Chapter 10: Bike and Pedestrian Paths

The City of Delaware requires the inclusion of new bicycle and pedestrian facilities with all new development activities in accordance with our Bicycle & Pedestrian Master Plan. Not every development will include the construction of a new pedestrian facility; however, the Central Ohio Greenways, Design Guidelines, attached herein and referenced as Exhibit 10-1 (13 pages total), shall be the basis of design in the City of Delaware.



DESIGNGUIDELINES

DESIGN GUIDELINES

These guidelines are intended to assist communities in the early stages of shared-use path development. They are simply meant to highlight some of the basic design requirements so that potential path alignments can be screened for possible physical or geometric restrictions so that they may be excluded early to help minimize preliminary engineering expenditures. They in no way cover all of the technical details that a professional engineer or landscape architect would provide to ensure the path satisfies the American Association of State Highway & Transportation Officials (AASHTO) "Guide for the Development of Bicycle Facilities" and Americans with Disabilities Act (ADA) design standards. They are also not meant to conflict with any formally adopted designed standards by local City Engineer / Public Service offices, Parks & Recreation Departments, or other trail organizations.

Definitions:

The following list of terms and definitions is meant to clarify the terminology common when discussing trails. With so many terms and different types of pedestrian and bicycle amenities, it is important that communities speak the same language---that there is a fundamental understanding and agreement---which allows interagency collaboration. As such, a common vernacular is used throughout this manual in describing the trail, its components, and amenities associated with the Louisville Loop. To ensure a shared understanding of the standards and their implications, a list of terms and their usage have been developed. This list of terms and their definitions are intended to reduce confusion and create uniformity throughout the system.

American Association of State Highway and Transportation Officials (AASHTO): A standards setting body which publishes specifications, test protocols and guidelines which are used in highway design and construction throughout the United States. Despite its name, the association represents not only highways but air, rail, water, recreation trails and public transportation as well.

Americans with Disabilities Act of 1990 (ADA): A federal law prohibiting discrimination against people with disabilities. Requires public entities and public accommodations to provide accessible accommodations for people with disabilities.

Americans with Disabilities Act Accessibility Guidelines (ADAAG): Design guidelines for providing access to a range of indoor and outdoor settings by people with disabilities.

Bicycle Boulevard: A local/neighborhood street is modified, by way of traffic calming, to function as a through street for bicycles while maintaining local access for automobiles. Bicycle boulevards are intended to provide an advantage for bicycles over motor vehicles, introducing low speed traffic conditions, and significantly improve bicycle and pedestrian environment.

Bicycle Lane: A portion of the roadway that has been designated by stripping, signing and pavement marking (bicycle stencil and directional arrow) for the preferential or exclusive use of bicyclists. This facility is typically used by experienced bicyclists.

Bicycle Path: A pathway designated for bicycle use, often a multi-use trail separated from other sidewalks and streets.

Bicycle Route: A designated location, either on or off-street, that is identified and designated as a route for bicycle traffic.

Clear Height (Vertical Clearance): The vertical dimension, which must be cleared of all tree branches and other obstructions that would otherwise obstruct movement along the trail.

Clear Zone: The area over and beside a trail that is cleared of trees, limbs, and other obstructions.

Crossing, Grade-Separated: Overpasses or tunnels that allow trail users to cross a railroad right-of-way or street at a different level than trains or traffic.

Crosswalk (Crossing): Any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Curb Cut: A cut in the curb where a trail crosses a street. The curb cut should be the same width as the trail.

Greenway: A linear open space established along a natural corridor, such as a river, stream, ridgeline, rail-trail, canal, or other route for conservation, recreation, or alternative transportation purposes. Greenways can connect parks, nature preserves, cultural facilities, and historic sites with business and residential areas.

Definitions Continued:

Multi-use / Mixed-Use Path: These terms have been used in the past for separated paths used by pedestrians and bicycles, but are no longer recommended.

Pavement, Porous/Pervious: A special type of pavement that allows rain and snowmelt to pass through it, thereby reducing the runoff from a site and surrounding areas. There are both special asphalt and concrete porous mixtures that satisfy this criteria.

Pavement, Impervious: Hard surfaces that do not allow absorption of water into the soil and that increase runoff. Examples are standard asphalt and concrete mixtures.

Pedestrian: Any person on foot or in a wheelchair.

Rail-Trail (Rail-to-Trail): A multi-purpose, public path or trail (paved or natural) created along an inactive railroad corridor.

Rail-with-Trail: Any shared-use path that is located on or directly adjacent to an active railroad or fixed route transit corridor.

Right-of-Way: A linear corridor of land held in fee simple title, or as an easement over another's land, for use as a public utility (highway, road, railroad, trail, utilities, etc.) for a public purpose.

Railing: A 47.5-inch high railing for guarding against danger at the edge of a deck, bridge, or boardwalk to prevent people from falling. Also a barrier (posts and steel cables or bars) placed along the edge of a highway at dangerous points.

Shared-use Path: Shared-use paths encompass facilities physically separated from motorized vehicular traffic by an open space or barrier and may be used by pedestrians, bicyclists and other non-motorized users. "Shared-use path" is the official term adopted by the American Association of State Highway and Transportation Officials (AASHTO) and the Ohio Department of Transportation (ODOT) for such facilities.

Sidepath: An inferior option to a shared-use path, but superior to a sidewalk. It is usually wider than a typical sidewalk but not as wide as a shared-use path. The separation is usually less than a shared-use path but equal to that of a sidewalk. Sidepaths are often an interim, less preferred solution.

Sidewalk: A paved strip (typically four to five feet wide of concrete construction) which runs parallel to vehicular traffic and is separated from the road surface by a curb and gutter or grass strip that typically provides for above ground drainage of stormwater. Sidewalks are common in urban areas and in some suburban residential areas.

Sight Line (Sight Distance): The visible and unobstructed forward and rear view seen by a trail user from a given point along the trail.

Definitions Continued:

Signage: A board, post, or placard that displays written, symbolic, tactile, or pictorial information about the trail or surrounding area. Signage provides important safety, wayfinding, or educational information to trail users. **The different categories of signage are:**

Regulatory:

- Tells the "rules of the trail" by prohibiting certain uses or controlling direction of travel.

Cautionary:

- Warns of upcoming roadway crossings, steep grades, blind curves, and other potential trail hazards.

Wayfinding:

- Gives street names, trail names, direction arrows, mileage to points of interest, and other navigational information.

