17-4 PEDESTRIAN ACCOMMODATIONS

17-4.01 General

Pedestrian accommodations are an integral part of urban and suburban transportation corridors. They facilitate pedestrian travel and access to public transportation and a wide variety of destinations, thereby contributing to alleviation of urban traffic congestion. The most pressing need for accommodation is at points of community development that result in pedestrian concentrations near or along the highway, such as at schools, public transportation stations and stops, local businesses, industrial plants, hospitals, churches, shopping centers, parking lanes, etc. Accommodations can include sidewalks, crosswalks, elevated walkways, grade-separated structures, stairs, curb ramps, and traffic signal devices.

17-4.02 Policies

Fully consider and accommodate the travel needs of all users of a transportation corridor when planning transportation improvements (Reference Chapter 17-1.02). If during the planning phase of a project, pedestrian travel in the vicinity of the project is determined to be sufficient to warrant consideration, provide appropriate accommodations.

Policies relating to construction and maintenance, including sidewalk/curb ramps for the disabled, are addressed in Chapter 58. Financial responsibilities for pedestrian accommodations within Municipalities are addressed in Chapter 5.

17-4.03 Warrants

Pedestrian accommodations will be considered appropriate if they are not already available and any of the following conditions exist:

- there is current evidence of frequent pedestrian activity;
- there is a history of pedestrian-related crashes;
- the roadway improvement will create a safety impediment to existing or anticipated pedestrian travel (e.g., adding lanes so that the improvement itself acts as a barrier to pedestrian traffic);
- the roadway is in or within one mile of an urban area;
- there is urban or suburban development that would attract pedestrian travel along the route to be improved;
- pedestrian-attracting development is expected along the route within five years of project completion, either as documented in a local plan or anticipated as a factor of similar development history; and/or
- the roadway provides primary access to a park, recreation area or other significant destination, or across a natural or man-made barrier.

Overpasses and underpasses will be evaluated on a case-by-case basis considering the type of pedestrian travel, travel generators (e.g., schools, factories, stadiums, parks, transit terminals, shopping districts), the amount of anticipated non-motorized traffic, and the safety impacts of not providing the accommodations. Anticipated pedestrian trip length to generators should be 1 mile (2 km) or less and the adverse travel distance alleviated by construction to the facility should be greater than 0.5 miles (1 km).

17-4.04 Pedestrian Facility Design

17-4.04.1 Designing Roadways to Accommodate Pedestrians

Designing a roadway that successfully meets the needs of both vehicular traffic and pedestrians can be a challenging task. The attributes of good roadway design that should be considered in accommodating pedestrians include:

- *Circulation* – The roadway environment should serve the circulation needs of all users, including pedestrians, bicyclists, private vehicles, public transit, and emergency vehicles. Pedestrians should have frequent opportunities to cross streets at well-designed intersection and midblock crossings.

- *Balance* – All features of the roadway environment should work in concert, equitably balancing the needs of all users, including pedestrians.

- *Connectivity* – The roadway system should provide overall connectivity. Walking routes should be obvious and should not require pedestrians to travel out of their way. Every destination should be served by an accessible path of travel.

- *Safety* – Sidewalk users should not feel threatened by adjacent traffic. Measures such as limiting design speeds, providing traffic-calming devices, and selecting appropriate speed limits may be used to encourage lower travel speeds. Additionally, a buffer area separating the sidewalk from the roadway is desirable for safety.

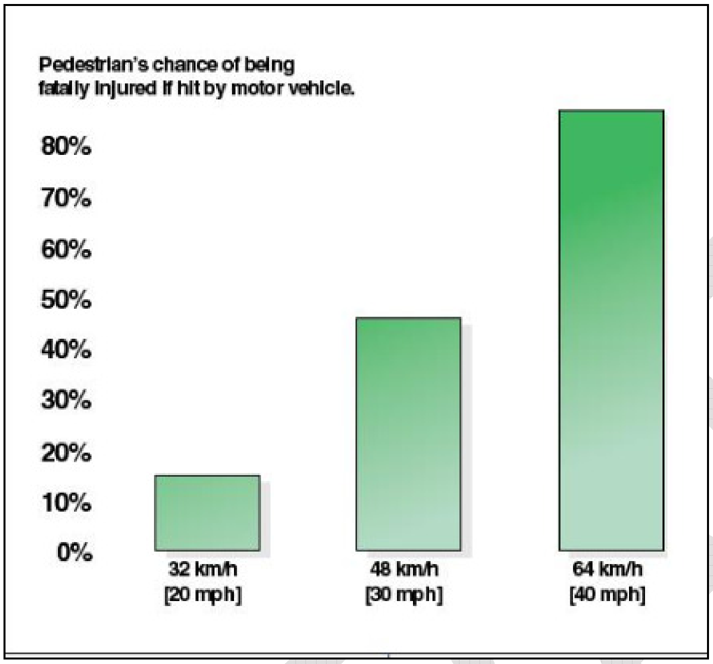
- *Accessibility* – Sidewalks and crossings should be fully accessible to all users.

- *Traffic Engineering Elements* – Elements, such as crosswalk treatments, signal location, and signal timing, should account for pedestrians and other roadway users.

- *Landscaping* – Plantings and street trees in the sidewalk area should contribute to the overall psychological and visual comfort of sidewalk users.

17-4.04.1 Speed Management

Selection of an appropriate design speed is one of the most important steps in roadway design. Studies have indicated that in a vehicle-pedestrian crash, the faster a motorist is traveling the higher the risk that injuries to a pedestrian will result in death. Reduced speeds provide more opportunity for pedestrians and motorists to see and react to one another in a timely manner.



17-4.04.2 Sidewalk Design

All roadways along which pedestrians are not prohibited should include an area where occasional pedestrians can walk safely, whether on unpaved walkways, on shoulders in rural or less developed areas, or on sidewalks in more urban areas. On an access route that is intended for pedestrian use, a walkway that meets the applicable ADA requirements must be provided. Newly constructed or improved pedestrian walkways must meet ADA requirements.

Providing adequate and accessible facilities should lead to increased numbers of people walking, improved safety, and the creation of social space. Attributes of well-designed sidewalks, include the following:

- *Accessibility* – A network of sidewalks should be accessible to all users and meet ADA requirements.

- *Adequate Width* – Two people should be able to walk side-by-side and pass a third person comfortably and different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should be wider to accommodate the greater volume of walkers.

- *Safety* – Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.

- *Continuity* – Walking routes should be obvious and should not require pedestrians to travel out of their way.

17-4.04.2.1 Sidewalk Installation

Sidewalk are constructed under four conditions: 1) new construction in areas with existing or anticipated pedestrian use, 2) new construction with no initial pedestrian presence, 3) reconstruction of existing sidewalks that do not presently accommodate the needs of all users, and 4) addition of sidewalks in reconstruction projects in areas of increasing pedestrian activity and where pedestrians needs are not being met.

Rural Roadways

Pedestrian activity along rural roadways can reasonably be expected to be fairly low. While sidewalks are not specifically recommended for rural roadways, sidewalks may be desirable (or necessary for accessibility) to serve schools, shops, and transit stops.

Sufficient space must be provided at bus stops on rural roads to accommodate people waiting at the roadside for the bus.

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 from a minimum width sidewalk to a wider walkway designed to accommodate higher levels of pedestrian traffic.

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.

Sidewalks on Only One Side of Street

Sidewalks should connect to street systems and destinations in a safe and convenient manner. Where sidewalks are provided on only 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 or has pedestrian generators or destinations. A sidewalk on one side of the street may also be adequate for some local streets on an interim basis, especially when this improves a condition where were no sidewalks previously.

17-4.04.2.2 Sidewalk Widths

The minimum clear width for a sidewalk is 5 ft (1.5 m), not including any attached curb, and all sidewalks must be constructed with at least this clear width. Where sidewalks are less than 5 ft (1.5 m) in width, passing spaces at least 5 ft (1.5 m) 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 is desirable. Along arterials not in the central business district (CBD), sidewalk widths of 6 to 8 ft. (1.8 to 2.4 m) are desirable where a planting strip is provided between the sidewalk and the curb, and sidewalk widths of 8 to 10 ft (2.4 to 3.0 m) are desirable where the sidewalk is flush against the curb. In CBD areas, the desirable sidewalk width is 10 ft (3.0 m) or sufficiently wide to provide the desired level of service. 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 4 ft (1.2 m) 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.

