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16. Abstract This product is formatted as a chapter to be included in a current or future TxDOT manual. The chapter presents guidance on the use and placement of selected treatments to accommodate pedestrian accessibility at signalized intersections. Specific accommodations discussed in the chapter include curb ramps and blended transitions, accessible pedestrian signals, and countdown pedestrian signals.					
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Chapter 0

Pedestrian Accessibility at Signalized Intersections

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Section 1

Overview

This chapter contains guidance for considerations to accommodate pedestrian accessibility at signalized intersections. The accommodation of pedestrian movements has become increasingly important as standards and requirements are developed in response to the *Americans with Disabilities Act Accessibility Guidelines* (ADAAG), the *Guidelines for Accessible Public Rights-of-Way* (PROW) that are supplemental to ADAAG, and the *Texas Accessibility Standards* (TAS). Section 2 contains additional information about these references.

The Americans with Disabilities Act (ADA) prohibits discrimination against people with disabilities, ensuring equal access to all public goods and services. The ADAAG includes design specifications and guidelines that cover public buildings, government offices, and some privately owned buildings used for public commerce, such as stores, theatres, hotels, and restaurants. The PROW Guidelines are currently under development to provide further details on and address conditions unique to public rights-of-way. In this chapter, references to the PROW Guidelines are taken from the November 23, 2005, *Revised Draft Guidelines for Accessible Public Rights-of-Way*.

Each state and local government has the authority to adopt and enforce its own building codes, but they must meet or exceed those contained in the ADAAG. Texas has its own guidelines based on the ADAAG. The *Texas Accessibility Standards* were developed by the Texas Department of Licensing & Regulation (TDLR) and apply to buildings and facilities constructed on or after April 1, 1994. In addition, Texas requires that architects, interior designers, landscape architects, and engineers submit their construction documents to the TDLR for review and inspection when the project cost exceeds \$50,000.

The applicable standards for pedestrian accessibility have the force of law in most cases and are requirements to be followed, not preferences or alternatives. The “rule of thumb” is that whenever pedestrian facilities are provided, those facilities must have the same level of access for all pedestrians, regardless of their physical abilities. The standards apply to new construction, but they also apply to alterations to existing facilities that change the nature of the design and operational elements that affect accessibility.

The following sections provide guidance on considerations for specific elements that affect pedestrian accessibility. For more detailed information, the reader is directed to the websites listed in [Section 2](#).

Section 2

References and Acronyms

Reference Materials

The following material provides additional background information about pedestrian accessibility issues. This chapter cites these materials throughout the text to indicate the source of the guideline content.

- ◆ *Americans with Disabilities Act Accessibility Guidelines (ADAAG)*: <http://www.access-board.gov/adaag/html/adaag.htm>.
- ◆ *ADAAG Supplemental Revised Draft Guidelines for Accessible Public Rights-of-Way*: <http://www.access-board.gov/provac/index.htm>.
- ◆ *ADAAG Requirements for Detectable Warnings*: <http://www.access-board.gov/adaag/dws/update.htm>.
- ◆ Fitzpatrick, K., M.D. Wooldridge, and J.D. Blaschke. *Urban Intersection Design Guide: Volume 1 – Guidelines*. Report FHWA/TX-05/0-4365-P2 Vol. 1. Texas Transportation Institute, The Texas A&M University System. College Station, TX. February 2005.
- ◆ Fitzpatrick, K., M.D. Wooldridge, and J.D. Blaschke. *Urban Intersection Design Guide: Volume 2 – Applications*. Report FHWA/TX-05/0-4365-P2 Vol. 2. Texas Transportation Institute, The Texas A&M University System. College Station, TX. February 2005.
- ◆ Noyce, D.A., and J.M. Barlow. *Interfacing Accessible Pedestrian Signals (APS) with Traffic Signal Control Equipment*. U.S. Access Board. April 2003. <http://www.access-board.gov/research/APS/report.htm>. Accessed July 2007.
- ◆ *Pedestrian Traffic Control Signal Indications*. Institute of Transportation Engineers, 1985 Edition.
- ◆ Singer, J.P., and N.D. Lerner. *Countdown Pedestrian Signals: A Comparison of Alternative Pedestrian Change Interval Displays*. Final Report. Westat, Rockville, MD. March 2005. http://www.atssa.com/galleries/default-file/Ped_Countdown_Report.pdf. Accessed July 2007.
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- ◆ Texas Department of Licensing and Regulation. *Architectural Barriers Texas Accessibility Standards (TAS)*. March 31, 1999. <http://www.license.state.tx.us/AB/abtas.htm>. Accessed July 2007.
- ◆ Texas Department of Transportation. *Roadway Design Manual*. Revised October 2006. <ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/manuals/rdw.pdf>. Accessed July 2007.

(continued...)

Reference Materials *(continued)*

- ◆ Texas Department of Transportation. *Roadway Standards (English), Pedestrian Facilities. PED-05 Standard Sheet*. March 2002. <ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/roadway/ped05.pdf>. Accessed July 2007.
- ◆ Texas Department of Transportation. *Standard Highway Sign Designs for Texas*. 2008 edition. http://www.txdot.gov/txdot_library/publications/highway_signs.htm. Accessed August 2009.
- ◆ Texas Department of Transportation. *Texas Manual on Uniform Traffic Control Devices. 2006 Edition*. ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/gov/devices/2006_mutcd_binder.pdf. Accessed August 2009.
- ◆ U.S. Access Board. *ADA Accessibility Guidelines for Buildings and Facilities (ADAAG)*. As amended through September 2002. <http://www.access-board.gov/adaag/html/adaag.htm>. Accessed July 2007.
- ◆ U.S. Access Board. *Revised Draft Guidelines for Accessible Public Rights-of-Way (PROW Guidelines)*. As amended through November 23, 2005. <http://www.access-board.gov/prowac/draft.htm>. Accessed July 2007.

Acronyms

The following acronyms are used throughout this chapter:

- ◆ ADA: Americans with Disabilities Act
- ◆ ADAAG: Americans with Disabilities Act Accessibility Guidelines
- ◆ APS: Accessible Pedestrian Signals
- ◆ CPS: Countdown Pedestrian Signals
- ◆ PROW: Public Rights-of-Way
- ◆ TAS: Texas Accessibility Standards
- ◆ TDLR: Texas Department of Licensing & Regulation
- ◆ TMUTCD: Texas Manual on Uniform Traffic Control Devices
- ◆ TxDOT: Texas Department of Transportation

Section 3

Curb Ramps and Blended Transitions

Overview

Curb ramps or blended transitions are possibly the most visible accessibility feature in intersection design and definitely one of the most important. They provide improved access for pedestrians of various physical abilities to make the transition from sidewalk elevation to street elevation and vice-versa. They also allow bicyclists and pedestrians with wheeled vehicles (i.e., strollers, scooters) easier access between street level and sidewalk level.

The TxDOT *Roadway Design Manual* states that curb ramps must be provided in conjunction with each project where the following types of work are performed:

- ◆ resurfacing projects, including overlays and seal coats, where a barrier exists to a sidewalk or path;
- ◆ construction of curbs, curb and gutter, and/or sidewalks;
- ◆ installation of traffic signals, which include pedestrian signals; and
- ◆ installation of pavement markings for pedestrian crosswalks.

The following section provides details on curb ramp components, but in general, curb ramps should be designed to provide 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. Utility poles, traffic signs, signals, signal control boxes, drainage structures, pedestrian call buttons, and street name signs are to be carefully located so they do not obstruct the installation of curb ramps or the pedestrian's ability to safely cross the road.

Application 7-1 in Volume 2 of the *Urban Intersection Design Guide* provides discussion on the selection of design elements at a specific intersection being considered for improvement. TxDOT *Roadway Standard Sheet PED-05 (Pedestrian Facilities)* may be referenced for additional information in the configuration of curb ramps. This sheet has been approved by the TDLR.

Required Installation

A curb ramp or blended transition shall be provided wherever a public sidewalk or pedestrian route crosses a curb or other change in level, including at:

- ◆ intersections;
- ◆ midblock crosswalks;
- ◆ medians and islands traversed by crosswalks, alleys, accessible parking aisles, passenger loading zones; and
- ◆ locations where the public sidewalk ends and pedestrian travel continues in the roadway.

A curb ramp or blended transition is not required where the pedestrian route crosses a driveway and the elevation of the pedestrian route is maintained.

At any intersection in the public right-of-way that has at least one corner served by a public sidewalk or a pedestrian route, all corners of the intersection served by a crosswalk should have curb ramps or blended transitions. This eliminates the possibility of a pedestrian traveling across the road to find no refuge at the other end of the crosswalk.

