



# INDIANA DEPARTMENT OF TRANSPORTATION

## *Driving Indiana's Economic Growth*

### Design Memorandum No. 16-12 Technical Advisory

March 21, 2016

**TO:** All Design, Operations, and District Personnel, and Consultants

**FROM:** /s/Elizabeth W. Phillips  
Elizabeth W. Phillips  
Manager, Standards and Policy Office  
Bridges Division

**SUBJECT:** Curb Ramps and Sidewalks

**REVISES:** *Indiana Design Manual (IDM)*  
51-1.0 through 51-11.0, Figures 51-1A through 51-1 O,  
40-8.04(01), 45-1.06(02), 46-11.02(04) and -11.02(07)

**SUPERSEDES:** Design Memo 15-20

**EFFECTIVE:** As Noted

#### Standard Drawings

INDOT *Standard Drawing* Series E 604-SDWK, Sidewalks and 604-SWCR, Sidewalk Curb Ramps have been revised in accordance with the *Public Rights-of-Way Accessibility Guidelines* (PROWAG). The *Standard Drawings* will become effective with lettings on or after September 1, 2016. The majority of the content is unchanged, but the presentation has been significantly reformatted. Notable revisions include

1. Dimensions based on an assumed 6-in. curb height, maximum slope, and level terrain have been removed. The expectation is that each curb ramp design will be shown on the construction plans.
2. Curb ramp types are no longer designated by a letter but instead by the configuration of the ramp, e.g. perpendicular or parallel.
3. Minimum width and maximum slope design criteria are shown. Slopes at least 0.5% less than the maximum are preferred.
4. Returned curb configurations have been added.

- Grooves have been removed from the ramp surface.

Standard Specifications

INDOT *Standard Specifications* Sections 604 and 905.05 have been revised to reflect the revisions to the *Standard Drawings* in accordance with the PROWAG. Notable revisions include

- Curb ramps are no longer paid for by a letter designated type. All curb ramps should be included in a single pay item (shown below).
- The terminology for Detectable Warning Elements has been revised to Detectable Warning Surfaces (DWS). DWS are no longer included in the cost of the curb ramp, and should be paid for separately (shown below).
- There is no construction tolerance for cross slope or running slope. Slopes are to be checked with a 2-ft level.

Effective with lettings on or after September 1, 2016, recurring special provision (RSP) 604-R-633, Curb Ramps, Landings, and Detectable Warning Surfaces should be included in each contract with a 604 pay item.

<b>Prior To September 1, 2016 Letting</b>	<b>On or After September 1, 2016 Letting</b>
Curb Ramp, Concrete, <i>(type)</i> (SYS)	604-08086 Curb Ramp, Concrete (SYS)
[none]	604-12083 Detectable Warning Surfaces (SYS)
[none]	604-12094 Detectable Warning Surfaces, Retrofit (SYS)

The curb ramp concrete area should include the DWS area, i.e. do not subtract the DWS area from the curb ramp concrete area.

For projects that only the DWS is being placed or replaced the pay item Detectable Warning Surfaces, Retrofit should be included in the contract. The pay item includes the cost of removal and replacement of portions of the concrete curb ramp.

The pay items Detectable Warning Surfaces and Detectable Warning Surfaces, Retrofit are new pay item and do not have a bid history. Until a bid history has been established the following unit prices may be used for estimating purposes.