17-4.04.2.3 Buffer Widths

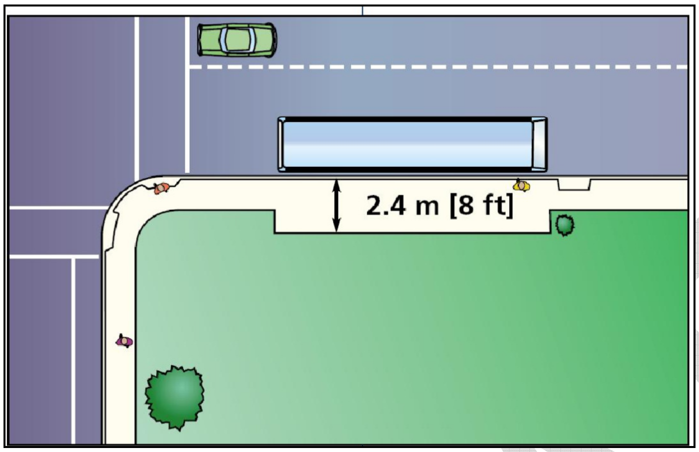
Providing a buffer can improve pedestrian safety and enhance the overall walking experience. Buffer width is the distance between the sidewalk and the adjacent roadway. The buffer width in a commercial area will be different from the buffer needs of a residential area. Landscaped buffers can serve to 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 pedestrians.

On-street parking or bike lanes also can 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 6 ft (1.8 m). Desirable landscape buffer widths as measured from the edge of the traveled way are:

- Local or collector streets – 2 to 4 feet (0.6 to 1.2 m)
- Arterial or major streets – 5 to 6 feet (1.5 to 1.8 m)

17-4.04.2.4 Transit Connections

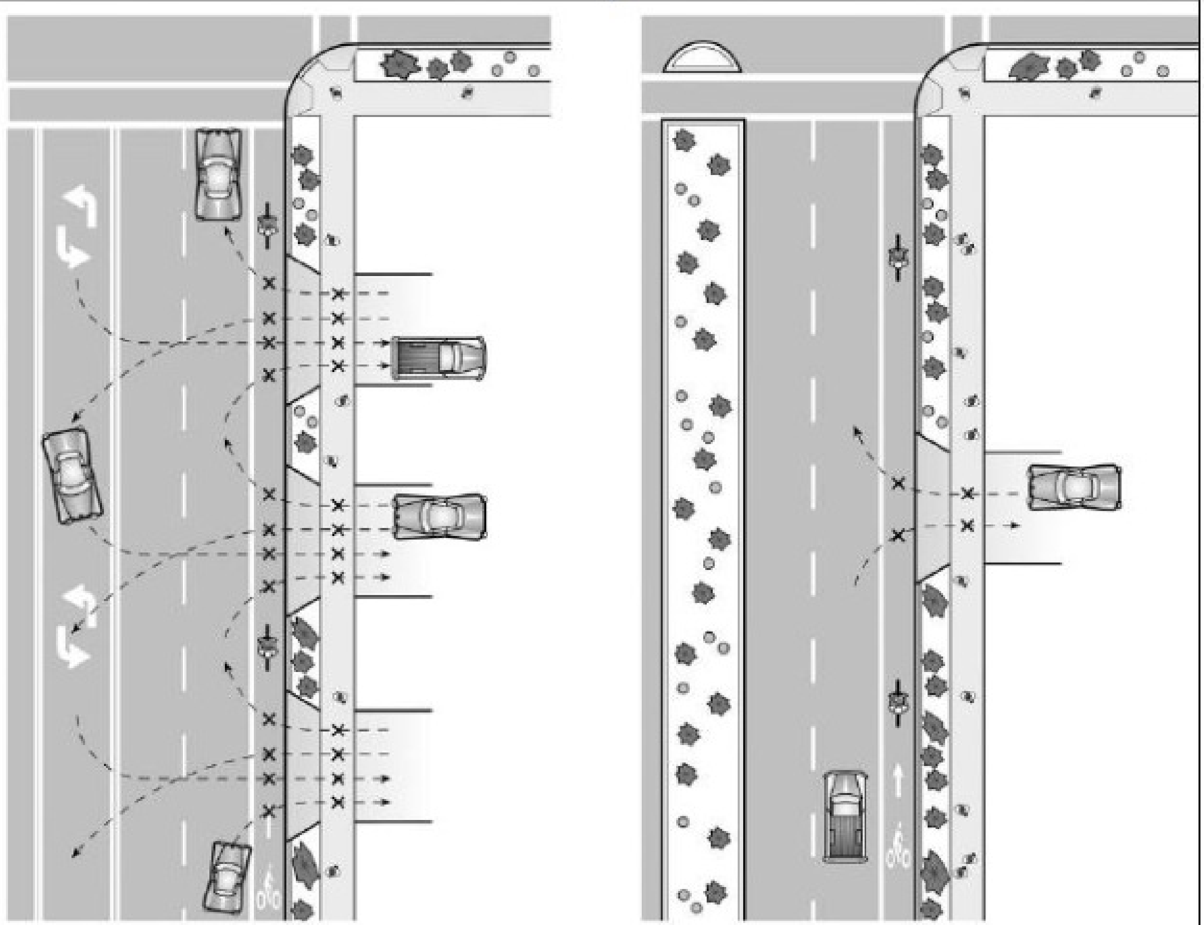
Transit stops and bus pullouts provide a designated space for loading and unloading passengers. A zone accommodating one bus is normally from 80 to 160 feet (24 to 48 m) in length. Bus stops can be as simple as a sign and designated space at the curb, a pullout area, or a shoulder for the bus to stop. 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 8 ft (2.4 m) by 5 ft (1.5 m) landing pad must be provided as required by ADAAG 10.2.1. It also is desirable to provide a continuous 8 ft (2.4 m) pad or sidewalk the length of the bus stop, or at least to the front and rear bus doors. At stops in areas without curbs, an 8 ft (2.4 m) 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.

17-4.04.2.5 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.



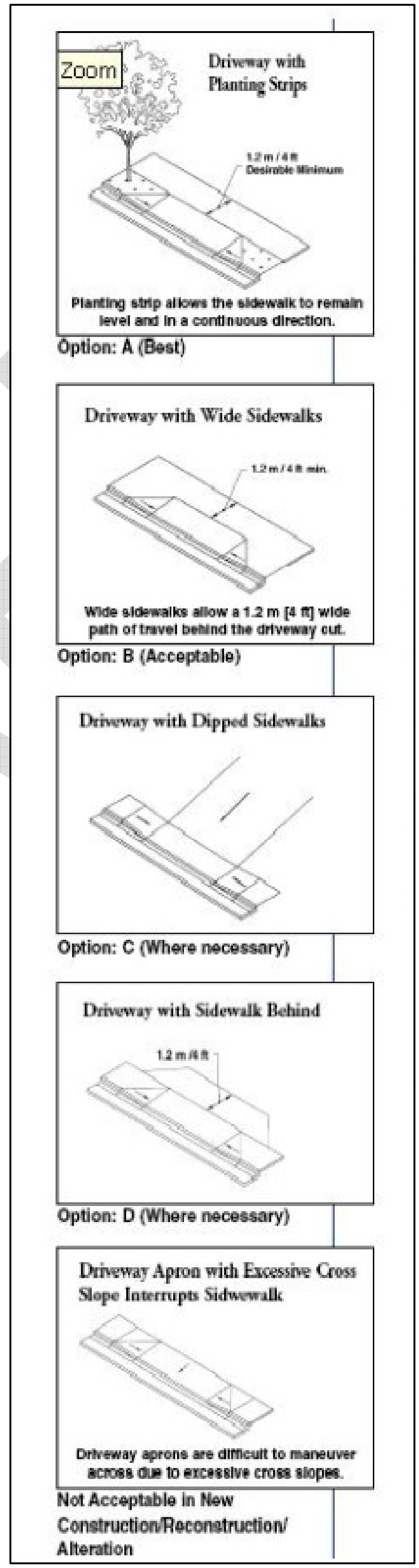
Uncontrolled accesses create 8 potential conflict points at every driveway.

A raised median and consolidating driveways reduce conflict points.

Note: Vehicle conflict points in diagram include both pedestrians and bicyclists.

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.



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. Cross slopes in new construction, reconstruction, or alterations must not exceed 1V:48H (two percent) per ADA requirements.

17-4.04.2.6 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 grade and cross slopes applicable to specific design situations are indicated in the exhibit.

17-4.04.2.7 Sidewalks for Highway Bridges, Underpasses and Tunnels

Provision 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 the 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, as described in the AASHTO *Roadway Design Guide*.

