may have been rural before being developed. To address both the goal of having safe places to walk and the community goal to retain a certain atmosphere, path systems can be developed that do not look like traditional sidewalks but do meet walking needs (4).

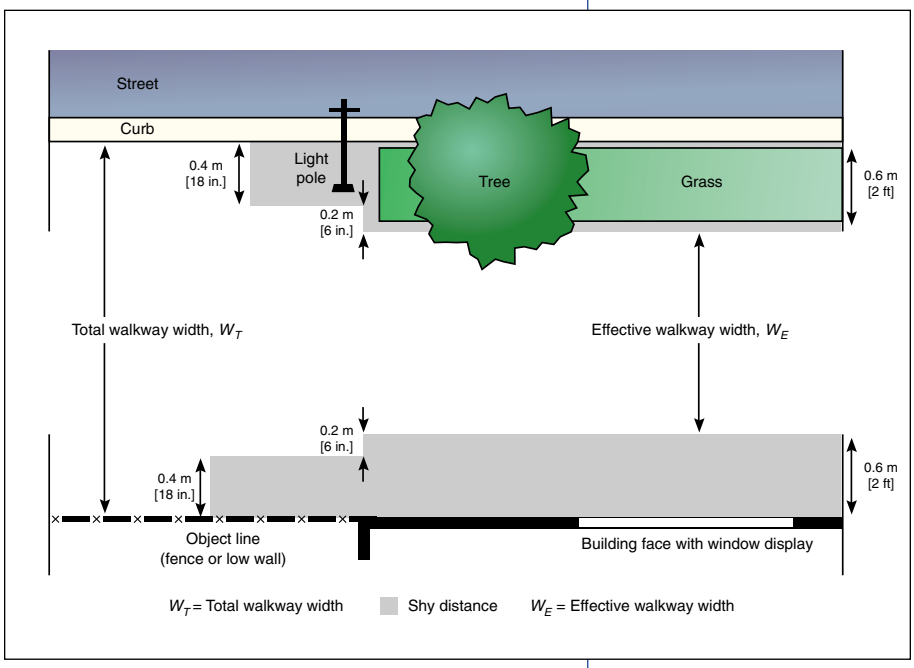


Exhibit 3-4. Effective Walkway Width (27).

Local Urban and Suburban Streets

A local urban or suburban street generally serves individual residences and distributes traffic within that localized urban or suburban area. These types of streets can receive a moderate level of pedestrian activity. However, because of the differing characteristics of urban and suburban local streets, the recommended practices can vary.

In outlying suburban areas, even those with no developed pedestrian facilities, people may walk for exercise, go to a friend's house, or access transit. Development of such areas should make appropriate provision for people to walk.

Urban Collectors and Arterials

Collectors and arterials are typically the streets that serve the largest number of vehicles and pedestrians, as well as being the primary location for businesses and other attractions. They typically require the greatest amount of available walking area. Sidewalks should be provided on each side of the street along collectors and arterials wherever the frontage is developed.

Even though collectors and arterials that serve industrial areas may have low pedestrian volumes, it is recommended that sidewalks be provided on at least one side of the street. However, to facilitate overall connectivity and safety, consideration should be given to providing sidewalks on each side of the street wherever the frontage is developed.

Sidewalks on Only One Side of the Street

Sidewalks should connect to street systems and destinations in a safe and convenient manner. Where sidewalks are provided on only one side of a roadway, the overall connectivity of the sidewalk is weakened, as well as pedestrian safety and accessibility. Sidewalks provided on only one side of the street often require pedestrians to cross streets unnecessarily to meet their travel needs. As a result, the level of exposure of pedestrians to potential conflicts is increased. Therefore, sidewalks on only one side of the street are not generally recommended. However, a sidewalk on one side of the street may be appropriate where only that side of the street is developed. A sidewalk on one side of the street may also be

