With Multiuse Paved Trail Classifications

Anticipated levels of use *and* the relationship between trail users (as illustrated on the previous page) are the primary factors used for determining the optimal width of a trail in a given situation. These factors were used as the basis for the width guidelines for each of the paved trail classifications, as the following considers.

Neighborhood Trails

These trails generally receive relatively low volume and function to link a residential area to the larger citywide trail system. An 8-foot minimum width with two-way traffic is the typical standard, although a 10-foot width is used where a higher level of use is expected, such as a mixed-use development area with high population densities. One-way directional and/or separated use trails are not commonly used at the neighborhood trail level. Center striping is not typically provided on this level of trail.

*This is a typical **neighborhood trail** integrated into a residential development.*

City Trails/County Trails

The volume of use on these trails can vary considerably depending on location and the population being served. A 10-foot minimum width for all major trails is recommended for all cross-city or countywide trails that form the backbone of the local trail system. An 8-foot minimum width for secondary or lower volume trails or within local or county parks is acceptable when use volumes are lower. 12-foot widths are only recommended for core areas in an urban setting or within a destination park with high use levels. Two-way traffic on all but the busiest trails is typical, but one-way and/or separated trails are common in very popular park settings, such as around a local lake. Center striping is more common, but not mandatory.

*This is a typical **city** or **county trail** through an established greenway corridor. A 10-foot width is optimal on most trails, but 12-foot widths are also used in very heavy use areas.*

Regional Trails/State Trails

These trails are 10 feet minimum in width irrespective of use levels, with a 12-foot width being an option for major trails in high use areas. Two-way traffic is the general standard for most trails, although higher-use trails in metropolitan areas may require one-way directional and/or separated trails. An 8-foot minimum width is occasionally used for looped trails within smaller or less frequented regional or state parks, but 10 feet is generally preferred for most situations for new trails.

*This is a typical **regional** or **state trail** through an established rails-to-trails greenway corridor. A 10-foot width is the minimum recommended.*

One Directional and Separated Trails

As noted above, one directional and/or separated trails are used on occasion for higher use areas at several service levels. On separated trails, walkers and joggers are on one trail, with bicyclists and in-line skaters on another. Directional trails typically relate only to bicyclists and in-line skaters. One directional trails are used to increase capacity, improve safety, and provide a more pleasant visitor experience.

These types of trails have become more common as trail use has increased over the last decade or so. In urban settings, such as around the Chain of Lakes in Minneapolis, separated and directional trails are prevalent due to the high levels of use. They have proven to be very successful in this type of setting.

As illustrated on page 5.2, separated two-way trails are a minimum of 8 feet wide for walkers and joggers, with 10 feet preferred. A 10-foot width is the minimum for a two-way bicycle and in-line skating trail, and is preferred for one-way traffic as well. A 10-foot minimum green boulevard between trails is preferred, with 20 or 30 feet more optimal. The following photos are examples of separated and directional trails.

Separated and directional trails. *The trail farthest to the left on this photo is for two-way walking and jogging. The trail to the right is a one-way trail for bicycles and in-line skaters. The one-way trail works in this situation because the trail loops around an urban lake. The high use volumes justify the 10-foot width for both trails. The green boulevard between the trails adds to the character of the trails and helps reduce conflicts between users.*

Trail "freeway" *located in a major greenway in Minneapolis, the Cedar Lake Trail is designed for heavy use. It features a separate two-way trail for walkers and joggers (far left) and two separate one-way trails for bicycles and in-line skaters. The walking trail is 8 feet wide with a 10-foot width used for each of the bicycle trails. This combination has proven exceedingly successful in this setting, but may be more than necessary for most applications outside heavily populated areas.*

Shoulder Width (Recovery Zone)

Adequate signage and visual cues alert trail users of the narrowed trail section. Although maintaining a minimum 2-foot shoulder is ideal, that is not always possible in retrofit situations, as is the case with this trail.

Shoulders provide a recovery area for trail users to avoid conflicts and regain control after slipping off the trail. Ideally, shoulders should be 3 feet wide, with 2 feet being the minimum on each side of trail. No obstructions should be in this zone whenever possible, including signs.

Shoulders can be aggregate or turf and should be free of brush and other woody material or excessively long grasses. Grasses should not overhang the trail to avoid reducing its usable width, which can increase conflicts between trail users and make it frustrating to walk or bike side by side. An 18- to 24 inch mowed strip is common along most trails.

In situations where the trail corridor is reduced or compromised due to retaining walls, fences, or other obstructions, shoulder width may have to be reduced. In these instances, adequate visual cues should be provided to ensure that a trail user recognizes that a change in shoulder width is coming. Where sightlines are adequate, the obstruction itself can be a suitable visual cue. In situations where a blind corner prevents a user from seeing a reduction in the shoulder, a warning sign and pavement marking may be necessary.

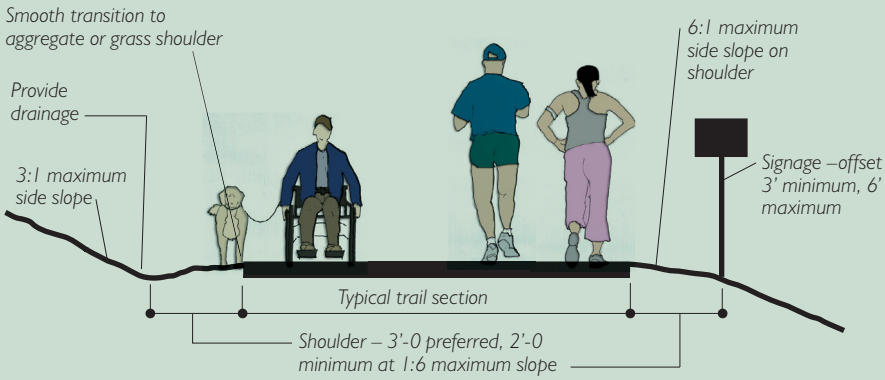
Even prairie grasses can be a significant impediment to travel along a trail. The extensive encroachment along this trail effectively narrows it from 10 feet down to 8 feet and is annoying to many bicyclists. Simply mowing a 2-foot strip on each side would vastly improve this situation. Encroaching vegetation also can shorten the life of a trail by getting under the pavement edges.

In cases where the trail traverses significant sideslopes or other hazards, the shoulder should be widened to increase the margin of safety. In most cases, a minimum shoulder of 5 feet is recommended, but this can vary considerably based on the site-specific circumstances.

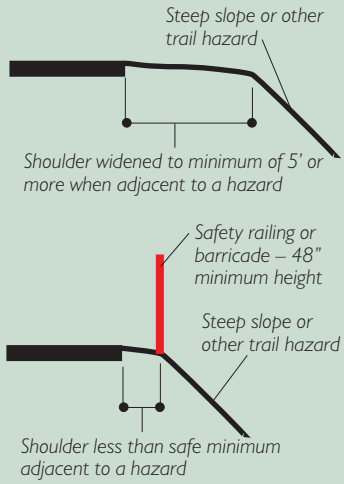
When the separation between a hazardous slope or drop-off is compromised, a physical barrier, such as a handrail or wall, should be used to protect the trail users. The height for a handrail is a minimum of 48 inches for most situations. Examples include a handrail adjacent to a deeper stream edge, over a bridge crossing a small channel, or on the side of a elevated boardwalk. A 54-inch handrail height is recommended in hazardous situations, such as a major bridge suspended well above a river crossing.

When a trail is following along the top of an old rail bed, the area for the trail and a shoulder may be limited and the shoulder will be steeper than would otherwise be desirable. In these situations, the clearance zone adjacent to the trail should be widened to a minimum of 8 feet to provide a bicyclist or other user who slips off the trail more space to recover. The graphic and photos on the next page illustrates some of the key aspects of trail shoulders.

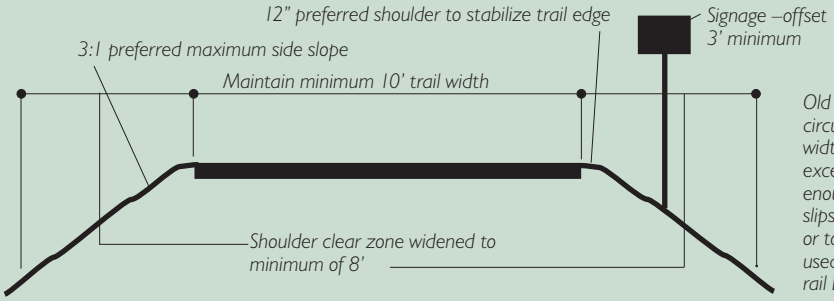
Shoulder Widths and Recovery Zones



Shoulders for a Typical Trail Section



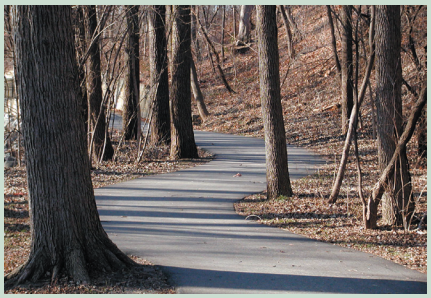
Shoulders Next to Hazards



Shoulders for a Rail Bed With Limited Top Width

Old rail beds with a limited top width pose a unique circumstance often requiring modified shoulder widths. Since the grade adjacent to the trail is in excess of 6:1, a wider shoulder is needed to allow enough space for recovery if a bicyclist or other user slips off the edge of the trail due to lack of attention or to avoid a collision. This approach should only be used when it is impractical to widen the top of the rail bed.

