Sidewalks

Sidewalks, specifically paved sidewalks, are an important piece of a walking route to school. Paved sidewalks are "pedestrian lanes" that provide people with space to travel within the public right-of-way separated from motor vehicles and on-road bicycles. They should have a level, hard surface and be separated from motor vehicle traffic by a curb, buffer or curb with buffer. Sidewalks provide places for children to walk, run, skate and play, and are often used by young bicyclists. Continuous and accessible sidewalk networks improve mobility for all pedestrians and are particularly important for pedestrians with disabilities. They provide access for all types of pedestrian travel to schools as well as work, parks, shopping areas, transit stops and other destinations.

Many parents are not willing to allow their children to walk to school if there is no place for them to walk.

Many roads around schools are not equipped with sidewalks and can be unsafe for walking. According to a study by the UNC Highway Safety Research Center conducted for the Federal Highway Administration, the likelihood of a site with a paved sidewalk being a crash site is 88.2 percent lower than a site without a sidewalk after accounting for traffic volume and speed limits[McMahon et al., 2002]. A study of the California SRTS program has shown that providing sidewalks is one of the most effective engineering measures in encouraging children to walk to school [Boarnet et al., 2005].

Sidewalks should be part of all new and renovated development. Streets that do not have sidewalks, particularly those on routes where children walk or bicycle to school, should be identified and assessed to determine if retrofitting these streets with sidewalks is appropriate. Where feasible, sidewalks should be provided on both sides of the street. A sidewalk on only one side forces pedestrians to either walk in the street or cross the street twice to get to the side with a sidewalk and back again.

Sidewalk Surface Types

While concrete is the most common sidewalk material, other construction materials may be acceptable, but may require more maintenance.

Sidewalks can be surfaced with a variety of materials to accommodate varying budgets and contexts. While urban, suburban and heavily used 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. In more rural areas, a “side path” made of a material other than concrete may be suitable and be a better fit with a rural environment.

Concrete is more expensive than asphalt to install, but it lasts longer and requires less maintenance, which may make it a better value in the long run. Although brick pavers may appeal to some designers, they can require more maintenance and create a tripping condition. Pavers may also pose a problem to pedestrians in wheelchairs if the bricks settle or become lifted. Safe sidewalk surfaces are firm, stable, and slip-resistant.

Sidewalk Placement

Common sense dictates that these two sidewalks should be connected.

The worn path in this picture clearly illustrates where pedestrians want to walk relative to traffic.
Sidewalk placement, or setback, along streets should take into account worn paths and buffer zones, and provide room for snow storage where snowfall is prevalent. The worn path that pedestrians create when there is not a sidewalk demonstrates where people naturally want to walk. The area between the street and the worn path or sidewalk is a 'buffer zone' which provides space between pedestrians and motor vehicles. Unfortunately, when sidewalks are built along major arterial streets, many tend to not include a 'buffer zone', thus placing pedestrians uncomfortably close to high-speed traffic. Sidewalks also need to provide a continuous path. Just as streets are designed and built to provide a continuous network, sidewalks too should provide users with a continuous path.

Sidewalk Width

This narrow four foot wide sidewalk doesn't work very well for these two children.
The preferred minimum sidewalk width recommended for safe routes to schools is five to six feet. Walking can be a social activity; facilities are needed to accommodate social walking. The six-foot width allows for two people to walk comfortably side by side and provides sufficient space for pedestrians crossing in the opposite direction. Sidewalks with a width of eight to ten feet or more should be built where there is no sidewalk buffer along an arterial street and along roads adjacent to school grounds where large numbers of walkers are expected.

The Americans with Disabilities Act of 1990 mandates the establishment of minimum walkway clearance widths and there are variety of organizations that offer sidewalk width recommendations. Updated and revised in 2004, the Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities state that walking surfaces should have a clear width minimum of 36 inches [ADA and ABA, Sec. 4.03]. This clear width minimum is the minimum width for passage and not a sidewalk width recommendation [PROW Guide, Sec. 3.2.1]. The clear width is the width of section of the walkway that is completely free of obstacles, vertical obstructions and protruding objects. The 36 inch width is the minimum width required to provide sufficient space for a person who uses mobility aids to travel within the restricted space [ADAAG, Sec. 4.3]. However, restricting the pedestrian zone to 36 inches prevents passing and does not allow for 2-way travel. The ADA and ABA guidelines state that where sidewalks are less than five feet in width, passing spaces sufficiently wide enough for wheelchair users to pass one another or to turn around shall be provided at intervals of 200 feet [ADA and ABA, Sec. 4.03]. For more details visitADA-ABA Accessibility Guidelines for Buildings and Facilities and the Accessible Rights-of-Way: A Design Guide.

