

A. Pedestrian Facility Design



Photo by Dan Burden



Photo by Cara Seiderman

Walkways are the portion of the public right-of-way that provide a separated area for people traveling on foot. Walkways that are safe, accessible, and aesthetically pleasing attract pedestrians.

People walk for many reasons: to go to a neighbor's house, to run errands, for school, or to get to a business meeting. People also walk for recreation and health benefits or for the enjoyment of being outside. Some pedestrians must walk to transit or other destinations if they wish to travel independently. It is a public responsibility to provide a safe, secure, and comfortable system for all people who walk.

1. Sidewalks or Walkways

Sidewalks and walkways are “pedestrian lanes” that provide people with space to travel within the public right-of-way that is separated from roadway vehicles. They also provide places for children to walk, run, skate, ride bikes, and play. Sidewalks are associated with significant reductions in pedestrian collisions with motor vehicles.⁽¹⁾ Such facilities also improve mobility for pedestrians and provide access for all types of pedestrian travel: to and from home, work, parks, schools, shopping areas, transit stops, etc. Walkways should be part of every new and renovated facility and every effort should be made to retrofit streets that currently do not have sidewalks.

While sidewalks are typically made of concrete, less expensive walkways may be constructed of asphalt, crushed stone, or other materials if they are properly maintained and accessible (firm, stable, and slip-resistant). In more rural areas, in particular, a “side path” made of one of these materials may be suitable. The Institute of Transportation Engineers (ITE) guidelines recommend a minimum width of 1.5 m (5 ft) for a sidewalk or walkway, which allows two people to pass comfortably or to walk side-by-side. Wider sidewalks should be installed near schools, at transit stops, in downtown areas, or anywhere high concentrations of pedestrians exist. Sidewalks should be continuous along both sides of a street and sidewalks should be fully accessible to all pedestrians, including those in wheelchairs.⁽²⁾

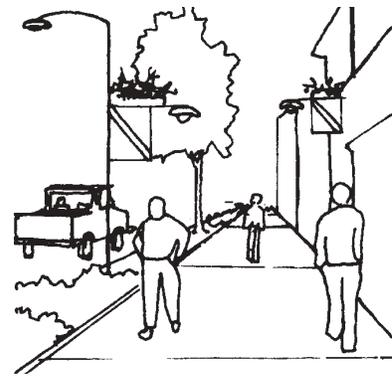
A buffer zone of 1.2 to 1.8 m (4 to 6 ft) is desirable and should be provided to separate pedestrians from the street. The buffer zone will vary according to the street type. In downtown or commercial districts, a street furniture zone is usually appropriate. Parked cars and/or bicycle lanes can provide an acceptable buffer zone. In more suburban or rural areas, a landscape strip is generally most suitable. Careful planning of sidewalks and walkways is important in a neighborhood or area in order to provide adequate safety and mobility. For example, there should be a flat sidewalk provided in areas where driveways slope to the roadway.

Recommended guidelines and priorities for sidewalks and walkways are given in Appendix B.



Photo by Dan Burden

This sidewalk and buffer zone provides a safe place for pedestrians to walk outside of the paths of vehicles in the street.



Making Streets That Work, Seattle, 1996

Purpose:

- Create the appropriate facility for the walking area of the public right-of-way.
- Improve pedestrian safety dramatically.

Considerations:

- While continuous walkways are the goal, retrofitting areas without them will usually occur in phases. Lack of a seamless system is no excuse not to provide parts of the system.
- In retrofitting streets that do not have a continuous or accessible system, locations near transit stops, schools, parks, public buildings, and other areas with high concentrations of pedestrians should be the highest priority.
- Street furniture placement should not restrict pedestrian flow.

Estimated Cost:

The cost for concrete curbs and sidewalks is approximately \$49/linear meter (\$15/linear foot) for curbing and \$118/square meter (\$11/square foot) for walkways. Asphalt curbs and walkways are less costly, but require more maintenance, and are somewhat more difficult to walk and roll on for pedestrians with mobility impairments.