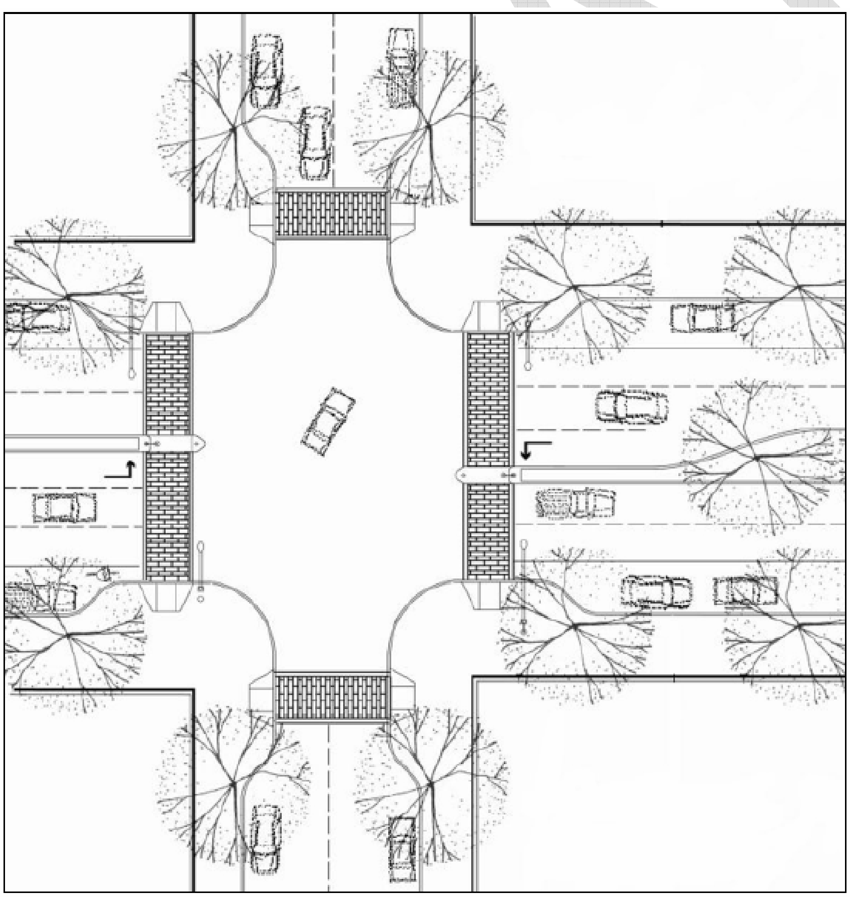
Where practical, sidewalk widths across bridges and through underpasses should be the same as or wider than the clear width of the existing connecting sidewalks. The minimum clear width for a curb-attached sidewalk on a bridge is 5 ft (1.5 m); a width of 8 ft (2.4 m) is desirable.

Typical sections for sidewalks along roadways are also discussed in Chapter 48.

Facilities intended to also accommodate bicycle travel should follow the guidance in Section 17-

17-4.04.3 Intersection Design

Street crossings are an essential component of any roadway design. A street may have excellent sidewalk facilities but, if the intersection crossings are intimidating, few pedestrians will use the street. Pedestrians, therefore, should be included as "design users" for all intersections where they can be expected to cross. Intersections are often the best and most direct place for pedestrians to cross a roadway and are the most common pedestrian crossing locations. This section discusses the various design features, as well as crossing techniques that can facilitate convenient and safe pedestrian travel at intersections.

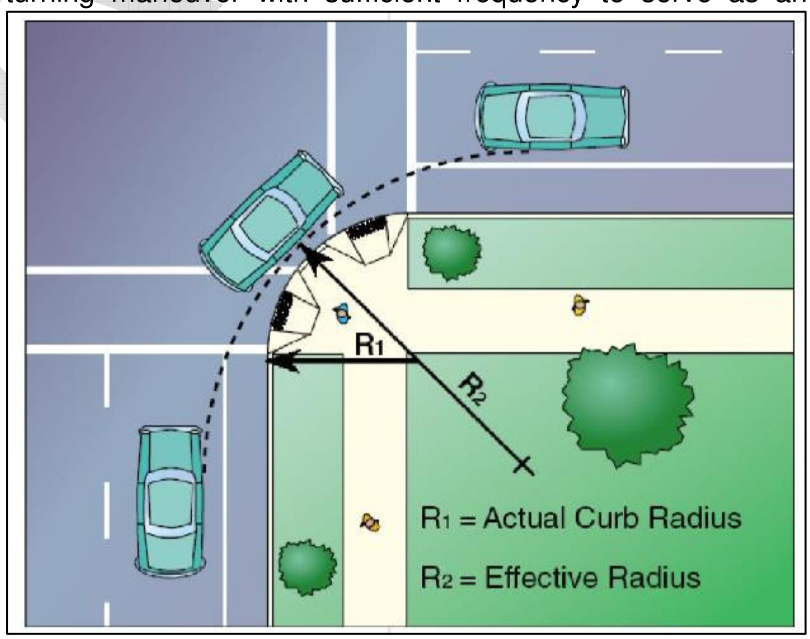


Some of the attributes associated with good intersection crossing design include:

- *Clarity* - it should be obvious to motorists that there will be pedestrians present; it should be obvious to pedestrians where best to cross.
- *Predictability* - The placement of crosswalks should be predictable. Additionally, the frequency of crossings should increase where pedestrian volumes are greater.
- *Visibility* - The location and illumination of the crosswalk allows pedestrians to see and be seen by approaching traffic while crossing.
- *Short Wait* - The pedestrian does not have to wait unreasonably long for an opportunity to cross.
- *Adequate Crossing Time* - The time available for crossing accommodates users of all abilities.
- *Limited Exposure* -Conflict points with traffic are few, and the distance to cross is short or is divided into shorter segments with crossing islands.
- *Clear Crossing* -The crosswalk is free of barriers, obstacles, and hazards and is accessible to all users. Pedestrian crossing information is available in accessible formats.

17-4.04.3.1 Curb Radii

The curb radii used at both signalized and unsignalized intersections should be selected considering safety, operations, and convenience for both motorists and pedestrians. Curb radii should be based on an appropriate balance of the needs of pedestrians and the needs of heavy vehicles, such as trucks and buses. Curb radii should be appropriate for the largest design vehicle which makes a specific turning maneuver with sufficient frequency to serve as an appropriate basis for design. At the same time, it should be recognized that larger intersection curb radii have disadvantages for pedestrians. A large radius can increase the crossing distance for pedestrians and the speeds of turning vehicles, creating increased exposure risks, which can be particularly challenging for pedestrians with impaired vision. Large radii also reduce the corner storage space for pedestrians, move pedestrians out of the driver's line of sight, and make it more difficult for pedestrians to see vehicles.



On the other hand, smaller radii that limit the speeds of turning vehicles may reduce the operational efficiency of an arterial intersection. A curb that protrudes into the turning radius of the design vehicle could cause vehicles to drive over and damage the curb, as well as increase the potential of hitting a pedestrian standing at the curb. Where appropriate, bollards may be added to reduce the likelihood of vehicles driving over the curb.

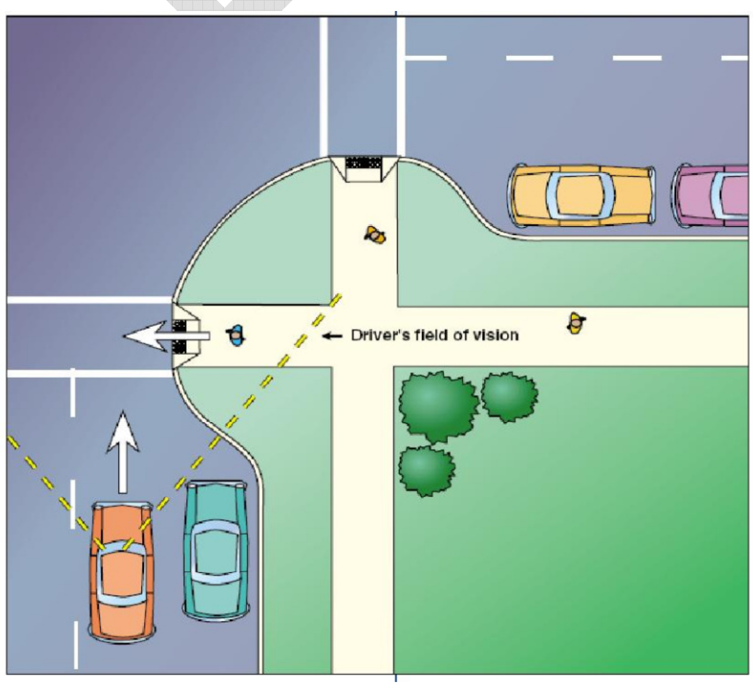
17-4.04.3.2 Crossing Distance Considerations

Short crosswalks help pedestrians cross streets. Excessive crossing distances increase the pedestrian exposure time, increase the potential of vehicle-pedestrian conflict, and add to vehicle delay. Pedestrian comfort and safety when crossing wide intersections is an essential component of good pedestrian facility design. At signalized intersections, reducing the distance a pedestrian needs to cross an intersection can usually improve the signal timing of the intersection. Where the pedestrian crossing time is the controlling factor, reducing the distance needed for a pedestrian to cross a main street permits the green time for the major street traffic to be increased proportionately. Thus, under certain conditions, reducing the arterial street throat width on an intersection approach may actually increase the capacity of that street.

Curb Extensions

On Streets with curb parking, curb extensions can:

- Reduce the crossing distance of pedestrians
- Improve the sight distance and sight lines for both pedestrians and motorists
- Prevent parked cars from encroaching into the crosswalk area
- Create adequate space for curb ramps and landings where the existing sidewalk space is too narrow



In general, curb extensions should extend the width of the parking lane, approximately 6 ft (1.8 m) from the curb. Curb extensions may not be needed or desirable on every leg of an intersection if the street leg is narrow, parking is not permitted, or the curb extension would interfere with a bicycle lane or the ability of the design vehicle to negotiate a right tum. Curb extensions may also make snow plowing more difficult. Low-level landscaping, through the use of planting strips or boxes, is recommended on curb extensions to provide alignment cues for pedestrians with vision impairments and conspicuity for approaching motorists.