<b>Pay Item</b>	<b>Unit Cost</b>
Detectable Warning Surfaces	\$350 per SYS
Detectable Warning Surfaces, Retrofit	\$500 per SYS

Indiana Design Manual

The *Indiana Design Manual* (IDM) Chapter 51 Section 51-1.0 and subsequent IDM section listed above have been revised to reflect the revisions to the *Standard Drawings* in accordance with the PROWAG. Notable revisions include

1. Design guidance for sidewalk and curb ramp design has changed from *Americans with Disabilities Act Accessibility Guidelines* (ADAAG) to *Public Rights-of-Way Accessibility Guidelines* (PROWAG). The applicable PROWAG section references are shown in brackets throughout Chapter 51.
2. A preferred slope at least 0.5% less than the maximum allowable cross slope or running slope is recommended to reduce the likelihood of exceeding the maximum slope during construction. Effective with Stage 2 submissions on or after July 1, 2016, the preferred slope is to be used as a design practice.
3. The grade of the sidewalk may meet the general grade of the adjacent roadway provided that the sidewalk is contained within a roadway public right of way. A grade in excess of 5% no longer triggers ramp requirements of handrail and landings.
4. Curb ramps are broken down into components and design elements to allow for more efficient design and detailing.
5. The design criteria for a curb ramp is distinguished from the design criteria for a ramp outside the public right of way, e.g. at a building entrance.
6. Curb ramp types are no longer identified with a letter designation. Curb ramp configurations, e.g. perpendicular or parallel, and selection considerations are provided.
7. Guidance is given for sidewalk and curb ramp plan detailing for new and reconstructed facilities.
8. Allowable street grades within a pedestrian street crossing are described.
9. Accessible Pedestrian Signals general guidelines are described.

The revisions are attachments to this memo. The revisions to these chapters in the on-line version of the IDM will be updated at a later date.

## SPECIAL DESIGN ELEMENTS

### 51-1.0 ACCESSIBILITY [Rev Mar. 2016]

The *Americans with Disabilities Act* of 1990 (ADA) prohibits discrimination and ensures equal opportunity and access for persons with disabilities. Title II of the ADA prohibits discrimination on the basis of disability in the provision of services, programs, and activities by State and local governments. The Department, along with each local public agency, under ADA Title II, is required to provide ADA-compliant, otherwise known as accessible, facilities within the public right of way. Buildings within the public right of way, sidewalks, curb ramps, transit stops, on-street parking, parking lots, overpasses and underpasses are just a few examples of programs covered by Title II. Each private business which is considered to be a place of public accommodation, such as a retail business, restaurant, doctor's office, law office, etc., is required under ADA Title III to provide an accessible facility on its private property.

The *2010 ADA Standards for Accessible Design* (2010 Standards) is the current standard for providing facilities that are readily accessible and usable by persons with disabilities. However, the guidelines were developed primarily for buildings and facilities outside the right of way. Pedestrian facilities within the public right of way contain elements to which the 2010 Standards cannot be readily applied. For this reason, the U.S. Access Board proposed guidelines specifically for pedestrian facilities in the public right of way - The *Public Rights-of-Way Accessibility Guidelines* (PROWAG). These guidelines are recommended as best practice by the Federal Highway Administration and are currently being evaluated as part of the federal rulemaking process. Once adopted as a regulation, with or without modifications, the guidelines will be mandatory.

The Department's accessibility criteria meet the requirements of the ADA and seek to ensure that persons with disabilities may access the public right of way without discrimination. Unless otherwise noted, the Department's accessibility criteria are based on the PROWAG, dated July 26, 2011. The applicable sections of the PROWAG are noted in brackets next to each section heading below. If local public agencies or local codes require standards which exceed the PROWAG, the stricter criteria should be used.

### **51-1.01 Transition Plan [Added Mar. 2016]**

Under ADA Title II and Section 504 of the Rehabilitation Act of 1973, public agencies with more than 50 employees are required to complete a self-evaluation to identify services, policies and practices that are not accessible for persons with disabilities. A transition plan to correct the deficiencies is also required. The transition plan includes the following.

1. Identification of physical obstacles that limit the accessibility of facilities
2. Description of the methods to be used to make the facilities accessible
3. A schedule for implementing access modifications, and
4. Identification of the public official responsible for implementation of the transition plan

The transition plan must be updated and maintained until all barriers to accessibility are removed or documented to be technically infeasible to construct compliantly. See Section 40-8.04(01) Item 3 for submitting a determination of technical infeasibility or technical inquiry.