2. Curb Ramps

Curb ramps (wheelchair ramps) provide access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcars, bicycles, and also for pedestrians with mobility impairments who have trouble stepping up and down high curbs. Curb ramps must be installed at all intersections and midblock locations where pedestrian crossings exist, as mandated by federal legislation (1973 Rehabilitation Act). Wheelchair ramps must have a slope of no more than 1:12 (must not exceed 25.4 mm/0.3 m (1 in/ft) or a maximum grade of 8.33 percent), with a maximum side slope of 1:10, and must be designed in accordance with the ADA guidelines.

Where feasible, separate curb ramps for each crosswalk at an intersection should be provided rather than having a single ramp at a corner for both crosswalks. This provides improved orientation for visually impaired pedestrians. Similarly, tactile warnings will alert pedestrians to the sidewalk/street edge. All newly constructed and altered roadway projects must include curb ramps. In addition, all agencies should upgrade existing facilities. They can begin by conducting audits of their pedestrian facilities to make sure transit services, schools, public buildings, and parks, etc. are accessible to pedestrians who use wheelchairs.

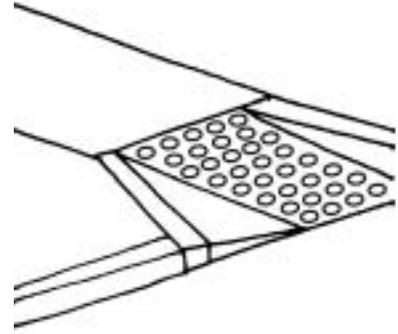
While curb ramps are needed for use on all types of streets, priority locations are in downtown areas and on streets near transit stops, schools, parks, medical facilities, shopping areas, and near residences with people who use wheelchairs.

For more information about curb ramp design, see *Designing Sidewalks and Trails for Access, Part I*, by the Federal Highway Administration, and *Accessible Rights-of-Way: A Design Guide*, by the U.S. Access Board and the Federal Highway Administration. The Access Board's right-of-way report can be found at www.access-board.gov.



Photo by Michael Ronkin

A curb ramp should be designed to provide direct access and should have the proper width and slope.



Adapted from *Making Streets That Work*, Seattle, 1996

Purpose:

- Provide access to street crossings.

Considerations:

- Follow Americans with Disabilities Act (ADA) design guidelines.
- Texture patterns must be detectable to blind pedestrians.

Estimated Cost:

The cost is approximately \$800 to \$1,500 per curb ramp (new or retrofitted).

3. Marked Crosswalks and Enhancements

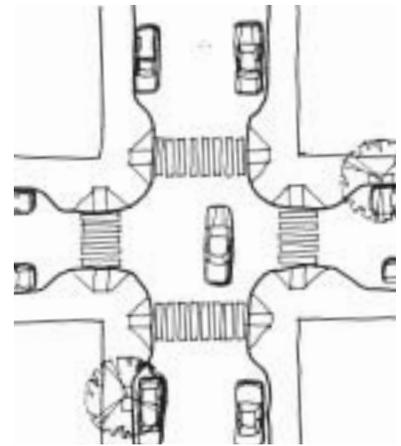
Marked crosswalks indicate optimal or preferred locations for pedestrians to cross and help designate right-of-way for motorists to yield to pedestrians. Crosswalks are often installed at signalized intersections and other selected locations. Various crosswalk marking patterns are given in the MUTCD.⁽³⁾ Marked crosswalks are desirable at some high pedestrian volume locations (often in conjunction with other measures) to guide pedestrians along a preferred walking path. In some cases, they can be raised and should often be installed in conjunction with other enhancements that physically reinforce crosswalks and reduce vehicle speeds. It is also sometimes useful to supplement crosswalk markings with warning signs for motorists. At some locations, signs can get "lost" in visual clutter, so care must be taken in placement.

Pedestrians are sensitive to out-of-the-way travel, and reasonable accommodation should be made to make crossings both convenient and safe at locations with adequate visibility.