Curb Ramp Components

There are multiple types of curb ramps that may be used, but each type of curb ramp has several common elements, as described in Section R303.3 of the *PROW Guidelines*, including the following:

- ◆ **Width** – The clear width of landings, blended transitions, and curb ramps, excluding flares, shall be 4 ft minimum.
- ◆ **Detectable Warnings** – Compliant detectable warning surfaces shall be provided, where a curb ramp, landing, or blended transition connects to a street.
- ◆ **Surfaces** – Compliant surfaces shall be provided on all curb ramps, blended transitions, and landings (see Section R301.5). Gratings, access covers, and other appurtenances shall not be located on curb ramps, landings, blended transitions, and gutters within the pedestrian access route.
- ◆ **Grade Breaks** – Grade breaks at the top and bottom of perpendicular curb ramps shall be perpendicular to the direction of ramp run. At least one end of the bottom grade break shall be at the back of the curb. Grade breaks shall not be permitted on the surface of curb ramps, blended transitions, landings, and gutter areas within the pedestrian access route. Surface slopes that meet at grade breaks shall be flush.
- ◆ **Counter Slopes** – The counter slope of the gutter or street at the foot of a curb ramp, landing, or blended transition shall be 5 percent maximum.
- ◆ **Clear Space** – Beyond the curb face, a clear space of 4×4 ft minimum shall be provided within the width of the crosswalk and wholly outside the parallel vehicle travel lane.

(continued...)

Curb Ramp Components (continued)

Figure 0-1 from Volume 1 of the *Urban Intersection Design Guide* illustrates further details of components common to curb ramps, including the following:

- ◆ **Landing** – level area of sidewalk at the top of a perpendicular curb ramp or the bottom of a parallel curb ramp for turning. Landing slopes are not permitted to exceed 2 percent in any direction.
- ◆ **Flare** – sloped transition on the side of a perpendicular curb ramp. The maximum slope is 10 percent. The path along the flare has a significant cross slope and is not considered an accessible path of travel. When the sidewalk is set back from the street, returned curbs may replace flares where pedestrians are not expected to cross the returned curb (i.e., a non-walking surface is provided).
- ◆ **Sloping Area** – transition between the street and the sidewalk, with a maximum running slope of 8.3 percent.

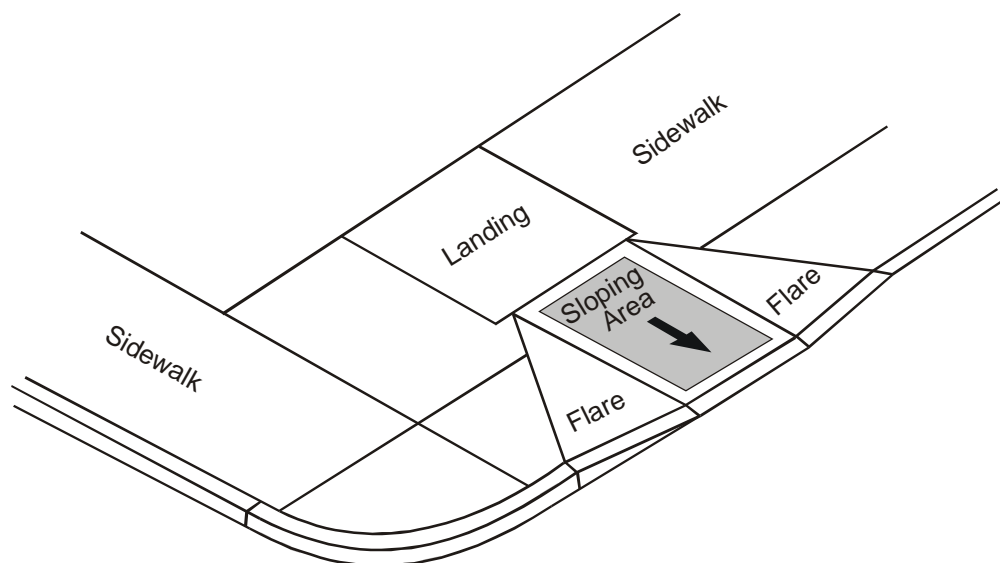


Figure 0-1. Components of a Curb Ramp.



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. Street corner designs commonly use one or more of the following types of ramps:

- ◆ perpendicular,
- ◆ parallel,
- ◆ combination, and
- ◆ diagonal.

Detailed dimensions for each curb ramp type are shown on TxDOT’s PED-05 Standard Sheet; however, designers should note that the TxDOT *Roadway Design Manual* states that diagonal curb ramps are not recommended. The general advisory from the PROW Guidelines states the following:

“Curb ramps can be a key source of wayfinding information for pedestrians who travel without vision cues if they are installed in-line with the direction of pedestrian travel at crossings. This is most easily accomplished by locating the ramp at the tangent point of the curb return, using either a small curb radius in an attached sidewalk or, in larger radii, a border or setback from the street edge. The Institute of Transportation Engineers (www.ite.org) has undertaken an industry-wide effort to develop and standardize intersection plans that optimize wayfinding. The challenge for practitioners is to provide usability for pedestrians in wheelchairs and scooters with a rectangular ramp plan that can also be directional.” (Section R303.1)

Selection of an appropriate type of curb ramp will incorporate wayfinding qualities as well as access for wheeled users.

(continued...)

Curb Ramp Types (continued)

Perpendicular Curb Ramps. The path of travel along a perpendicular curb ramp is oriented at a 90-degree angle to the curb face. It is aligned perpendicular to the curb where it crosses the curb, even if it crosses the curb within the radius of the corner. If a perpendicular approach is not provided, wheelchair users could face a change in cross slope, which could create a path that results in one wheel off the ground.

Perpendicular curb ramps are usually installed in pairs at a corner (see [Figure 0-2](#), from the *Urban Intersection Design Guide, Volume 1*). Two accessible perpendicular curb ramps are generally safer and more usable for pedestrians than a single diagonal curb ramp. [Figure 0-3](#) from the same publication shows an example of perpendicular curb ramps. When using perpendicular curb ramps within the radius of the corner, the path of the ramp should not guide users outside of the crosswalk. This characteristic of ramp alignment is described further in the discussion on diagonal ramps.

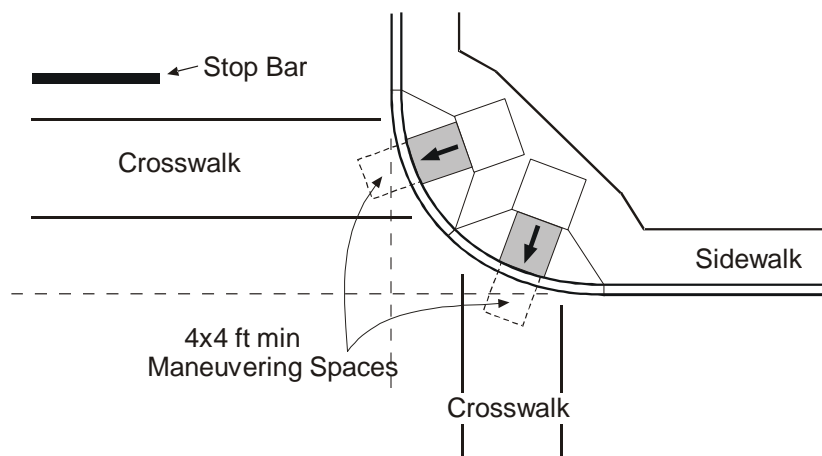


Figure 0-2. Typical Perpendicular Curb Ramps.



Figure 0-3. Photo of Perpendicular Curb Ramps.

(continued...)

Curb Ramp Types (continued)

Parallel Curb Ramps. The path of travel along a parallel curb ramp is a continuation of the sidewalk. Figure 0-4 from the *Urban Intersection Design Guide, Volume 1* shows a typical parallel curb ramp, while Figure 0-5 from the same publication is a photograph of a parallel curb ramp. Parallel curb ramps provide an accessible transition to the street on narrow sidewalks. However, if the landing on parallel curb ramps is not sloped toward the gutter (maximum of 2 percent), water and debris can pool there and obstruct passage along the sidewalk. Careful analysis of the hydraulics related to the landing, gutter slope, and roadway crown must be performed to avoid ponding water at the landing. Parallel curb ramps also require pedestrians continuing along the sidewalk to negotiate two ramp grades (down and up), unless a wide buffer zone permits the sidewalk to continue behind the parallel curb ramp.

