

CHAPTER 9: SIDEWALK DESIGN

Sidewalks and walkways should provide a continuous system of safe and accessible pathways for pedestrians. Decisions on whether to provide a sidewalk should not be based on existing pedestrian volumes because they are not a reliable indication of pedestrian demand. Individuals tend to walk in locations where continuous connections are provided. A lack of pedestrian activity in a location with discontinuous sidewalks is, therefore, not necessarily an indication of a lack of pedestrian demand.

All roadways should have some type of walking space outside of the vehicular travelway. Pedestrian walkways should be provided on both sides of the roadway in all urban and suburban areas of the State. When a sidewalk is provided on only one side of the roadway, pedestrians traveling on the opposite side may not cross to the sidewalk, and may instead elect to walk in the roadway. If pedestrians do cross, they increase their exposure to vehicular traffic. Though it may be appropriate for some roadways in developing areas to temporarily have a pedestrian walkway only on one side, sidewalks on both sides are necessary for pedestrian-compatible roadways.

9.1 Pedestrian Accommodations in Rural Areas

In rural locations sidewalks may not be feasible due to lack of development or destinations, cost, environmental, or other considerations. In these locations, multipurpose (4' - 6' wide) shoulders adjacent to the traveled way or separated pathways should be considered. Roadway shoulders should be paved to accommodate pedestrians as well as bicyclists. Separated pedestrian paths should be a minimum of 5' wide (unless they are intended for shared use with bicycles, in which case the provisions in Chapter 6 apply), and may be constructed of asphalt or concrete. The *AASHTO Green Book* provides additional information on shoulder width and cross-slope.

When installing a separated pedestrian walkway along a rural road with an open section, the location of drainage ditches, buildings, retaining walls, utility poles, bus stops, vegetation, and significant roadside grade changes should be carefully coordinated with the pedestrian walkway alignment to ensure adequate sight distance, and separation between pedestrians and vehicular traffic.

9.2 Meandering Sidewalks

Meandering sidewalks (sidewalks that weave back and forth within the right-of-way) are generally discouraged. While they may seem visually interesting, pedestrians prefer a direct, non-circuitous route. Meandering sidewalks cause navigational difficulties for pedestrians with vision impairments. There are circumstances, however, when it is desirable to curve the sidewalk away from the road, such as when an opportunity arises to achieve a greater degree of separation between the road and the sidewalk (i.e. wider buffer). It may also be desirable for a walkway to gently curve to meet a pedestrian destination, such as a plaza, or to align with driveway crossings and crosswalks, or to avoid wetlands or significant trees. This type of shift is acceptable, as long as the purpose of the shift is to create a more direct connection, or to improve the comfort and/or safety of pedestrians, rather than to provide curves that are intended merely to enhance aesthetics. Sidewalks may also shift position at driveways and intersections in order to achieve the optimum location for an accessible crossing.

9.3 Sidewalk Design

Figure 9.1 shows guidelines for the design of sidewalks, including width and cross slopes.

Sidewalk Buffer Zone

A pedestrian's safety and comfort in the roadway environment is largely dependent on the width and quality of the buffer between the sidewalk and the roadway. Physical barriers between the sidewalk and roadway (such as street trees, landscaping, bike lanes and parked cars) will increase pedestrian safety and comfort, and therefore encourage higher levels of walking.

On-street parking has a very positive effect on pedestrian comfort. Along some arterial and collector streets in areas that are seeking to enhance and/or introduce a traditional commercial core (with stores/businesses in front and parking lots behind), it may be feasible to add on-street parking lanes.

Approved tree species for SHA rights-of-way and public easements are listed in the "Roadside Tree Law Recommended Tree List." For narrow landscape buffers less than 5 feet wide, care should be taken to use shade tree species that can survive in a narrower space and have less invasive root systems, such as varieties of maple and oak trees. Large shade trees are preferred to medium and small trees that do not offer as much shade.

Street trees should typically be placed no closer than 30 feet on center, and no greater than 60 feet on center, depending on the species of tree. In locations with no buffer strip, consideration can be given to providing tree planting behind the sidewalk, which may improve aesthetic conditions and provide shade, but will not improve pedestrians' sense of safety in the roadway environment. Planting trees behind the sidewalk should not be done in new developments or retrofits (such as a road diet) where there is room for a buffered planting strip. Street trees should not be positioned so as to block sight distances at intersections and driveways.