### **51-1.02 Pedestrian Access Route (PAR) [R302] [Added Mar. 2016]**

A pedestrian access route or PAR is a continuous and unobstructed path of travel provided for pedestrians with disabilities within or coinciding with the pedestrian circulation path. The pedestrian circulation path is any prepared interior or exterior surface provided for pedestrian travel in the public right of way. Within the public right of way, the PAR typically includes sidewalks, pedestrian street crossings, and curb ramps, as well as overpasses and underpasses. Where the PAR is within a wider pedestrian circulation path, the accessibility criteria in this section apply only to the PAR.

The Department is responsible for ensuring the PAR is accessible within Department right of way. A business that serves the public and has a building with the building face on or nearly on the right of way or property line is responsible for ensuring that each building entrance or walk, etc., is accessible and compatible with the adjacent public right-of-way sidewalk.

### **51-1.03 Sidewalk [Rev. Mar. 2016]**

A sidewalk provides a continuous path for pedestrians just as streets provide a continuous network to the motoring public. A sidewalk is part of a PAR and must meet the requirements of the ADA.

## **51-1.03(01) Location**

The following should be considered when locating a sidewalk.

1. Sidewalk Continuity. Where a small section of the sidewalk must be rebuilt, for example to construct a compliant curb ramp, it is recommended to address the non-compliant aspects for the length of the sidewalk between logical termini. Logical termini may be the nearest intersection, drive, or other intersecting location.
2. Sidewalk Placement. Where new sidewalk is being considered, placement and setback along streets should take into account worn paths and buffer zones. A worn path where no sidewalk exists typically demonstrates the natural path pedestrians will take. Additional space should be provided for snow storage.

The placement of a sidewalk should not require an exception to other Level One design criteria, such as shoulder or lane width.

3. Meandering sidewalks. Sidewalks that weave back and forth within the right-of-way are generally discouraged. While they may seem visually appealing, pedestrians prefer a direct, non-sinuous route. Meandering sidewalks may cause navigational difficulties for pedestrians with vision impairments.
4. Separation. It is desirable to provide a buffer space of 4 to 6 ft between the traveled way and the sidewalk. A buffer space provides for pedestrian comfort as well as facilitates installation of an accessible curb ramp.

Where the speed limit of the adjacent roadway is 45 mph or less, a vertical curb should be used in conjunction with the sidewalk section to separate pedestrians from adjacent traffic.

Where the speed limit of the adjacent roadway is greater than 45 mph, a barrier should be considered between the sidewalk and adjacent traffic if a sufficient separation cannot be provided.

5. Vertical drop off. Vertical drop offs are not addressed as part of the PROWAG. To address safety concerns, slopes adjacent to sidewalks should be as flat as practical. Consideration should be given to providing pedestrian railing where side slopes adjacent a sidewalk are 1:1 or steeper with a drop off greater than 24 in.

### **51-1.03(02) Sidewalk Design Criteria [Rev. Mar. 2016]**

This section applies to sidewalks within the public right of way and meets the criteria described in the *Public Rights-of-Way Accessibility Guidelines* (PROWAG), dated July 26, 2011. The applicable PROWAG sections are shown in brackets. A determination of technical infeasibility or technical inquiry must be approved for a sidewalk that does not meet the following criteria. See Section 40-8.04(01) Item 3 for submitting a request for determination of technical infeasibility or technical inquiry.

See INDOT *Standard Drawings* series 604-SWDK for sidewalk and driveway crossing details.

1. Width [R302.3]. Sidewalks should be wide enough to accommodate the volume and type of pedestrian traffic expected.

Where a sidewalk is used in conjunction with a buffer, the minimum clear width is 5 ft, exclusive of the curb. See Section 51-1.03(01) item 4, for desirable buffer widths. See [Figure 51-1A](#), Sidewalk Clear Width.