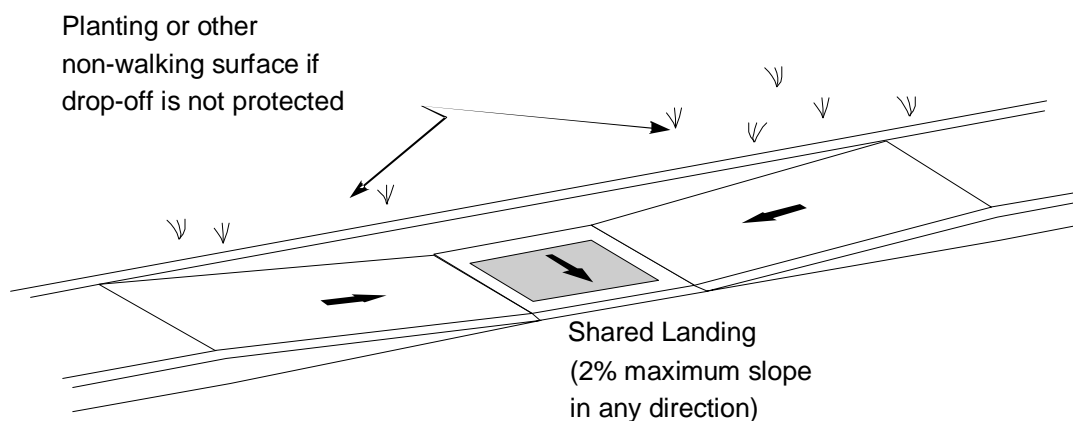


Figure 0-4. Typical Parallel Curb Ramp.



Figure 0-5. Photo of Parallel Curb Ramp.

(continued...)

Curb Ramp Types (continued)

Combination Curb Ramps. When a curb ramp includes components of both perpendicular and parallel curb ramps, it is known as a combination curb ramp. Figure 0-6 from the *Urban Intersection Design Guide, Volume 1* shows examples of combination curb ramps.

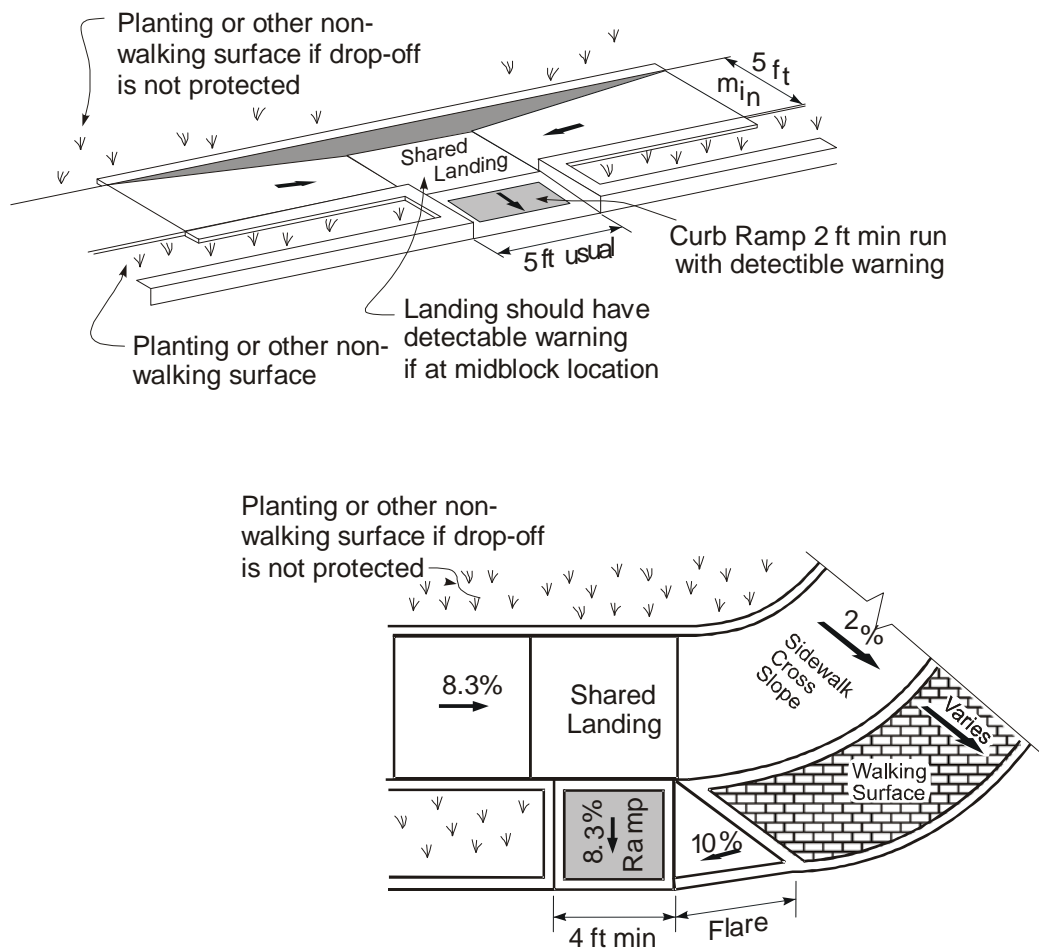


Figure 0-6. Examples of Combination Curb Ramps.

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Curb Ramp Types (continued)

Diagonal Curb Ramps. Diagonal curb ramps are single curb ramps installed at the apex of a corner to serve two crossing directions (see Figure 0-7 from the *Urban Intersection Design Guide, Volume 1*). Diagonal curb ramps force pedestrians descending the ramp to proceed into the intersection before turning to the left or right to cross the street. A clear space of 4×4 ft is necessary to allow curb ramp users in wheelchairs enough room to maneuver into the crosswalk.

A designer’s ability to create a clear space at a diagonal curb ramp might depend on the turning radius of the corner. For example, a tight turning radius requires the crosswalk line to extend too far into the intersection and exposes pedestrians to oncoming traffic. Diagonal curb ramps also provide no directional orientation information to persons with visual impairments. Therefore, diagonal curb ramps should be used only as the last alternative; special ADAAG and TAS requirements apply to diagonal curb ramps. The PROW Guidelines do not mention diagonal curb ramps; instead, refer to ADAAG, TAS, and the PED Standard Sheet for more information.

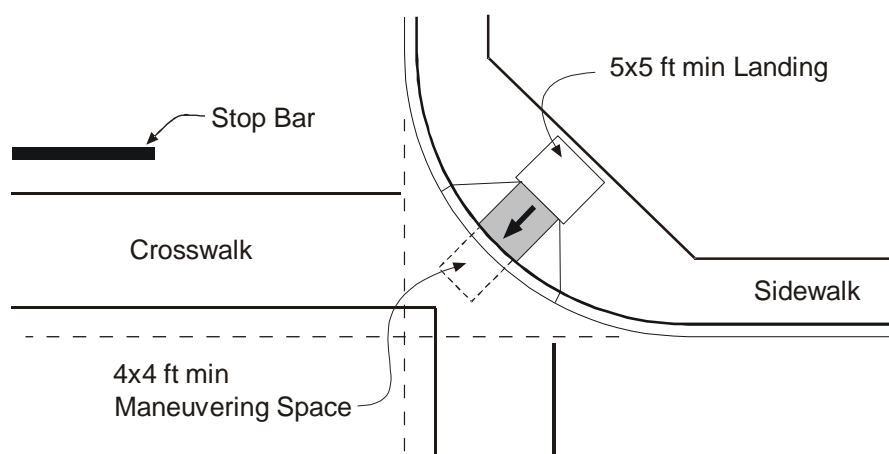


Figure 0-7. Diagonal Curb Ramp.

Blended Transitions

Figure 0-8 from the *Urban Intersection Design Guide, Volume 1* shows an example of a blended transition. Blended transitions have design requirements in Section R303.3 of the PROW Guidelines, reproduced above in the discussion on Curb Ramp Components, which are largely shared with curb ramps. Specifically, blended transitions shall have the following:

- ◆ minimum clear width (excluding flares) of 4 ft,
- ◆ compliant detectable warning,
- ◆ cross slope of no more than 2 percent in any direction,
- ◆ no grade breaks on the surface, and
- ◆ beyond the curb face, a minimum clear maneuvering space of 4×4 ft provided within the width of the crosswalk and wholly outside the parallel vehicle travel lane (see Figure 0-2).

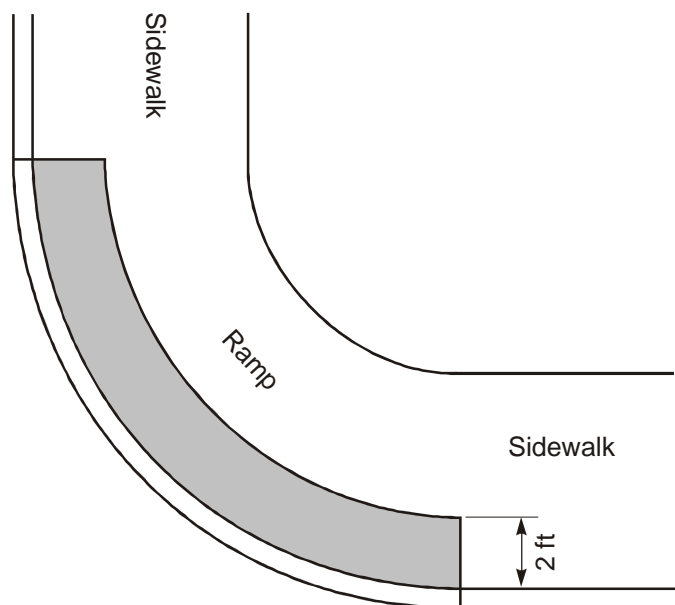


Figure 0-8. Example of a Blended Transition.