The walkway width recommendations stated in several pedestrian facility guides exceed the 36-inch minimum needed for accessible travel as defined by the ADA-ABA Accessibility Guidelines for Buildings and Facilities.

- *Guide for the Planning Design and Operation of Pedestrian Facilities* from the American Association of State Highway and Transportation Officials (AASHTO) recommends a minimum clear width for a sidewalk of four feet, and for sidewalks that are less than five feet in width passing space at least five feet in width should be provided at reasonable intervals [AASHTO, 2004, Sec. 3.2.3].
- *Design and Safety of Pedestrian Facilities* from the Institute of Transportation Engineers (ITE) recommends different sidewalk width depending on the land uses and street type adjacent to the sidewalk. For residential areas, ITE recommends sidewalks widths ranging from four feet to five feet depending on housing density and for commercial areas a sidewalk width minimum of five feet. Sidewalks are required on a local street within 2-blocks of a school site that is on a walking route to school [ITE, 1998].
- *Designing Sidewalks and Trails for Access: Best Practices and Design Guide Part 2* from the Federal Highway Administration (FHWA) recommends a minimum width of five feet of sidewalk that is free of obstacles [FHWA, 2001, Ch.4].

Sidewalk Buffers

The space between the sidewalk and closest lane of moving vehicles is the sidewalk buffer. In general, there are four types of sidewalk buffers including;

- Planting strip of grass and trees: This is the preferred buffer as it provides a more pleasant, shaded environment to walk.
- Bicycle lane: If a planting strip is not possible, a bicycle lane can provide an acceptable buffer between pedestrians and motor vehicles.
- Parked cars: Parked cars can provide a buffer between pedestrians and motor vehicles, but can also create a visual screen for pedestrians as they cross at midblock.
- Street furniture including benches, newspaper boxes, street lighting and public art.

If a sidewalk buffer does not exist, an effort should be made to provide a wider sidewalk. A wider sidewalk allows a pedestrian to avoid the splash zone (area adjacent to a motor vehicle travel lane into which water spray created by a motor vehicle traveling through water on the roadway enters) and provides a snow storage area and a more comfortable separation between moving vehicles and pedestrians. Guidelines for sidewalk buffers is available in the FHWA's Designing Sidewalks and Trails for Access (Section 4.1.2) and AASHTO's Guide for the Planning , Design, and Operation of Pedestrian Facilities (Section 3.2.4).

Sidewalk and Landscaping Maintenance

Sidewalks should be monitored for repair.

Sidewalks and adjacent landscaping should be monitored for conditions that may impede safe pedestrian use. Sidewalks that have been damaged by tree roots, ground swelling or heat buckling present a tripping danger to pedestrians and can often be easily repaired. Sidewalks must be smooth and in good repair to accommodate wheelchairs. A smooth sidewalk is also safer for strollers, young bicyclists, and skateboarders. A program to monitor sidewalks for repair should be instituted by local agencies. Parents, school officials, and students are an excellent source of feedback on sidewalk condition. This feedback provided to the agency can be used to list and prioritize sections of sidewalks that require maintenance.

These trees need trimming to provide clear access to this sidewalk, which is within 100 feet of an elementary school and along a major route to school.

Properly maintained landscaping along sidewalks helps maintain appropriate sight distances and makes it easier for pedestrians to use the sidewalks. Property owners are required to keep trees and bushes from blocking sidewalks and obstructing visibility at corners. If overgrowth is an issue, neighborhood "pruning parties" or friendly reminders from residents of the neighborhood can inform property owners about the need to maintain landscaping. Local public works or traffic departments can provide guidance on plantings including the type of plants allowed along sidewalks, the distance from the sidewalk that plants can be installed, and how often plants are to be maintained.

Treatment: Sidewalks

Description/Purpose

Paved walkways that clearly delineate that area of the public right-of-way for pedestrian use and typically separated from motor vehicles by a curb or buffer area.