Adequate shoulders. *Both of these trails exhibit shoulders that provide a margin of safety for trail users. In the left photo, the trail sign is about 2 feet from the edge of the trail, with heavy brush cut back from the trail edge 4 feet or more. In the right photo, the heavy grass edge is cut back about 18 inches to prevent taller weeds from encroaching onto the trail and narrowing it, which is annoying to most trail users.*



Visual cues. *The neighborhood trail shown in the left photo is shoehorned into a greenway corridor. Although the shoulders are less than generally optimal, it does not pose a significant concern here because the trees are very visible, the trail is very curvilinear, and it is designated for walking and jogging only. On bridge approaches, as shown in the right photo, shoulders are inherently reduced. Adequate sight distances allow trail users to easily see the bridge coming and take precaution, such as slowing down.*

Unique circumstances. *The retaining wall in the left photo is imposing enough to alert trail users. Although hard to notice, the trail was widened by about 2 feet to create more maneuvering space. Also notice that the right shoulder drops off quickly from the top of this old rail bed. This requires a widening of the shoulder zone to give users more space to recover if they slip off the trail. The right photo illustrates a narrow section of a trail corridor that required a retaining wall and barrier fence to keep it safe. This section's visibility from both directions makes it a safe trail segment even with limited shoulders.*

Clearance Zones

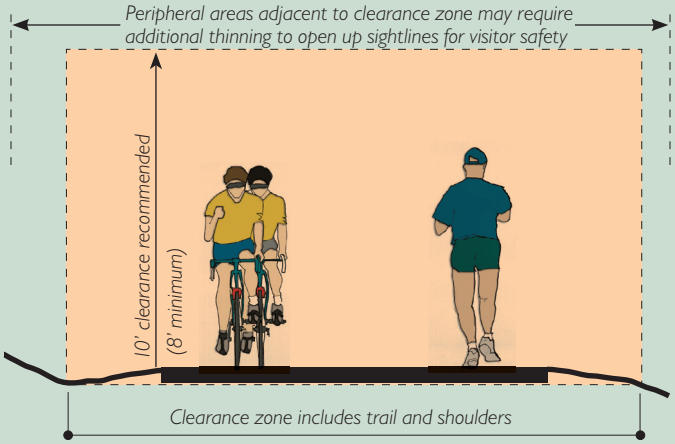
The clearance zone is defined as the physical space that lies above and on either side of the trail and is free from all obstructions. This includes all of the shoulder area.

A 10-foot vertical clear area is recommended throughout the clearance zone, especially where sightlines are obscured on steeper downhill sections approaching a turn. This clear zone is especially important when larger maintenance equipment is used and also to allow emergency vehicles easy passage. An 8-foot-high clear zone is the minimum for a multiuse paved trail.

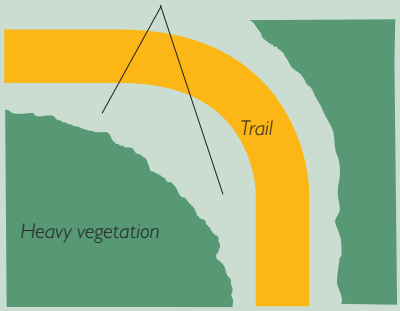
The clearance zone should increase around corners where sightlines are obscured. The extent to which this should happen is a function of trail type and design speed. On neighborhood level trails, where trail widths are narrower and travel speeds less, the clearance zone can be more modest around a corner and along the trail in general. On regional or state level trails, where trails are wider and travel speeds greater, a more generous clearance zone is often needed and appropriate.

Clearance zones should also increase where personal safety may be of concern. Longer segments of trails through tunnel-like vegetation can be intimidating and may require additional clearing to increase the sense of security for some trail users. This is especially the case with curvilinear trails where the trail user cannot see far enough ahead to feel secure about proceeding. In all cases, site-specific sightlines should be carefully considered and an adequate clearance zone maintained to ensure user safety and security. The following graphic and photos illustrate some of the key aspects of clearance zones.

Clearance Zones



Clearance zones need to be widened around curves and other areas where impaired sightlines can cause a hazard. The best approach is to field test and adjust sightlines at design speeds until safe.



Typical Trail Clearance Zone

The trees and other vegetation along this trail create a gateway affect while still providing adequate clearance for trail users and maintenance and emergency vehicles.

Enlarged Clearance Zones

The top middle photo illustrates a neighborhood trail where the clearance is appropriate for the setting. Note that this trail is adjacent to many homes, so the vegetation is used to screen the trail.

The top right photo illustrates a trail in a wooded state park. With reasonable site distances, this trail remains safe even though vegetation creates a tunnel affect.

The bottom photo illustrates a well-balanced clearance zone that provides for a safe but compelling trail experience.

Design Speeds

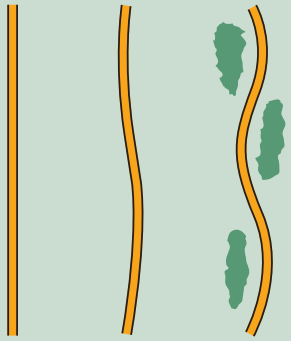
Actual travel speeds on paved trails vary due to trail width, surface material, and trail setting. Trail user expectations also play a role in determining design speeds. At the local level, where a trail often winds through a neighborhood and is only 8 feet wide, an 8 to 15 mph speed is fairly common. Once a neighborhood trail connects to a longer and wider city trail, faster user speeds can be reasonably expected and the design of the trail needs to keep pace. Major city, regional, and state trails typically have design speeds up to around 20 mph, with most bicyclists riding comfortably between 8 and 20 mph (elite recreational riders can maintain speeds of 25 mph or more). Generally, trail design speeds need to take into consideration the setting, width of the trail, gradients, sightlines, and expected levels of use.

Design speeds also need to be higher for longer and steeper downslopes. Trails with a slope of 4 percent or more may require a design speed of up to 30 mph. The same holds true for trails where prevailing winds encourage elite riders to go faster. Notably, designing trails for over 20 mph is the exception rather than the rule. Above this mark, there is a greater propensity for user conflicts since higher speeds encourage riders to go too fast with increased risk of not being able to react to others on the trail. (Many accidents are collisions with other trail users, not users missing a turn because they were going too fast.)

Whenever possible, trails should be designed to provide visual cues that alert users to slow down to a more safe speed. Certain design techniques, such as introducing more curves (even subtle ones) and bringing vegetation closer to the trail, give bicyclists visual cues that tend to slow them down. On the other hand, design speeds cannot easily be artificially lowered. For example, a long, straight rail grade conversion will result in a trail with a higher design speed because there is little to slow riders down, especially with a tail wind or slight downslope. Under these circumstances, the trail should be designed to accommodate the speed at which riders are likely to travel.

Appropriate signage and pavement markings (e.g., painted warnings, striping) should be used wherever field conditions requires the user to slow down below the design speed of the trail. For example, the trails around the Chain of Lakes in Minneapolis limit speeds on bicycle trails to 10 mph, which is appropriate given the potential for conflicts between trail users. The following photos illustrate key aspects of design speeds.

Trail Shape and Speed



Varying travel speeds can be promoted through the use of different design shapes. Notably, many bicyclists seek out trails with higher design speeds for recreation, training, and commuting. Importantly, trail systems need to appropriately accommodate all user groups with trails designed for varying needs.

The transition from one surface to another can dramatically change trail speeds. On this trail, travel speeds on the asphalt surface could reach 20 mph. On aggregate, a 12- to 15-mph travel speed is more common.

The visual cues provided by the creek (far left), walking trail, trees, and parkway road (far right) all tend to slow down bicycle speeds.

A simple curve introduced into a long stretch of trail will often cause travel speeds to go down. It also makes the trail more visually interesting.

The design speed for a neighborhood trail such as this is lower than that for a regional or state trail. Most often, trail users will travel in the 8- to 15-mph range on a bicycle, a more leisurely 2- or 3-mph on foot.