Crossing Islands and Medians

Medians are raised or painted longitudinal spaces separating the two main directions of traffic movement in the street. Triangular channelization islands adjacent to right turning lanes can also act as crossing islands. Where possible, raised crossing islands are preferred due to their increased safety and comfort benefits to pedestrians and greater detectability by motorists.
At signalized intersections, median islands provide a storage area for pedestrians to wait for the next available cycle if they are unable to cross the street entirely during a provided crossing phase. Crossing islands also help maintain or improve the efficiency of the motor vehicle level of service by permitting split signal phasing for major turning movements. Depending on the signal timing, crossing islands should be considered where the crossing distance exceeds 60 ft (18.3 m), but can be used at intersections with shorter crossing distances where a need has been recognized. Median islands should not be used to justify a signal timing that does not allow pedestrians to complete their crossing in one cycle. However, on wide streets the median can provide a refuge for those who begin crossing too late or are exceptionally slow.

At unsignalized intersections, crossing islands can also be beneficial by providing a storage area for pedestrians to wait for acceptable gaps in the flow of traffic before completing the meet crossing. Some of the other attributes associated with good crossing island locations include:

- Two-way arterial streets with high traffic volumes, high travel speeds, and large pedestrian volumes

- Wide two-way intersection with high traffic volumes and significant numbers of crossing pedestrians

- Two-way collector and local access streets where they function as traffic-calming devices and street crossing aids

- Complex or irregularly shaped intersections where islands could provide a pedestrian with the opportunity to rest and become oriented to the flow of oncoming traffic

Design Dimensions of Crossing Islands

The width of the median or crossing island is determined by the expected pedestrian or bicycle use of the crossing and the traffic characteristics of the meet to be crossed. A relatively narrow median may be acceptable in areas with limited pedestrian activity and low traffic volumes and speeds. When pedestrian volumes are greater and traffic volumes and speeds are higher, a wider crossing island may be needed to provide a larger waiting area.

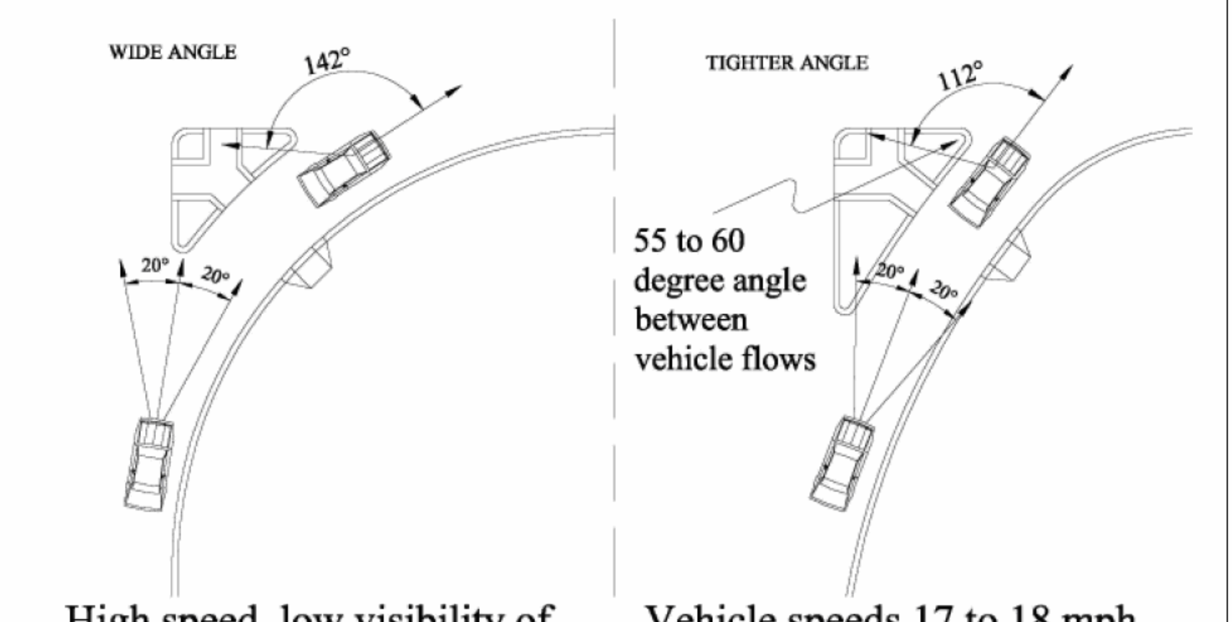
The width of a newly constructed crossing island should be 6 ft (1.8 m) or more to provide space for a wheelchair user or more than one pedestrian to wait, and so that the pedestrian storage area is separated from the face of the curb. Island size can be increased based on anticipated pedestrian storage area and crosswalk level of service criteria. Existing 4 ft (1.2 m) medians may be retained, but medians should be widened to 6 ft (1.8 m) or more in reconstruction projects. Where practical, a width of 8 ft (2.4 m) may be provided to accommodate groups of pedestrian, bicycles, and mobility aids such as wheelchairs and scooters. Travel lanes may be narrowed to 11 ft (3.3 m) or even 10 ft (3.0 m) in constrained conditions, to provide space for the crossing island. However, considerations such as traffic volume, vehicle mix, speed, and the presence of bicyclists should be taken into account prior to narrowing lanes. Where it is not practical to widen the median, the crossing or cut-through width may be increased to provide more storage space for pedestrians and bicycles within the median. At a minimum, the clear width should be maintained in the cut-through section. Crossings through a median can be angled so that pedestrians can see and be more aware of traffic on the roadway they are about to cross. Crossing islands must include detectable warnings for 2 ft (0.6 m) at the street edge on each side of the island.

17-4.04.3.3 Turning Movements

The presence of turning vehicles is an important consideration in designing pedestrian crossings. For example, at signalized intersections, 37 percent of all vehicle-pedestrian collisions involve left- or right-turning vehicles. At both signalized and unsignalized intersections, steps should be taken to ensure that turning speeds are kept low and that sight distance is not compromised for either the motorist or pedestrian.

Channelized Right-Turn Slip Lanes

Channelized right-turn slip lanes are sometimes used at unsignalized intersections to provide motorists with smoother turning maneuvers. These slip lanes are also used to allow right-turning traffic to bypass a traffic signal, thereby helping to reduce traffic congestion. More importantly, such lanes can be used to reduce the through street crossing distance by separating the crossing phases. A triangular crossing island, sometimes referred to as a "pork chop" island, separates the channelized right-turn slip lane from the through traffic lanes.