Expected Effectiveness

Sidewalks reduce the likelihood of pedestrian crashes by more than half the likelihood in areas where sidewalks don't exist [Knoblauch et al., 1987]. Another study found the likelihood of a site with a paved sidewalk being a crash site is 88.2 percent lower than a site without a sidewalk after accounting for traffic volume and speed limits [McMahon et al., 2002].

Costs

Costs vary depending on such factors as sidewalk width and materials but are approximated at $35 - $40 per linear foot (Bushell, Poole, Zegeer, Rodriguez, 2013).

Keys to Success

- Careful planning of the sidewalk design and network to ensure functionality and coverage.
- Inclusion of curb ramps for each crosswalk at an intersection.
- Providing an adequate buffer between the sidewalk and road, such as a planting strip, bicycle lane and/or on-street parking.

Key Factors to Consider

- Overcoming previous road construction projects that ignored the need for sidewalks.

Evaluation Measures

- Frequency and percent of "walking along roadway" crashes.
- Pedestrian volume.

The image of a newly completed boulevard with lights.

Street Lighting

Street lighting improves pedestrian visibility and personal security. On streets with lots of trees, street lighting scaled to pedestrians (low lights) illuminates the sidewalk even after the trees grow big and tall. Street lighting improves safety by allowing pedestrians and motorists to see each other. It also adds to personal safety and aesthetics. Two-sided lighting should be considered along wide streets, and it is especially important to provide lighting at the crossings. Lighting can also be helpful along streets adjacent to the school grounds to minimize school vandalism and improve security. While most school walking activity occurs during daylight hours, the morning school trip in the middle of winter often occurs during hours of darkness, and many school activities occur during nighttime hours.

Treatment: Street Lighting

Description/Purpose
Lighting along streets, especially at crosswalks, that more clearly illuminates areas of pedestrian activity to increase motorist visibility and improve nighttime pedestrian security.

Expected Effectiveness
Better street lighting can reduce nighttime pedestrian crashes and increase the vision and awareness that drivers have relative to pedestriansn [Pegrum, 1972; Freedman et al., 1975]. Increases actual and perceived pedestrian safety and comfort.

Costs
Costs vary widely, but a general cost estimate is $3,000 to $5,000 per streetlight (Bushell, Poole, Zegeer, Rodriguez, 2013).

Keys to Success

- Installing lighting on both sides of wide streets and avoiding “dark spots.”
- Using uniform lighting levels.

Key Factors to Consider

- Acquiring adequate funding.
- Design issues regarding height and existing objects, such as trees.

Evaluation Measures

- Number of nighttime pedestrian crashes.
- Percentage of all pedestrian crashes that occur at night.
- Increased pedestrian activity and reduction in crime.

ADA / Universal Design

This sidewalk meets ADA requirements and is easy to maneuver by people in wheelchairs as well as other pedestrians.

The purpose of universal design is to provide an environment that is equally accessible and comfortable for users of all abilities and ages, including children. To help ensure access for all, the Americans with Disabilities Act (ADA) of 1990 prohibits discrimination on the basis of disability. Sidewalks and other pedestrian facilities in the public right-of-way are subject to the requirements of the ADA. In 2004 the U.S. Access Board released the Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities. These guidelines contain scoping and technical requirements for accessibility to sites, facilities and buildings by all users. Much of the information on walkway and street design contained in the ADA-ABA guidelines are contained in the 1999 Accessible Rights-of-Way: A Design Guide. The Federal Highway Administration (FHWA) document *Designing Sidewalks and Trails for Access* also provides detailed guidance on the design of pedestrian facilities that can be used as a supplement to the ADA–ABA guidelines.

Curb Ramps

Each corner should have two curb ramps, one for each crossing.

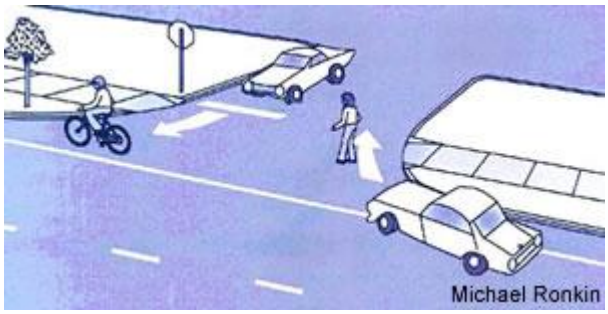
Curb ramps should be perpendicular wherever possible, where each corner has two ramps installed perpendicular to the face of the curb (vs. a single ramp facing diagonally into the intersection). A big advantage of having two ramps at the corner and small curb radii is that the curb ramps can lead directly along the line of travel guidingpedestrians into the crosswalk rather than into the middle of the intersection. Two ramps which end at the crosswalk also provide directional guidance to pedestrians with vision impairments. When a corner is retrofit with new curb ramps, the crosswalk markings may have to be moved so that the curb ramp fully aligns within the crosswalk.