On this regional level trail on a rail grade with long sight lines, a 20 mph travel speed would not be uncommon – faster on downslopes and with a tail wind. Although the trail can accommodate the speed, above 20 mph trail conflicts can become more likely.

Where trail speeds must be kept low for general safety, signage and pavement markings are required – as is enforcement. Although speed limits help curtail speeds, the innate character and design of a trail are the most likely determinants of bicyclist's travel speeds.

Curve Radius

Curve radii are usually determined for bicyclists, who tend to go the fastest. Radii are functions of design speed, degree of superelevation, lean angle, and surface friction coefficients. In practice, most trail design is based on computed tables that reflect desired minimum guidelines that are consistent with AASHTO and other applicable standards to gain assurance that curves in a trail are reasonable for the design speed.

Generally, most bicyclists lean at about 15 degrees while in the seat. If the lean angle approaches or goes over 20 degrees, the degree of superelevation and the coefficient of friction (i.e., level of friction between the tires and trail surface) come more into play. To accommodate accessibility standards, superelevations on a trail should not exceed 3%. The coefficient of friction is a bit more complex and depends on speed; surface type, roughness, and condition; tire type and condition; and whether the surface is wet or dry.

Taking all of this into consideration, the AASHTO *Guide for the Development of Bicycle Facilities* (1999) recommends using the radius formula shown in the left column to determine the minimum radius of curvature. In practice, applying the more conservative of the lean angles ensures that the curvature of a given trail will meet or exceed commonly accepted standards.

In actual field conditions other factors often affect the curvature of a trail and must be accommodated. For example, curve radii smaller than the recommended are often required in retrofit situations due to limited space and rights-of-way or other constrictions. Anytime a curve in a trail requires a change in speed, adequate visual cues should be provided to alert users. In instances where curve radii are substandard and sightlines inadequate for the trail user to realize that a change in speed is needed, curve warning signs and pavement markings should be installed. This could include center striping through tighter curves to alert bicyclists.

Increasing the trail width by a couple of feet through curves with less than the desired radius can also help improve safety.

Curve Radius Formula

The AASHTO recommended formula for determining curve radii is:

$$R = \frac{0.067\,V^2}{\tan\theta}$$

R = max. radius of curvature (ft)
V = design speed (mph)
θ = Lean angle (degrees*)
* (15% is the recommended maximum)

Applying this formula with a lean angle of 15% (recommended), the desirable minimum radii for multiuse paved trails should be:

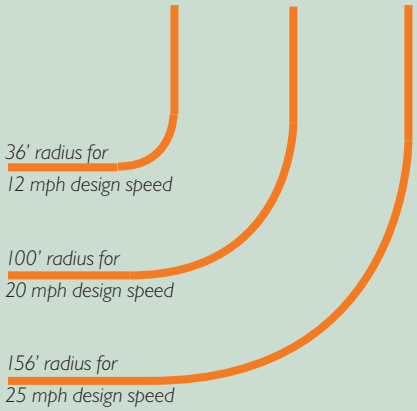
- 36' for 12 mph
- 100' for 20 mph
- 156' for 25 mph
- 225' for 30 mph

If the lean angle is increased to 20%, the minimum radii for multiuse paved trails changes as follows:

- 30' for 12 mph
- 90' for 20 mph
- 155' for 25 mph
- 260' for 30 mph

Curve Radii Comparisons And Illustrations

As the curve radius comparisons illustrate, anticipated bicycle speed greatly affects the selection of an appropriate curve radius. Whenever a curve in a trail is inconsistent with the design and actual travel speeds for the overall trail segment, adequate visual cues are necessary to alert a trail user that a change in speed is coming. This could range from clear sightlines that make the curve highly visible to signage and pavement markings.



Sweeping curve. *This curve has a nice feel to it from a user's perspective. The vegetation on the edge is set back enough to provide reasonable sightlines, yet still encroaches enough to get bicyclists to slow down a bit.*

Curves used to slow down traffic. *As these trails converge into a narrow corridor under a bridge, curves and visual cues were added to slow down bicycle traffic. The long, open sightlines make this approach suitable for this situation.*

Relaxed curves. *When there is adequate space in a trail corridor, curves can be laid out to meet or exceed desirable standards and still fit well into the surrounding landscape. In this case, the curvilinear nature of the trail adds considerably to its character.*

Curve sets up a crossing. *This easily visible curve slows trail users down as they approach a road. The open sightlines ensure that the curve and crossing can be seen in more than adequate time for the trail user to slow down and stop.*

GRADIENTS

Trail gradient is one of the most important factors in designing trails for general family use. For asphalt-surfaced trails, gradients should average less than 5 percent to be considered an accessible trail, with 3 percent the preferred average gradient over longer distances. Gradients of 6 percent are sustainable for moderate distances (800 feet). Beyond 6 percent, grade restrictions become more pronounced, as the following grade/length ratios suggest:

- 7 percent for up to 400 feet
- 8 percent for up to 300 feet
- 9 percent for up to 200 feet
- 10 percent for up to 100 feet

Grades between 10 and 12 percent are only practical for very short distances (under 100 feet), with most bicyclists having to dismount and walk their bikes up these gradients. Above 12 percent trail grades become impractical.

For aggregate-surfaced trails, grades steeper than 3 percent may not be practical nor recommended for extended distances due to increased potential for erosion and loss of handling.

In design application, segments of steeper-than-desirable trail grades may not be avoidable. Options to mitigate excessive grades include:

- Widening the trail by 4 to 6 feet to allow riders to pass walkers
- Providing signage to alert bicyclists of upcoming steeper grades (and possible alternate routes)
- Extending stopping distances and alerting bicyclists of abrupt stops well in advance if they occur at the bottom of a long, steep downhill
- Exceeding minimal clearance zones, recovery areas, etc.

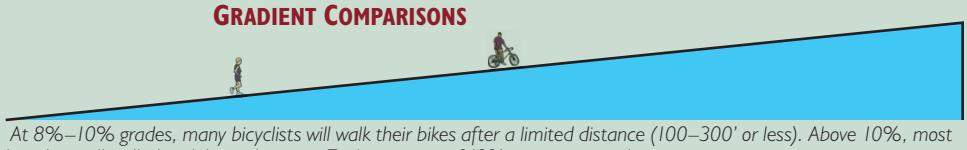
Warning signs are recommended when downhill grades approach 7 percent or more, or where visual sightlines to significant changes in trail grades are obstructed. Also, trail grades around a curve should not exceed 5 percent whenever possible. The following graphic box illustrates key aspects of trail gradients.

Grading Caution!

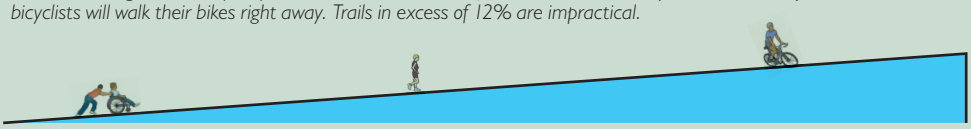
Note that increasing the grade of a trail inherently increases concerns about stormwater management, especially controlling erosion due to increased flow rates. Refer to Section 3 for additional information on best practices to prevent erosion.

GRADIENT COMPARISONS

These grade comparisons illustrate the relative difference between grades. Although visually not overwhelming, in reality a percent or two change in gradient will significantly affect people's ability and desire to use a trail. Notably, it is also appropriate to have a balanced system where some trails are purposefully more challenging to appeal to a broader set of users.



At 8%–10% grades, many bicyclists will walk their bikes after a limited distance (100–300' or less). Above 10%, most bicyclists will walk their bikes right away. Trails in excess of 12% are impractical.



A 6%–7% grade is acceptable for modest distances, but can deter some riders from routinely using the trail. This type of trail can be very popular with fitness enthusiasts and elite riders.

A 5% grade is suitable for long distances for most bicyclists and in-line skaters, with 3% preferred.

Ramp up to old rail grade. *Although this ramp exceeds 5 percent, it is short enough for most people to negotiate. This could have been improved by providing larger landing areas at top and bottom.*

Steep grades alters use. *This trail climbs at up to 10 percent through a ravine. At this grade, bicyclists will often use the adjoining road to go faster on the downhill than the trail would accommodate.*

Winding up the grade. *By traversing up a steeper grade with modest switchbacks and landings, this trail is less imposing (and more fun) than it might otherwise be if the trail climb were more direct.*

Sight Distances

Sight distances along a trail are critical to user safety. Bicyclists and in-line skaters in particular must be able to see far enough ahead to react to something that might be occurring on the trail – whether expected (e.g., a curve in the trail) or unexpected (e.g., someone standing or riding on the wrong side of the trail).

