

Section 9

Pedestrian Facility Standards

The purpose of this section is to provide an overview of existing standards for pedestrian facility design. It includes a discussion of standards applicable to the Rockford Area Transportation Study (RATS) Metropolitan Planning Area (MPA). Standards were reviewed from the American Association of Highway and Transportation Officials (AASHTO), the Illinois Department of Transportation (IDOT), The Manual on Uniform Traffic Control Devices (MUTCD), the Public Rights of Way Access Advisory Committee (PROWAAC), and the Institute of Transportation Engineers (ITE).

The pedestrian network primarily consists of four main components: sidewalks, crosswalks, intersections, and signals and signs. Pedestrian facilities primarily consist of a continuous sidewalk network that connects communities to necessary services and destinations and to each other. The sidewalk network needs to be accessible, direct, continuous, safe, and aesthetically pleasing. The pedestrian network must work in conjunction with the roadway system and minimize pedestrian-vehicle conflicts. Proper design will influence the number and the characteristics of pedestrians that will use the system and their relationship to other modes of transportation.

9.1 Sidewalks

Walking is one of the most fundamental forms of transportation and is an integral part of all healthy and livable communities. For every trip taken, walking is an essential part. People can walk an entire trip, as part of a trip to ride public transit, or between parking spots and a destination. People also walk for leisure and better health.

People's decisions to walk generally are based upon the trip distance, density of a community, feelings of personal safety and security, the availability of sidewalks or shared-use paths, and personal comfort and sense of attractiveness for the surroundings.¹

Installation/Location

Most agencies recommend that in all new developments, sidewalks should be installed on both sides of the street with few exceptions. According to the Institute of Transportation Engineers, sidewalks should be on both sides of new urban and suburban streets in all commercial/industrial areas and residential areas along arterials, collectors, and local streets. The standards do allow that when 1 to 4 units per acre are built, both sides still are preferred, but at minimum one side should be built.²

¹ American Association of State Highway and Transportation Officials. Guide for the Planning, Design, and Operation of Pedestrian Facilities. Washington, D.C.: American Association of State Highway and Transportation Officials, 2004.

² Ranck, Fred. "Sidewalks and Paths." Design and Safety of Pedestrian Facilities. Traffic Engineering Council Committee TENC-5A-5. Washington, D.C.: Institute of Transportation Engineers, 1998. 29-42.

Width

The Institute of Transportation Engineers suggests that sidewalks within commercial areas should be 8 feet, unless they are located outside of the central business district, in which case, sidewalks should be at minimum 5 feet with a 2-foot planting strip or 7 feet without a planting strip. Residential streets should be 5 feet wide with a 2-foot planting strip on arterial and collector strips.³ Sidewalks typically should be placed at least one foot inside the right-of-way or easement line.

If uses other than pedestrian needs are required of the sidewalk, the width should be increased to accommodate them. For instance, if street furniture or plantings are to be placed upon the sidewalks, adequate room for improvements should be provided only where appropriate so as to not interfere with the flow of pedestrians and non-motorized vehicle traffic, such as wheelchairs.

In accordance with standards established by IDOT in the *Bureau of Design and Environment Handbook (BDE)*, at minimum, 3 feet of sidewalk width always should be kept clear for adequate passage of pedestrians and disabled persons.⁴ The Public Rights of Way Access Advisory Committee (PROWAAC), on the other hand, recommends a clear distance of 4 feet.

Buffer Widths

The buffer width is the distance between the sidewalk and the adjacent roadway. The buffer can provide a measure of safety for the pedestrian, while at the same time enhancing the overall walking experience. On-street parking or bike lanes can serve as sidewalk buffers, as well.

For local or collector streets, the minimum recommended buffer is 2 to 4 feet, measured from the edge of the traveled way or face of curb. For arterial streets, the width should increase to 5 to 6 feet.⁵

Thickness

The pavement should be constructed with a minimum of 4 inches of Portland Concrete Cement or Asphalt (Bituminous) Concrete at the contractor's option in accordance with section 400 of IDOT Standard Specifications for Road and Bridge Construction.⁶

Grades/Slopes

³ Ranck. 1998.

⁴ Illinois Department of Transportation (IDOT). Bureau of Design and Environment Manual. Illinois: IDOT, 2002a.

⁵ AASHTO Ped. Guide. 2004.