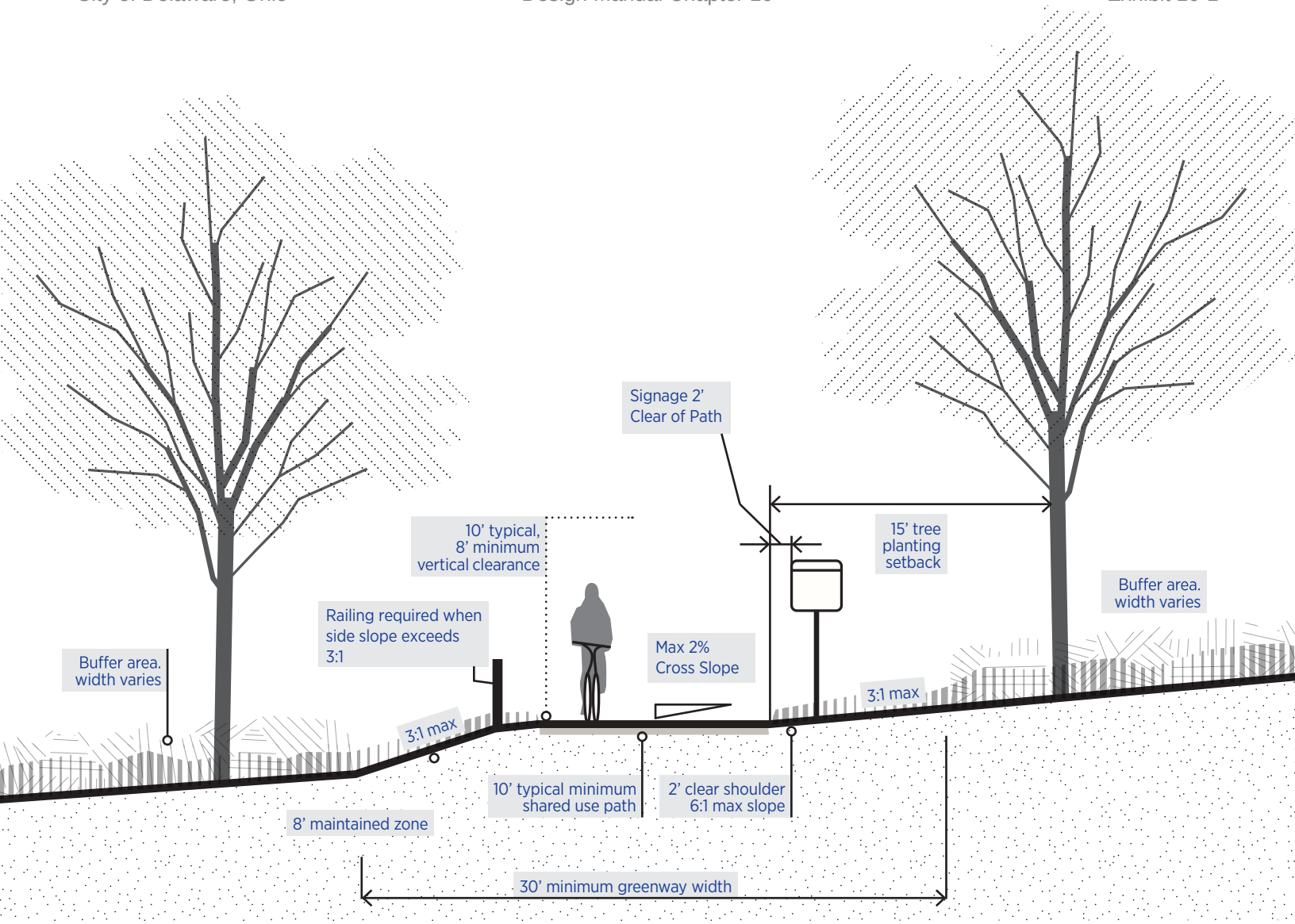
Interpretive:

- Offers educational information that describes and explains a natural or cultural point of interest on or along the trail.

Signed Bicycle Route: A shared lane, without any pavement markings, that is signed for use by bicyclists as a preferred route.

Trail: A trail is a designated route that is physically separated from motorized vehicular traffic by an open space or barrier and may be used by pedestrians, bicyclists and other non-motorized users. "Trail" is the term adopted and regularly used by Central Ohio Greenways (COG) when referring to such facilities.

Trailhead: A physical facility that marks a major access point to a bicycle and pedestrian facility. The shape, size and form of trail head will vary and may include amenities such as parking, transit station, signage, drinking fountain, and art.