In retrofit locations where the sidewalk is unavoidably placed adjacent to the curb, an additional 2-feet of sidewalk width should be provided. Sidewalks placed directly adjacent to retaining walls or other vertical obstructions should also be increased in width by 2-feet.

9.4 Curb Ramp Design

For guidance on curb ramps and other accessibility issues, refer to SHA's *Accessibility Policy & Guidelines for Pedestrian Facilities along State Highways*. In the past, some engineers have denied requests for curb ramps in an effort to discourage crossing at uncontrolled legs of intersections. Pedestrians have a legal right to cross the roadway at uncontrolled crosswalks and when curb ramps are not provided at legal crossings, some pedestrians are physically unable to do so. For this reason, it is necessary to provide curb ramps at uncontrolled locations (such as "T" intersections) as well as conventional four-legged intersections.

Curb ramps are also needed at the ends of sidewalks where they do not terminate at an intersection, so that pedestrians can safely access the roadway shoulder.



Figure 9.2 - Example of a Great Sidewalk



Figure 9.3 - Example: of a Sidewalk with Buffer Zone

NOT TO SCALE

RECOMMENDED BUFFER AND SIDEWALK WIDTHS

Location	Buffer Zone Width	Through Pedestrian Zone Width
Residential Street	5'	Min. 5'
	0*	Min. 6'
Local/Collector Street- Non CBD	5'	Min. 5'
	0*	Min. 7'
Arterial Street- Non CBD	5-6'	6-8'
	0*	8-10'
Central Business District (CBD)	Buffer to Correspond to Type of Street	Min. 10'

* Buffer widths less than 5' are only acceptable in retrofit situations where no new right-of-way is acquired. Any buffer width is better than none. Where buffer width is less than 5' it is important that additional sidewalk width be provided.



Right-of-Way or Building

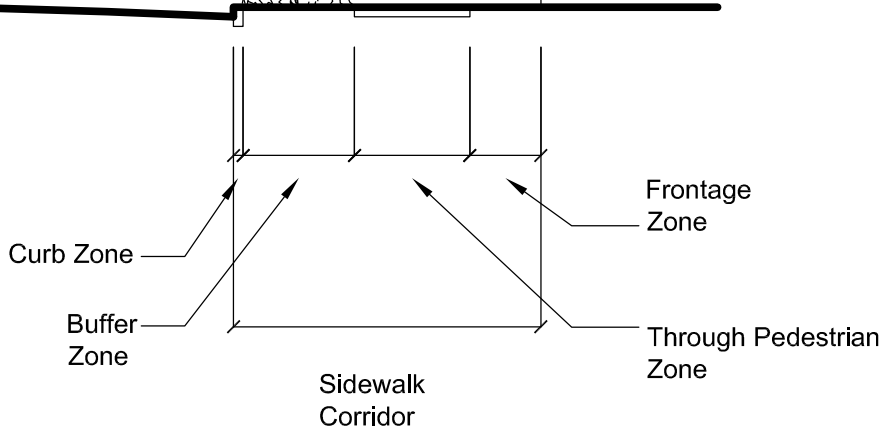
DEFINITIONS:

Curb Zone - The horizontal surface of the curb

Buffer Zone - The area between the through pedestrian zone and the street. May contain street trees, newspaper boxes, street signs, etc.

Through Pedestrian Zone - The area where pedestrians walk

Frontage Zone - The area between the through pedestrian zone and the right-of-way line. In downtown areas, this is the **shy area** next to a building where pedestrians tend not to walk. It is typically 2' in width.



DESIGN OF THE THROUGH PEDESTRIAN ZONE:

- Minimum clear width of 5' (Width measurement should not include curb)
- It is undesirable for the through pedestrian zone to be located immediately adjacent to the roadway
- Shall be completely free of protruding objects
- Ground surface shall be firm, stable, and slip resistant
- 2% max. cross slope
- Running slope must be equal or less than that of the adjacent roadway

DESIGN OF THE BUFFER ZONE:

- Width is measured from the face of curb to the nearest edge of the sidewalk
- Street trees are recommended where possible (30-60' on center)
- On-street parking and bike lanes can act as a buffer
- Utilities should not be placed directly beneath the buffer zone if trees are present

Figure 9.1 - Sidewalk Design

Handrails on Sidewalks

Handrails are required when the through pedestrian zone is adjacent to a vertical drop of 2.5' or more. Sidewalks with running slopes less than or equal to the slopes of the adjacent roadway are not considered ramps, even when they are at grades greater than 5%. As a result, they are exempt from the requirements for running slope in the Americans with Disabilities Act, including the requirements for handrails.