⁶ Illinois Department of Transportation (IDOT). Standard Specifications for Road and Bridge Construction. Illinois Department of Transportation, 2002b.

Sidewalks should be designed in order to ease the movement of pedestrians. If the grade of the sidewalk is steep, pedestrians are less inclined to exert the extra energy to traverse it. Sidewalks and other pedestrian access routes should be designed with maximum grades of 5 percent. Where a sidewalk runs along a roadway with a grade that exceeds 5 percent, the sidewalk grade may exceed 5 percent but must be less than or equal to the roadway grade.⁷ These allowances adhere to the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

Cross slopes are the grades that are perpendicular to the direction of accessible pedestrian travel. On a sidewalk or shoulder, it is measured perpendicular to the curb line or edge of the street or highway; whereas on a curb ramp, it is measured perpendicular to the running grade, which is the grade of the ramp.⁸ The cross slope is a necessary feature for drainage, but it should not exceed 2 percent to ensure that a relatively level area for travel is available for pedestrians and wheelchair users.⁹ The ADA Accessibility Guidelines provides standards that set a maximum cross slope at 2 percent, as well.¹⁰

Surface Treatments/Pavement Types

The preferred materials for the construction of sidewalks are Portland Concrete Cement (PCC) and Asphalt (Bituminous) Cement (AC). PCC typically is found in urban areas, as it provides a smooth, long lasting, and durable finish that is easy to grade and repair. AC has a shorter life expectancy than PCC, but it may be more appropriate in less urban areas and park settings. Crushed aggregate can be used as an all weather walkway surface in parks or rural areas, but it has a high level of maintenance.¹¹

Amenities

Not only should sidewalks be functional, but they also should be aesthetically pleasing and inviting. For this reason, sidewalks often are designed to incorporate amenities, such as lighting, planting strips, landscaping, and street furniture.

Street lighting is important for visibility, comfort, and security of pedestrians. In urban areas, AASHTO recommends the placement of continuous lighting. Along arterial streets with sidewalks on both sides of the street, lighting should be placed along both sides, as well. The preferred pedestrian-level lights are mercury vapor, metal halide, or incandescent.¹²

⁷ AASHTO Ped. Guide. 2004.

⁸ Public Rights of Way Access Advisory Committee. "Notice of Availability of Draft Public Rights-of-Way Accessibility Guidelines". Washington, D.C., 2005. Access Board. June 2006. <www.access-board.gov/PROWAV/index.htm.

⁹ AASHTO Ped. Guide. 2004.

¹⁰ IDOT 2002a.

¹¹ AASHTO Ped. Guide. 2004.

¹² AASHTO Ped. Guide. 2004.

Planting strips and street furniture can create obstacles if not placed properly. Landscaping, for example, can be placed within the buffer zones. Plantings within this area should not limit sight distance for motorists or pedestrians. Plantings and shrubs should be maintained to no higher than 3 feet. If street trees are used, the branches should be trimmed such that the branches are at least 7 feet high. Landscaping also may be placed on medians.

Wall mounted objects should not protrude more than 4 inches from a wall and should be located between 27 inches and 7 feet above the sidewalk. Single post-mounted objects should not overhang more than 4 inches per side of post when located between 27 inches and 7 feet above the sidewalk, and multiple post-mounted objects' lowest edges should have a clear distance between adjacent posts greater than 1 foot.¹³

Street furniture also should be placed so as to avoid sight distance conflicts along adjacent roadways. Some designers fail to recognize sight impacts on these roadways creating points of blocked vision.¹⁴

9.2 Curb Ramps

Curbs should be installed according to the American with Disabilities Act Guidelines (ADAG). The curb is an important element of roadway and sidewalk design as it acts as a barrier between motor vehicles and pedestrians.¹⁵

Curb ramps provide access between the sidewalk and the street for people using mobility assistance devices and other non-motorized vehicles acceptable for sidewalk use. Curb ramps are required at all pedestrian crossings and designed to a slope consistent with the curb height, available corner area, and underlying topography.¹⁶

Curb ramps should not exceed 8.33 percent except in special cases. In new construction, curb ramps should be a minimum of 4 feet wide, not including the widths of flared sides. Standards can exceed the minimum ADAG requirements in order to account for construction error.¹⁷

9.3 Crosswalks

Crosswalks help direct pedestrians to cross roadways within sight distances of motor vehicle operators. Short crosswalks are preferred over long ones so as to create less distance for motor vehicle-pedestrian conflicts. Crosswalks are not always marked, and pedestrians are allowed to cross at any intersection unless otherwise posted.