TRAIL TYPICAL SECTION

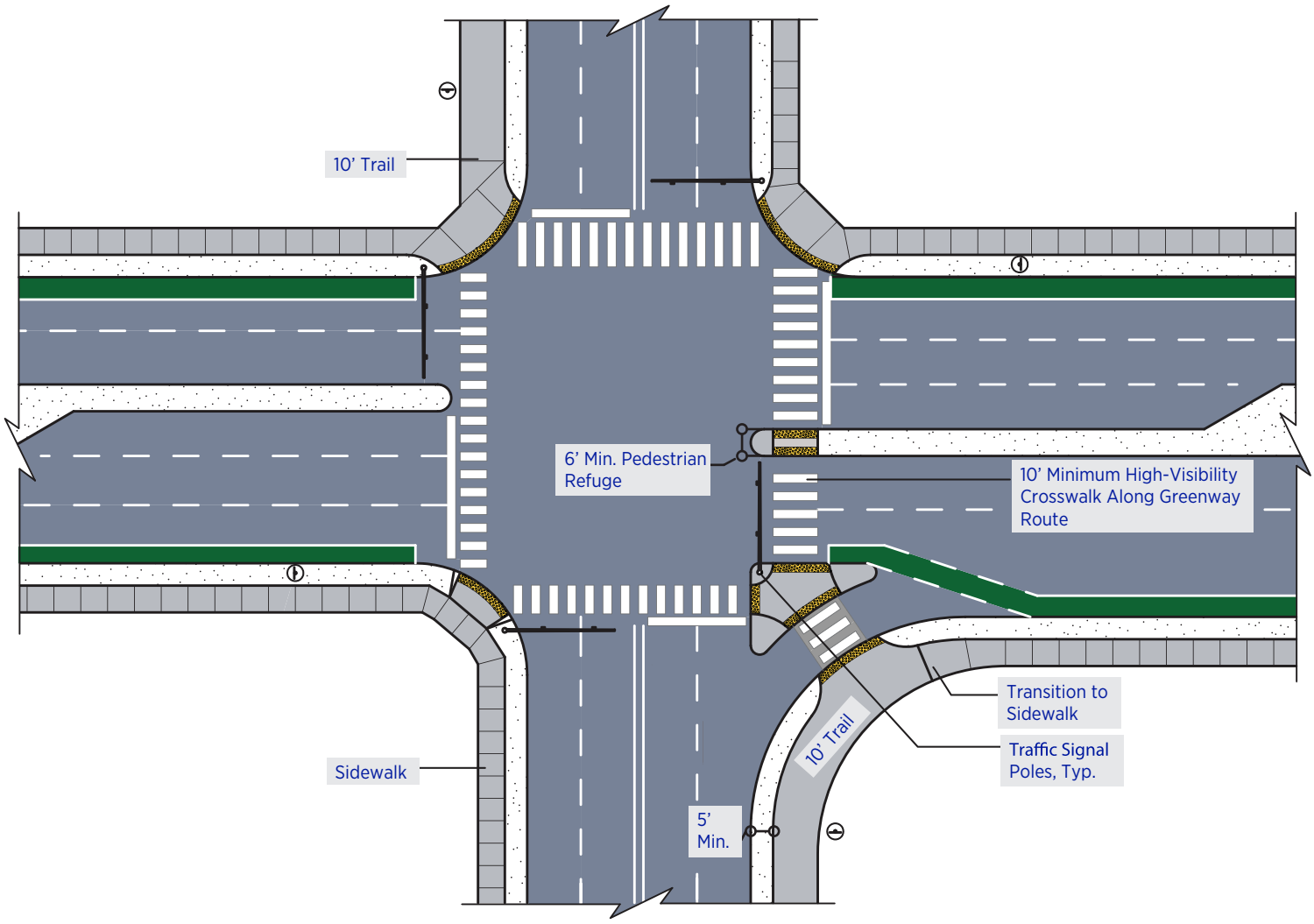
Width: Trail width should typically be 10-foot minimum. In cases of limited right-of-way, an 8 foot wide trail may be used. A wider trail may be necessary in areas that are expected to have a high number of users and/or a greater mix of user types (cyclists, walkers, in-line skaters, etc.) that require more horizontal space for passing.

Paths should have a maximum of a 2 percent cross slope. The maximum horizontal grade should be 5 percent (grades steeper than 5 percent are permitted, but should be limited to distances indicated in the AASHTO guidelines).

Clear Zone: A clear zone should occur on both sides of the shared-use path at a minimum of 2-feet wide. Area should be graded at a maximum slope of 6:1. Additionally, a minimum 1-foot buffer zone between the edge of the graded clear zone and any fixed objects such as signs, mile markers, lighting, or plantings should occur. On bridges this guideline does not apply. The clear zone should include shoulder height obstructions such as pathway signage or fences.

Vertical Clearance: Clear height zone should be a minimum of 8 feet, with 10 feet being typical.

Drainage: Path drainage should be addressed to ensure safe passage for users during moderate rain events.



4-WAY INTERSECTION W/ INTERSECTING PATH

All crossings shall comply with AASHTO and ADA guidelines

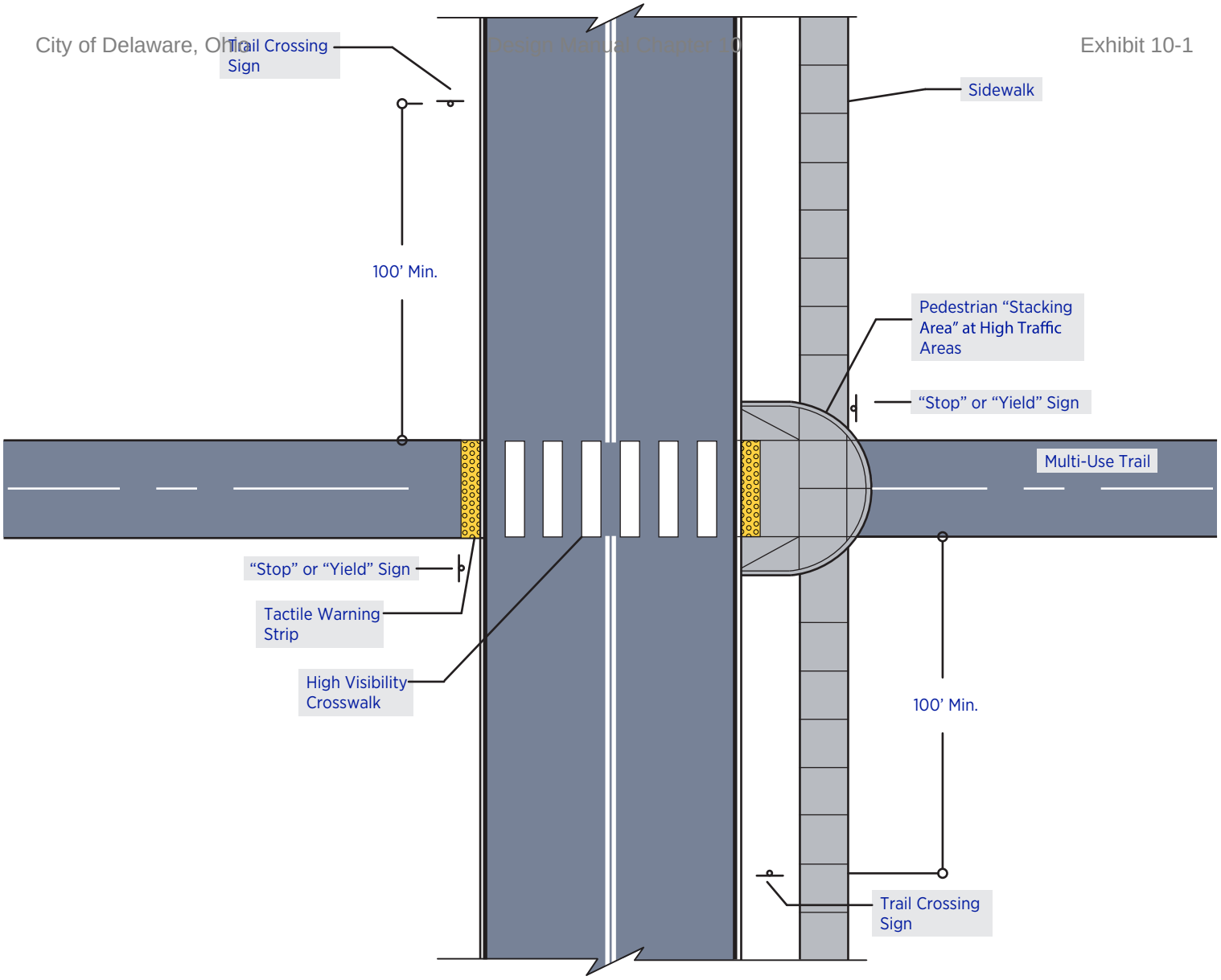
In instances where trails cross through signalized intersections, crossings must be carefully designed and constructed to ensure safety of pedestrians, trail users, and vehicles. For trail users, it is also important that there is a visible, obvious route for the trail or greenway through the intersection. This is especially important at intersections where the trail crosses two streets. This standard illustrates how greenway routes should be incorporated into the design of signalized intersections.