Sight distances down a trail should be adequate for users to come to a complete stop if they are traveling at the design speed of the trail. The distance required to bring a bicycle to a complete stop is a function of speed, reaction time (usually about 2.5 seconds), and coefficient of friction to account for poor or wet braking conditions. For two-way paths, the descending direction controls the design formula.

The AASHTO *Guide for the Development of Bicycle Facilities* (1999) suggests the formula in the upper left box for determining the minimum stopping distance on a downward gradient. Using this formula, stopping distances on all trails should typically be a minimum of 50 feet for relatively slow biking (6 mph on 3 percent grade) and 150 feet or more for a bicyclist traveling 20 mph on a 5 percent downslope. For practical application, sight distances for trails with a design speed of 20 mph should have minimum sightlines of 150 to 200 feet, depending on the grades.

Where curves and other constrictive situations are present, consideration should also be given to increasing sight distances to equal the total of stopping distances for bicyclists going in either direction. This is due to bicyclists' tendency to ride side by side or near the center of the trail. When going around a curve or through a constricted area, the tendency is for riders to focus on the trail and not necessarily pay attention to someone coming in the opposite direction. A longer stopping distance gives more time to both riders and accidents can often be avoided. Where this is not practical, consider widening the trail through constricted areas to give everyone more maneuvering space.

Longer sight distances may also be required when trails traverse long open stretches or encounter steeper down gradients where higher riding speeds occur. It is also important to factor in the vertical curve of a trail, whereby bicyclists (with an eye height of about 54 inches) may lose sight of the trail in the distance because the crest of the hill obscures the view. AASHTO suggests the formula in the lower box in the left column for determining the minimum vertical curve length. Using this formula, the vertical curve for a trail with a 5 percent grade, 20 mph design speed, and 150-foot stopping distance is 120 feet. For a 10 percent combined grade (5 percent grade in each direction from crest), a 250- foot vertical curve is required.

The following graphic illustrates a number of sightline issues. As a general rule, even after formulas are applied, sight distances should be field verified to ensure adequate visibility around curves, over hills, and approaching intersections. Signage should be also be provided where sight distances are obscured and the trail users' ability to see what lies ahead is compromised.

Stopping Distance Formula

The AASHTO recommended formula for determining stopping distance is:

$$S = \frac{V^2}{30\,(f \pm G)} + 3.76V$$

S = stopping sight distance (ft)
V = design speed (mph)
f = coefficient of friction (use 0.25)
G = grade (ft/ft) (rise/run)

Vertical Curve Formula

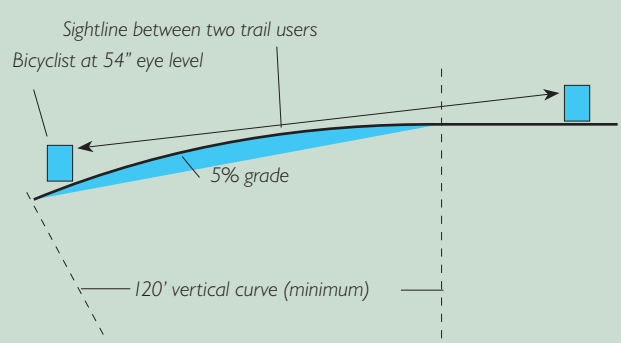
The AASHTO recommended formula for determining a vertical curve based on stopping distance is:

When S > L, then: $L = 2S - \frac{900}{A}$

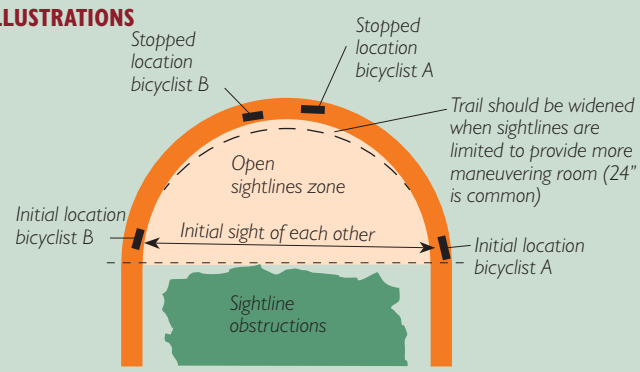
When S< L, then: $L = \frac{AS^2}{900}$

S = stopping sight distance (ft)
L = minimum length of vertical curve (ft)
A = algebraic grade difference

Sightline Illustrations



With a proper vertical curve, one bicyclist will not lose sight of another within a prescribed stopping distance, in this case 150 feet.



The lateral clearance zone must be adequate to allow bicyclists to first see each other and then safely come to a stop. On turns such as this, the stopping distance for both riders needs to be factored in. Lacking adequate sightlines, trailside warning signs, pavement markings, and pavement widening through the turn are recommended.

In Minnesota, the most common and preferred surface for multiuse trails is asphalt. Occasionally, trails in urban settings are bordered by a concrete band to reduce edge wear and provide a more finished look.

Surfacing

In Minnesota, asphalt is the most common and desirable surface for general multiuse trails. Crushed compacted aggregate surfacing is also acceptable for less traveled trails and those located in a natural setting. The cross-slope on a trail should be 1.5 to 2 percent. Excessive cross-slope (beyond 2 percent) is too noticeable and an annoyance to walkers and makes the trail less accessible to those in wheelchairs and using walkers. Superelevating trails greater than 3 percent around curves can also cause accessibility issues and encourage higher speeds and is therefore generally not recommended.

Concrete is occasionally used, but poses some limitations, including expense and crack control joints making for a rougher ride for bicyclists and in-line skaters. In limited application, concrete can be used around buildings and structures to get bicyclists to slow down in response to a changed surface and an expectation of more congestion. It also has application in areas prone to flooding, such as under a bridge adjacent to a river. Otherwise, the use of concrete for miles and miles of trails is impractical in Minnesota.

Separating Trails and Roadways

Where a trail follows a roadway right-of-way, maximizing the separation between the edge of the road and the trail is desirable for three reasons. First, the margin of safety is improved. Second, the impact that traffic will have on the recreational value of the trail is reduced. Third, plant material and landscaping will be more healthy and vibrant with a wider boulevard.

Where right-of-way space is very limited or physical constraints require reduced separation, the minimum setback from the back of the curb to the edge of the trail should be 3 feet if road signs are required in the boulevard. If space is extremely limited, the trail can be directly adjacent to the back of the curb and the signs placed on the opposite side of the trail. Both of these cases should be the exception and not the rule, with a 10-foot minimum desired standard being much preferred. The following graphic highlights the key aspects of trail and roadway separation.

Separating Trails And Roadways

Boulevard guidelines:

Rural section:

10' minimum for speeds under 40 mph, 20'+ preferred

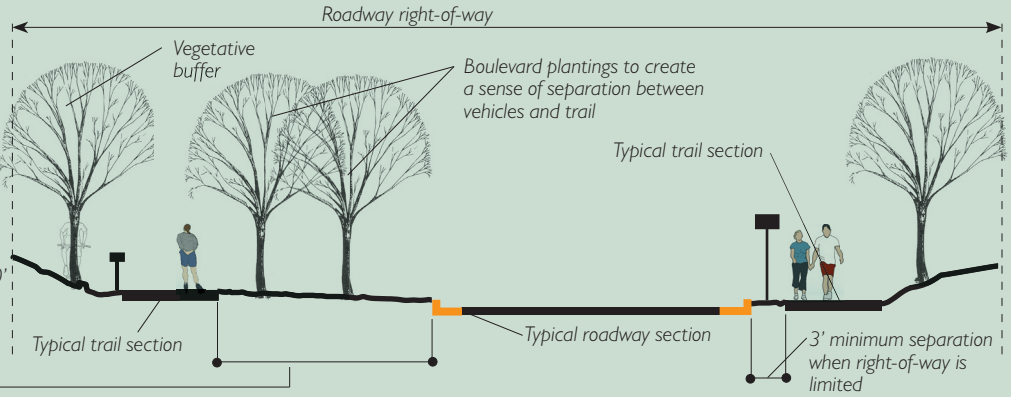
24' or more for speeds over 40 mph, 24'–35' typical

Urban section:

3' minimum for speeds under 30 mph if parking is allowed, 5' preferred

5' for speeds from 31–45 mph, 10' for speeds over 45 mph

10'+ minimum preferred for plantings



Optimal separation in urban setting. *This parkway trail is separated enough for the street to avoid a sense of encroachment.*

Concrete boulevard. *In select situations, replacing turf with concrete has merit. In this case, the concrete provides a walking area for seniors from a nearby senior housing complex. This helps separate faster users from those simply ambling along.*

Trying to do too much. *Too small of a boulevard makes plantings very difficult to sustain. Also, over time, the roots of these trees will likely reduce the design life of the trail. Sometimes not providing vegetation is the prudent, albeit less appealing, approach.*

A chainlink fence was used along this trail/rail corridor to provide safe separation between uses.