Selection of Curb Ramp Type

Selection of the appropriate type of curb ramp at each location involves a variety of considerations. Curb ramps should be considered in the following order of preference: perpendicular, parallel or combination, and diagonal. When determining whether a particular type of curb ramp is feasible, the designer should make every attempt to locate other features such as sign and signal supports, curb inlets, and fire hydrants so that the most preferable type of curb ramp can be provided.

Placement

At marked crossings, the bottom of a curb ramp run should be wholly contained within the markings of the crosswalk. For perpendicular or diagonal curb ramps, there shall be a minimum 4×4 ft maneuvering space beyond the curb line that is wholly contained within the crosswalk (marked or unmarked) and outside the path of parallel vehicular traffic. Intersections may have unique characteristics that can make the proper placement of curb ramps difficult, particularly in retrofit situations. Following are fundamental guidelines for consideration in dealing with curb ramp placement, as described in Volume 1 of the *Urban Intersection Design Guide*:

- ◆ Perpendicular curb ramps should be built 90 degrees to the curb face, and their full width at the toe (exclusive of flares) must be within the crosswalk. Aligning the ramp to the crosswalk, if possible, will enable the visually impaired pedestrian to more safely navigate across the intersection and exit the roadway on the adjoining curb ramp.
- ◆ All curb ramps must avoid storm drain inlets, which can catch wheelchair casters or cane tips.
- ◆ Curb ramps must be adequately drained. A puddle of water at the base of a ramp can hide pavement discontinuities. Puddles can also freeze and cause the user to slip and fall.
- ◆ Curb ramps must be situated so that they are adequately separated from parking lanes. Regulatory signs and parking enforcement can limit vehicles from blocking or backing across a crosswalk or curb ramp. Even better, curb extensions physically prevent parked cars from encroaching into the curb ramp.

Width

The minimum width of curb ramps is 4 ft, exclusive of the flared sides.

Landings

Landings are unobstructed level areas used for turning (including U-turns for wheeled pedestrians), accessing pedestrian signal call buttons, resting, passing, and waiting for a safe crossing time. They are required on public sidewalks prior to the point at which pedestrians cross into the roadway, even if the public sidewalk and the roadway are at the same elevation, such as with a parallel ramp. Landings provide a level area (less than 2 percent cross slope in any direction) for users to wait, maneuver into or out of a curb ramp, or to bypass the ramp altogether. A landing should have a minimum clear dimension of 5×5 ft square or a 5 ft diameter circle. Landings should also be provided at raised medians or channelizing islands in lieu of a cut-through.

Grade

The maximum grade of any curb ramp is 8.3 percent, which is a 1:12 slope. Lesser grades should be used when possible.

Flares

Curb ramp flares are graded transitions from a curb ramp to the surrounding sidewalk or terrain. Flares are not part of accessible routes and are typically steeper than the slopes on the curb ramps themselves. According to the PROW Guidelines, flared sides with a slope of 10 percent maximum, measured parallel to the curb line, shall be provided where a pedestrian circulation path crosses the curb ramp. The flare is provided to help prevent pedestrians from tripping.

Flares are only needed in locations where the ramp edge abuts a non-walking surface. A returned curb edge may be used where the sides of the curb ramp abut grass landscaping or an obstruction blocks travel across the ramp. Returned curbs that align with the crosswalk are a useful orientation cue to provide direction for visually impaired pedestrians.

Cross Slope

The maximum cross slope is 2 percent. Flatter grades and slopes should be used where possible. Cross slope requirements also apply to the continuation of the pedestrian route through the crosswalk.

Counter Slopes

The counter slopes of gutter or road surfaces at the foot of a curb ramp may not exceed 1:20. When possible, the algebraic difference in grade between the curb ramp and the street should be ≤ 11 percent.

Surfaces

Surfaces of blended transitions, curb ramps, and landings shall be stable, firm, and slip resistant. The PROW Guidelines state that gratings, access covers, and other appurtenances shall not be located on curb ramps, landings, blended transitions, and gutter areas within the pedestrian access route. Vertical alignment shall be planar within curb ramp runs, blended transitions, landings, and gutter areas within the pedestrian access route, and within clear spaces required for accessible pedestrian signals, street furniture, and operable parts. Grade breaks shall be flush. Surface discontinuities shall not exceed 0.50 inch maximum. Vertical discontinuities between 0.25 inch and 0.50 inch maximum shall be beveled at 1:2 minimum. The bevel shall be applied across the entire level change.

Detectable Warnings

A detectable warning is a standardized feature built in or applied to walking surfaces to warn visually impaired pedestrians before they enter a roadway or vehicular way. Detectable warnings alert visually impaired pedestrians that they should stop and determine the nature of the hazard before proceeding further. The two components of a detectable warning surface are texture and light-reflective color contrast. A truncated dome surface is required on all curb ramps and blended transitions to mark the street edge.

The material used to provide visual contrast shall be an integral part of the walking surface and should contrast visually with adjoining surfaces by at least 70 percent. TxDOT's PED-05 standard sheet contains provisions for the detectable warning surface. Although the standard sheet depicts a brick paver product as an option, the truncated dome design is required by the PROW Guidelines. The shaded area on each of the curb ramps on the PED-05 standard sheet indicates the proper placement of the detectable warning surface.

Section 4.7.7 of TAS is currently reserved for definition of detectable warnings. Until TAS' definition is approved, the description in ADAAG and the PROW Guidelines provides guidance for designers. Following are excerpts from the PROW Guidelines:

General. Truncated domes in a detectable warning surface shall have a base diameter of 0.9 inch minimum to 1.4 inches maximum, a top diameter of 50 percent of the base diameter minimum to 65 percent of the base diameter maximum, and a height of 0.2 inch. Truncated domes shall have a center-to-center spacing of 1.6 inches minimum and 2.4 inches maximum, and a base-to-base spacing of 0.65 inch minimum, measured between the most adjacent domes. Detectable warning surfaces shall contrast visually with adjacent gutter, street or highway, or walkway surfaces, either light-on-dark or dark-on-light. Detectable warning surfaces shall extend 24 inches minimum in the direction of travel and the full width of the curb ramp (exclusive of flares), the landing, or the blended transition. (See [Figure 0-9](#) from the ADAAG Requirements for Detectable Warnings for an example.)

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Detectable Warnings (continued)

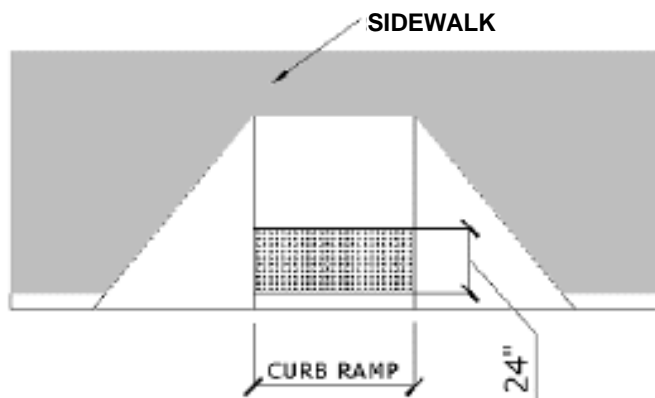


Figure 0-9. Example of a Detectable Warning Installation.

Location and Alignment. For perpendicular curb ramps, where both ends of the bottom grade break are 5 ft or less from the back of the curb, the detectable warning shall be located on the ramp surface at the bottom grade break. Where either end of the bottom grade break is more than 5 ft from the back of curb, the detectable warning shall be located on the lower landing. For landings and blended transitions, the detectable warning shall be located at the back of the curb. The rows of truncated domes in a detectable warning surface shall be aligned to be perpendicular or radial to the grade break between the ramp, landing, or blended transition and the street. Where a ramp, landing, or blended transition provides access to the street continuously around a corner, the vertical rows of truncated domes in a detectable warning surface should be aligned to be perpendicular or radial to the grade break between the ramp and the street for a 4 ft width for each crosswalk served.