Where a sidewalk is located immediately adjacent the curb, a width of 6 ft should be used to allow additional space for street and highway hardware as well as to provide pedestrian comfort due to the proximity of traffic.

Where the sidewalk serves commercial areas, schools, or other areas with concentrated pedestrian traffic, a width of 8 ft or greater may be appropriate.

Where insufficient space is available, the sidewalk width may be reduced to 4 ft for short distances. Where the clear width is less than 5 ft, a passing space must be provided at no more than 200-ft intervals. The passing space must be a minimum of 5 ft by 5 ft. A taper rate of 6:1 should be used to widen and reduce the sidewalk width at passing spaces. See [Figure 51-1B](#), Sidewalk Passing Space.

2. Surface [R302.7]. The sidewalk surface must be firm, stable, and slip-resistant. A change in level of up to 1/4 in. may be vertical and without edge treatment. A change in level of 1/4 in. to 1/2 in. must be beveled with a slope not greater than 1V:2H. A change in level of greater than 1/2 in. should be accommodated with a running slope in accordance with the curb ramp criteria.

Where a grating is required within the PAR, the grating opening must not exceed 1/2 in. in the direction of pedestrian travel. Where a grating has elongated openings, the grating

must be placed so that the long dimension is perpendicular to the dominant direction of pedestrian travel.

3. Cross Slope [R302.6]. Cross slope is measured perpendicular to the direction of pedestrian travel. The maximum allowable cross slope of a sidewalk is 2.0%. A maximum cross slope of 1.5% is preferred and should be used as a design practice to reduce the likelihood of exceeding the maximum allowable cross slope during construction.
4. Grade [R302.5]. The grade or running slope is defined as the slope parallel to the direction of pedestrian travel. The grade of the sidewalk must not exceed the general grade established for the adjacent roadway.
5. Protruding Object [R210]. Protruding Objects such as street furniture, signal-controller cabinet, light standard, strain pole, utility pole, mailbox, sign support and other objects should not be placed within the width of the sidewalk. Protruding objects can be hazardous for pedestrians, especially pedestrians who are blind or have low vision. Where it is necessary to place a protruding object within the width of the sidewalk, a 4-ft minimum clear width may be provided for a short distance, see [Figure 51-1A](#). For a shared-use path, protruding objects should not overhang into any portion of the shared-use path at or below 8 ft measured from the finished surface. This is to accommodate for bicycle traffic.
6. Curb Ramp [R304]. A curb ramp is used to lower or raise the sidewalk to connect with a public road approach. Each curb ramp must be in accordance with the criteria described in Section 51-1.04.
7. Sidewalk Transition. A sidewalk transition should be used as part of a sidewalk driveway crossing. The sidewalk transition is used to lower or raise the sidewalk to connect with a residential or commercial driveway without yield or stop control. A sidewalk transition has a maximum running slope of 8.33%. A maximum running slope of 8% is preferred as a design practice to reduce the likelihood of exceeding the maximum allowable running slope during construction. Sidewalk transition details are shown on the INDOT *Standard Drawings* series 604-SDWK.
8. Sidewalk Driveway Crossing. A sidewalk driveway crossing is where a sidewalk crosses a driveway with or without a sidewalk transition. Sidewalk driveway crossings should only be used at a residential or commercial driveway intersection without yield or stop control. Sidewalk driveway crossing details are shown on the INDOT *Standard Drawings* series 604-SDWK.



### **51-1.03(03) Sidewalk Plan Requirements [Added Mar. 2016]**

Each sidewalk to be reconstructed should be detailed as follows:

1. Plan Views. Lines representing the sidewalk should be shown in plan view over existing survey or an aerial image. Use of an aerial image should consider the effect on file size.
2. Spot Elevations. In the absence of a full survey or paper relocation (PR) line, spot elevation at reasonable intervals must be included. Elevations at each side of the sidewalk, every 100 ft or break point should be tabulated or detailed.
3. Dimensions. Sections of sidewalk to be reconstructed should be shown with starting and ending stations. The width, especially where varying widths are expected, should be tabulated or detailed.
4. Slopes. Running slopes and cross slopes for each section of sidewalk should be tabulated or detailed. The preferred slopes should be used in design and shown on the plans.