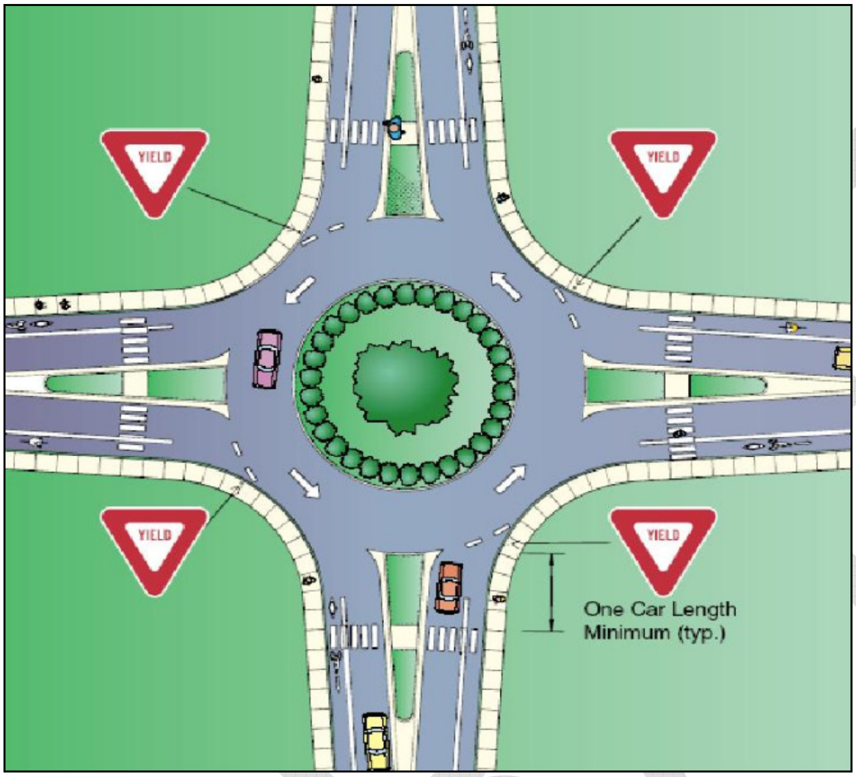


High speed, low visibility of pedestrians, a real head turner

Vehicle speeds 17 to 18 mph, good visibility of pedestrians

Roundabouts

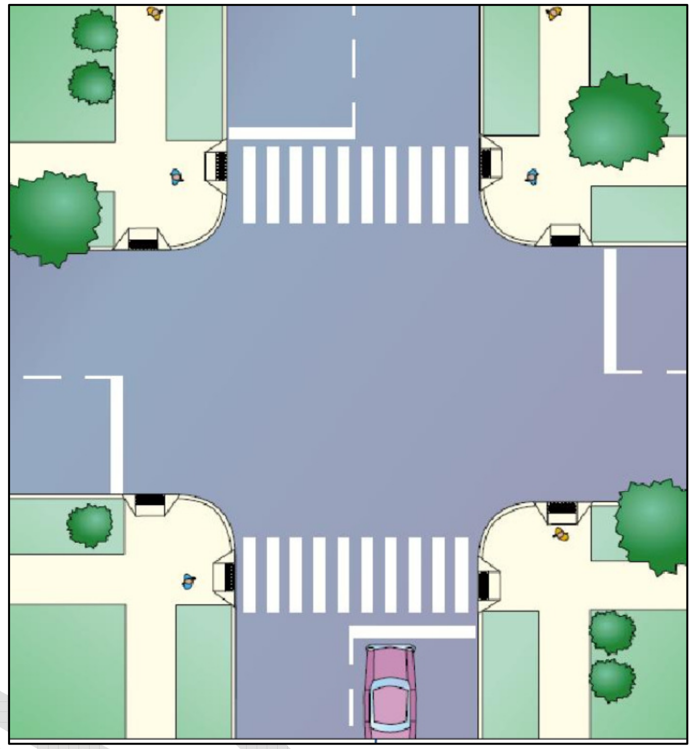
Roundabouts are increasingly popular for use in place of signals at relatively busy intersections. The primary purpose of roundabouts is to provide motor vehicles with free-flowing mobility at reduced speeds through an intersection.



17-4.04.3.4 Crosswalks

Intersections should be designed with the premise that there will be pedestrians present, that they should be able to cross the street, and that they need to do so safely. The key design question is, "How should this task be best accomplished?" If one treatment does not fully accomplish the task, then consider others. In many cases, a combination of treatments may be the best solution.

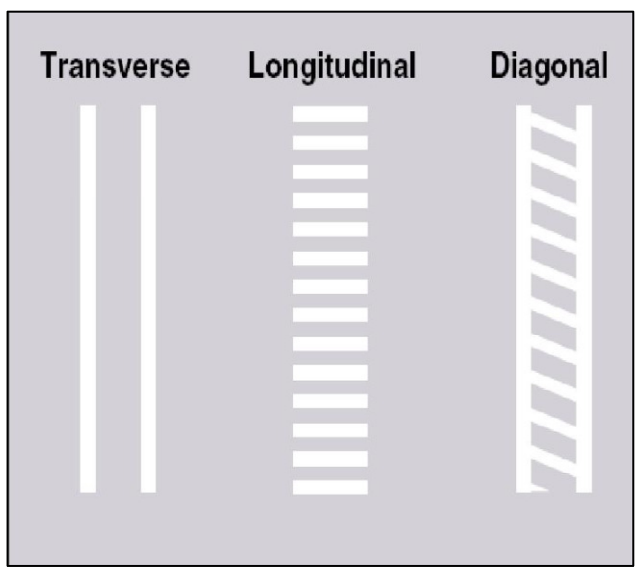
Crosswalks serve as the pedestrian right-of-way across a street. An intersection crosswalk is defined as the extension of a sidewalk or shoulder across an intersection, whether it is marked or not. In most jurisdictions, it is legal for a pedestrian to cross the street at any intersection, even if no crosswalk is marked, unless crossing is specifically prohibited. In addition, midblock street crossings can be designated with crosswalk markings. Marked crosswalks serve two purposes: (1) to inform motorists of the location of a pedestrian crossing so that they have time to lawfully yield to a crossing pedestrian; and (2) to assure the pedestrian that a legal crosswalk exists at a particular location. The level of connectivity between pedestrian facilities is directly related to the placement and frequency of locations where pedestrians are permitted to cross the street.



The MUTCD provides guidelines for marked crosswalks, as well as standards and guidance for various crossing improvements, including signs, signals, and other devices, which should be analyzed for appropriateness to specific intersections.

Marked crosswalks are one tool to get pedestrians safely across the street, though they are often best used in combination with other treatments. In most cases, marked crosswalks alone should not be installed within an uncontrolled environment when speeds are greater than 65 km/h [40 mph). Under certain conditions, marked crosswalks may be used to supplement an existing or new traffic control feature. Research indicates that where crosswalk markings are used at uncontrolled crossing locations along multilane roads (i.e., roads with four or more lanes) on which traffic volumes exceed approximately 12,000 vehicles per day with no raised medians, or exceed 15,000 vehicles per day with raised medians that could serve as crossing islands, the potential for motor vehicle pedestrian crashes increases.

Marked crosswalks can also be used to create midblock crossings. Midblock crossings may provide pedestrians with a more direct route to their destination. Both intersection and midblock crossings should be considered in assessing the frequency of crossing opportunities. The design of midblock crossings is presented later in this chapter. The following are five key issues to consider when designing pedestrian crossings:



- *Assumptions* - Assume that pedestrians want and need safe access to all destinations that are accessible to motorists. Additionally, pedestrians will want to have access to destinations not accessible to motorists such as trails and parks.
- *Generators and Destinations* – Typical pedestrian generators and destinations include residential neighborhoods, schools, parks, shopping areas, and employment centers. All transit stops require that pedestrians be able to cross the street.
- *Controlled Intersections* – All

intersections that have signals, stop signs, or yield signs to facilitate motor vehicle crossing of streets and arterials must also be designed to accommodate pedestrians.

- *Uncontrolled Locations* -Pedestrians need safe access at many uncontrolled locations, including both intersections and midblock locations.

- *Frequency* - Pedestrians must be able to cross streets and highways at regular intervals. Unlike motor vehicles, pedestrians cannot be expected co go a quarter mile or more out of their way to take advantage of a controlled intersection.

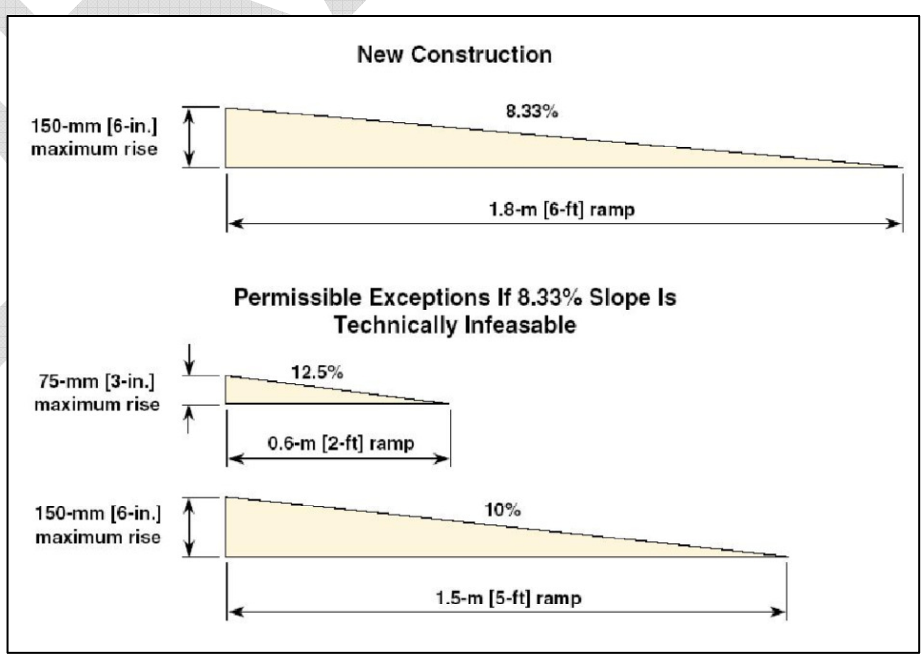
17-4.04.3.5 Sidewalk and Curb Treatments at Pedestrian Crossings

Since most pedestrian crossings are at intersections, pedestrian needs - and particularly sidewalk and curb treatments - are a key consideration in the design of street corners.
The use of curb extensions at a street corner can effectively reduce the pedestrian crossing distance, and reduced turning radii can affect the speed of motor vehicles turning right at the intersection. A properly designed street corner configuration will also improve sight distances for both pedestrians and motorists.

Curb Ramps

Curb ramps provide access between the sidewalk and the street for people who use mobility aids such as wheelchairs and scooters, people pushing strollers and pulling suitcases, children on bicycles, and delivery services. Curb ramps are required at all pedestrian crossings, including midblock crossings as well as at intersections. Curb ramps should be designed to the least slope consistent with the curb height, available corner area and underlying topography. A level landing is necessary for turning, maneuvering, or bypassing the sloped surface. Proper curb ramp design is important to users either continuing along a sidewalk path or attempting to cross the street.