Section 4

Accessible Pedestrian Signals

Overview

The term “accessible pedestrian signals” (APS) is generally applied to the special features and considerations used to accommodate disabled pedestrians and/or comply with TAS or ADA requirements. However, features of all pedestrian signals should contribute to their accessibility by all pedestrians, whether disabled or not. Therefore, there are elements of all pedestrian signals that are also elements of “accessible” pedestrian signals. This section contains material on features commonly found in most, if not all, new pedestrian signals as well as standards and guidance on those features specifically defined as “accessible.”

Use of Pedestrian Signal Heads

The *Texas Manual on Uniform Traffic Control Devices* (TMUTCD) contains the standards and guidance for use of pedestrian signal heads in Texas; the 2006 Edition of the TMUTCD provides this information in Chapter 4. The purpose of pedestrian signal heads is to provide special types of traffic signal indications exclusively intended for controlling pedestrian traffic. These signal indications consist of the illuminated symbols of a WALKING PERSON (symbolizing WALK) and an UPRAISED HAND (symbolizing DONT WALK). Engineering judgment should determine the need for separate pedestrian signal heads and accessible pedestrian signals. Examples of typical pedestrian signal indications from the TMUTCD are shown in [Figure 0-10](#).

The TMUTCD provides standards and guidance on the appropriate locations for installation. Pedestrian signal heads shall be used in conjunction with vehicular traffic control signals under any of the following conditions:

- ◆ if a traffic control signal is justified by an engineering study and meets either Warrant 4, Pedestrian Volume or Warrant 5, School Crossing;
- ◆ if an exclusive signal phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped;
- ◆ at an established school crossing at any signalized location; or
- ◆ where engineering judgment determines that multiphase signal indications (as with split-phase timing) would tend to confuse or cause conflicts with pedestrians using a crosswalk guided only by vehicular signal indications.

(continued...)

Use of Pedestrian Signal Heads *(continued)*

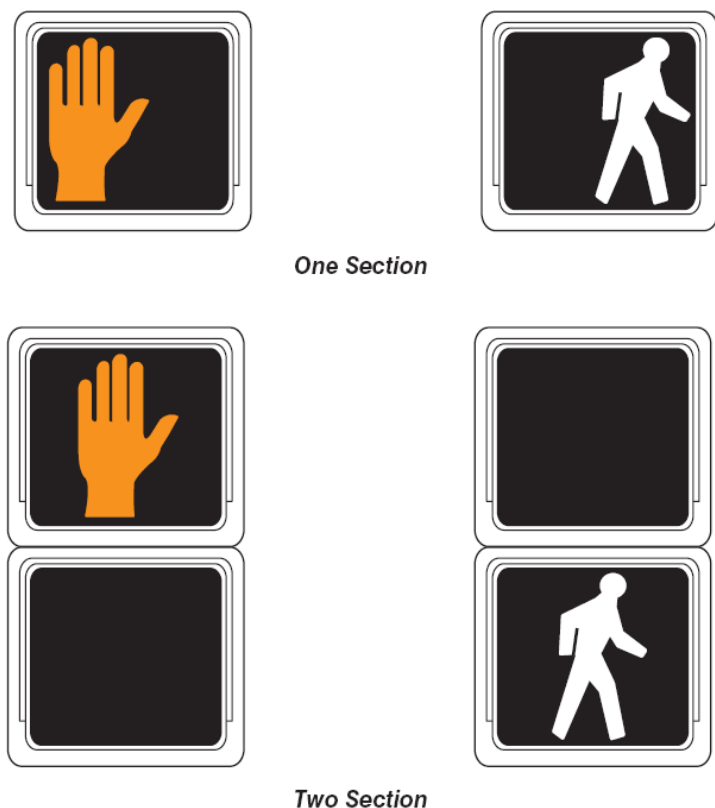


Figure 0-10. Examples of Typical Pedestrian Signal Indications.

Pedestrian signal heads should be used under any of the following conditions:

- ◆ if it is necessary to assist pedestrians in making a reasonably safe crossing or if engineering judgment determines that pedestrian signal heads are justified to minimize vehicle-pedestrian conflicts;
- ◆ if pedestrians are permitted to cross a portion of a street, such as to or from a median of sufficient width for pedestrians to wait, during a particular interval but are not permitted to cross the remainder of the street during any part of the same interval; and/or
- ◆ if no vehicular signal indications are visible to pedestrians, or if the vehicular signal indications that are visible to pedestrians starting or continuing a crossing provide insufficient guidance for them to decide when it is reasonably safe to cross, such as on one-way streets, at T-intersections, or at multiphase signal operations.

General Specifications

The TMUTCD defines the specifications for size, design, illumination, location, and height of pedestrian signals and their indications. The standards for size, design, and illumination are as follows:

- ◆ All new pedestrian signal head indications shall be displayed within a rectangular background and shall consist of symbolized messages (see [Figure 0-10](#)), except that existing pedestrian signal head indications with lettered or outline style symbol messages may be retained for the remainder of their useful service life. The symbol designs that are set forth in the *Standard Highway Sign Designs for Texas* book shall be used. Each pedestrian signal head indication shall be independently illuminated and emit a single color.
- ◆ The UPRAISED HAND (symbolizing DONT WALK) signal section shall be mounted directly above or integral with the WALKING PERSON (symbolizing WALK) signal section.
- ◆ The WALKING PERSON (symbolizing WALK) signal indication shall be white, conforming to the publication entitled *Pedestrian Traffic Control Signal Indications*, with all except the symbol obscured by an opaque material.
- ◆ The UPRAISED HAND (symbolizing DONT WALK) signal indication shall be Portland orange, conforming to the publication entitled *Pedestrian Traffic Control Signal Indications*, with all except the symbol obscured by an opaque material.
- ◆ When not illuminated, the WALKING PERSON (symbolizing WALK) and UPRAISED HAND (symbolizing DONT WALK) symbols shall not be readily visible to pedestrians at the far end of the crosswalk that the pedestrian signal head indications control.
- ◆ For pedestrian signal head indications, the symbols shall be at least 6 inches high.
- ◆ The light source of a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication shall be flashed continuously at a rate of not less than 50 nor more than 60 times per minute. The illuminated period of each flash shall be not less than half and not more than two-thirds of the total flash cycle.

The TMUTCD provides additional guidance that pedestrian signal head indications should be conspicuous and recognizable to pedestrians at all distances from the beginning of the controlled crosswalk to a point 10 ft from the end of the controlled crosswalk during both day and night. For crosswalks where the pedestrian enters the crosswalk more than 100 ft from the pedestrian signal head indications, the symbols should be at least 9 inches high.

(continued...)

General Specifications (continued)

An animated eyes symbol may be added to a pedestrian signal head in order to prompt pedestrians to look for vehicles in the intersection during the time that the WALK signal indication is displayed. If used, the animated eyes symbol shall consist of an outline of a pair of white steadily illuminated eyes with white eyeballs that scan from side to side at a rate of approximately once per second (see [Figure 0-11](#) from *Interfacing Accessible Pedestrian Signals [APS] with Traffic Signal Control Equipment*). The animated eyes symbol shall be at least 12 inches wide with each eye having a width of at least 5 inches and a height of at least 2.5 inches. The animated eyes symbol shall be illuminated at the start of the walk interval and shall terminate at the end of the walk interval.



Figure 0-11. Example of Animated Eyes Indication.

Regarding location and height of signal heads, the TMUTCD standard is that pedestrian signal heads shall be mounted with the bottom of the signal housing including brackets not less than 7 ft nor more than 10 ft above sidewalk level, and shall be positioned and adjusted to provide maximum visibility at the beginning of the controlled crosswalk. If pedestrian signal heads are mounted on the same support as vehicular signal heads, there shall be a physical separation between them.

Pedestrian Detectors

Information in this segment focuses on the more common and traditional pushbutton type of pedestrian detectors; for information on accessible pedestrian detectors, see the segment on APS Detectors.

The TMUTCD states that, when pedestrian actuation is used, pedestrian pushbutton detectors should be capable of easy activation and conveniently located near each end of the crosswalk.

Signs. Signs (defined in Section 2B.44 of the TMUTCD) shall be mounted adjacent to or integral with pedestrian pushbutton detectors, explaining their purpose and use. At certain locations, a sign in a more visible location may be used to call attention to the pedestrian detector. If two crosswalks, oriented in different directions, end at or near the same location, the positioning of pedestrian detectors and/or the legends on the pedestrian detector signs should clearly indicate which crosswalk signal is actuated by each pedestrian detector.

Detectors in Medians. If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and the signals are pedestrian actuated, an additional pedestrian detector shall be provided in the median. The use of additional pedestrian detectors on islands or medians where a pedestrian might become stranded should be considered. A mounting height of approximately 3.5 ft above the sidewalk should be used for pedestrian pushbutton detectors (see Figure 0-12 from the TMUTCD). If used, special purpose pushbuttons (to be operated only by authorized persons) should include a housing capable of being locked to prevent access by the general public and do not need an instructional sign.