9.5 Sidewalk Design on Bifurcated Roadways

For the purpose of this document, a bifurcated roadway is one where the sidewalks are raised above or set below the elevation of the roadway. Bifurcation is typically used in environmentally sensitive areas or hilly terrain and is often accomplished with the use of roadside barriers and small retaining walls. See Figure 9.4 for more information.

9.6 Options for when Street and Building Entrances are at Different Elevations

Sometimes building entrances are at different elevations than the adjacent sidewalks. Figure 9.5 provides four options for maintaining accessibility in these situations.

9.7 Entrance/Driveway Design

Standards for the design of driveway entrances are discussed in the *Maryland State Highway Access Manual* (SHA). The *Access Manual* describes six different types of entrances: 1) depressed curb entrances (which include both residential and commercial applications); 2) commercial two-way entrances; 3) commercial one-way entrances; 4) commercial right-in/right-out entrances; 5) monumental entrances; and 6) special entrance designs. All six different entrance types will not be discussed in detail here except to describe design considerations for pedestrians.

Depressed curb entrances have flared sides and are what most designers think of as driveways (examples are shown in Figures 9.7, 9.8, and 9.9). They are the preferred type of entrance for locations where pedestrian volume is expected to be high. A sidewalk that remains level across a driveway best meets the intent of ADA and most accurately reflects the fact that pedestrians have the right-of-way on sidewalks.

All of the remaining types of entrances are between curbed sides and therefore function much like roadway intersections (an example is shown in Figure 9.10). According to the *Highway Access Manual* depressed curb entrances are appropriate as follows:

- Depressed curb entrances are appropriate for use along lower speed highways in urban settings, where significant pedestrian traffic is anticipated and highway capacity issues are not a primary concern. The posted speed should be no higher than 40 mph.
- The use of depressed curb entrances is restricted to undivided highways and divided highways that have a raised median.