Recommended guidelines and priorities for crosswalk installation at controlled locations are given in Appendix C. These guidelines are based on a major study of 1,000 marked crosswalks and 1,000 unmarked crossings in 30 U.S. cities. Recommendations are also given for providing other pedestrian crossing enhancements at uncontrolled locations with and without a marked crosswalk.⁽⁴⁾

Crosswalk Materials

It is important to ensure that crosswalk markings are visible to motorists, particularly at night. Crosswalks should not be slippery or create tripping hazards. Even though granite or cobblestones are aesthetically appealing materials, they are generally not appropriate for crosswalks. One of the best materials for marking crosswalks is inlay tape, which is installed on new or repaved streets. It is highly reflective, long-lasting, and slip-resistant, and does not require a high level of maintenance. Although initially more costly than paint, both inlay tape and thermoplastic are more cost-effective in the long run. Inlay tape is recommended for new and resurfaced pavement, while thermoplastic may be a better option on rougher pavement surfaces. Both inlay tape and thermoplastic are more visible and less slippery than paint when wet.



City of Cambridge, MA

Purpose:

- Warn motorists to expect pedestrian crossings.
- Indicate preferred crossing locations.

Considerations:

- Crosswalk locations should be convenient for pedestrian access.
- Crosswalk markings alone are unlikely to benefit pedestrian safety. Ideally, crosswalks should be used in conjunction with other measures, such as curb extensions, to improve the safety of a pedestrian crossing, particularly on multi-lane roads with average daily traffic (ADT) above about 10,000.
- Marked crosswalks are important for pedestrians with vision loss.
- Crosswalk markings must be placed to include the ramp so that a wheelchair does not have to leave the crosswalk to access the ramp.

Estimated Cost:

\$100 for a regular striped crosswalk, \$300 for a ladder crosswalk, and \$3,000 for a patterned concrete crosswalk.



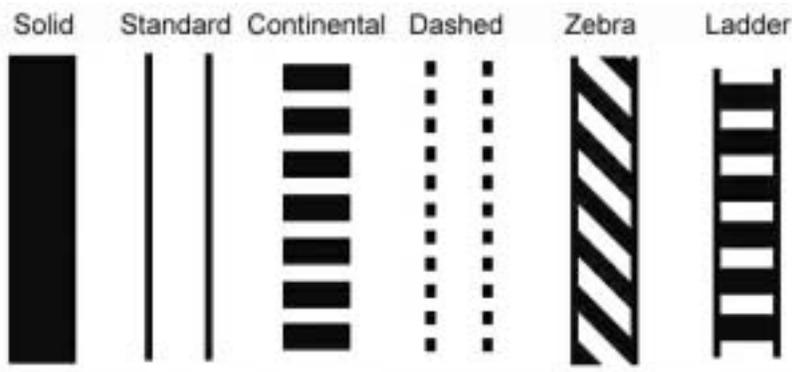
Photo by Peter Lagerwey

The "ladder" pattern shown above is more visible to motorists than parallel lines and requires less maintenance if painted to allow the tires of motor vehicles to track between the painted lines.



Photo by Dan Burden

Some crosswalks are angled to the right in the median. This is intended to facilitate a pedestrian's view of oncoming traffic before crossing the second half of the street.



Examples of different crosswalk marking patterns

4. Transit Stop Treatments

Good public transportation is as important to the quality of a community as good roads. Well-designed transit routes and accessible stops are essential to a usable system.

Bus stops should be located at intervals that are convenient for passengers. The stops should be designed to provide safe and convenient access and should be comfortable places for people to wait. Adequate bus stop signing, lighting, a bus shelter with seating, trash receptacles, and bicycle parking are also desirable features. Bus stops should be highly visible locations where pedestrians can reach them easily by means of accessible travel routes. Therefore, a complete sidewalk system is essential to support a public transportation system. Convenient crossings are also important.

Proper placement of bus stops is key to user safety. For example, placing the bus stops on the near side of intersections or crosswalks may block the pedestrians' view of approaching traffic, and the approaching drivers' view of pedestrians. Approaching motorists may be unable to stop in time when a pedestrian steps from in front of a stopped bus into the traffic lanes at the intersection.