DESIGN:

- At major roadway crossings such as this, the overall design shall be dictated by the Engineering / Public Service Department responsible for the roadway.
- Greenways should be constructed to merge into the existing pedestrian walks at the intersections.
- Sufficient space should be provided to accommodate bicycles and other users from the trail.

MARKINGS:

- Vehicular-scaled signage should be incorporated into the intersection to alert motorists that the greenway route is passing through the intersection.
- If the greenway follows the street well before or beyond the intersection, an additional identification sign should be placed between the trail and street in advance of the intersection to alert motorists that the greenway is sharing the street corridor.
- Crossings should be designed to provide high visibility. High visibility lane markings and signage should be used to call attention to the crossing. All signage shall conform to MUTCD standards.
- For the trail route, the crossing markings shall be the same width as the trail route, or 10' minimum width.
- Pedestrian-activated signals are desired. Signals with "countdown" display preferred.



MID-BLOCK CROSSING: ARTERIAL/COLLECTOR STREETS

All crossings shall comply with AASHTO and ADA guidelines.

Mid-block crossings may be used with special design consideration that include pedestrian crossing signals, pavement markings and signs on the roadway. For vehicles, it is critical that they are alerted and aware of the crossing well in advance. This standard illustrates how mid-block crossings should be used on arterial & collector streets.

TRAILS:

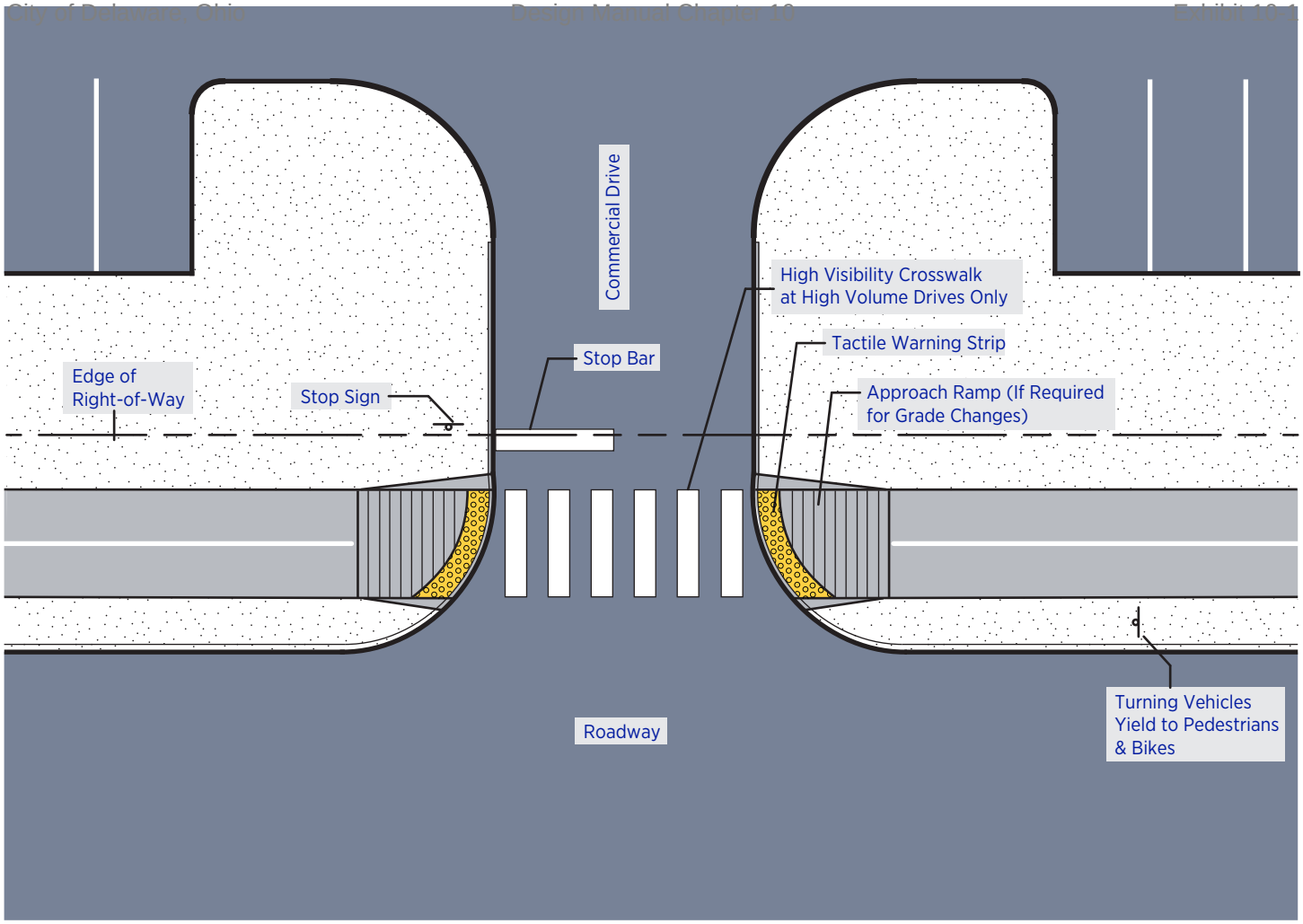
- The trails should cross streets at **90-degree** angles.
- Where trails approach a crossing at a skew, the trail should ideally be routed so that the physical crossing is at 90 degrees to the street; or as close to 90 degrees as practicable.
- When determined to be necessary, pedestrian stacking areas shall be provided at each edge of the crossing and shall be shall be sized to accommodate users waiting to cross the street.

MARKINGS:

- High visibility pavement markings and signage should be used to call attention to the crossing.
- All regulatory signs and markings, for the both streets and trails, should comply with MUTCD's Traffic Controls for Bicycle Facilities.
- Crossing markings shall be the same width as the trail.