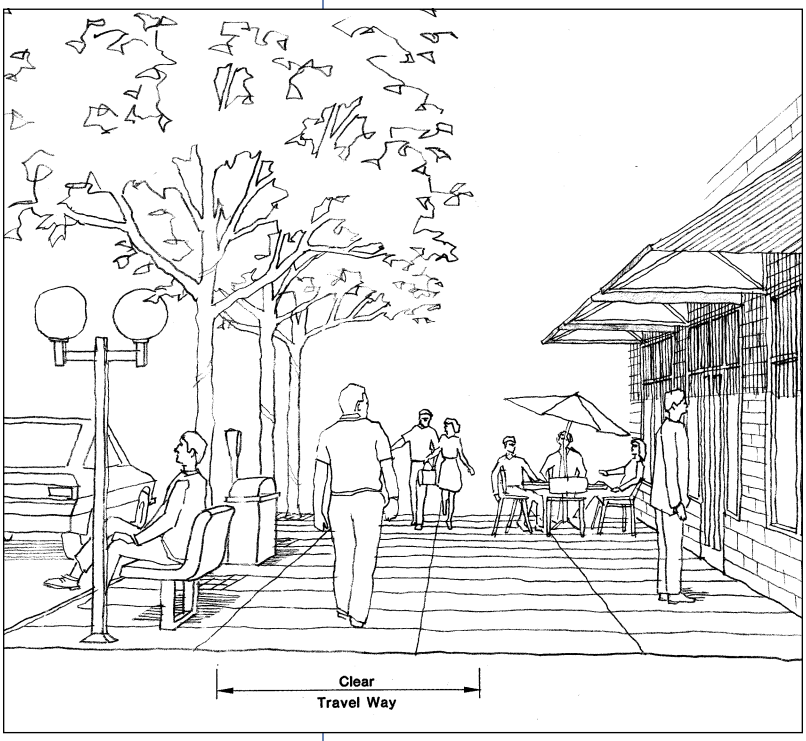


Exhibit 3-5.
Pedestrian Travel Way Clear of Obstructions (29).

adequate for some local streets on an interim basis, especially when this improves a condition where there were no sidewalks previously (28).

3.2.3 Sidewalk Widths

The minimum clear width for a sidewalk is 1.2 m [4 ft], not including any attached curb, and all sidewalks must be constructed with at least this clear width. Where sidewalks are less than 1.5 m [5 ft] in width, passing spaces at least 1.5 m [5 ft] in width should be provided at reasonable intervals. This width is needed for wheelchair users to pass one another or to turn around.

There are many locations where clear sidewalk widths greater than the minimum are desirable. Along arterials not in the central business district (CBD), sidewalk widths of 1.8 to 2.4 m [6 to 8 ft] are desirable where a planting strip is provided between the sidewalk and the curb, and sidewalk widths of 2.4 to 3.0 m [8 to 10 ft] are desirable where the sidewalk is flush against the curb. In CBD areas, the desirable sidewalk width is 3.0 m [10 ft] or sufficiently wide to provide the desired level of service (see discussion below). These widths represent a clear or unobstructed pedestrian travel way. Point narrowings in the desired widths may be acceptable in isolated instances as long as there is at least 1.2 m [4 ft] for accessible passage. However, where practical, street lights, utility poles, sign posts, fire hydrants, mailboxes, parking meters, bus benches, and other street furniture should be located so they do not obstruct the desirable sidewalk width (4).

Chapter 18 of the Institute of Transportation Engineers' *Highway Capacity Manual* (HCM) (27) provides procedures to assess the sidewalk width needed to accommodate particular volumes at a desired level of service. Exhibit 3-4 illustrates the method used by the HCM to define effective walkway width, deducting shy distances from building faces, fences, walls, and other lateral obstructions.

The principal performance measure for sidewalks and walkways is space. Two criteria that are used to determine sidewalk level of service (LOS) are available area per person and flow rate. These performance measures are designated by six levels of service from A to F. LOS A represents an almost empty sidewalk, LOS C to D usually provide maximum pedestrian flow conditions, while LOS F is total breakdown.

In areas where high pedestrian volumes are expected, it may be appropriate to provide sidewalks with widths of 3.0 to 4.5 m [10 to 15 ft] or more to accommodate pedestrian flows. Conversely, when excessively wide sidewalks are located in areas where there are low pedestrian volumes, the expansive pavement and empty-looking sidewalks may seem uninviting to pedestrians (28).

Exhibit 3-5 illustrates a variety of potential obstructions and how the sidewalk can be designed with adequate clearance. For example, when the sidewalk abuts storefronts, it is desirable to provide about 0.6 m [2 ft] of additional width to accommodate shy distance from walls, shoppers stopping to look into windows, and to avoid conflicts with doors opening and pedestrians entering and leaving the adjacent buildings (14). The provision of shy distance along building fronts is illustrated in Exhibit 3-6. Similar width accommodations may be needed adjacent to sidewalk vendors and newsstands. The use of any sidewalk width for cafes, newsstands, or other vendors should be regulated under an encroachment permit process that considers accessibility and pedestrian level of service.

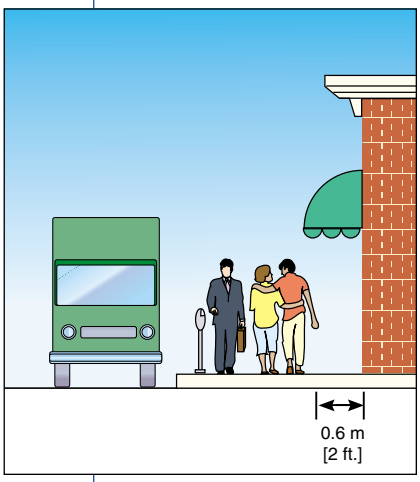


Exhibit 3-6. Shy Distance Between Building and Walkway (29).