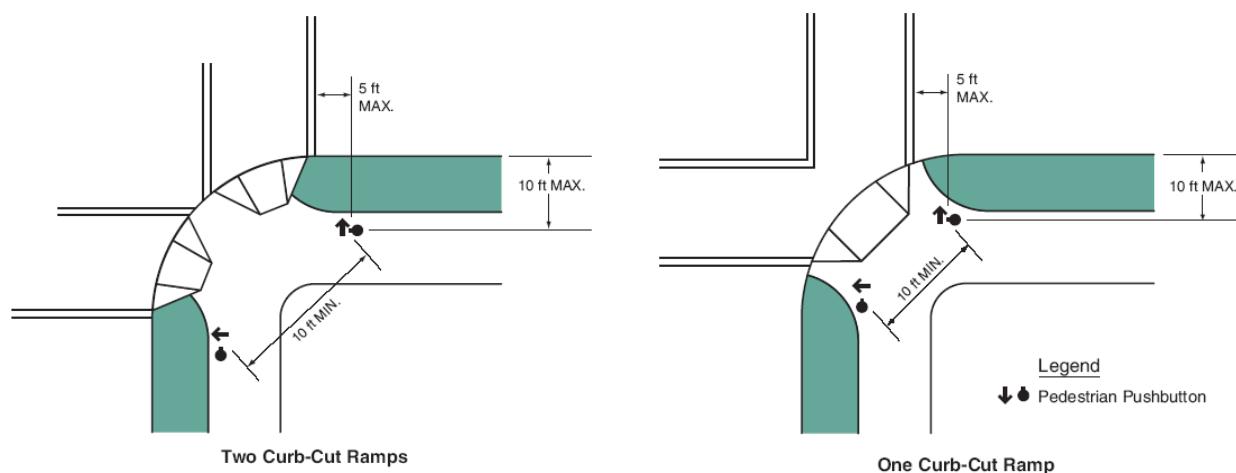


Figure 0-12. Recommended Pushbutton Locations for Accessible Pedestrian Signals.

Signal Phasing and Timing

The TMUTCD defines the following standard for pedestrian intervals and signal phases:

- ◆ When pedestrian signal heads are used, a WALKING PERSON (symbolizing WALK) signal indication shall be displayed only when pedestrians are permitted to leave the curb or shoulder.
- ◆ A pedestrian clearance time shall begin immediately following the WALKING PERSON (symbolizing WALK) signal indication. The first portion of the pedestrian clearance time shall consist of a pedestrian change interval during which a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed. The remaining portions shall consist of the yellow change interval and any red clearance interval (prior to a conflicting green being displayed), during which a flashing or steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed.
- ◆ If countdown pedestrian signals are used, a steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed during the yellow change interval and any red clearance interval (prior to a conflicting green being displayed).
- ◆ At intersections equipped with pedestrian signal heads, the pedestrian signal indications shall be displayed except when the vehicular traffic control signal is being operated in the flashing mode. At those times, the pedestrian signal lenses shall not be illuminated.

Walk Interval. The walk interval should be at least 7 seconds in length so that pedestrians will have adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins. If pedestrian volumes and characteristics do not require a 7-second walk interval, walk intervals as short as 4 seconds may be used. The walk interval itself need not equal or exceed the pedestrian clearance time calculated for the roadway width, because many pedestrians will complete their crossing during the pedestrian clearance time.

Pedestrian Clearance Time. According to the TMUTCD, the pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the curb or shoulder during the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 4 ft/s, to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait. Where pedestrians who walk slower than 4 ft/s, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 4 ft/s should be considered in determining the pedestrian clearance time.

However, the current draft of the PROW Guidelines states that all pedestrian signal phase timing shall be calculated using a pedestrian walk speed of 3.5 ft/s maximum. The Guidelines add that the crosswalk distance used in calculating pedestrian signal phase timing shall include the entire length of the crosswalk. While the PROW Guidelines have not yet been finalized, if they are adopted in this form, they will override the 4 ft/s currently described in the TMUTCD.

(continued...)

Signal Phasing and Timing *(continued)*

As an option, the TMUTCD states that pedestrian detection equipment, which can detect pedestrians who need more time to complete their crossing and can extend the length of the pedestrian clearance time for that particular cycle, may be used in order to avoid using a lower walking speed to determine the pedestrian clearance time.

Where the pedestrian clearance time is sufficient only for crossing from the curb or shoulder to a median of sufficient width for pedestrians to wait, additional measures should be considered, such as median-mounted pedestrian signals or additional signing. As an option, the pedestrian clearance time may be entirely contained within the vehicular green interval, or may be entirely contained within the vehicular green and yellow change intervals.

On a street with a median of sufficient width for pedestrians to wait, a pedestrian clearance time that allows the pedestrian to cross only from the curb or shoulder to the median may be provided. During the transition into preemption, the walk interval and the pedestrian change interval may be shortened or omitted according to Section 4D.13 of the 2006 TMUTCD.

APS Specifications

This segment contains a comparison of the state and national policies, with added discussion on the differences between them. TAS does not currently have a definition of Accessible Pedestrian Signals; therefore, the primary reference for Texas is the TMUTCD. However, the PROW Guidelines contain standards for APS, some of which are not the same as the TMUTCD. From a standpoint of compliance with ADA, use of the PROW Guidelines is recommended. Until the PROW Guidelines are finalized and ratified, and corresponding Texas policies such as TAS are revised accordingly, care should be taken to meet (or exceed) the requirements of both the TMUTCD and the PROW Guidelines in order to achieve compliance with both state and federal laws and requirements.

Use of APS. The TMUTCD and the PROW Guidelines have distinctly different approaches to the use of APS. Section R306.2 of the PROW Guidelines states that APS are mandatory at all new and modified pedestrian signal installations, stating:

“Each crosswalk with pedestrian signal indication shall have an accessible pedestrian signal which includes audible and vibrotactile indications of the WALK interval. Where a pedestrian pushbutton is provided, it shall be integrated into the accessible pedestrian signal and shall comply with R306.2.”

Conversely, the TMUTCD indicates that APS are optional based on expected need and use, as follows:

(continued...)

APS Specifications (continued)

“The primary technique that pedestrians who have visual disabilities use to cross streets at signalized locations is to initiate their crossing when they hear the traffic in front of them stop and the traffic alongside them begin to move, corresponding to the onset of the green interval. This technique is effective at many signalized locations. The existing environment is often sufficient to provide the information that pedestrians who have visual disabilities need to operate reasonably safely at a signalized location. Therefore, many signalized locations will not require any accessible pedestrian signals.

If a particular signalized location presents difficulties for pedestrians who have visual disabilities to cross reasonably safely and effectively, an engineering study should be conducted that considers the safety and effectiveness for pedestrians in general, as well as the information needs of pedestrians with visual disabilities.

The factors that might make crossing at a signalized location difficult for pedestrians who have visual disabilities include: increasingly quiet cars, right turn on red (which masks the beginning of the through phase), continuous right-turn movements, complex signal operations, traffic circles, and wide streets. Further, low traffic volumes might make it difficult for pedestrians who have visual disabilities to discern signal phase changes.

Local organizations, providing support services to pedestrians who have visual and/or hearing disabilities, can often act as important advisors to the traffic engineer when consideration is being given to the installation of devices to assist such pedestrians. Additionally, orientation and mobility specialists or similar staff also might be able to provide a wide range of advice. The U.S. Access Board’s Document A-37, “Accessible Pedestrian Signals,” provides various techniques for making pedestrian signal information available to persons with visual disabilities.

Accessible pedestrian signals provide information in nonvisual format (such as audible tones, verbal messages, and/or vibrating surfaces).”

The TMUTCD focuses almost exclusively on visually impaired pedestrians. While visual impairments may be the most common disability that requires accommodation at pedestrian crossings, it is not the only one. Pedestrians with mobility or hearing impairments must also be included in accommodation for accessibility. The “vibrotactile” indication mentioned in the PROW Guidelines is one example of accommodation for pedestrians with hearing impairments who cannot hear the audible indication. Pedestrians may also have more than one type of disability; APS features are intended to accommodate these pedestrians as well.

(continued...)

APS Specifications (*continued*)

The TMUTCD concludes its general information with the standard that, when used, accessible pedestrian signals shall be used in combination with pedestrian signal timing. The information provided by an accessible pedestrian signal shall clearly indicate which pedestrian crossing is served by each device. Under stop-and-go operation, accessible pedestrian signals shall not be limited in operation by the time of day or day of week. The installation of accessible pedestrian signals at signalized locations should be based on an engineering study, which should consider the following factors:

- ◆ potential demand for accessible pedestrian signals;
- ◆ a request for accessible pedestrian signals;
- ◆ traffic volumes during times when pedestrians might be present, including periods of low traffic volumes or high turn-on-red volumes;
- ◆ complexity of traffic signal phasing; and
- ◆ complexity of intersection geometry.