Curb Ramp Types

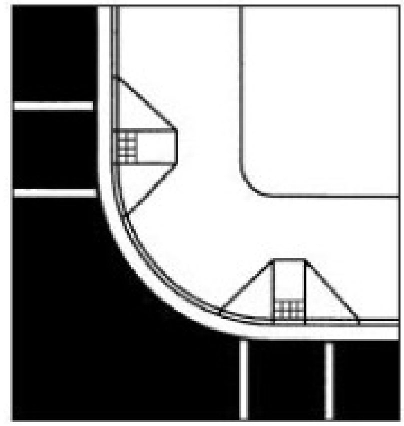


The appropriate type of curb ramp to be used is a function of sidewalk and border width, curb height, curb radius, and topography of the street corner. Three types of ramps are currently used in street corner designs: perpendicular, parallel, and diagonal ramps.

Curb ramps should be located entirely within the marked crosswalks (where they exist). Drainage grates or inlets should not be located within the crosswalk area. Such grates are a potential problem for wheelchairs, strollers, and those who use walkers.

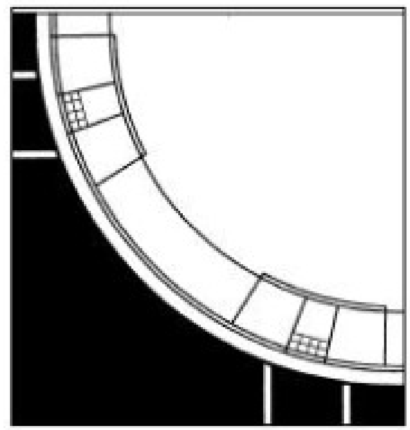
- **Perpendicular Ramps**

These ramps are perpendicular to the curb face. They are generally the best design for pedestrians, provided that a 4 ft (1.2 m) landing is available for each approach. If landings are not provided, perpendicular ramps may not be accessible.



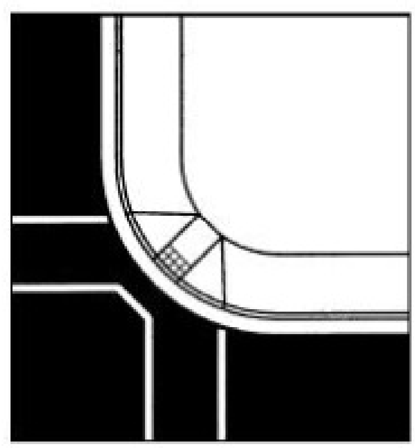
- **Parallel Ramps**

Parallel ramps are used where the available space between the curb and the property line is too tight to permit the installation of both a ramp and a landing.



- **Diagonal Ramps**

Diagonal ramps are single perpendicular curb ramps that are located at the apex of the corner. Diagonal ramps are often appropriate in retrofit projects at existing intersections where the location of drainage inlets or other design considerations make the provision of separate perpendicular ramps for each crosswalk impractical. Diagonal ramps may also be appropriate in retrofit projects at locations with low vehicle and pedestrian volumes.

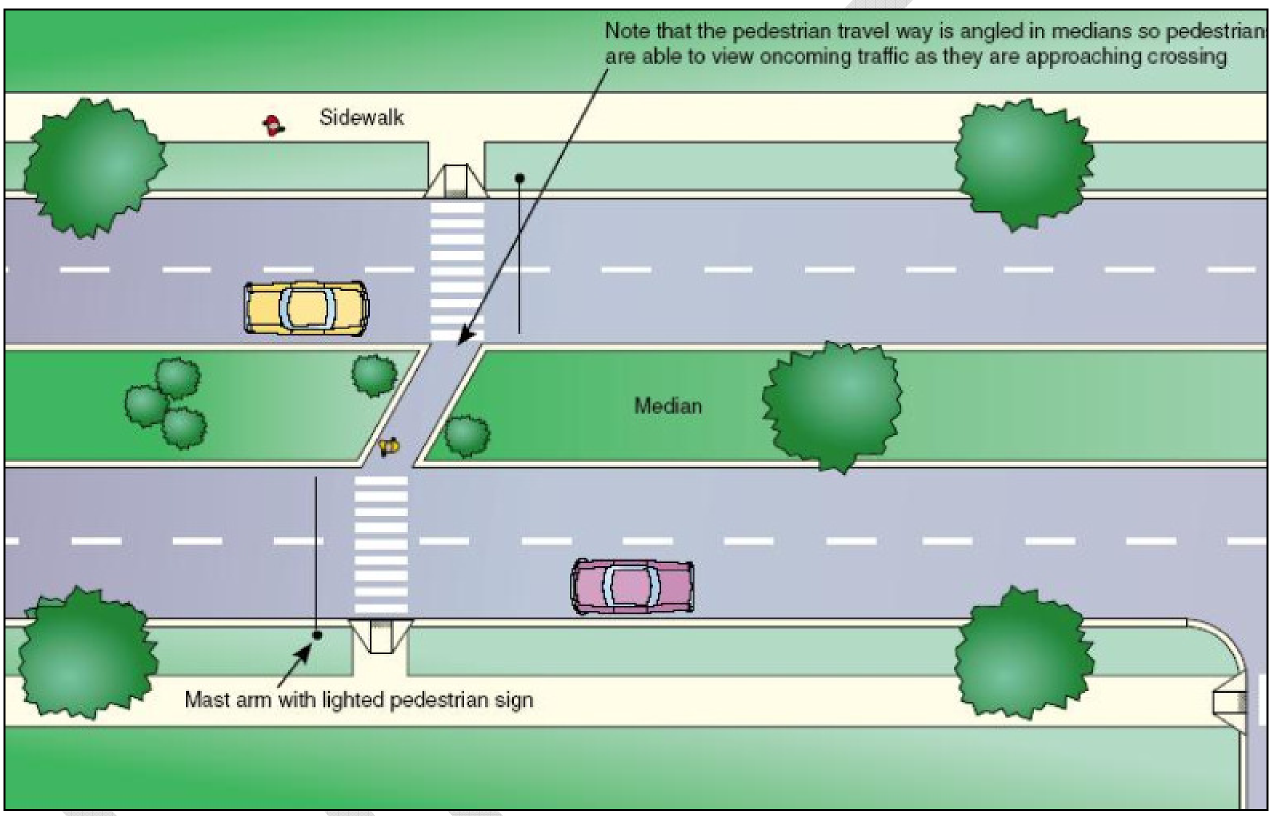


A disadvantage of diagonal ramps is that they often require pedestrians to enter the intersection prior to entering a crosswalk, which creates additional exposure for the pedestrian. Because of the disadvantages of diagonal ramps, where space is available, new construction should include two perpendicular (or parallel) ramps rather than a single diagonal ramp.

Policies and guides for sidewalk/curb ramps for the disabled are addressed in Chapter 58.

17-4.04.4 Midblock Crossings

Designated midblock crossings can help supplement the crossing needs within an area. At specific locations where intersections are spaced relatively far apart or substantial pedestrian generators are located between intersections, midblock crossings may be utilized. Midblock crossings are preferred because pedestrians should not be expected to make excessive or inconvenient diversions in their travel path to cross at an intersection. On the other hand, because midblock crossings are not generally expected by motorists, they should be used only where truly needed and should be well signed and marked.



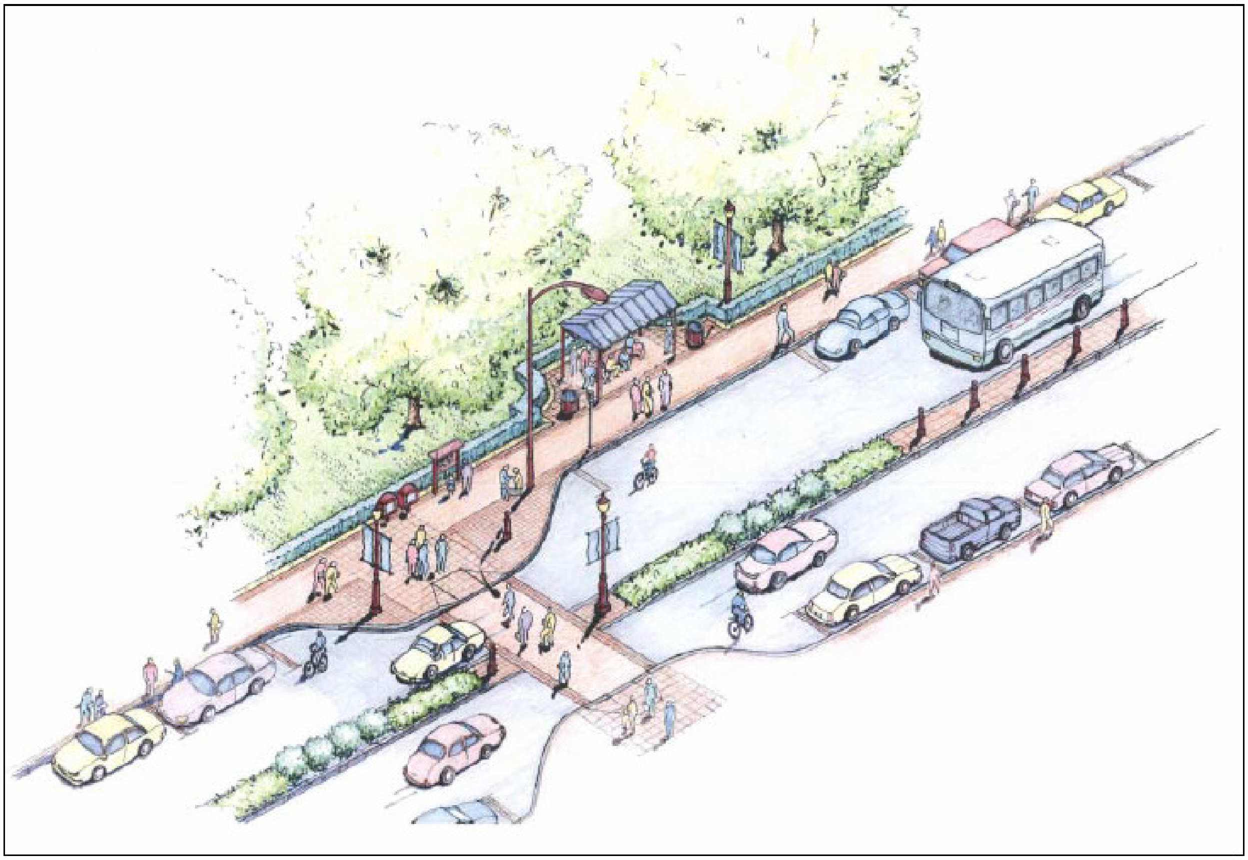
17-4.04.4.1 Crossing Distance Considerations