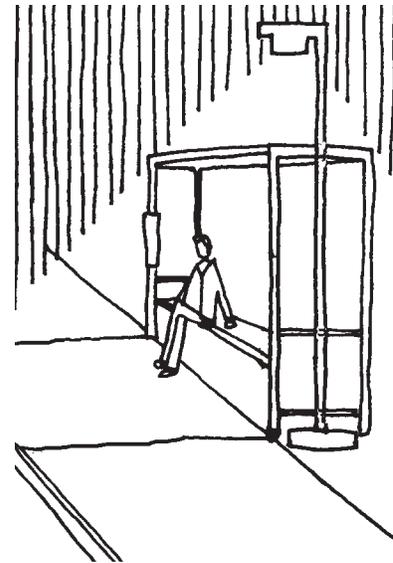
Far-side bus stops generally encourage pedestrians to cross behind the bus. Relocating the bus stop to the far side of the intersection can improve pedestrian safety since it eliminates the sight-distance restriction caused by the bus. Placing bus stops at the far side of intersections can also improve motor vehicle operation.

The bus stop location should be fully accessible to pedestrians in wheelchairs, should have paved connections to sidewalks where landscape buffers exist, and should not block pedestrian travel on the sidewalk. Adequate room should exist to operate wheelchair lifts. Yet, it is also useful to install curb ramps at bus stops so that a passenger can board from the street if bus-lift deployment is blocked.



Photo by Barbara Gray

The transit shelter above is in a lively commercial district. The shelter design reflects the surrounding architecture. Pedestrian-scale lighting and landscaping add visual interest and security.



Adapted from *Making Streets That Work*, Seattle, 1996

Purpose:

- Provide safe, convenient, and inviting access for transit users.

Considerations:

- Ensure that access to and from stops is provided when transit stops are created.
- Ensure adequate room to load wheelchairs.
- Ensure a clear and comfortable path for passing pedestrians when placing transit shelters.
- Locate transit stops on the far side of marked crosswalks.

Estimated Cost:

\$1,000 to \$10,000. Cost varies widely depending on type of improvements.

5. Roadway Lighting Improvements

Good quality and placement of lighting can enhance an environment as well as increase comfort and safety. Pedestrians often assume that motorists can see them at night; they are deceived by their own ability to see the oncoming headlights. Without sufficient overhead lighting, motorists may not be able to see pedestrians in time to stop.

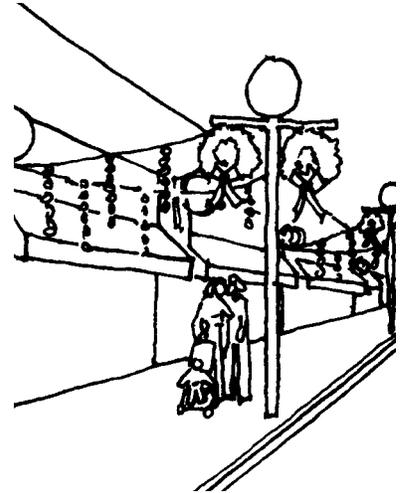
In commercial areas with nighttime pedestrian activity, streetlights and building lights can enhance the ambiance of the area and the visibility of pedestrians by motorists. It is best to place streetlights along both sides of arterial streets and to provide a consistent level of lighting along a roadway. Nighttime pedestrian crossing areas may be supplemented with brighter or additional lighting. This includes lighting pedestrian crosswalks and approaches to the crosswalks.

In commercial areas or in downtown areas, specialty pedestrian-level lighting may be placed over the sidewalks to improve pedestrian comfort, security, and safety. Mercury vapor, incandescent, or less expensive high-pressure sodium lighting is often preferred as pedestrian-level lighting. Low-pressure sodium lights are low energy, but have a high level of color distortion.



Photo by Dan Burden

This well-lit commercial district is an attractive place to shop in the evening. The combination of pedestrian-scaled street lighting, holiday lights in the trees, and light from shop windows enhances visibility and creates a secure and festive atmosphere.