Ultimately, accessibility for all pedestrians must be provided wherever pedestrian access is provided, according to ADA and supported by the description in the PROW Guidelines. While the TMUTCD scenario may be realistic, in that most of the added features specific to APS are largely unused at many locations, the current draft of the PROW Guidelines does not allow the option of not installing them at new or modified pedestrian signal installations.

Placement

The PROW Guidelines specify that accessible pedestrian signals shall be located so that the vibrotactile feature can be contacted from the level landing serving a curb ramp, if provided, or from a clear floor or ground space that is in line with the crosswalk line adjacent to the vehicle stop line.

Crossings. Accessible pedestrian signal devices shall be 10.0 ft minimum from other accessible pedestrian signals at a crossing. The control face of the accessible pedestrian signal shall be installed to face the intersection and be parallel to the direction of the crosswalk it serves.

Medians and Islands. Accessible pedestrian signals located in medians and islands shall be 5 ft minimum from other accessible pedestrian signals.

Reach. Accessible pedestrian pushbuttons shall be located within a reach range complying with the following guidelines on reach ranges:

- ◆ Where a forward reach is unobstructed, the high forward reach shall be 48 inches maximum, and the low forward reach shall be 15 inches minimum above the finish surface.
- ◆ Where a high forward reach is over an obstruction, the clear space shall extend beneath the element for a distance not less than the required reach depth over the obstruction. The high forward reach shall be 48 inches maximum where the reach depth is 20 inches maximum. Where the reach depth exceeds 20 inches, the high forward reach shall be 44 inches maximum, and the reach depth shall be 25 inches maximum.
- ◆ Where a clear space allows a parallel approach to an element and the side reach is unobstructed, the high side reach shall be 48 inches maximum, and the low side reach shall be 15 inches minimum above the finish surface. An obstruction shall be permitted between the clear space and the element where the depth of the obstruction is 10 inches maximum.
- ◆ Where a clear space allows a parallel approach to an element and the high side reach is over an obstruction, the height of the obstruction shall be 34 inches maximum, and the depth of the obstruction shall be 24 inches maximum. The high side reach shall be 48 inches maximum for a reach depth of 10 inches maximum. Where the reach depth exceeds 10 inches, the high side reach shall be 46 inches maximum for a reach depth of 24 inches maximum.

(continued...)

Placement (*continued*)

Clear Floor or Ground Space. A clear floor or ground space complying with the following guidelines on clear space shall be provided at the pushbutton and shall connect to or overlap the pedestrian access route:

- ◆ Surfaces of clear spaces shall be firm, stable, and slip resistant, and shall have a slope and cross slope of 2 percent maximum.
- ◆ The clear space shall be 30 inches minimum by 48 inches minimum.
- ◆ Unless otherwise specified, clear space shall be permitted to include knee and toe clearance as follows:
 - Space under an element between the finish surface and 9 inches above the finish surface shall be considered toe clearance. Toe clearance shall extend 25 inches maximum under an element. Where toe clearance is required at an element as part of a clear space, the toe clearance shall extend 17 inches minimum under the element. Space extending more than 6 inches beyond the available knee clearance at 9 inches above the finish surface shall not be considered toe clearance. Toe clearance shall be 30 inches wide minimum.
 - Space under an element between 9 inches and 27 inches above the finish surface shall be considered knee clearance. Knee clearance shall extend 25 inches maximum under an element at 9 inches above the finish surface. Where knee clearance is required under an element as part of a clear space, the knee clearance shall be 11 inches deep minimum at 9 inches above the finish surface and 8 inches deep minimum at 27 inches above the finish surface. Between 9 inches and 27 inches above the finish surface, the knee clearance shall be permitted to reduce at a rate of 1 inch in depth for each 6 inches in height. Knee clearance shall be 30 inches wide minimum.
- ◆ Unless otherwise specified, clear space shall be positioned for either forward or parallel approach to an element.
- ◆ One full unobstructed side of the clear space shall adjoin a pedestrian access route or adjoin another clear space.
- ◆ Where a clear space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering space shall be provided as follows:
 - Alcoves shall be 36 inches wide minimum where the depth exceeds 24 inches.
 - Alcoves shall be 60 inches wide minimum where the depth exceeds 15 inches.

Audible Walk Indications

PROW Guidelines. The PROW Guidelines state that the audible indication of the WALK interval shall be by tone or speech message. Tones shall consist of multiple frequencies with a dominant component at 880 Hz. The duration of the tone shall be 0.15 second and shall repeat at intervals of 0.15 second. (Many new accessible pedestrian signal installations in the US use speech messages, which are perceived as being more user-friendly than tones; however, such messages may not be intelligible under high-ambient-noise conditions or to non-English speakers. Electronic tones are more universal and unambiguous. Section 4E.06 of the TMUTCD specifies content of speech messages.) Tone or voice volume measured at 3.0 ft from the pedestrian signal device shall be 2 decibels (dB) minimum and 5 dB maximum above ambient noise level in standard operation and shall be responsive to ambient noise level changes. (Where additional volume or beaconing features are available on pedestrian activation, they will momentarily exceed volume limits.)

TMUTCD. The TMUTCD mandates that when choosing audible tones, possible extraneous sources of sounds (such as wind, rain, vehicle backup warnings, or birds) shall be considered in order to eliminate potential confusion to pedestrians who have visual disabilities. Audible pedestrian tones should be carefully selected to avoid misleading pedestrians who have visual disabilities when the following conditions exist:

- ◆ where there is an island that allows unsignalized right turns across a crosswalk between the island and the sidewalk;
- ◆ where multileg approaches or complex signal phasing require more than two pedestrian phases, such that it might be unclear which crosswalk is served by each audible tone; and
- ◆ at intersections where a diagonal pedestrian crossing is allowed, or where one street receives a WALKING PERSON (symbolizing WALK) signal indication simultaneously with another street.

When accessible pedestrian signals have an audible tone(s), they shall have a tone for the walk interval. The audible tone(s) shall be audible from the beginning of the associated crosswalk. If the tone for the walk interval is similar to the pushbutton locator tone, the walk interval tone shall have a faster repetition rate than the associated pushbutton locator tone (see the segment on pushbuttons for more details). The accessible walk signal tone should be no louder than the locator tone, except when there is optional activation to provide a louder signal tone for a single pedestrian phase. Automatic volume adjustment in response to ambient traffic sound level should be provided up to a maximum volume of 89 dB. Where automatic volume adjustment is used, tones should be no more than 5 dB louder than ambient sound. The A-weighted sound pressure level should conform to the requirements of ISO 1996-1:1982 and ISO 1996-2:1987.

(continued...)

Audible Walk Indications (*continued*)

When verbal messages are used to communicate the pedestrian interval, they shall provide a clear message that the walk interval is in effect, as well as to which crossing it applies. The verbal message that is provided at regular intervals throughout the timing of the walk interval shall be the term “walk sign,” which may be followed by the name of the street to be crossed. A verbal message is not required at times when the walk interval is not timing, but, if provided:

- ◆ it shall be the term “wait,” and
- ◆ it need not be repeated for the entire time that the walk interval is not timing.

Accessible pedestrian signals that provide verbal messages may provide similar messages in languages other than English, if needed, except for the terms “walk sign” and “wait.”

A vibrotactile pedestrian device communicates information about pedestrian timing through a vibrating surface by touch. Vibrotactile pedestrian devices, where used, shall indicate that the walk interval is in effect, and for which direction it applies, through the use of a vibrating directional arrow or some other means. When provided, vibrotactile pedestrian devices should be located next to, and on the same pole as, the pedestrian pushbutton, if any, and adjacent to the intended crosswalk.

APS Detectors/Pedestrian Pushbuttons

PROW Guidelines. According to the PROW Guidelines, pedestrian pushbuttons shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 lb maximum. Pedestrian pushbuttons shall incorporate a locator tone at the pushbutton. Pushbutton locator tone volume measured at 3.0 ft from the pushbutton shall be 2 dB minimum and 5 dB maximum above ambient noise level and shall be responsive to ambient noise level changes. The duration of the locator tone shall be 0.15 second maximum and shall repeat at intervals of one second. The locator tone shall operate during the DONT WALK and flashing DONT WALK intervals only and shall be deactivated when the pedestrian signal is not operative. Pedestrian pushbuttons shall be a minimum of 2 inches across in one dimension and shall contrast visually with their housing or mounting. An extended button press shall be permitted to activate additional features. Buttons that provide additional features shall be marked with three Braille dots forming an equilateral triangle in the center of the pushbutton.