3.2.4 Buffer Widths

Providing a buffer can improve pedestrian safety and enhance the overall walking experience. Buffer width is the distance between the sidewalk and the adjacent roadway. The buffer width in a commercial area will be different from the buffer needs of a residential area. Landscaped buffers can serve to provide a snow storage area and splash protection for pedestrians, and space for curb ramps, street light poles, trash pick up, and traffic signs. Additionally, buffer area plantings and benches can aid in creating an inviting social setting for the pedestrian.

On-street parking or bike lanes can also act as a sidewalk buffer. In areas where there is no on-street parking or bike lane, the ideal width of a planting strip is 1.8 m [6 ft]. Desirable landscape buffer widths as measured from the edge of the traveled way are:

- Local or collector streets—0.6 to 1.2 m [2 to 4 ft]
- Arterial or major streets—1.5 to 1.8 m [5 to 6 ft]

If a planting strip is not provided, then the desirable total width for a curb-attached sidewalk in residential areas should be at least 1.8 m [6 ft]. In commercial areas or along busy arterial streets, the desirable total curb-attached sidewalk width should be 2.4 m [8 ft] to provide space for light poles and other street furniture, as well as protection from splashing, car door openings, and snow storage in northern climates (4).

Where there is a landscaped buffer area at a bus stop between the sidewalk and street, accessible paved loading/waiting pads and connections to the sidewalk for both front and rear doors of a bus should be provided. Accessibility requirements for bus stops are presented in ADAAG Section 10 (12).

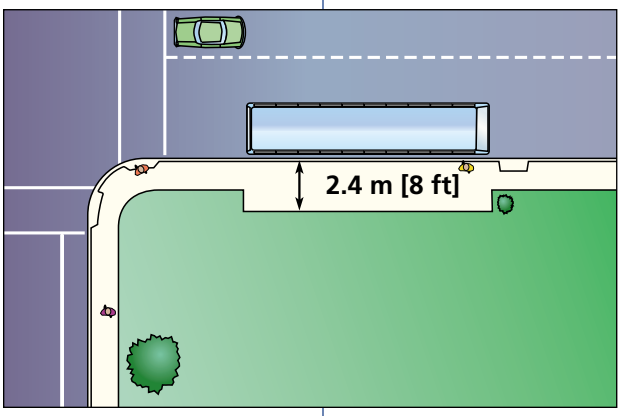


Exhibit 3-7. Sidewalk Dimensions at Bus Stops (11).

3.2.5 Transit Connections

Transit stops and bus pullouts provide a designated space for loading and unloading passengers. A zone accommodating one bus is normally from 24 to 48 m [80 to 160 ft] in length. Bus stops can be as simple as a sign and a designated space at the curb, a pullout area, or a shoulder for the bus to stop. Bus stops may also include other facilities, such as shelters, benches, and other furnishings. To discourage midblock crossings by pedestrians, bus stops at or near intersections are generally preferred to midblock bus stops.

A newly constructed transit stop must be accessible to all users; thus, a 2.4-m [8-ft] by 1.5-m [5-ft] landing pad must be provided as required by ADAAG 10.2.1 (12). It is also desirable to provide a continuous 2.4-m [8-ft] pad or sidewalk the length of the bus stop, or at least to the front and rear bus doors (see Exhibit 3-7). At stops in areas without curbs, a 2.4-m [8-ft] shoulder should be provided as a landing pad. Care should be taken to ensure that utility poles, fire hydrants, and other street furniture do not impede access to the bus stop and loading areas (17).

Curb ramps at bus stops will allow waiting passengers to board a lift from the street in those instances where the bus cannot pull up to deploy the lift directly to the sidewalk due to illegally parked cars or other obstructions. At transit stops, sidewalks should be constructed to the nearest intersection or to the nearest section of existing sidewalk. Even if a transit route does not have complete sidewalks, it is still important to provide a suitable waiting area for pedestrians (24).

Bus shelters should be provided where practical to provide visible, comfortable seating and waiting areas for passengers. Bus shelters must have a minimum clear floor area of 0.8 m by 1.2 m [2.5 ft by 4 ft], entirely within the perimeter of the shelter, connected by a pedestrian access route to the boarding area.