TREATMENTS:

- Treatments to increase visibility of the crossing or to increase motorist yielding to trail users, such as overhead signs or pedestrian-activated RRFBs, may be used at mid-block crossings.
- Such treatments should be evaluated on a case-by-case basis depending on the volume/speed of vehicular traffic and volume of trail user crossings during peak vehicle periods.



COMMERCIAL DRIVE CROSSING

All crossings shall comply with AASHTO and ADA guidelines.

In some areas where a greenway follows a street corridor, crossings of commercial drives will be required. Because of the volume and frequency of vehicular traffic at these drives, special design considerations are required to promote awareness of the greenway and ensure the safest condition for both trail users and vehicles. This standard illustrates a typical standard for commercial drive crossings.

TRAILS:

- The trails should cross streets at **90-degree** angles.
- Where trails approach a crossing at a skew, the trail should ideally be routed so that the physical crossing is at 90 degrees to the street; or as close to 90 degrees as practicable.

MARKINGS:

- High visibility pavement markings and signage should be used to call attention to the crossing at high volumes drives.
- All regulatory signs and markings, for the both streets and trails, should comply with MUTCD's Traffic Controls for Bicycle Facilities.
- Crossing markings shall be the same width as the trail.

STOPPING:

- For commerical drive crossings, vehicles exiting a commercial use and entering the street should be required to stop prior to proceeding through the crossing.
- Signage and pavement markings should comply with MUTCD's Traffic Controls for Bicycle Facilities.
- Warning signs should be used along the street for vehicles turning into the commercial drive.
- These drivers should be required to yield to trail users.
- Trail users shall not be required to stop, although measures should be taken to make them aware of the potential interaction with vehicles.
- Warning signs should be used to alert trail users of the approaching traffic.

RESIDENTIAL DRIVE CROSSING

In some areas where a trail follows a street corridor, crossings of residential drives will be required. Since traffic volumes and frequency are low at these crossings, these crossings should be treated differently than commercial drives and minimal design treatments are required. This standard illustrates a typical standard for residential drive crossings.

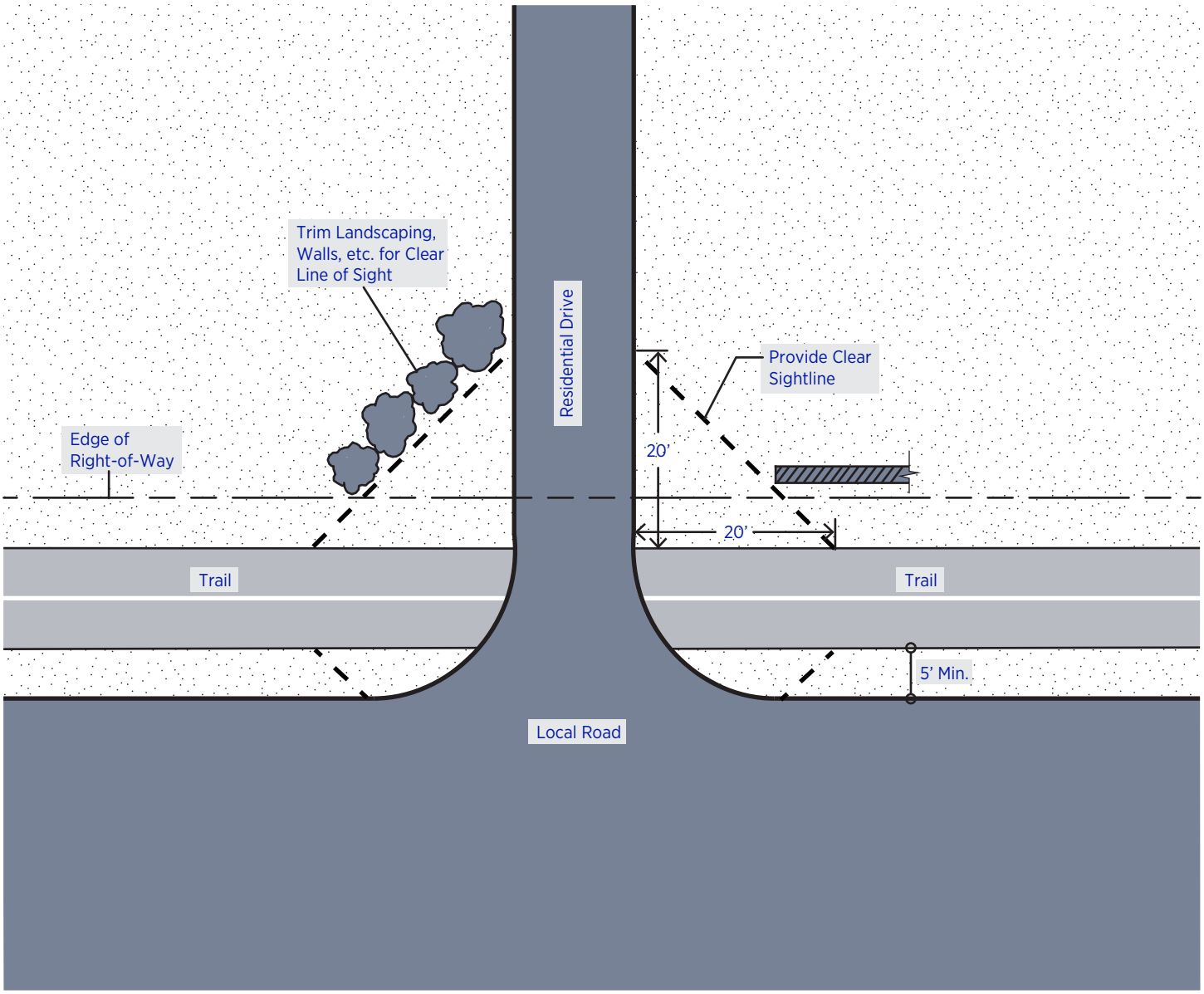
TRAILS:

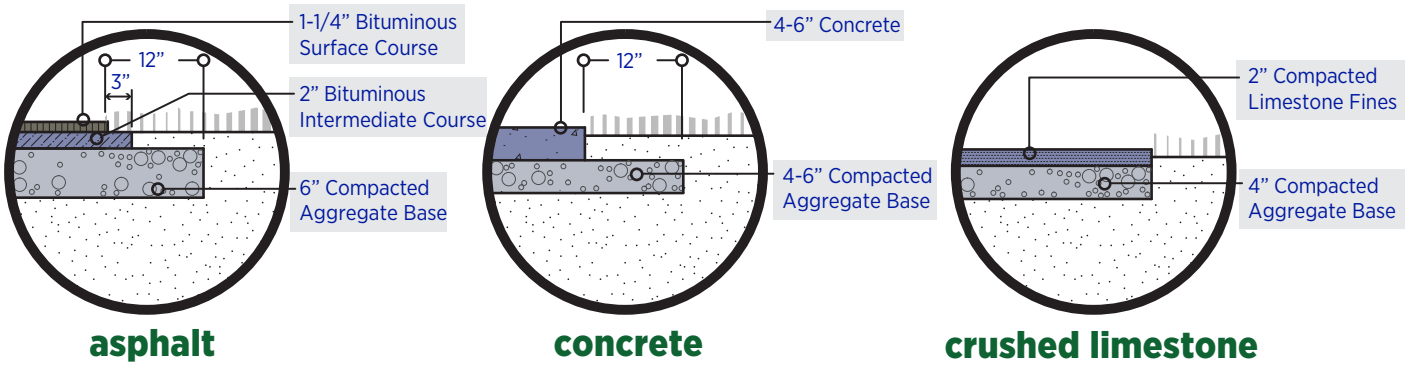
- For residential drive crossings, ensure that clear sightlines are maintained within 20' of the drive.
- Do not include enhancements or any other potential visual obstructions within 20‘ of the drive.

MARKINGS:

- Warning signs and pavement markings should not be used unless there are extenuating circumstances where their use is mandated.

All crossings shall comply with AASHTO and ADA guidelines.





TRAIL CONSTRUCTION: PAVEMENTS

Trail materials and designs should comply with local agency design standards. This page shows minimum recommendations.

Asphalt Paving:

- Asphalt cross section shall meet the minimum depths, thicknesses, and base materials as illustrated above.
- Design width and other spatial standards should be consistent with the design standards illustrated in the geometric standards noted elsewhere.
- Pervious asphalt designs are encouraged.

Concrete Paving:

- Concrete pavement may be used in certain circumstances such as areas with annual flooding, urban areas, or other areas where substantial benefit or durability can be gained through the use of concrete.
- These areas should be dictated by site specific evaluation.

Crushed Limestone Paving:

- Crushed limestone paving cross section shall meet the minimum depths, thicknesses, and base materials as illustrated above.
- The use of crushed limestone is not the most preferred method of construction, but is an option open to agencies.

All pavements and bases shall be designed to accommodate the weight of service, security, and emergency vehicles and meet ADA accessibility requirements.

RAILINGS

Height:

47.5” Min, up to 54” where conditions warrant extra protection.

Railing should not encroach into required 2’-0” clear zones adjacent to greenways.

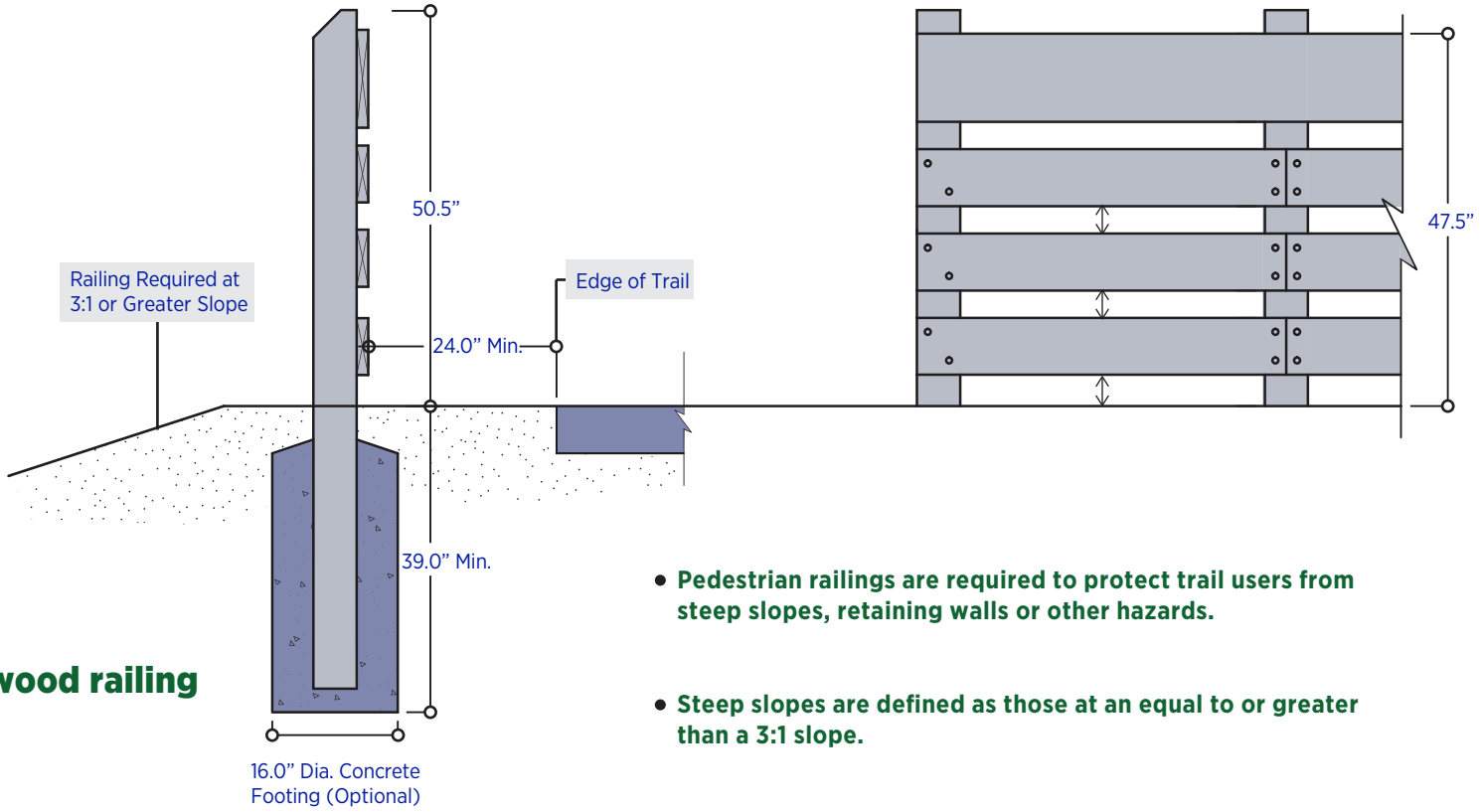
Utilize cable railing in areas where wood railings would interrupt desirable views such as along stream corridors.