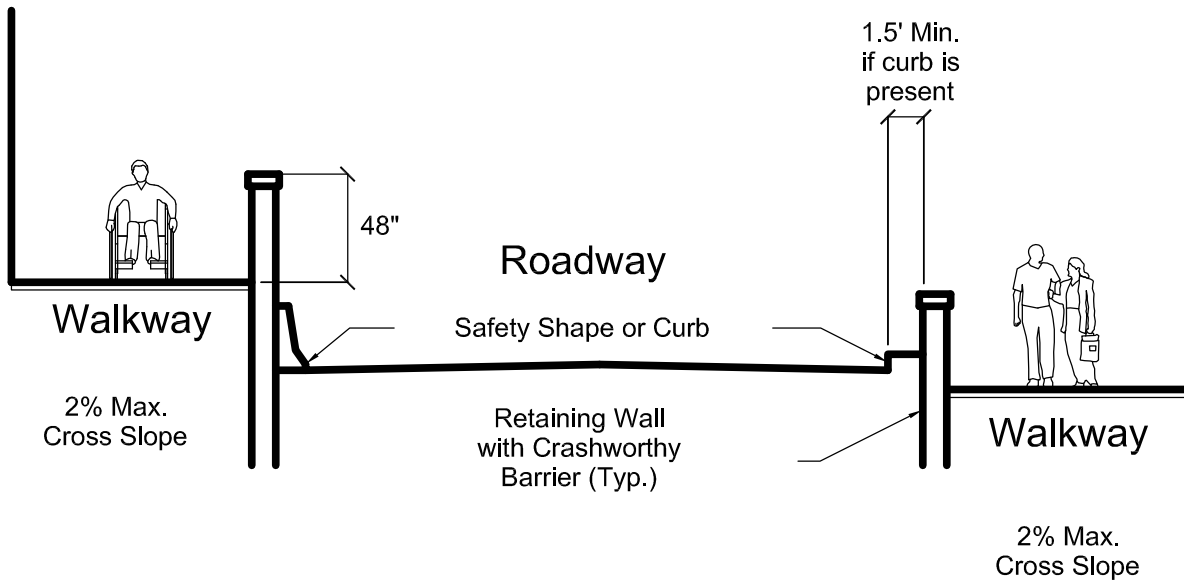


Figure 9.6 - Example of Building Entrance Higher than Sidewalk



Figure 9.9 - Example of a Continuous Pedestrian Route over a Depressed Curb Entrance where there is a Buffer between the Sidewalk and the Curb (An example application of Standard No. 630.02)

NOT TO SCALE



DEFINITION:

Bifurcated Roadway - For the purpose of this document, a bifurcated roadway is one where the sidewalks are raised above or set below the elevation of the roadway. Bifurcation is typically used in environmentally sensitive areas or hilly terrain and is often accomplished with the use of roadside barriers and small retaining walls.

DESIGN OF BIFURCATED SIDEWALKS:

- The barrier between the roadway and the sidewalk should be crashworthy and have the ends protected if within the roadway's clear zone.
- If used in curbed roadway sections, the barrier should be placed a minimum of 1.5' behind the face of curb.
- The 1.5' is not considered the roadway's clear zone.
- Refer to the AASHTO Roadside Design Guide for proper clear zone determination.

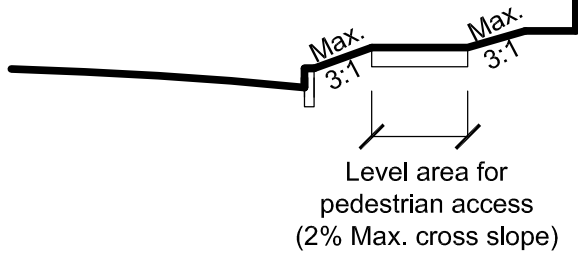
NOTES:

When elevation differences between adjoining properties and the street are less significant, other options can be used, as shown in Figure 9.5.

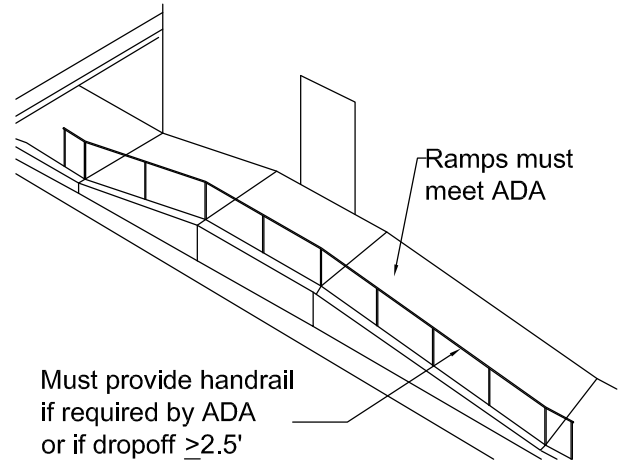
Figure 9.4 - Bifurcated Roadway and Sidewalks

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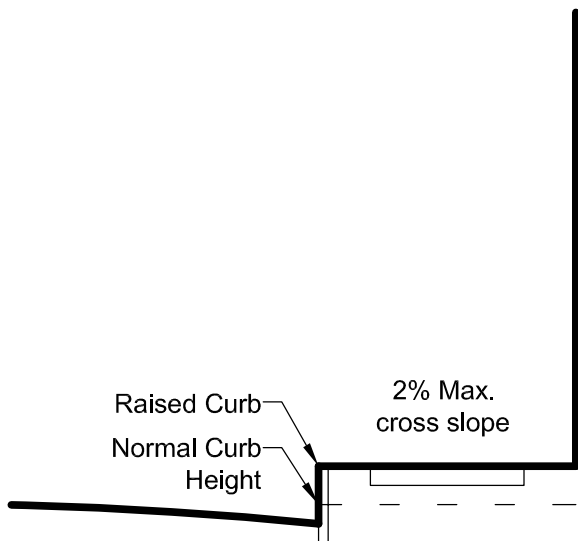
OPTION 1:
Slope Furnishings Zone
and Frontage Zone