At midblock locations where the crossing exceeds 60 ft (18.0 m), or where there are a limited number of gaps in traffic, a median or crossing island should be considered. The use of medians or crossing islands in conjunction with a midblock crossing can reduce the crossing distance and wait time for pedestrians, as well as provide an improved crossing environment. Because the motorist docs not typically expect pedestrians to cross at midblock locations, medians and crossing islands can provide added protection for the pedestrian.

A median or crossing island is a raised area separating the two main directions of traffic movement. Medians tend to be long and continuous, while crossing islands are much shorter.

Benefits of Medians and Crossing Islands

The primary advantage of a median or crossing island is that it separates conflicts in time and place. The pedestrian faced with one or more lanes of traffic in each direction must determine a safe gap for two, four, or even six lanes at a time. This is a complex task, requiring accurate decisions. Medians or crossing islands allow pedestrians to cross one direction of traffic at a time and provide a refuge island halfway across the street.



Design Dimensions of Crossing Islands

Islands that use ramps should have a level landing at least 4 ft (1.2 m) square to provide a rest area for wheelchair users. This level area, combined with a maximum ramp slope of 1V: 12H (8%), means that ramped islands are only feasible where the median or island width is at least 16 ft (4.2 m). Detectable warnings should be provided at the bottom of all ramps. The length of a median island parallel to the street should be at least 20 ft (6.0 m) to protect the potential users and to be visible to approaching motorists.

Medians and crossing islands should be at least 6 ft (1.8 m) wide so that more than one pedestrian can wait and so that 2 ft (0.6 m) detectable warnings can be provided at both sides of the island. Where practical, a width of 8 ft (2.4 m) may be provided to accommodate bicycles, wheelchairs, scooters, and groups of pedestrians, and to provide a pedestrian storage area separated by at least 2 ft (0.6 m) from the face of the curb.

17-4.04.5 Project Limits

Project limits may be extended beyond highway improvements for reasonable distances to include necessary pedestrian facilities at nearby intersections, to provide access to public transportation facilities, or to avoid short sidewalks gaps. Any such extensions should be reflected in the Phase I report.

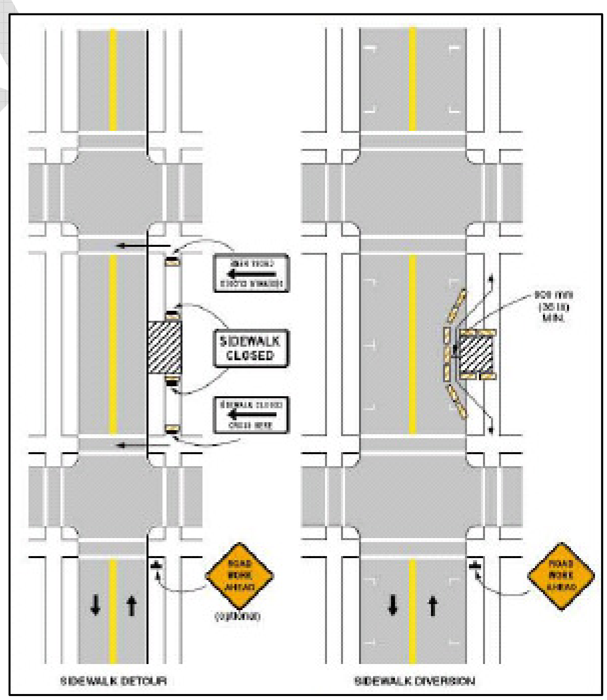
17-4.05 Documentation

Document in the Phase I report the reasons for providing or not providing pedestrian accommodations. Include a discussion of the coordination with local officials concerning, at a minimum, the selection of access routes for the disabled. Indicate the location of the ramps to be provided on the Intersection Design Studies. The impact of access routes for the disabled should be assessed in any request for a design exception.

17-4.06 Pedestrian Accommodations During Construction

The *Standard Specifications* addresses pedestrian needs during construction for the typical project. However, additional analysis is required on projects that are adjacent to schools, hospitals, rest homes, businesses, and other developments, and have high volumes of traffic and pedestrians. Special attention also should be directed at maintaining pedestrian access to public transportation facilities at all times during construction. Use the following guidelines in determining the need to include temporary sidewalks as part of PS&E:

- where a known generator such as a school, hospital or neighborhood shopping center, or known facility for the disabled, such as a nursing home, exists;
- if the principal access for pedestrian traffic to a business is by an existing paved surface and the surface will be removed; and
- when the construction sequence will include the removal of existing sidewalks and the new sidewalks will not be constructed prior to a winter shutdown.



Temporary sidewalks shall be a minimum of 3 ft (1 m) in width. Wider sidewalks should be provided in areas where a high pedestrian volume and/or disabled persons are known to exist (Reference the Draft Public Rights of Way Accessibility Guidelines for additional guidance). If the temporary sidewalk is to remain in place for more than four weeks, it shall be constructed with a minimum of 2 in (50 mm) of Portland cement or bituminous concrete at the Contractor's option.

Otherwise, give the Contractor the option to use 2 in (50 mm) of Portland cement or bituminous concrete or a minimum 3 in (75 mm) compacted aggregate (CA 10 or CA 12), Type B or other similar locally available aggregate approved by the Engineer. The pay item should be Temporary Sidewalk, measured in square feet (square meters), and should include removal after the permanent sidewalks are placed.

17-4.07 Maintenance and Jurisdiction

Jurisdiction and maintenance of pedestrian walkways are considered a local responsibility and should be coordinated with Local Agencies early in the planning process (see Chapter 5).

17-4.08 Right-of-Way

If a roadway improvement requires widening the existing roadway to accommodate additional travel demand, the needs of all users of the travel corridor must be considered and appropriately accommodated. The determination of right-of-way needs must consider pedestrian facilities along with vehicular facilities. Right-of-way acquisition to accommodate the total section (Roadway, utilities, and sidewalk) shall be the responsibility of the agency with roadway jurisdiction.

17-4.09 Funding

Pedestrian facilities intended for transportation purposes, which are necessary for the safe travel of pedestrians within an improvement corridor, are considered an integral part of a highway project for Federal funding purposes, and thus are eligible for Federal cost participation. Overall financial responsibilities for pedestrian accommodations are addressed in Chapter 5.

17-5 REFERENCES

The following are applicable references for bicycle and pedestrian facility accommodation:

1. *Guide for the Development of Bicycle Facilities,* AASHTO, 1999.

X. *Guide for the Planning Design and Operations of Pedestrian Facilities*, AASHTO, 2004

XX. *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, An ITE Proposed Recommended Practice*, ITE 2006

XXX. *Accessible Public Rights of Way, Planning and Design for Alterations,* Public Rights of Way Advisory Committee (PROWAAC) 2007

XXXX. Draft Public Rights-of-Way Accessibility Guidelines. Draft Regulations. U.S. Access Board, 2005.

2. *Selecting Roadway Design Treatments to Accommodate Bicycles,* Federal Highway Administration, 1994.

3. *Trails for the Twenty-First Century | Planning, Design, and Management Manual for Multi-Use Trails,* Rails-to-Trails Conservancy, 1993.

4. *Arizona Bicycle Facilities Planning and Design Guidelines*, Arizona Bicycle Task Force, 1988.

5. *Bicycle Planning and Facility Workshop Manual*, Northwestern University Traffic Institute.