3.2.6 Driveway Access Management

Uncontrolled access across a sidewalk not only degrades the quality of the pedestrian environment, but also increases the potential for vehicle-pedestrian conflicts. Unsignalized intersections, alleys, and driveways can present an uncomfortable environment to the pedestrian, and the number of access points available for motor vehicles should be kept to a minimum while still providing needed access to adjacent property.

Driveway Types

Commercial driveways generally have higher volumes than other driveway types and, therefore, have the greatest potential for vehicle-pedestrian conflicts. Not only is the design of the driveway ramp important to accessibility for pedestrians with disabilities, but the number of commercial driveways and their proximity to one another will have a direct effect on the quality of the overall pedestrian environment.

Limiting and consolidating vehicle access points benefit pedestrians in several ways. One important improvement is the reduction in the number of conflict points created by consolidated driveway access areas. Exhibit 3-8 illustrates this principle. Access management can also assist by redirecting motor vehicles to intersections with appropriate control devices. The benefits of access management are discussed further in the AASHTO Green Book (3).

Residential driveways to individual homes pose less conflict potential to pedestrians than commercial driveways because of their much lower usage rates. However, care should be taken to ensure that there is enough space outside the public right-of-way to discourage sidewalk blockage by parked vehicles. Multiple-unit apartment and condominium buildings can have traffic volumes approaching those of commercial driveways.

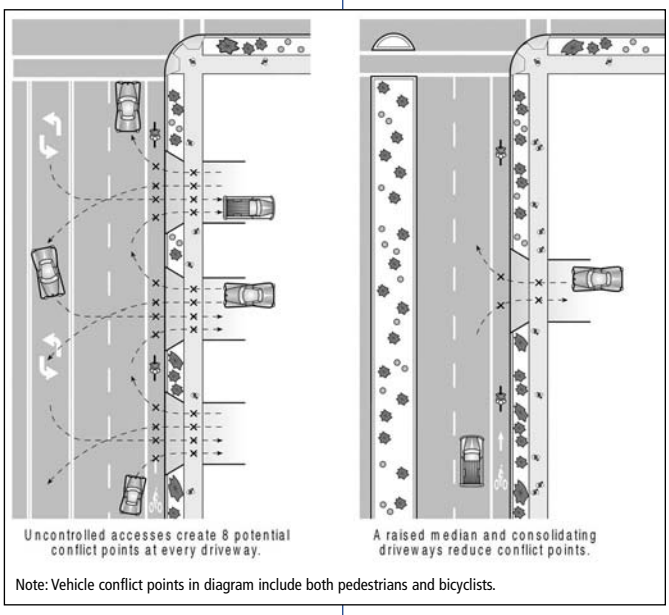


Exhibit 3-8. Uncontrolled Access vs. Controlled Access. (24).

Driveway Design

Where a driveway crosses a sidewalk, the driveway must conform in width, cross slope, and grade to the design requirements for sidewalks in order to maintain accessibility for pedestrians with disabilities. Unramped curb returns are not permitted. Wheelchairs, strollers, and those who use walkers need a relatively flat surface to travel. Side flares and cross slopes at driveway aprons may cause a drive wheel, caster, or leg tip to lose contact with the surface (see Exhibit 3-9.) Cross slopes in new construction, reconstruction, or alterations must not exceed 1V:48H (two percent) per ADA requirements.

There are four basic driveway designs that meet accessibility requirements. Each design maintains a level, or nearly level, surface by either maintaining a minimum 1.2-m [4-ft] wide continuous path, or by providing a 1.2-m [4-ft] area adjacent to the main walk, without exceeding a two percent cross slope. Exhibit 3-10 illustrates four acceptable alternatives (Options A through D) and, for contrast, a design that is **not** acceptable for new construction or alterations.

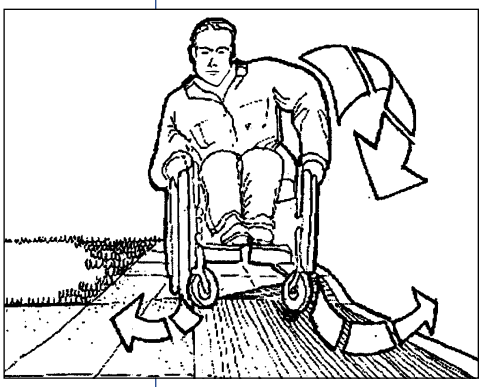
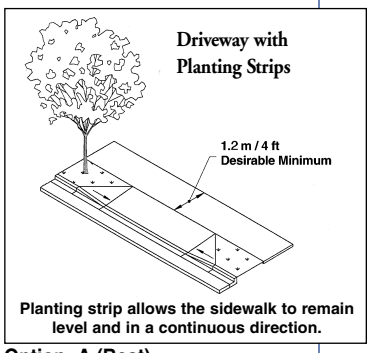
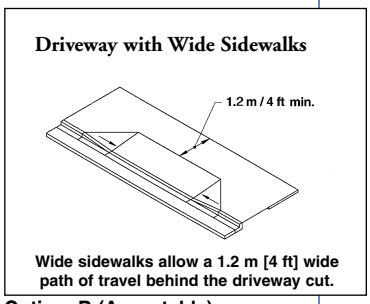


Exhibit 3-9. Effect of Warped Surface on Wheelchairs (24).