Examples of pushbuttons are shown in [Figure 0-13](#).

(*continued...*)

APS Detectors/Pedestrian Pushbuttons *(continued)*



Figure 0-13. Examples of Accessible Pedestrian Pushbuttons.

TMUTCD. The TMUTCD defines an accessible pedestrian signal detector as a device designated to assist the pedestrian who has visual or physical disabilities in activating the pedestrian phase. At accessible pedestrian signal locations with pedestrian actuation, each pushbutton shall activate both the walk interval and the accessible pedestrian signals. Accessible pedestrian signal detectors may be pushbuttons or passive detection devices. Pushbutton locator tones may be used with accessible pedestrian signals.

At accessible pedestrian signal locations, pushbuttons should clearly indicate which crosswalk signal is actuated by each pushbutton. Pushbuttons and tactile arrows should have high visual contrast as described in ADAAG. Tactile arrows should point in the same direction as the associated crosswalk. At corners of signalized locations with accessible pedestrian signals where two pedestrian pushbuttons are provided, the pushbuttons should be separated by a distance of at least 10 ft. This enables pedestrians who have visual disabilities to distinguish and locate the appropriate pushbutton.

Pushbuttons for accessible pedestrian signals should be located (see [Figure 0-12](#)) as follows:

- ◆ adjacent to a level all-weather surface to provide access from a wheelchair, and where there is an all-weather surface, wheelchair accessible route to the ramp;
- ◆ within 5 ft of the crosswalk extended;
- ◆ within 10 ft of the edge of the curb, shoulder, or pavement; and
- ◆ parallel to the crosswalk to be used.

(continued...)

APS Detectors/Pedestrian Pushbuttons *(continued)*

If the pedestrian clearance time is sufficient only to cross from the curb or shoulder to a median of sufficient width for pedestrians to wait and accessible pedestrian detectors are used, an additional accessible pedestrian detector should be provided in the median.

When used, pushbutton locator tones shall be easily locatable, shall have a duration of 0.15 second or less, and shall repeat at 1 second intervals. Pushbuttons should be audibly locatable. Pushbutton locator tones should be intensity responsive to ambient sound and be audible 6 to 12 ft from the pushbutton, or to the building line, whichever is less. Pushbutton locator tones should be no more than 5 dBA louder than ambient sound. Pushbutton locator tones should be deactivated during flashing operation of the traffic control signal. At locations with pre-timed traffic control signals or non-actuated approaches, pedestrian pushbuttons may be used to activate the accessible pedestrian signals. The audible tone(s) may be made louder (up to a maximum of 89 dBA) by holding down the pushbutton for a minimum of 3 seconds. The louder audible tone(s) may also alternate back and forth across the crosswalk, thus providing optimal directional information. The name of the street to be crossed may also be provided in accessible format, such as Braille or raised print.

Directional Information and Signs

PROW Guidelines. Pedestrian signal devices shall provide compliant tactile and visual signs on the face of the device or its housing or mounting to indicate crosswalk direction and the name of the street containing the crosswalk served by the pedestrian signal. Signs shall include a tactile arrow aligned parallel to the crosswalk direction. The arrow shall be raised 0.03 inch minimum and shall be 1.5 inches minimum in length. The arrowhead shall be open at 45 degrees to the shaft and shall be 33 percent of the length of the shaft. Stroke width shall be 10 percent minimum and 15 percent maximum of arrow length. The arrow shall contrast with the background (see [Figure 0-13](#)). Accessible pedestrian signals shall include street name information aligned parallel to the crosswalk direction and shall comply with requirements for raised Braille characters in Section R409.3 or shall provide street name information in audible format. Where provided, graphic indication of crosswalk configuration shall be tactile.

TMUTCD. The TMUTCD does not define directional information and signs specific to APS, but it does define appropriate signs for general use. Pedestrian Crossing signs (see [Figure 0-14](#)) may be used to limit pedestrian crossing to specific locations. If used, Pedestrian Crossing signs shall be installed to face pedestrian approaches. Where crosswalks are clearly defined, the CROSS ONLY AT CROSSWALKS (R9-2) sign may be used to discourage jaywalking or unauthorized crossing. The No Pedestrian Crossing (R9-3a) sign may be used to prohibit pedestrians from crossing a roadway at an undesirable location or in front of a school or other public building where a crossing is not designated.

(continued...)

Directional Information and Signs (continued)



Figure 0-14. TMUTCD Pedestrian Signs.

The NO PEDESTRIAN CROSSING (R9-3) word message sign may be used as an alternate to the R9-3a symbol sign. The USE CROSSWALK (R9-3b) supplemental plaque, along with an arrow, may be installed below either sign to designate the direction of the crossing. One of the most frequent uses of the Pedestrian Crossing signs is at signalized intersections that have three crossings that can be used and one leg that cannot be crossed. The R9-3b sign should not be installed in combination with educational plaques.

Section 5

Countdown Pedestrian Signals

Overview

Countdown pedestrian signals (CPS) are an optional feature that may be used to provide pedestrians with additional information at a pedestrian crossing. They provide pedestrians approaching and using the crossing with a visual display of the time remaining in the pedestrian change interval. CPS may be used at intersections (in conjunction with a concurrent vehicular phase) or at midblock crossings (where there is no concurrent vehicular traffic).

Currently, no standards or guidelines exist in TAS or ADAAG specific to CPS; available guidance is intended for the use of CPS for all pedestrians in general. However, as it concerns providing equal accessibility and information to all pedestrians, CPS provide little to no benefit to visually impaired pedestrians.

Installation Standards and Guidance

The *Texas Manual on Uniform Traffic Control Devices* provides information to traffic engineers on the use and installation of CPS. Section 4E.07 of the 2006 Edition of the TMUTCD contains most of the information on CPS. The primary instruction in the TMUTCD is that CPS are optional:

“A pedestrian interval countdown display may be added to a pedestrian signal head in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval.”

If CPS are installed, then the following standards apply:

- ◆ If used, countdown pedestrian signals shall consist of Portland orange numbers that are at least 6 inches in height on a black opaque background. The countdown pedestrian signal shall be located immediately adjacent to the associated UPRAISED HAND (symbolizing DONT WALK) pedestrian signal head indication. (See [Figure 0-15](#) from *Countdown Pedestrian Signals: A Comparison of Alternative Pedestrian Change Interval Displays* for an example.)
- ◆ If used, the display of the number of remaining seconds shall begin only at the beginning of the pedestrian change interval. After the countdown displays zero, the display shall remain dark until the beginning of the next countdown.
- ◆ If used, the countdown pedestrian signal shall display the number of seconds remaining until the termination of the pedestrian change interval. Countdown displays shall not be used during the walk interval nor during the yellow change interval of a concurrent vehicular phase.



Figure 0-15. Example of a Countdown Pedestrian Signal Head.

The TMUTCD provides additional guidance, as follows:

- ◆ If used with a pedestrian signal head that does not have a concurrent vehicular phase, the pedestrian change interval (flashing UPRAISED HAND) should be set to be approximately 4 seconds less than the required pedestrian crossing time (see Section 4E.10), and an additional clearance interval (during which steady UPRAISED HAND is displayed) should be provided prior to the start of the conflicting vehicular phase. In this case, the countdown display of the number of remaining seconds should be displayed only during the display of the flashing UPRAISED HAND, should display zero at the time when the flashing UPRAISED HAND changes to steady UPRAISED HAND, and should be dark during the additional clearance interval prior to the conflicting vehicular phase.
- ◆ For crosswalks where the pedestrian enters the crosswalk more than 100 ft from the countdown pedestrian signal display, the numbers should be at least 9 inches in height.
- ◆ Because some technology includes the countdown pedestrian signal logic in a separate timing device that is independent of the timing in the traffic signal controller, care should be exercised by the engineer when timing changes are made to pedestrian change intervals.
- ◆ If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence (see Section 4E.10), the countdown pedestrian signal display should be discontinued and go dark immediately upon activation of the preemption transition.

Timing of Pedestrian Intervals and Signal Phases

Section 4E.10 of the 2006 TMUTCD contains standards and guidance on appropriate pedestrian signal timing practices. Specific to CPS, the TMUTCD has the following standard:

- ◆ If countdown pedestrian signals are used, a steady UPRAISED HAND (symbolizing DONT WALK) signal indication shall be displayed during the yellow change interval and any red clearance interval (prior to a conflicting green being displayed).

The general standards and guidance on signal timing for pedestrians apply regardless of the presence of Countdown Pedestrian Signals. Those standards and guidelines can be found in the discussion of Accessible Pedestrian Signals in [Section 4](#) of this chapter and in the relevant sections of the TMUTCD.