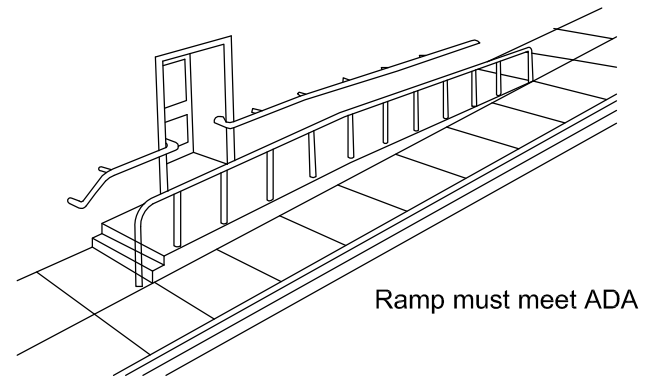
OPTION 2:
Ramp Entire Sidewalk



OPTION 3:
Raised Curb



OPTION 4:
Ramp Adjacent to Sidewalk



SUITABLE LOCATIONS:

- In locations where the elevation of the building entrance was not coordinated with the elevation of the street resulting in either steps or a through pedestrian zone with a steep cross-slope

NOTE:

- Handrails as required per Section 9.4

All drawings adapted from
*Designing Sidewalks and
Trails for Access-- Part 2, Best
Practices Guide*

Figure 9.5 - Options for where Street and Building Entrances are at Different Elevations

- Depressed curb entrances are not appropriate for one-way entrances.
- Depressed curb entrances should be reserved for sites that will not generate sufficient traffic to have a significant effect on the highway traffic stream.
- Depressed curb entrances shall not be used on primary highways, in the interest of minimizing traffic interference due to turning vehicles.

The Book of Standards for Highway & Incidental Structures includes details for different methods of constructing depressed curb entrances for residential and commercial use (SHA). For the design of sidewalks in relation to depressed curb entrances, see Standard Numbers 630.01 and 630.02. The best driveway entrances are in locations where there is a 24 inch or greater buffer zone between the sidewalk and the curb. Standard Number 630.02 is used in these locations (see Figure 9.9). This is the most desirable type of driveway entrance because pedestrians are not deflected horizontally or vertically from their path of travel. In locations without a buffer zone or in locations where the buffer zone is less than 24 inches, Standard Number 630.01 should be used. Standard Number 630.01 requires that pedestrians are deflected horizontally, vertically, or both from their path of travel (See Figure 9.7 and 9.8).

Both standards 630.01 and 630.02 maintain an accessible route over the entrance, which is required by SHA's *Accessibility Policy & Guidelines for Pedestrian Facilities along State Highways* and the Americans with Disabilities Act (maximum cross slope is 2%). In locations with numerous entrances it is important to remember that pedestrians are sensitive to increases in walking distance which may result from horizontal deflection of the sidewalk around the entrance. This sort of deflection may be especially problematic to pedestrians with vision impairments because they may have trouble following the sidewalk. Additionally if entrances are frequent, pedestrians with mobility impairments may have difficulty negotiating the numerous changes in grade when the sidewalk ramps down to the entrance.

In designing depressed curb entrances it is also important that the curb becomes flush with the gutter. Lips at the mouth of driveways have been known to cause crashes by bicyclists when entering the driveway at a shallow angle.

In locations where depressed curb entrances are not appropriate, *the Access Manual* recommends commercial



Figure 9.8 - Example of a Continuous Pedestrian Route over a Depressed Curb Entrance with Horizontal Deflection (An example application of Standard No. 630.01)



Figure 9.9 - Example of a Continuous Pedestrian Route over a Depressed Curb Entrance with Vertical Deflection (An example application of Standard No. 630.01)



Figure 9.10 - Example of a Commercial Two-Way Entrance

two-way entrances, commercial one-way entrances, commercial right-in/right-out entrances and monumental entrances. These types of entrances function like roadway intersections and should contain the same pedestrian safety features as intersections. Curb ramps, detectable warnings, and crosswalk markings should be used to provide a continuous and accessible pedestrian route as described in this design guide and the *Accessibility Policy & Guidelines for Pedestrian Facilities along State Highways*. Additionally, pedestrians should be given the opportunity to cross the public street at major commercial entrance locations as they would at an intersection of two roadways.