Making Streets That Work, Seattle, 1996

Purpose:

- Enhance safety of all roadway users, particularly pedestrians.
- Enhance commercial districts.
- Improve nighttime security.

Considerations:

- Ensure that pedestrian walkways and crosswalks are well lit.
- Install lighting on both sides of wide streets and streets in commercial districts.
- Use uniform lighting levels.

Estimated Cost:

Varies depending on fixture type and service agreement with local utility.

6. Pedestrian Overpasses/Underpasses

Pedestrian overpasses and underpasses allow for the uninterrupted flow of pedestrian movement separate from the vehicle traffic. However, they should be a measure of last resort, and it is usually more appropriate to use traffic-calming measures or install a pedestrian-activated signal that is accessible to all pedestrians. This is also an extremely high-cost and visually intrusive measure.

Such a facility must accommodate all persons, as required by the ADA. These measures include ramps or elevators. Extensive ramping will accommodate wheelchairs and bicyclists, but results in long crossing distances and steep slopes that discourage use.

Studies have shown that many pedestrians will not use an overpass or underpass if they can cross at street level in about the same amount of time.⁽⁵⁻⁶⁾ Overpasses work best when the topography allows for a structure without ramps (e.g., overpass over a sunken freeway). Underpasses work best when designed to feel open and accessible. Grade separation is most feasible and appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials.



Photo by Yan Jia

This pedestrian overpass takes advantage of existing topography and allows pedestrians to avoid conflicts with traffic at street level.

Purpose:

- Provide complete separation of pedestrians from motor vehicle traffic.
- Provide crossings where no other pedestrian facility is available.
- Connect off-road trails and paths across major barriers.

Considerations:

- Use sparingly and as a measure of last resort. Most appropriate over busy, high-speed highways, railroad tracks, or natural barriers.
- Pedestrians will not use if a more direct route is available.
- Lighting, drainage, graffiti removal, and security are also major concerns with underpasses.
- Must be wheelchair accessible, which generally results in long ramps on either end of the overpass.

Estimated Cost:

\$500,000 to \$4 million, depending on site characteristics.

7. Street Furniture/Walking Environment

Sidewalks should be continuous and should be part of a system that provides access to goods, services, transit, and homes. Well-designed walking environments are enhanced by urban design elements and street furniture, such as benches, bus shelters, trash receptacles, and water fountains.

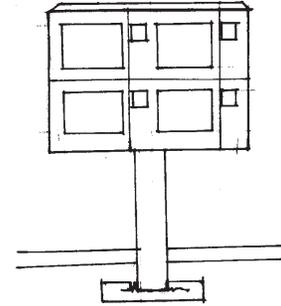
Sidewalks and walkways should be kept clear of poles, signposts, newspaper racks, and other obstacles that could block the path, obscure a driver's view or pedestrian visibility, or become a tripping hazard. Benches, water fountains, bicycle parking racks, and other street furniture should be carefully placed to create an unobstructed path for pedestrians. Such areas must also be properly maintained and kept clear of debris, overgrown landscaping, tripping hazards, or areas where water accumulates. Snow removal is also important for maintaining pedestrian safety and mobility. In most areas, local ordinances give property owners the responsibility of removing snow within 12 to 48 hours after a storm.

Walking areas should also be interesting for pedestrians and provide a secure environment. Storefronts should exist at street level and walking areas should be well lit and have good sightlines.



Photo by Michael Ronkin

This is a good example of a street furniture zone along the sidewalk on Portland, Oregon's light-rail transit line.



Making Streets That Work, Seattle, 1996

Purpose:

- Enhance the pedestrian environment.
- Enliven commercial districts by fostering community life.

Considerations:

- Good-quality street furniture will show that the community values its public spaces and is more cost-effective in the long run.
- Include plans for landscape irrigation and maintenance at the outset.
- Ensure proper placement of furniture; do not block pedestrian walkway or curb ramps or create sightline problems.
- Ensure adequacy of overhead clearances and detectability of protruding objects.

Estimated Cost:

Varies depending on the type of furniture, the material out of which it is constructed, and the amount of planting material used.