¹³ AASHTO Ped. Guide. 2004.

¹⁴ Pietrucha, Martin T., Kenneth S. Opiela, and Charles W. Plummer. "Roadway Design Considerations." Design and Safety of Pedestrian Facilities. Traffic Engineering Council Committee TENC-5A-5. Washington, D.C.: Institute of Transportation Engineers, 1998. 7-18.

¹⁵ Pietrucha et. al. 1998.

¹⁶ AASHTO Ped. Guide. 2004.

¹⁷ City of Chicago Department of Transportation. *ADA Standards Issued for 2007 Construction*. 2006.

Marked

Marked crosswalks typically are located at intersections. They also can be used to create mid-block crossings usually in order to provide pedestrians with a direct route to a destination. The 2004 AASHTO Pedestrian Guide identifies five main considerations for the design of crosswalks:

- **Assumptions** - Assume that pedestrians need and want a place to cross traffic.
- **Generators and Destinations** - All transit stops require that pedestrians be able to cross the street.
- **Controlled Intersections** - All intersections should be designed to accommodate pedestrians, as well as motor vehicles.
- **Uncontrolled Locations** - Pedestrians need to be able to cross in places where controls are not available.
- **Frequency** - Pedestrians need to be able to cross streets at regular intervals.

Crosswalks should not be less than 6 feet wide. In central business districts or other commercial areas, this width may be increased to 10 feet or wider. The crosswalk lines should extend the length of the crosswalk and include at least the curb ramps within the markings. All crosswalk lines must be white as per MUTCD requirements.¹⁸

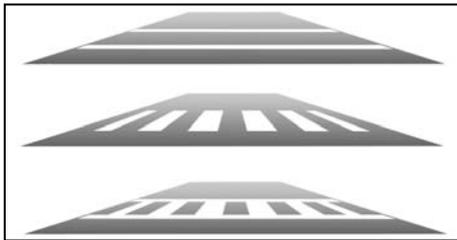


Figure 9-1
Examples of Crosswalk Markings

Three markings commonly are used: transverse, diagonal, and longitudinal (often called zebra or continental crossings). Diagonal and longitudinal lines should be 1 to 2 feet wide and spaced 1 to 5 feet apart. The placement of lines for longitudinal markings should avoid wheel paths, and line spacing should not exceed 2.5 times the line width. Transverse line markings consist of solid white lines neither less than 6 inches wide nor greater than 2 feet wide.¹⁹ Longitudinal markings should be bordered by transverse lines across the intersection.

A number of crosswalks are enhanced with aesthetic color and texture treatments. These treatments are acceptable as long as they are supplemented with white pavement markings so as to be visible to approaching motorists. In addition, the crosswalks should be smooth, as opposed to stamped asphalt or brick, in order to minimize wheelchair vibration impacts.

9.4 Intersections

¹⁸ Manual of Uniform Traffic Control Devices (MUTCD). 2003 ed. Washington, D.C.: Federal Highway Administration, 2004.

¹⁹ AASHTO Ped. Guide. 2004.

Intersections are the most common pedestrian crossing locations. Intersections should be designed so as to accommodate both pedestrians and motor vehicles. Pedestrians should be able to cross intersections quickly and in places with limited points of conflict. The placement of crosswalks should be predictable and obvious to both motorists and pedestrians.

Intersection design incorporates a number of features pertinent to the safe travel of pedestrians within a sidewalk network. These features include curb radii, crossing distances, and turning movements.