A split-rail fence was used along this trail/rail corridor to provide safe separation between uses.

Separating Trails and Active Railroad Tracks

In situations where a trail parallels an active railroad track, maximizing the separation between the two is desirable for the same reasons cited for trails along roadways. Where space is not a constraint, the setback from the edge of the nearest track to the edge of the trail should be 25 feet or more if a physical barrier, such as a fence, is not provided.

In situations where right-of-way space is very limited or physical constraints require a reduced separation less than 25 feet, a physical barrier should be provided. Typically, a 6-foot-high chainlink fence or a wood split-rail fence is used. The trail location must conform to any requirements stipulated by the railroad authority.

General Trail Layout Geometric Considerations

Shared-used paved trail classifications establish a general hierarchal relationship between trails from the local to the state level. At a planning level, these relationships help make sense of how trails interrelate across a city, region, or state.

At the actual design and use level, the geometric layout of a trail is most closely linked to user expectations. For example, a trail user would expect a relatively short neighborhood trail to be slower paced and more intimate than a city or regional trail that traverses an entire community or region. At the neighborhood level, the design of the trail should be such that higher bicycle speeds are purposefully discouraged.

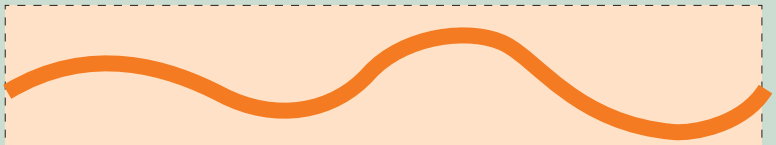
A longer regional trail is expected to be wider and allow users to go faster. Therefore, the geometrics of this type of trail must accommodate higher speeds and provide longer sightlines to be consistent with user expectations.

This is not to suggest that all city, regional, and state trails must be bicycle freeways. Depending on the setting, a slower, more intimate trail may be appropriate at any service level. Therefore, the most important factor in determining the layout of any given trail is defining the target user groups and then designing the trail to meet their expectations. Service level, targeted user groups, geographic location, physical landscape, and desired design speeds are all important factors that must be considered in the geometric layout of the trail if the trail is to be successful and safe. The following graphic illustrates how geometric forms affect the character of a trail.

Trail Layout as a Reflection of User Expectations

Neighborhood Trail

The user expectation for a paved trail through a local open space linked to a residential development is for an intimate, slower paced experience, such as an evening walk or bike ride with the kids.



The trail is purposefully curvilinear and responsive to the details of the landscape, with a more relaxed feel and sightlines less open to create a sense of intimacy.

Regional Or State Trail

In a larger open space, such as a linear greenway or regional or state park, users expect a faster pace with more open sightlines and miles of trail to cover.

The trail is less curvilinear (but still interesting) and has some straight sections between curves to make it more predictable to bicyclists traveling at a higher speed.

Context and user expectations matter in laying out a trail. *In the left photo, the trail follows a narrow greenway through a neighborhood. At 8 feet and winding, the trail feels very intimate and family-oriented.*

In contrast, the right photo illustrates a regional or state trail through a larger greenway. In this case, higher design speeds and longer sightlines are very appropriate and necessary to satisfy the trail user. If the trail were too windy and slow, the expectations of the target audience would not be met.

At-Grade/Grade-Separated Crossings at Road Intersections

For more information!

Refer to Mn/DOT's *Bikeway Facility Design Manual* (2006) at www.dot.state.mn.us/transit/bike/bikedesign.html for additional information.

Roadway crossings at intersections are one of the most critical design considerations for shared-use trails due to the potential conflict between motorists and trail users. Determining whether an at-grade or grade-separated approach is best depends on a number of variables, including traffic volumes, roadway speeds, crossing distance, and practical issues such as site topography and the amount of space available. In day-to-day application, the need for and viability of a grade-separated crossing is intrinsically linked to the engineering of the roadway and will have to comply with Mn/DOT standards.

The following table provides recommendations for various types of roadway intersections. Note that these are general guidelines and each application requires site-specific engineering to determine the best course of action to maximize safety.

Guidelines for Determining Roadway Crossing Treatment

The following table provides general guidelines for roadway crossings at intersections based on speeds, and vehicular volume. The "good" standard is recommended when the trail is used by a large number of children, seniors, or disabled people. Good is also recommended if the trail crossing is heavily used and if the trail is a main recreational corridor. Source: Mn/DOT's *Bikeway Facility Design Manual* (2006).

Posted Speed	Standard	Type of Crossing Depending on Speed and Volume of Traffic					
50+ mph		Grade Separated					
45 mph	Good	Grade Separated					
	Satisfactory	Traffic Signals					
40 mph	Good	Traffic Signals			Grade Separated		
	Satisfactory	Crosswalk + Median Refuge Island			Traffic Signals		
30 mph	Good	Crosswalk + Median Refuge Island		Traffic Signals		Grade Separated	
	Satisfactory	Crosswalk		Crosswalk + Median Refuge Island		Traffic Signals	
Vehicular Volume (Average Daily Traffic)		2,000	4,000	6,000	8,000	10,000	12,000

Notes:

- The type of crossing selected at an intersection between a main and secondary road is usually the same as for the main road.
- If more than three lanes are to be crossed, the intersection should have a refuge or median island. Where pedestrians or bicyclists wait at an island, a push button or bicycle-sensitive traffic detection device may be desirable.
- At large intersections of very busy roads, pedestrian and bicycle traffic should be separated by grade from both the main and secondary road, instead of using signals.
- Along main roads, crossings should be at intersections. If a midblock crossing is unavoidable, there must be good sight distances. If the speed limit is over 40 mph, consider lowering the speed limit through the crossing area to 40 mph.

Based on the above table, a grade-separated crossing is desirable once speeds reach 45 mph or when a combination of speed and average daily traffic (ADT) volumes reach the thresholds highlighted in the table.

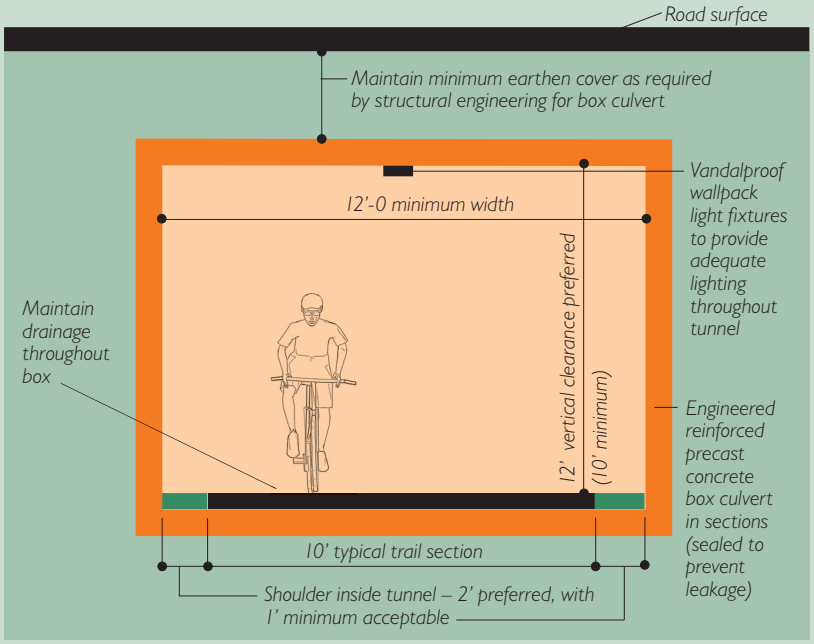
A grade-separated crossing is recommended when speeds and ADT reach thresholds as defined in the previous table.

Grade-Separated Crossings – Underpasses

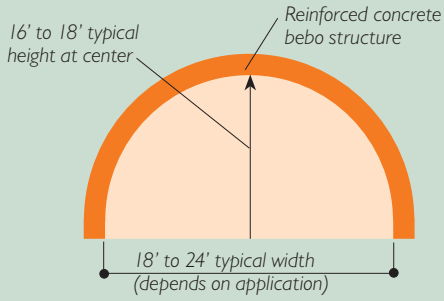
The clearance zone for trails under bridges and through box culverts and bebos is generally consistent with or greater than the other clearance zones for a trail. Three major considerations with any type of tunnel are sightlines, space for emergency and maintenance vehicles, and lighting.