For new construction, a compliant sidewalk can be detailed by calling out a standard sidewalk width, cross slope and running slope as part of a typical cross section. New construction assumes a new alignment or significant modification to an existing cross section and adequate right of way. Areas that fall outside the typical cross section (e.g. where the beginning and end of the project tie into an existing cross section) should be detailed as described for retrofits and reconstruction.

### **51-1.04 Curb Ramps [Rev. Mar. 2016]**

Curb ramps provide access between the sidewalk and the roadway for wheelchair users. Note that although the design elements are similar, sidewalk curb ramp requirements are separate from the requirements for ramps that provide access in other locations outside the public rights of way, such as a ramp within or leading to a building, or a pedestrian overpass. Curb ramps for existing facilities which do not meet the PROWAG criteria must be included in the owner's transition plan. See [Figure 51-1C](#), Curb Ramp Components and Design Elements.

For project activities deemed as alterations in accordance with the Department of Justice/Department of Transportation Joint Technical Assistance on the Title II of the Americans with Disabilities Act guidance, ADA-compliant curb ramp installation or retrofit must be included within the scope of the project. See [Figure 51-1D](#), Alteration vs. Maintenance activities.

## **51-1.04(01) Location [Rev. Mar. 2016]**

Each curb ramp should be designed and placed to provide an unobstructed PAR while providing pedestrians the shortest but most direct route across a street.

In determining the location of a curb ramp, the designer should consider the following.

1. Where a raised sidewalk or improved surface intersects a public road approach, a curb ramp must be provided to transition to the elevation of the roadway.
2. Where sidewalk or other PAR continues on the opposite side of an intersection, opposing curb ramps must be provided.
3. Curb ramps should be located directly opposite one another for each pedestrian street crossing. Installing curb ramps in-line with the direction of pedestrian travel facilitates wayfinding for the blind and those with low vision.
4. Obstructions such as a signal controller box, planter, or signal pole base should be relocated away from the curb ramp wherever feasible. It is important that drivers be able to see the pedestrian using a curb ramp. Where it is not feasible to move the obstruction, the vehicle sight distance relative to the placement of the curb ramp should be considered.

The designer is responsible for identifying potential utility conflicts and mitigating conflicts to the extent feasible. If utilities are present, utility coordination should be in accordance with Chapter 104.

5. Crosswalk markings are preferred for all pedestrian street crossings and are required where a single curb ramp serves two directions of pedestrian traffic. See [Figure 51-1L](#), Depressed Corner Curb Ramp. Where crosswalk markings are used, the full width of the ramp and clear space must be contained wholly within the markings. For placement of the crosswalk markings, see the *Indiana Manual on Uniform Traffic Control Device* .
6. Stop line markings must not block the curb ramp or pedestrian street crossing, regardless of the use of crosswalk markings. The *Indiana Manual on Uniform Traffic Control Devices* (IMUTCD) contains additional constraints on stop line markings.
7. The normal gutter flow line should be maintained through the curb ramp. Drainage structures should be placed as needed to intercept the flow prior to the curb ramp. Positive drainage should be provided to carry water away from the intersection of the curb ramp and the gutter line, thus minimizing the depth of flow across the pedestrian street crossing.

## **51-1.04(02) Curb Ramp Components, Design Elements, and Design Criteria [Added Mar. 2016]**

Curb ramp details are shown on the INDOT *Standard Drawings* series 604-SWCR. The details include the curb ramp components, design elements of each component, and the criteria for each design element. This information is summarized in [Figure 51-1C](#), Curb Ramp Components and Design Elements.