Warning Strips

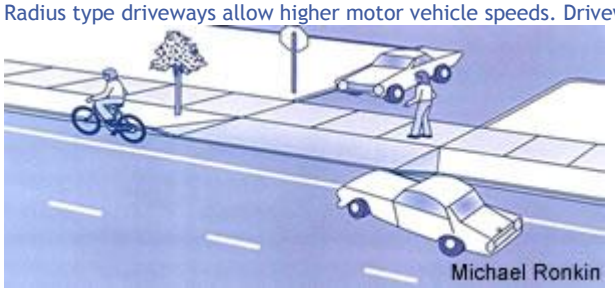
The two-foot deep truncated dome tactile strip at the bottom of the curb ramp has a contrasting color to the rest of the sidewalk.

Truncated domes are the standard design requirement for detectable warnings on curb ramps and at transitions from sidewalks to street crossings. These small, flattened domes provide a surface that is distinguishable underfoot and by cane. ADA guidelines require the use of a truncated dome warning strip at the bottom of every newly constructed curb ramp. These domes provide a tactile warning to pedestrians with a visual impairment who would otherwise be given warning by the presence of a curb. The truncated dome tactile strip should be two feet deep for the entire width of the ramp and should have a contrasting color with the adjacent sidewalk. There are different materials and construction methods that can be used to provide the truncated dome tactile warning strip at the base of the curb ramp.

Driveway Design



Radius type driveways allow higher motor vehicle speeds. Driveways should NOT be designed like this.



Wing-type driveways provide the best pedestrian crossing as long as the driveway apron does not extend into the sidewalk area.

Properly designed driveways, as they cross sidewalks, can enhance pedestrian safety by providing a consistent surface and reminding drivers that they are crossing a sidewalk. The following principles should be applied to driveway design;

- The sidewalk continues across the driveway at the same elevation or ‘level’, and
- The driveway apron does not go through the sidewalk.

Ramps may be necessary at intersections when pedestrians cross the street, but the rest of the sidewalk network should be continuous and at one level. At driveways, there is no need to break the sidewalk network. Driveways should not look like intersections. Radius driveway designs, like the one pictured here, encourage higher turning speeds and makes it less likely that the motorists will yield to pedestrians on the sidewalk.

Providing a level, continuous sidewalk not only brings the sidewalk up to the standards of universal access for persons in wheelchairs but also changes driver behavior. The driver exiting or entering the driveway is more aware that they are crossing a sidewalk, will proceed more slowly and is more likely to stop. Wing type driveways, see illustration, also cause slower turning movements.

Sidewalks must allow a flat driveway crossing that is at least three feet wide with a side slope of less than 2 percent.
Alternative driveway designs for constrained spaces can be used. When there is not room for a full driveway apron, some alternative driveway designs can still comfortably maintain the level pedestrian pathway across the driveway. This will avoid cross-slope problems for wheelchair users.

Fewer driveways and narrower driveway crossings will provide for improved pedestrian safety for children, especially for busy commercial zones. School walking routes should keep busy driveway crossings to a minimum. If young students are required to cross a busy school driveway, an adult should be assigned to monitor or direct the students at the driveway.

Treatment: Driveway Design and Location

Description/Purpose
Designing driveway crossings for pedestrians can improve the walking environment, improve visibility and reduce conflicts between drivers and pedestrians. Reducing the number of driveways can make it easier for people with disabilities to access and walk on the sidewalk.

Expected Effectiveness
Proper driveway design and placement can improve the safety of the pedestrian environment.

Keys to Success
For best results, driveways should be properly designed and consolidated at the outset. Local regulations can govern appropriate design when driveways are created.

Key Factors to Consider
Projects that propose to retrofit or consolidate driveways after they are built should include an adequate level of public involvement and education to gain support from the community.

Evaluation Measures
Reduced conflicts at driveways for pedestrians, bicyclists, and motorists.