Curb Radii

Curb radii typically are designed to accommodate the largest design vehicle, but large radii may increase the crossing distance for pedestrians and encouraging faster turning movements. Large radii also may limit driver visibility for the pedestrians and increase exposure risks to pedestrians.²⁰

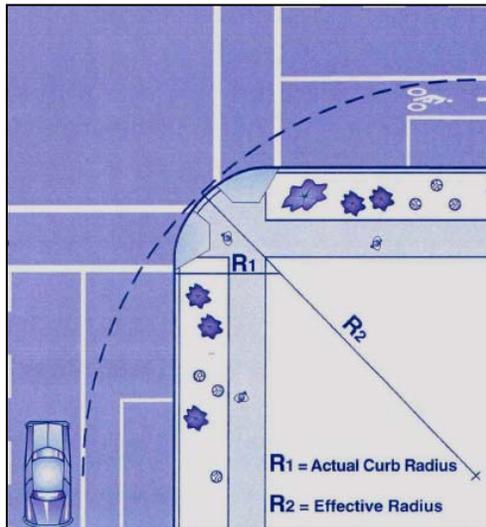


Figure 9-2
Effective Corner Radius

In determining curb radius dimensions, two radii need to be considered. They are the radius of the street corner itself and the effective turning radius (See **Figure 9-2, Effective Corner Radius**). The effective turning radius is the radius needed for a turning vehicle to clear any adjacent parking lanes and/or to align itself with any lane within its new route of travel. If little truck traffic is present, the recommended street corner radius is 10 to 15 feet.²¹

Crossing Distances

Excessive crossing distances increase the exposure time of pedestrians, add to vehicle delays, and increase the chances for pedestrian-vehicle conflicts. A couple of design techniques can be used to decrease the crossing distance.

One of these methods is to extend the curb into the street when on-street parking is present. Curb extensions not only reduce the crossing distance of pedestrians, but they also improve the sight distance and sight lines for pedestrians and motorists, prevent parked cars from entering the crosswalk areas, and create adequate space for curb ramps and landings.

Crossing islands and medians also can help to reduce the distance that pedestrians have to travel. Medians can be raised or painted longitudinal spaces separating the movements of

²⁰ AASHTO Ped. Guide. 2004.

²¹ AASHTO Ped. Guide. 2004.

traffic. Crossing islands should be used when distances for pedestrian crossing exceeds 60 feet, but they should not be used to justify short signal timings. They should be 6 feet or wider in order to accommodate wheelchairs.²²

Stop and yield lines should be used in conjunction with crosswalks. They should be placed at a minimum of 4 feet in advance of the nearest crosswalk line at controlled intersections. However, in the absence of a marked crosswalk, the stop line or yield line should be placed at the desired stopping or yielding point neither more than 30 feet nor less than 4 feet from the nearest edge of the intersecting traveled way. If they are used at an un-signalized mid-block crosswalk, yield lines should be placed 20 to 50 feet in advance of the nearest crosswalk line. Stop lines should be placed at least 40 feet in advance of the nearest signal indication.²³

Turning Movements

At both signalized and unsignalized intersections, a common point of conflict between pedestrians and motor vehicles occurs when turning vehicles are involved. Conflicts can be avoided with simple solutions including improving the marking of crosswalks and providing illuminated crossings. Design concepts include creating small turning radii, separate left-turn signal phasing, providing accessible crossing islands, and installing pedestrian islands and signals.²⁴

Turning Islands

Turning islands also can be called right turn channelizations, or pork chops. They separate certain vehicular movements when approaching an intersection. (See **Figure 9-3, Turning Island**). However, right turn lanes can impact pedestrian access. Negative aspects include increased driver speed at crosswalks where the motorist does not need to stop, motorists tend to look for traffic rather than pedestrians, and bicyclists find difficulties in maintaining a through traffic position. Advantages, on the other hand, are a decreased crossing distance, since the island acts as a pedestrian refuge.²⁵ Pedestrians also can cross one leg of traffic and then wait on the island before crossing to the second.

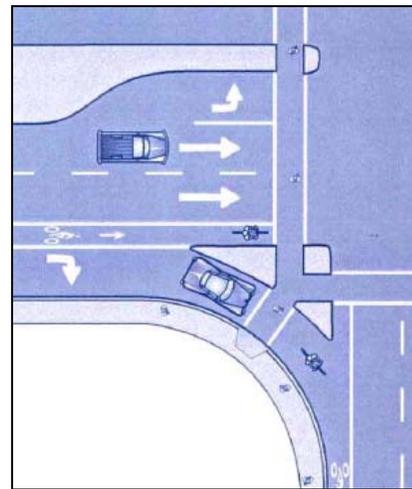


Figure 9-3
Turning Island

9.5 Signalization and Signage

²² AASHTO Ped. Guide. 2004.

²³ MUTCD. 2003.

²⁴ AASHTO Ped. Guide. 2004.