6. *Illinois Manual on Uniform Traffic Control Devices (ILMUTCD),* IDOT.

7. *National Bicycling and Walking Study: Case Study No. 24 | Current Planning Guidelines and Design Standards Being Used By State and Local Agencies for Bicycle and Pedestrian Facilities*, Federal Highway Administration, 1994.

8. *North Carolina Bicycle Facilities Planning and Design Guidelines*, North Carolina Department of Transportation, 1994.

9. *Oregon Bicycle and Pedestrian Plan*, Oregon Department of Transportation, 1998.

10. *Recommendations for Accessibility Guidelines: Recreational Facilities and Outdoor Developed Areas,* Access Board Recreation Access Advisory Committee, 1994 or subsequent edition.

11. *Standard Specifications for Road and Bridge Construction,* Illinois Department of Transportation.

12. *Warrants for Pedestrian Over and Underpasses,* Federal Highway Administration, 1984, Report # FHWA-RD-84/082.

13. Checklist for Organizations and Public Coordination (Figure 17-1C) addresses:

- League of Illinois Bicyclists, 2935 Barberry Ct., Aurora, IL 60504.

- Illinois Department of Natural Resources, Office of Planning and Realty, One Natural Resources Way, Springfield, IL 62702-1271

- Illinois Trails Conservancy, 144 West Main Street, PO Box 10, Capron, IL 61012

- Chicagoland Bicycle Federation, 9. West Hubbard Street, Suite 402, Chicago, IL 60610-6545.

All projects involving bicycle accommodation for the Department will be in accordance with Reference publications 1, 2, and 3 above. For projects involving separate bikeways, guidance beyond the AASHTO *Guide* (i.e., Reference Publication 1) is available in Reference Publication 3.

17-6 BICYCLE AND PEDESTRIAN CHECKLIST

CHECKLIST FOR BICYCLE AND PEDESTRIAN TRAVEL GENERATORS IN PROJECT VICINITY

Generators	Yes	NA	Generators	Yes	NA
Residential Areas	☐	☐	Shopping Centers	☐	☐
Parks	☐	☐	Hospitals	☐	☐
Recreation Areas	☐	☐	Employment Center	☐	☐
Churches	☐	☐	Government Offices	☐	☐
Schools	☐	☐	Local Businesses	☐	☐
Libraries	☐	☐	Industrial Plants	☐	☐
Existing Bicycle Trails	☐	☐	Public Transportation Facilities	☐	☐
Planned Bicycle Trails	☐	☐	Other	☐	☐

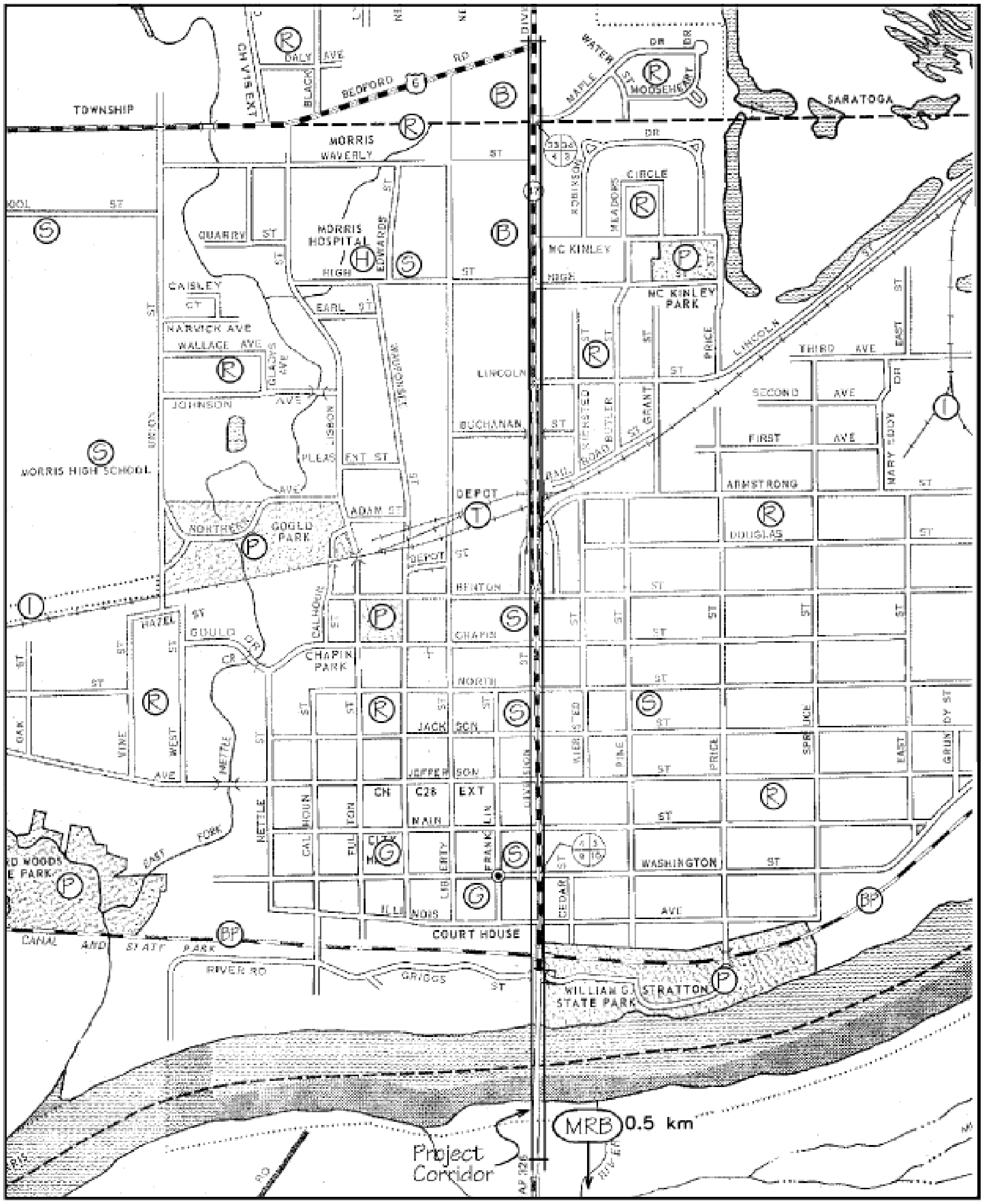
CHECKLIST FOR ORGANIZATIONS AND PUBLIC COORDINATION

Organization	Yes	NA	Generators	Yes	NA
Metropolitan Planning Organization	☐	☐	League of Illinois Bicyclists	☐	☐
Local Municipalities	☐	☐	Illinois Department of Natural Resources	☐	☐
Park or Forest Preserve Districts	☐	☐	Illinois Trails Conservancy	☐	☐
Sub-Regional Planning Council (as appropriate)	☐	☐	Chicagoland Bicycle Federation (District 1 only)	☐	☐

Organizations and Public Coordination addresses:

- League of Illinois Bicyclists, 2935 Barberry Court, Aurora, IL 60504
- Illinois Department of Natural Resources, Office of Planning and Realty, One Natural Resources Way, Springfield, IL 62702-1271
- Illinois Trails Conservancy, 142 West Main Street, PO Box 0454, Capron, IL 61012
- Chicagoland Bicycle Federation, 9 West Hubbard Street, Suite 402, Chicago, IL 60610-6545

Example Map to Accompany Checklist for Bicycle or Pedestrian Travel



R	Residential Areas	BP	Existing Bicycle Trails	G	Government Offices
P	Parks	PBP	Planned Bicycle Trails	B	Local Businesses
P	Recreational Areas	M	Shopping Centers	I	Industrial Plants
C	Churches	H	Hospitals	T	Public Transit Facilities
S	Schools	E	Employment Centers	O	Other

FORM FOR BICYCLE AND PEDESTRIAN TRAVEL ASSESSMENT

Route ______________________________
Section ______________________________
County ______________________________

1) Where would bicyclists or pedestrians cross the project?
2) Where would bicyclists or pedestrians need to ride parallel to the project?
a) Does the project provide unique or primary access (see Note 1): 1. Across a river, railroad, highway corridor or other natural or man-made barrier?
2. Into or out of a residential or commercial development?
3. Between communities or other likely significant destinations, such as a university campus or recreation facility?
b) Are there any secondary roads parallel to the project that could reasonably be used by cyclists or pedestrians as alternates to access these destinations (see Note 2)?
If so, how far from the corridor are these roads? (A key consideration with parallel roads is whether there are significant destinations located on the project corridor that bicyclists or pedestrians would need to access.)
3) Do local governmental entities or other organizations have plans for bicycle or shared-use facilities or generators, such as a park or recreational area that could affect this project or generate additional travel in the project corridor?

Notes:
1. Unique or primary access is defined as access which is not otherwise available within a reasonable riding distance of 1 mile (2 km).

2. Secondary roads that could be used as alternate routes are usually within 2-3 blocks of projects in urban areas, within 0.5 miles (1 km) in suburban areas, and within 1 mile (2 km) in rural areas.