Lumber:

Pressure-treated and/or decay-resistant lumber, stainless steel cable systems and other weather-resistance materials should be considered for railing construction.

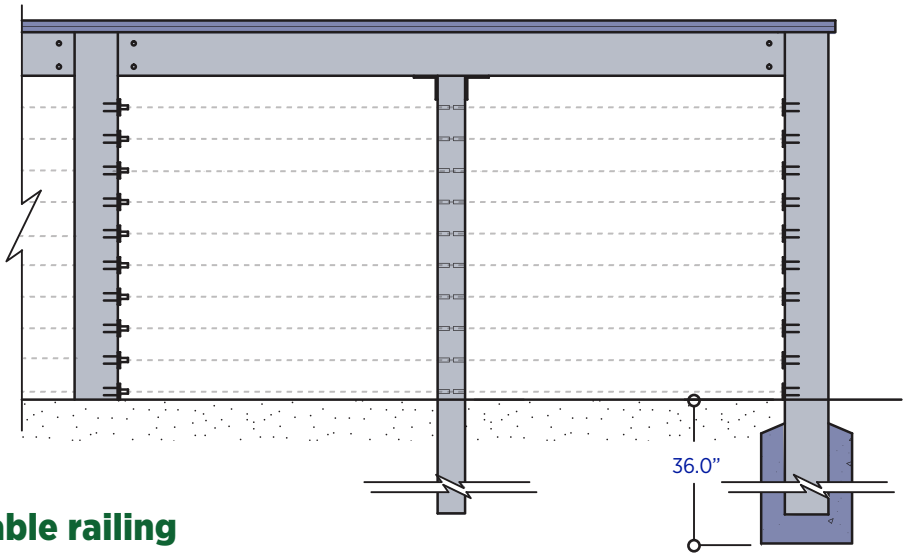
Pedestrian railings:

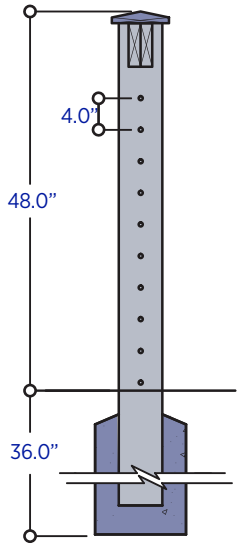
Railings shall be designed to meet both recreational and transportation standards including AASHTO and ADA.



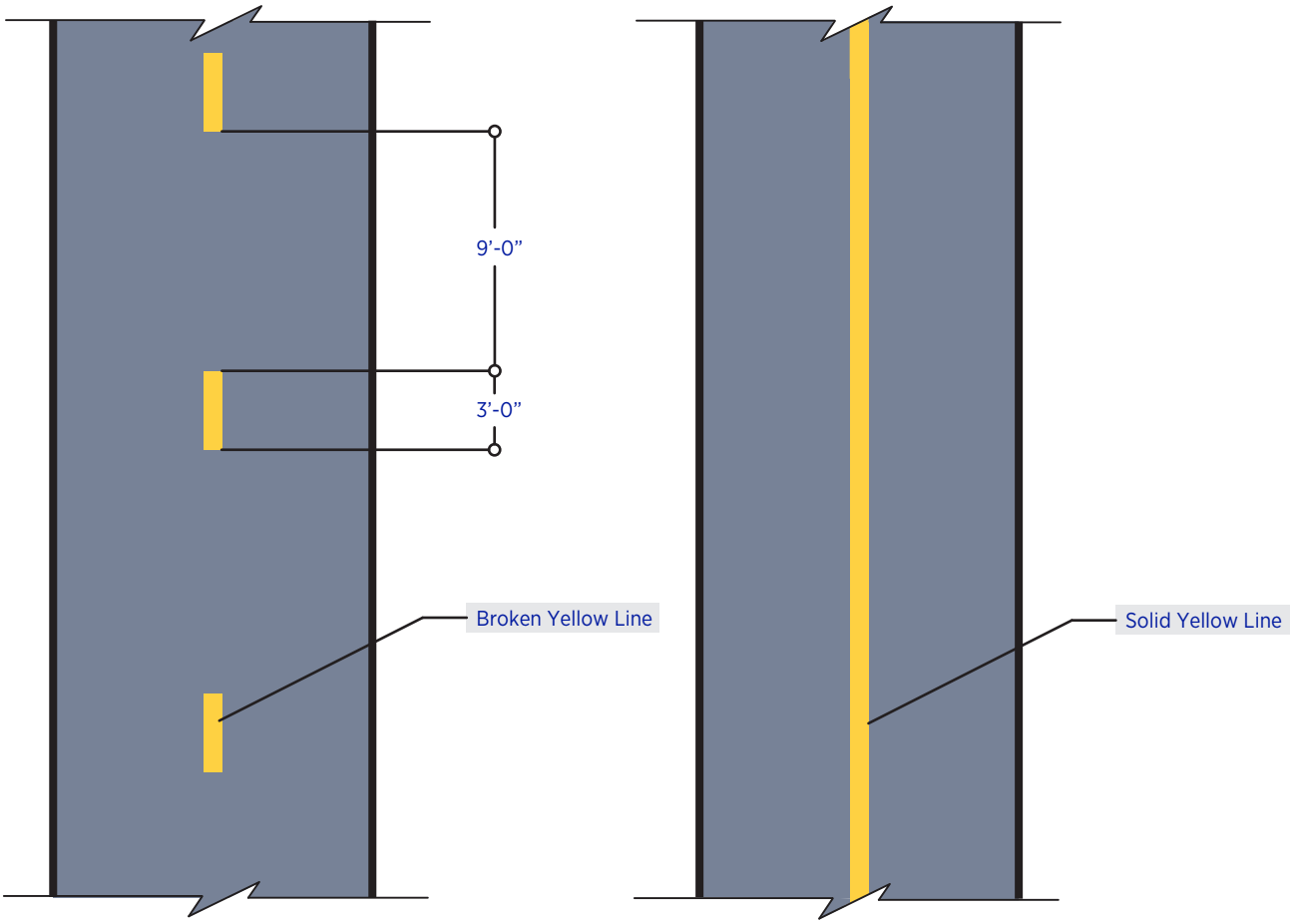
wood railing

- **Pedestrian railings are required to protect trail users from steep slopes, retaining walls or other hazards.**
- **Steep slopes are defined as those at an equal to or greater than a 3:1 slope.**