²⁵ Pietrucha et. al. 1998.

Traffic signals are important elements to the overall design of pedestrian facilities. Signals have the ability to provide gaps in heavy volumes of motor vehicle traffic and help to minimize points of conflict between pedestrians and automobiles. The MUTCD provides eleven separate warrants for installing new traffic signals. Some of these warrants include minimum vehicle volume, minimum pedestrian volume, school crossings, progressive movements, peak hour delays and volumes, combinations of warrants, and accident experiences. Pedestrian signal indications are recommended when multiphase signals, complex geometry, and areas where older adults and children are present.²⁶

Signal Timing

The MUTCD recommends a 7-second minimum walk interval with longer walk times preferred, under most conditions. For the pedestrian clearance phase, the assumed walking speed should be 3.5 feet per second, and 3.0 feet per second for the entire walk and clearance phase.²⁷ However, if older pedestrians or pedestrians with disabilities are expected, clearance phase crossing speeds as low as 3.0 feet per second may be assumed.²⁸

Indications

Pedestrian signals should be at least 6 inches high, and should be placed in conspicuous locations and recognizable to pedestrians from the beginning of a controlled crosswalk to a point 10 feet from the end of the crosswalks. The height of the symbols should increase with the length of the crosswalk. The signals should be placed not less than 7 feet or more than 10 feet above the sidewalk level. Research has shown that pedestrians tend not to understand the signals associated with pedestrian crossing. Whenever possible, the flashing “don’t walk” symbol should be supplemented with countdown signals.²⁹

Actuated Signals

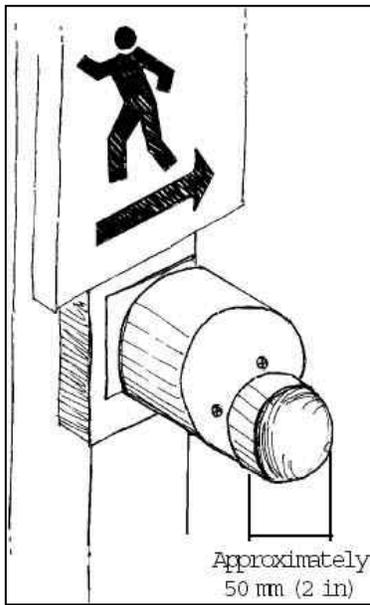
Actuated signals, also known as pedestrian push-buttons, are appropriate for occasional pedestrian movements (See **Figure 9-4, Pedestrian Push-Button**). The pushbuttons may be used to allow sufficient crossing time or to increase the crossing time (the green phasing). If used, no more than 5 pounds should be required for the signal to be activated. They should be placed no more than 3.5 feet above the sidewalk and in a convenient location, preferably next to the curb ramp. Wheelchair operators should be able to use the push-button, and thus, 3 feet by 4 feet of level ground surface centered on

²⁶ Badgett, Alf, and Charles V. Zegeer. “Signalization.” *Design and Safety of Pedestrian Facilities*. Traffic Engineering Council Committee TENC-5A-5; Washington, D.C.: Institute of Transportation Engineers, 1998. 43-52.

²⁷ Badgett and Zegeer. 1998.

²⁸ AASHTO Ped. Guide. 2004.

²⁹ AASHOT Ped. Guide. 2004. and Badgett and Zegeer. 1998.



each control for a forward or side approach is needed. Signs are needed, too, in order to direct pedestrians to the use of the signal.³⁰

9.6 Recommendations

Sidewalks within the MPA should adhere to specified standards combining the best available practices. Whenever possible, sidewalks should be installed on both sides of the street and should follow accepted standards appropriate to the adjacent land use. These standards should include a sidewalk width of a minimum of 5 feet in width and should exceed Americans with Disabilities Act standards for accessibility to account for construction tolerances. These standards not only require that sidewalks should have accessible ramps at all intersections and crosswalks; but also that curb ramp slope should not exceed 8.33 percent. They also must contain detectable warning strips to signal to blind users that the ramp is present.

Figure 9-4
Pedestrian Push-Button
 (Source: Federal Highway
 Administration)

A sidewalk design guideline should be adopted by municipalities within the MPA as a developer reference and to eliminate piecemeal planning. Measures also should be taken to address existing sidewalk networks, maintenance, and repairs.

³⁰ MUTCD, 2003.