In general, a trail user should be able to clearly see all the way through a tunnel-like structure from entry to exit. Lurking areas should be avoided on either end of the tunnel to avoid any perception of entrapment while passing through the tunnel. Lighting should be adequate for safety. The box should also ideally allow enough space for maintenance vehicles to pass through with adequate clearance. The following graphic illustrates some of the key aspects of a clearance zone for a box culvert and bebo structure.

Clearance Zone for Box Culverts and Bebos



Typical Box Culvert Tunnel



Bebo-type arched structures are used when a larger underpass is needed for trail uses. The height and width of the structure are greater than a traditional box culvert to allow adequate space for maintenance vehicles under the arch.

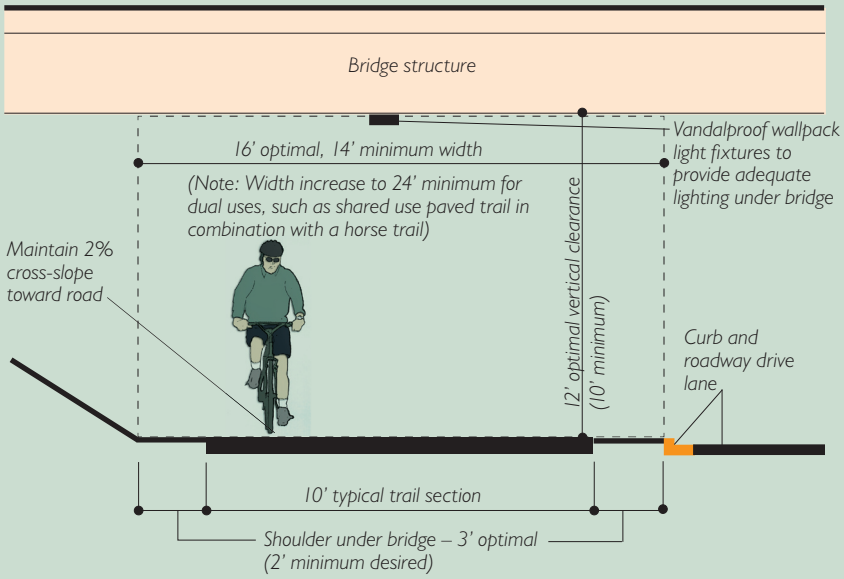
Bebo Arch Special-Use Tunnel

Contrast of sightlines. *Both of these box culverts provide adequate light for visitor safety. The light opening in the center of the box culvert in the right photo greatly improves visibility and will be more accepted by the user. Notably, in both of these cases the shoulder is minimal due to site limitations. For this not to be an issue, visual cues, adequate sightlines, and signage before entering the tunnels are important to alert trail users to a narrowed section.*

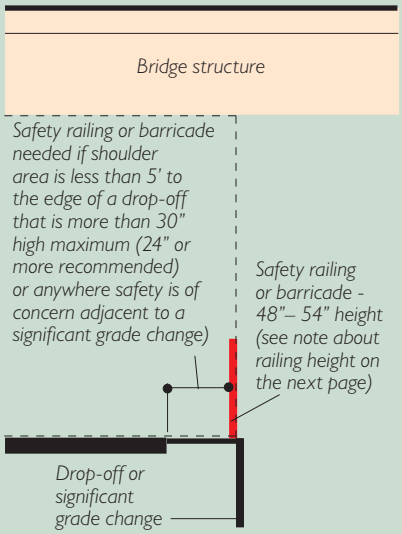
Ornate. *Both of these tunnels are appealing visual features of the trail, rather than a distraction. In the left photo, the box is wide and provides a shoulder and drainage all the way through the tunnel. In the right photo, the ornate character of the box culvert makes it more of a gateway than an impediment to travel. The hardscape around the entrance is also a visual cue for bicyclists and in-line skaters to slow down.*

The clearance zones associated with bridge underpasses have much in common with box culverts, albeit with some notable nuances, as the following graphic illustrates.

Clearance Zone Under Bridges



Under-Bridge Clearance Requirements



Requirements With Grade Change or Drop-off

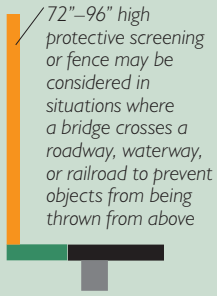
Trail hazard management. *The trail in the left photo illustrates a potentially unsafe condition due to the lack of a fence barrier adjacent to a drainageway of uncertain depth. The limited sight line from both directions make this even a more questionable situation. In contrast, the underpass on the right is also narrow but has a fence barrier to protect trail users from slipping off the trail into a drainageway. The sightlines in this area also allow trail users to see what is coming ahead. The only limitation of this trail is the lack of a shoulder, which only poses a small constraint in this situation.*

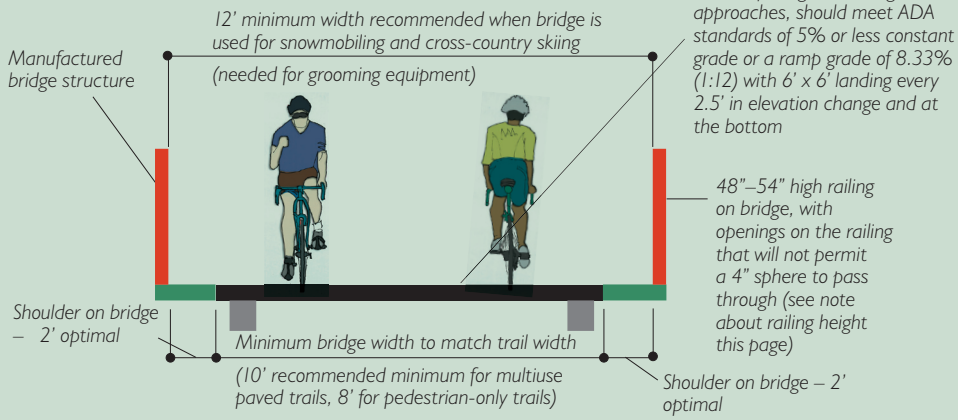
Different shapes and forms. *Bridge underpasses take on many characteristics, as these two photos illustrate. The important common denominator is that the clearance zone requirements are adequately met in each case, making these trails very safe and suitable.*

Grade-Separated Crossings – Bridges

In general, bridge widths should, at a minimum, match the width of the trail. In cases where the trail is groomed for cross-country skiing or snowmobile use, a wider trail is recommended. The following graphic illustrates the key aspects of trail bridge widths.

Bridge Widths and Characteristics





Bridge With Protective Screening

Typical Bridge Requirements

Modern bridges. *Most contemporary bridges are premanufactured steel bridges with an all-weathering steel finish that requires limited maintenance. Decking is primarily treated wood planks laid perpendicular to the trail to prevent bike tires from catching on an edge and throwing a bicyclist off balance. Although steel is often the material of choice, its character can be softened with other materials, such as wood aprons. Note that the bridge is the same width as the trail in the right photo (10 feet). The aprons help alert trail users to the lack of shoulders.*

Contrast of styles. *In many applications, the use of alternative materials has merit to be in sync with the setting. Also, trail widths should be consistent with the intended use. In the left photo, the trail and bridge are 10 feet wide for multiple use. In the right photo, a 6-foot width is appropriate for this pedestrian-only bridge across a small ravine.*

Bridge designs to be cautious about. *In the left photo, the bridge is only 8 feet wide, which is less than the adjoining trails. This can cause conflicts if those using the trail do not go single file across the bridge. In the right photo, the planking runs in the direction of the trail. If used for ATVs or horses, this poses few problems. But bicycle tires can catch on the edges and throw the rider off balance.*

Bicycle Railing Height Guideline

The AASHTO Subcommittee on Design guidelines for railing heights associated with bicycle facilities is the recommended standard for along trails and bridges in Minnesota. The most up-to-date information can be found on the web at cms.transportation.org/?siteid=59&pageid=849. Follow the link entitled Bicycle Railing Height Report and reference pages 34, 35, and 36 for specific railing height recommendations.

In general, the report recommends that railings be a minimum of 48 inches for most applications, with 54" recommended where there is significant potential for a high-speed angular collision with a railing.

At-Grade Crossings and Curb Ramps

The proper design of driveway, roadway, railroad track crossings and curb ramps is an often overlooked yet important aspect of well-designed trails. The following considers the key aspects of these features.

Driveway Crossings

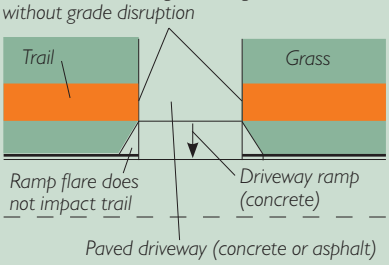
When trails run parallel to a roadway, driveway crossings are routinely encountered. Along urban roads, the curb cuts and ramps for driveways should be designed to minimize disruption to trail gradients and alignments. With rural road sections, maintaining trail continuity is simpler since grade changes due to curb lines do not need to be accommodated. The following graphic illustrates a couple of common examples of driveway crossings associated with an urban road.