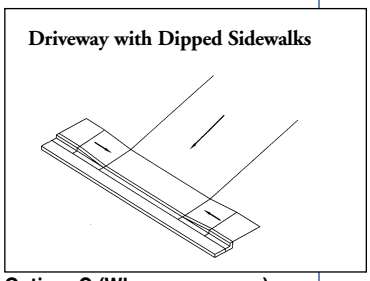
- Option A illustrates how planting buffer strips can greatly improve the safety of driveway access areas for both the pedestrian and motorist. Wide planting strips allow more turning area for entering and exiting vehicles. Placing the driveway slope in the planting strip provides a continuous level walkway.
- Option B incorporates a sidewalk at the driveway that is narrower than the sidewalk on either side of the driveway, but still maintains the minimum clear sidewalk width of 1.2 m [4 ft].
- In areas where the distance from the edge of the sidewalk to the face of curb is insufficient to provide a cross slope of two percent, Option C should be considered; this option incorporates appropriately designed curb ramps from the sidewalk to the driveway and back.



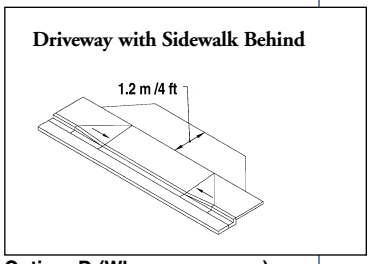
Option: A (Best)



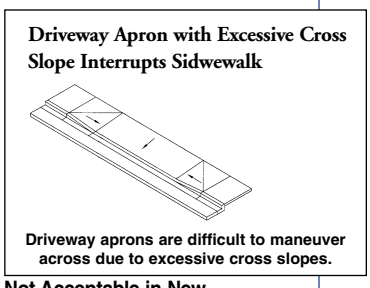
Option: B (Acceptable)



Option: C (Where necessary)



Option: D (Where necessary)



Not Acceptable in New Construction/Reconstruction/ Alteration

Figure 3-10. Sidewalk Design Options at Driveway Crossing (29).

- Purchasing or obtaining an easement from the adjacent property to provide a level sidewalk area next to the driveway may be appropriate, as shown in Option D, although this design may not be practical at some sites because of physical constraints.

In reconstruction work at some locations, the driveway slope may need to be increased to maintain a 1.2-m [4-ft] clear sidewalk width. However, the policies of state and local agencies concerning driveway slope should be consulted.

Where a parking garage exit crosses a sidewalk, exiting drivers should be reminded that they need to yield to pedestrians. This can be accomplished with Stop or Yield signs and can be supplemented with mirrors, electronic animated eyes, displays, audible signals, and/or flashing lights. Such signs and signals should be directed to the drivers, not the pedestrians. Using audible or visible signals to require pedestrians to yield to vehicles at driveways is confusing and inappropriate. Sufficient sight distance for drivers to see pedestrians at such locations is needed.

Driveways for large traffic generators are often designed as intersections with curb returns, curb ramps, and marked crosswalks. Unless such high-volume, private-access driveways are signalized, the standard driveway treatments described above are preferred to clearly indicate the pedestrian right-of-way.

When an intersection-type design is used at a driveway, the design guidelines in the next section on Intersections Design should be applied.

3.2.7 Grade and Cross Slope

Steep sidewalk grades create problems for all pedestrians, especially under adverse weather conditions. Extremes of terrain exact a cost in energy or battery reserves for pedestrians with mobility impairments. Sidewalks and other walkways that incorporate pedestrian access routes must be designed with maximum grades of five percent (1V:20H); where a sidewalk runs along a roadway with a grade that exceeds five percent, the sidewalk grade may exceed five percent but must be less than or equal to the roadway grade. Maximum grades and cross slopes applicable to specific design situations are indicated in Exhibit 3-11.

Where steep sidewalk grades are present, they will be avoided by pedestrians with mobility impairments if alternative routings are available and known. A few cities have developed and publicized routings that use existing building elevators.

The cross slope of a sidewalk is the slope that is measured perpendicular to the direction of travel. Cross slopes are needed for drainage. However, sidewalks must be constructed with a maximum cross slope of two percent (1V:48H) to ensure a relatively level area for travel and maneuverability for walkers and wheelchair users. This is particularly desirable in cases of steep grades. At corners, sidewalks should have slopes of two percent or less in both perpendicular travel directions.