cable railing



passing permitted **passing not permitted**

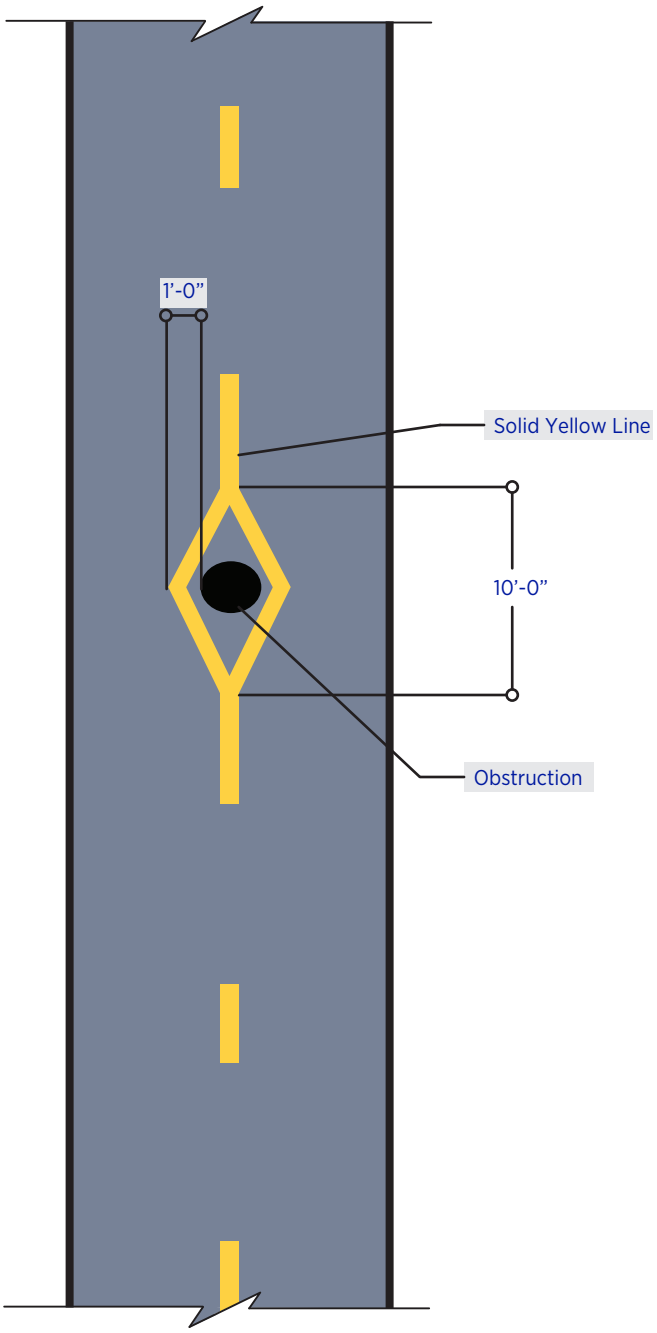
PAVEMENT MARKINGS

DESIGN:

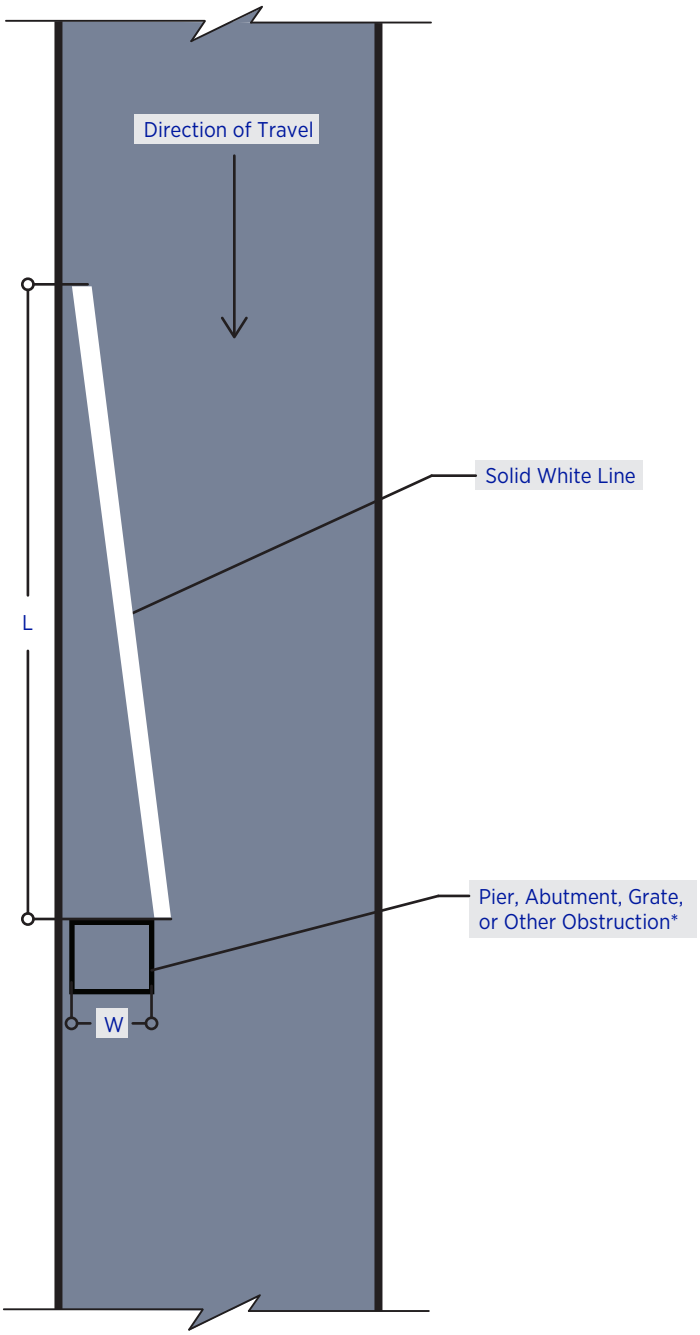
- Typically use pavement markings on high-volume trails only.

MARKINGS:

- Avoid the use of "thermoplastic" marking on trails.



obstruction within path



obstruction at edge of path

OBSTRUCTION PAVEMENT MARKINGS

DESIGN:

- **L = WS**, where W is the offset in feet and **S** is bicycle approach speed in mph
  - * Provide an additional foot of offset for a raised obstruction and use the formula **L = (W+1)S** for the taper length

MARKINGS:

- Avoid the use of "thermoplastic" marking on trails.