Driveway Crossings

The most important aspect of driveway crossings is minimizing disruption to the trail grade as it crosses a driveway or series of driveways. When a ramp is required, it should be at an accessible gradient and long enough to maintain trail flow.

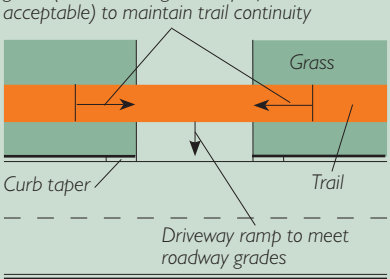
Level Trail With Ramped Driveway Crossing

Trail continues through crossing without grade disruption



Ramped Driveway and Trail Crossing

Trail gradient modified to meet driveway grade (7.1% or less gradient preferred, 8.3% acceptable) to maintain trail continuity



Ramped Trail With Level Driveway Crossing

Ramps follow curb taper to meet driveway grade (7.1% or less gradient preferred, 8.3% acceptable) to maintain trail continuity

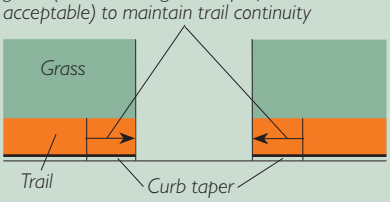


Photo Illustrations Of Various Conditions

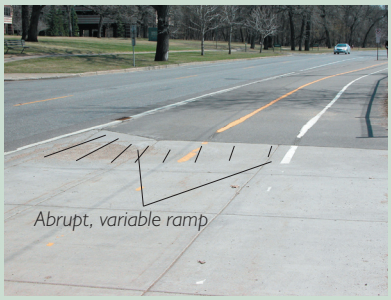
The curb cut is as wide as the trail. *By placing the ramp flares and curb tapers to the side of the trail, overall continuity and ease of use is maintained, with trail users flowing through the crossing unimpeded.*

The consistent trail grade across this driveway is ideal. *Although the driveway crossing gains the attention of the bicyclists, it does not adversely affect the continuity of the trail or pose a nuisance to the rider.*

Although the curb taper is short, this trail grade remains fairly constant and acceptable. *The mailbox is less than ideally located, however.*

Trail accessibility and continuity is compromised by the design of this driveway apron. *The ramp is difficult for wheelchairs to maneuver through and frustrating for bicyclists.*

The use of concrete can help remind trail users to look both ways at a driveway crossing. *The consistent grade is also a positive aspect of this crossing.*



Abrupt pavement changes can catch trail users off guard. *Although difficult to see in the photo, the ramp is uneven and short. This can cause bicyclists and in-line skaters to drift out of their lane into oncoming traffic.*

For more information!

Refer to Mn/DOT's Bikeway Facility Design Manual (2006) at www.dot.state.mn.us/transit/bike/bikedesign.html for additional information.

Roadway Crossings

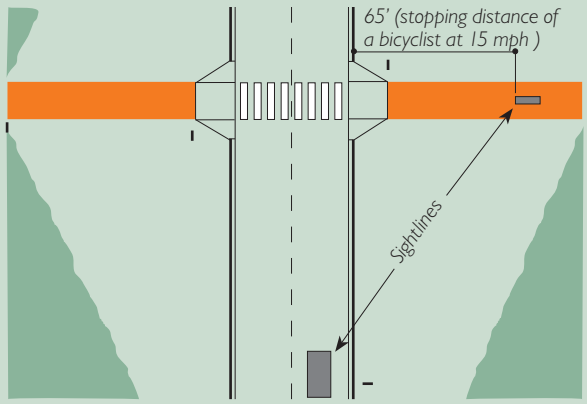
Roadway crossings come in a variety of forms due to site-specific roadway configurations and right-of-way limitations. This is especially the case where trails are retrofitted into an existing infrastructure of roads. All road crossings should be designed to be safe, which means having adequate sightlines, appropriate signage and traffic control devices, and ample time to cross the road between traffic flows. The following graphic provides an overview of sightline distances relative to a motorists speed and reaction time.

Sightline Distance Considerations

The table defines the distance traveled in three seconds at listed speeds, which is the time a motorist needs to react to a bicyclist about to cross the road.

Distance Traveled in Three Seconds at Listed Speeds

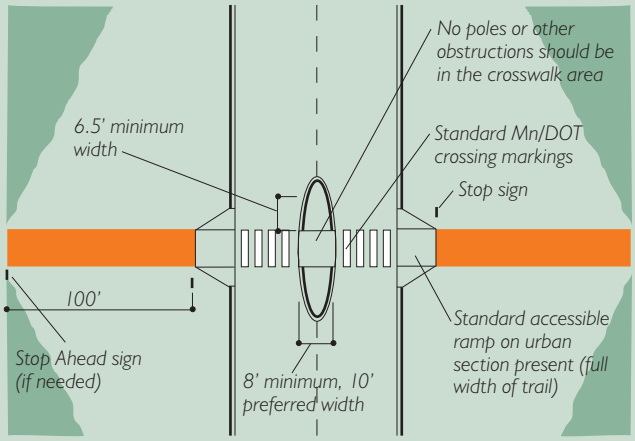
Vehicle Speed (mph)	30	40	45	50	55	60	70
Distance Travel (ft)	132	176	198	220	242	264	308



In general, trail crossings at intersections are favored over midblock crossings because motorists and trail users are inherently more aware of traffic issues at intersections. That said, midblock crossings are common in urban and rural settings and must be accommodated. The following graphics provide design guidelines for the most common forms of at-grade roadway crossings.

Crosswalk Median/Raised Island

The Mn/DOT road design manual recommends pedestrian median islands at intersections wider than 75 feet or when a pedestrian walking at 2.5 feet per second cannot cross the street completely in one green cycle. Islands are most typically used for midblock crossings, but can also be used at intersections.

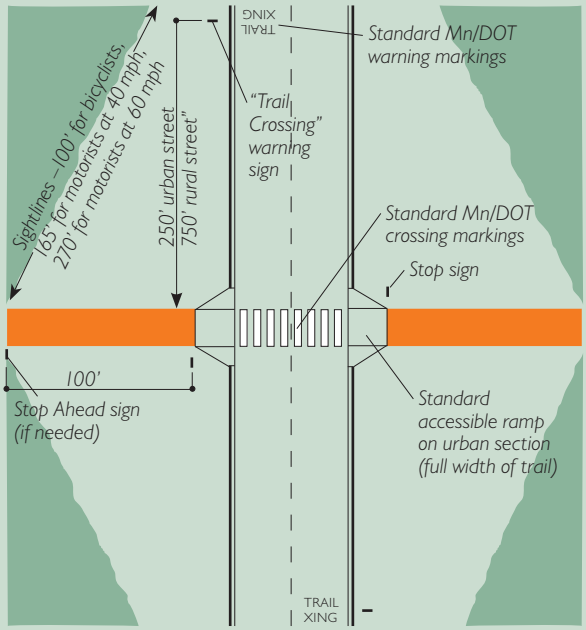


The width of the crosswalk and curb cuts should be 10' minimum. Raised islands should be cut through or have ADA accessible curb ramps with a minimum landing area of 4 feet between ramps.