3.2.8 Stairs

Stairs should be avoided along a sidewalk route. When unavoidable, the steps or stairs must follow current ADAAG (12) requirements. The construction of stairs may also be regulated in greater detail by local building codes.

Adjacent to Public ROW	
Maximum Sidewalk Grade Adjacent to Roadway	No limit if it follows the grade of the street
Maximum Cross Slope	2% (1V:48H)
Not Adjacent to Public ROW	
Maximum Grade Without Railings	5% (1V:20H)
Maximum Ramp Grade with Handrails and Landings	8.3% (1V:12H)

Exhibit 3-11. Sidewalk Grade Criteria.

While it is not the responsibility of public agencies to design building entryways, aligning the level of an adjoining sidewalk with an entry when the sidewalk is constructed, repaved, or repaired, can dramatically improve accessibility and eliminate potential tripping problems (14). Title II of the ADA requires state and local agencies to consider changes to their practices, procedures, and policies if doing so would provide needed accessibility.

3.2.9 Sidewalks for Highway Bridges, Underpasses, and Tunnels

Provisions should always be made to include some type of walking facility as a part of vehicular bridges, underpasses, and tunnels, if the facility is intended to be part of a pedestrian access route. Sidewalks along bridges and underpasses are more difficult to design than sidewalks along streets because overall space is at a premium and the edges of the sidewalk are limited by the roadway and a wall or railing. Where practical, pedestrians should not be forced to walk uncomfortably close to a wall, and a protective barrier may be desirable at the curb (see Exhibit 3-12), as described in the AASHTO *Roadside Design Guide* (4).

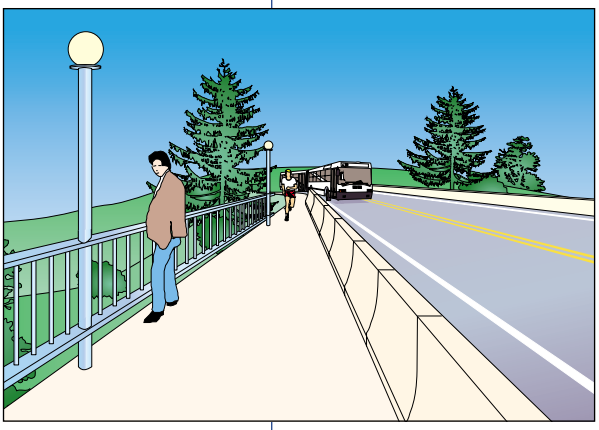


Exhibit 3-12. Bridge with Protective Barrier at Curb (20).

Where practical, sidewalk widths across bridges and through underpasses should be the same as or wider than the clear width of the existing connecting sidewalks. The minimum clear width for a curb-attached sidewalk on a bridge is 1.2 m [4 ft]; a width of 2.4 m [8 ft] is desirable.

Underpasses can pose a problem if the sidewalk is located between the abutment wall and supporting columns next to the roadway. Here the concern is more about security due to the blind spots created by the large columns or pillars, particularly if the length of the underpass exceeds 30 m [100 ft]. Where practical, underpasses should be designed with a clear span from abutment to abutment (or to center columns). Where columns are placed on either side of the roadway, it is desirable for pedestrian security reasons to place the sidewalk between the columns and the roadway. Where columns must be located adjacent to the curb, the sidewalk behind the columns should be made as wide as practical depending on the length of the structure, and/or include additional vandal-proof lighting (including daytime lighting for long underpasses) in order to increase the feeling of security. In addition, underpasses should be designed to drain properly so that standing water is not splashed onto pedestrians by passing vehicles.

Because sidewalks require less vertical clearance than roadways, sidewalks through underpasses do not need to be at the same grade as the roadway. This can be important

Exhibit 3-13.
Brick Sidewalk.
Photo courtesy of
James T. McDonnell.

where the grade of the roadway is greater than the desirable sidewalk grade. However, this would probably require railings along the roadway edge and may raise security concerns.

Normally, pedestrians are not permitted in long tunnels; however, space should be provided in the tunnel for an emergency walk and for access by maintenance personnel. Raised sidewalks are desirable beyond the shoulder areas to serve the dual purpose of a safety walk and an obstacle to prevent damage of the wall finish or the tunnel lighting fixtures by vehicle overhangs.