This midblock crossing has a raised median with a cut through. *This allows trail users to proceed without any ramps or grade changes, so they can focus on the traffic and other trail users.*

Raised island with partial ramp cut-through. *Although the island is a good idea, the cut-through is too narrow, which forces opposing trail users to wait in the middle of the road to pass one at a time. This can pose a safety risk when motorized traffic is approaching from both sides.*

Basic Configurations of Roadway Crossings

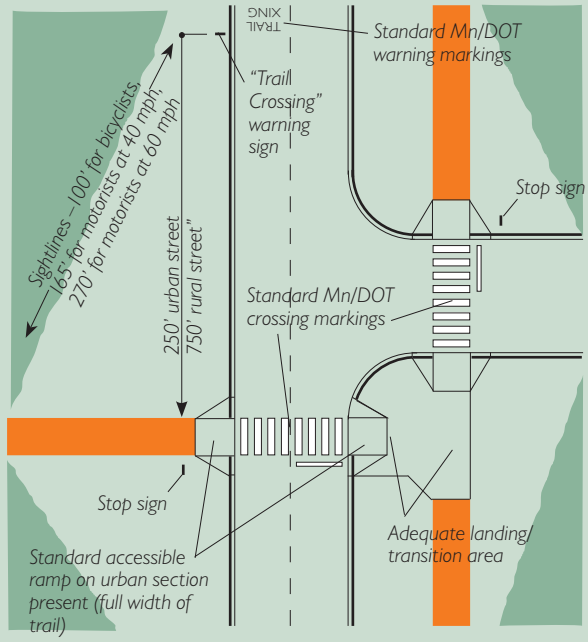


Mid-block Trail Crossing

Midblock crossing in an urban setting works. *Clear sightlines and slower traffic speeds allow for a safe crossing.*

However, this crossing could be improved by widening the ramp to match the width of the trail. (This is considered in more detail on page 5.21)

Standard, easy-to-see at-grade trail crossing in rural area. *This highly visible trail crossing works well in this setting. Although not shown, sightlines from the roadway are open and trail users are easy to see.*



Intersection Trail Crossing

Standard, appropriately positioned crossing. *This crossing at an intersection works well. The only limiting factor is that the accessible ramp is not as wide as the trail, which can cause problems if bicyclists meet on the ramp and are both forced to the center.*

Nicely integrated with streetscape. *Integrating the trail crossing with the streetscape makes it less intimidating to the user. Sightlines and the center island also improve the safety of this crossing.*

The following photos provide examples of at-grade trail crossings of roads to highlight various design techniques.

(Left) The safety of this crossing of a busy road is enhanced by the median. This space gives trail users some protection if they fail to make it all the way across.

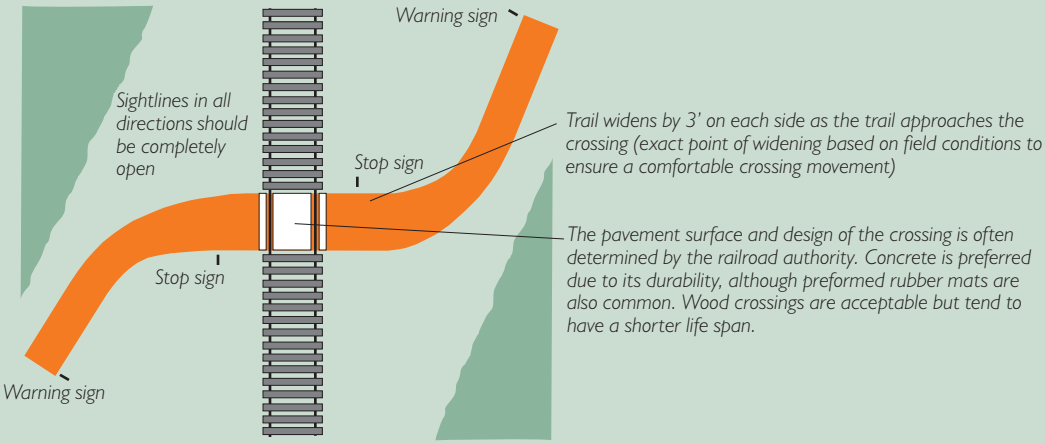
(Right) This landing area is in between the main road and an access ramp to a freeway. Although it is large enough to accommodate a few trail users, the narrow curb forces users to the center of the ramp just when everyone is grouped-up at a constricted point. If the ramp were as wide as the trail, people headed in either direction could stack up beside each with little interference.

Railroad Track Crossings

Railroad crossings require special care. Whenever possible, the approach to the crossing should be at 90 degrees to the track to allow bicyclists and in-line skaters to ride over the pavement gap caused by the rails at a perpendicular angle and to allow trail users to look both ways down the track as they approach the crossing. Crossing angles of between 60 and 90 degrees are acceptable, but should only be used if 90 degrees is not possible. The following graphic and photos provide guidelines and examples of railroad crossings.

Railroad Track Crossings

The preferred crossing width of a railroad track is equal to the width of the trail plus 3 feet on each side to provide adequate maneuvering space at the actual crossing. This is especially important when the trail is adjacent to the track and then curves to make the crossing, which should be as close to 90 degrees as possible. The combination of making the turn and crossing the tracks while looking for trains, observing oncoming trail traffic, and making sure that a wheel does not catch in the rail gap can take trail users attention away from staying in their lane. The extra width provides some recovery space if a user misjudges the corner. Since trains are usually infrequent, trail users often do not stop at the tracks, which underscores the need for plenty of maneuvering space at the crossing area.



This trail crossing, constructed with concrete with steel framing, provides ample shoulder width for maneuvering through this congested area.

The concrete and steel framing of this crossing is very durable and stable. Although acceptable, the less-than-90-degree crossing angle increases the chance of catching a wheel.

Although smooth, this crossing is only as wide as the trail. Given the abruptness of the crossing, more width would make the turn more comfortable and increase the margin of safety.

Wood crossings are common in rural settings and work well if maintained. This crossing could be improved by widening it.

This rail crossing is at an odd angle and could result in a bicyclist catching a wheel while watching for motorists. The formed concrete with steel frame crossing helps limit the chance of that occurring.

This confusing light-rail transit (LRT) and roadway crossing area near a busy intersection poses a challenge even to elite bicyclists. It is also confusing to motorists who are easily distracted from paying attention for trail users.

A handy guide to have!

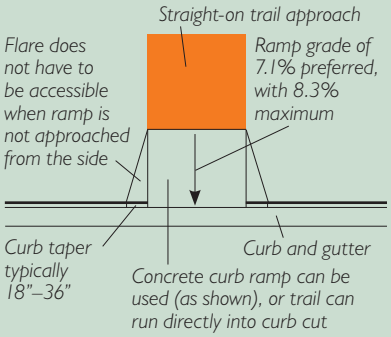
Accessible Sidewalks and Street Crossings – On the Safe Side (see Accessibility of Shared-Use Trails on the next page).

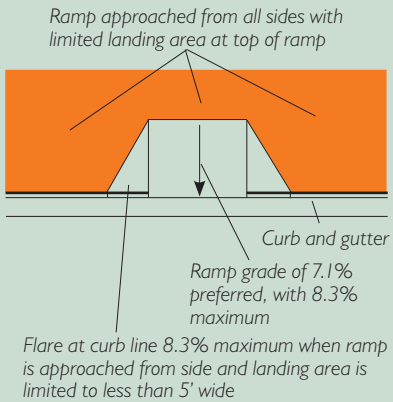
Curb Ramps

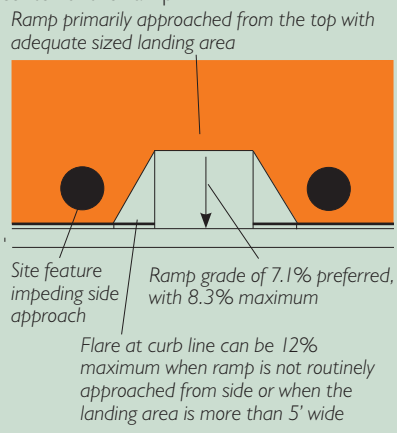
For accessibility, curb ramps should meet or exceed all federal, state, and local requirements. For use with paved trails, curb ramps should also be conveniently located and minimize conflicts between trail users and with vehicular traffic. The following graphic highlights desirable aspects of curb ramps for common trail situations.

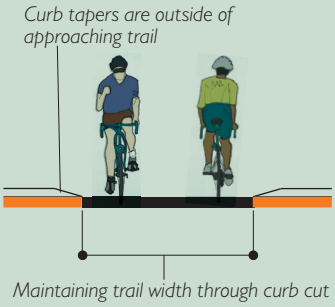
Basic Aspects of Curb Ramps

The most important aspect of curb ramps is gradient. A 7.1 percent slope is preferred for the ramp to allow for construction tolerance, with 8.3 percent the maximum allowed. The gradient on ramp flares at the curb line should also be a maximum of 8.3 percent when the landing area is restricted or where the ramp is routinely approached from the side. *The ramp width (excluding flares/tapers) should match the width of the trail* to avoid forcing two-way traffic into the center of the ramp.









Trail users should not have to change their alignment when traveling through a curb cut. This is especially important on busy trails where numerous trail users can congregate at a crossing and want to get across the ramp at the same time.

This curb cut is not wide enough for bicyclists and in-line skaters to maintain their line through the ramp, creating the potential for conflict and congestion. The bottom of the ramp should match the width of the trail.

This ramp is as wide as the trail, relatively flat with no significant gutter lip, and protected on each side with bollards. Sightlines are also clean to reduce conflicts with motorists.

This is simply a poorly placed ramp and signage combination. The sign is a hazard and the ramp is too small and abrupt to be of much value to trail users, especially bicyclists.

Although a bit crowded, this ramp is wide, flat and has little gutter lip, making it very usable.