Bridge railings are intended to prevent motorists, pedestrians, and bicyclists from falling off the structure. AASHTO's *Standard Specifications for Highway Bridges* (5) specifies geometric, design load, and maximum allowable material stress requirements for the design of traffic railings, pedestrian/bicycle railings, and railings that combine traffic railing features with those of pedestrian/bicycle railings. Where a traffic barrier or railing is used between the roadway and the sidewalk, no part of the curbed sidewalk should extend closer to the roadway than the front of the traffic barrier.

3.2.10 Surface Treatments

The sidewalk surface treatment can have a significant impact on the overall accessibility and comfort level of the facility. Sidewalk surfaces should be smooth and continuous. It is desirable that the sidewalk surface be stable, firm, and slip resistant. The preferred materials are portland cement concrete (PCC) and asphaltic concrete (AC) pavement. PCC (typically found in urban areas) provides a smooth, long-lasting, and durable finish that is easy to grade and repair. AC has a shorter life expectancy but may be appropriate in less urban areas and park settings. Crushed aggregate may be used as an all-weather walkway surface in park settings or rural areas, but such paths generally require a higher level of maintenance to maintain accessibility (14).

Sidewalks, walkways, and crosswalks can be constructed with bricks and pavers if they are constructed to avoid settling or removal of bricks, which can create a tripping condition (see Exhibit 3-13). "Stamping" molds have also been used to create the visual appearance of bricks and pavers. The technique has the advantages of traditional concrete without some of the maintenance issues associated with bricks and pavers. Commercial products are available that produce a variety of aesthetically pleasing surfaces that are almost impossible to distinguish from real bricks and pavers (14). Stamped surface treatments are not completely without maintenance issues, however. The color has been known to fade, and when utility cuts or sidewalk repairs are made, there is usually little or no attempt made to replicate the original pattern and color. Crosswalks that are constructed with bricks or pavers may be outlined with white lines, per MUTCD specifications, to help motorists detect the presence of the crosswalk. A disadvantage of either real or stamped brick sidewalks is the problem that seemingly small surface irregularities pose for wheelchair users with spinal injuries. However, it is possible to enhance sidewalk aesthetics while still providing a smooth walking surface by combining a concrete main walking area with brick edging where street furniture (lights, trees, poles, etc.) can be placed. For example, in a CBD, a 4.5-m [15-ft] total sidewalk width might include a 2.4-m [8-ft] clear concrete sidewalk with a 2.1-m [7-ft] decorative brick-edging treatment (14).

3.2.11 Pedestrian Facility Lighting

Exhibit 3-14. Newspaper Boxes Consolidated Out of Pedestrian Path
Photo courtesy of Terry R. Short, Jr.

Good street lighting improves the visibility, comfort, and security of pedestrians. Consideration should be given to lighting at least the intersections and other pedestrian crossing areas. Lighting is also recommended in areas where there is a high concentration of dusk or nighttime pedestrian activity, such as places of worship, shops, schools, and community centers.

In urban areas, continuous lighting is encouraged. Along wide arterial streets with sidewalks on both sides of the street, it is desirable also to place the lights along both sides of the street. Streetlights should be spaced to provide a relatively uniform level of light. To improve the comfort and security of pedestrians in shopping districts or in downtown areas with high concentrations of pedestrians, it may be desirable to provide pedestrian-level lighting in addition to the street lighting. The preferred pedestrian-level lights are mercury vapor, metal halide, or incandescent. Low-pressure sodium lights may be energy-efficient, but are undesirable because they create considerable color distortion. High-pressure sodium lights produce less distortion and are a more desirable alternative. Pedestrian-level lighting may also be installed in selected areas of pedestrian activity to create a sense of intimacy and place.

For further lighting information, refer to the AASHTO *Informational Guide for Roadway Lighting* (1).

3.2.12 Obstacles and Protruding Objects

Obstacles that encroach on the pedestrian's path of travel are often beyond the control of the designer. To ensure that visibility is not compromised along sidewalks and walkways, a local government may establish ordinances that require property owners to maintain their property free of obstacles for the benefit of others.

Additional obstacles that should be avoided are utility wires that cross over the sidewalk or walkway. Guy wires and utility tie-downs should not be located in or across sidewalks at heights below 2.4 m [8 ft]. When placed parallel to sidewalks or pedestrian walkways, the guy wires should be covered with a bright yellow (or other high-visibility color) plastic "guard" to make the wire more visible (14).

Street Furniture and Other Obstacles

Improperly placed street furniture, such as benches and shelters, can create obstacles for pedestrians with vision impairments. Street furniture, including bicycle racks, should be outside the normal travel path (see Exhibit 3-14). High-contrast colors should be used for conspicuity. The following clearances, which apply to street furniture and other obstacles, are adapted from ADAAG (12) and MUTCD (15) requirements (see Exhibit 3-15):

- *Wall-Mounted Objects*—Objects shall not protrude more than 100 mm [4 in.] from a wall when located between 0.675 m [27 in.] and 2.1 m [7 ft] above the sidewalk.
- *Single-Post-Mounted Objects*—Objects shall not overhang more than 100 mm [4 in.] per side of post when located between 0.675 m [27 in.] and 2.1 m [7 ft] above the sidewalk.

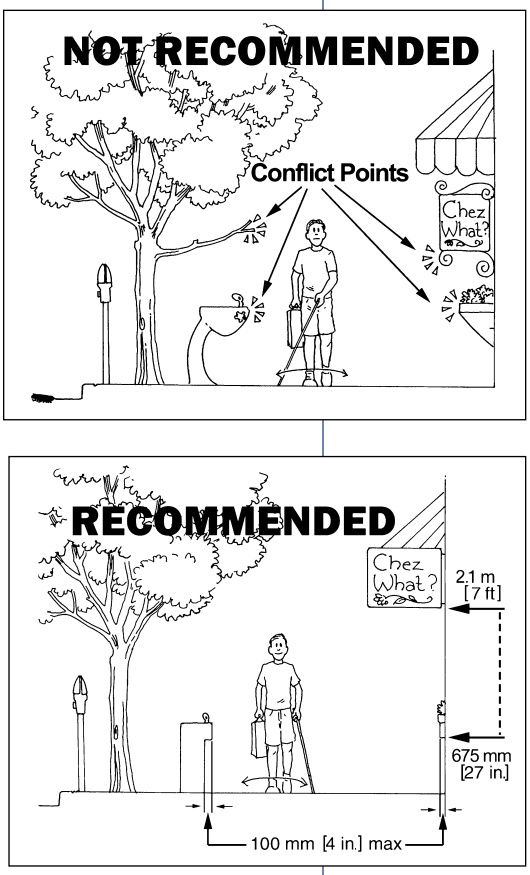


Exhibit 3-15. Proper Positioning of Street Furniture (13).

- *Multiple-Post-Mounted Objects*—The lowest edge of an object mounted on multiple posts having a clear distance between adjacent posts greater than 0.3 m [1 ft] shall be no higher than 0.675 m [27 in.] or no lower than 2.1 m [7 ft].

Another common problem is the random placement of street furniture where there is on-street parking. Such placement can make exiting a lift-equipped vehicle difficult. One remedy is to have street furniture, such as benches, telephone poles, or streetlights, placed at the ends of parking spaces rather than in the middle of parking spaces (16).

Drainage Grates

Drainage grates, particularly those with parallel bars, are concerns for wheelchair, bicycle, stroller, walker, and cane users; for example, a gap or opening that is too large may catch the tip of a cane or capture a wheelchair caster. Where practical, drainage grates should be placed outside the pedestrian travel way. However, where present in the walking surface, grates (as well as manhole covers, hatches, vaults, and other utility coverings) should be mounted flush and level with the surrounding surface. Such grate openings should not exceed 13 mm [0.5 in.] in width in one direction of travel. If grates in the walking surface have elongated openings, they must be placed so that the long dimension is perpendicular to the dominant direction of travel (12).

Railroad Crossings

Light rail vehicle (LRV) and surface commuter rail systems frequently cross roadways and sidewalks at grade. Conventional passenger and freight railroads occasionally cross streets and sidewalks as well. Pedestrian crossings at such railroads must be designed in accordance with the ADAAG (12) to avoid situations in which wheelchair casters rotate when they hit the top of a rail and drop into the flangeway. The pedestrian crossing must have clear lines of sight and good visibility so that pedestrians can see approaching trains. Coordination with the local transit authority on grade-crossing protection is essential. An effective and low-cost solution is the provision of a very high-contrast front end on the vehicle and the placement of high-intensity strobe lighting on the vehicle. The crossing must be level and flush with the top of the rail at the outer edge and between the rails. The crossing should also be as close as practical to perpendicular with tracks, and flangeway gaps that do not exceed 64 mm [2.5 in.] (75 mm [3 in.] for tracks that carry freight) must be provided. Detectable warnings to alert pedestrians with vision impairments should be placed where railways cross any accessible pedestrian route. When a raised sidewalk is adjacent to a roadway, curb ramps should be provided to bring the pedestrian walkway down to the same grade as the railroad crossing. In this type of installation, the detectable warning should be placed outside the train's dynamic envelope.

If the trains or LRVs stop close to the pedestrian crossing at bidirectional operation facilities, pedestrians should be warned of a train approaching from the opposite direction that may be blocked from view by the vehicle stopped at the station. Fencing or landscaping can be used to guide pedestrians to safer crossing points. Pedestrian-only crossing gates or other audible and visible warning devices should also be considered.