Components and design elements are discussed below. The PROWAG section reference is shown in brackets adjacent to the description. Note that although the components are similar, curb ramp requirements are separate from the requirements for ramps that provide access in other locations outside the public right of way, such as in a building or at a pedestrian overpass.

An approved Determination of Technical Infeasibility or Inquiry must accompany each curb ramp that does not meet the PROWAG requirements. Examples of non-compliance include missing components, e.g. detectable warning surface or turning space, or a design element falling outside of the minimum or maximum criteria. See Section 40-8.04(01) Item 3 for requesting a Determination of Technical Infeasibility or Technical Inquiry.

### **Components**

1. **Ramp and Blended Transition**. A ramp or blended transition is the component of a curb ramp that lowers the sidewalk or other pedestrian path to the roadway elevation.
2. **Turning Space [R304.2.1 and R304.3.1]**. A turning space is a level area, running slope of 2.0% or less, critical for a wheelchair user to maneuver. A turning space must be provided at the top of a perpendicular curb ramp, the bottom of a parallel curb ramp, and where the PAR changes direction. It is acceptable for two perpendicular curb ramps to share a common turning space. A turning space is not required for a one-way directional curb ramp or a blended transition curb ramp.

The minimum required clear dimensions of a turning space are 4 ft by 4 ft. Where the turning space is constrained by a curb, building, or other feature over 2 in at the back of the sidewalk, the minimum required clear dimensions are 4 ft by 5 ft, with the 5-ft dimension in the direction of the ramp running slope.

3. **Clear Space [R304.5.5]**. The clear space is provided beyond the grade break or detectable warning surface at the bottom of a ramp or blended transition to allow a wheelchair user to maneuver and align with the crosswalk markings. The minimum required clear dimensions

are 4 ft by 4 ft. The clear space should be level and must be within the width of the pedestrian street crossing and wholly outside the parallel vehicle travel lane. The parallel vehicle travel lane is the lane where traffic is traveling parallel to the pedestrian street crossing. A grade break may fall within the clear space where the bottom of the ramp or blended transition meets the roadway pavement or gutter line; see item 9.

The clear space requires particular attention at diagonal ramps and other locations where the ramp is not in line with the direction of pedestrian travel.

4. Flared Side and Returned Curb [R304.2.3]. The flared side cannot be part of the PAR, but is part of the pedestrian circulation route. See Section 51-1.02. A flared side is required where the curb ramp intersects a sidewalk or other walkable surface. The maximum allowable slope of a flared side is 10%.

The returned curb may be used where the curb ramp intersects a buffer, sodded area, or other non-walkable surface or where protected from pedestrian travel by landscaping, street furniture, fencing, utility pole or railing.

5. Detectable Warning Surfaces [R305]. A detectable warning surface (DWS) warns a visually-impaired pedestrians that they are entering the roadway. However, they are not intended to provide wayfinding.

The DWS consists of truncated domes aligned in a square or radial grid pattern and must extend the full width of the ramp, blended transition or median cut-through. Although PROWAG allows for a 2-in. border where forming is required, plans should show the DWS the entire width of the ramp. The need for forming is associated with the material selected for the DWS, and several materials are available on the Department's Approved List for Detectable Warning Surfaces.

The DWS must contrast visually with the adjacent surfaces.

Each curb ramp and median cut through must contain a DWS except as follows.

- a. Where a median cut through is less than 6 ft in the direction of pedestrian travel, DWS should not be placed. Where the median width is less than 6 ft, there is not sufficient distance between surfaces to distinguish the boundary between pedestrian and vehicular routes.

- b. Where a PAR intersects a residential driveway or a commercial driveway that does not contain stop or yield control, a DWS should not be placed. Where the PAR intersects a commercial driveway which contains stop or yield control, DWS should be provided.

The INDOT *Standard Drawings* series 604-SWCR contains DWS design elements and acceptable configurations based on the setback of the surface from the back of curb.

### **Design Elements**

1. **Width [R304.5.1]**. The minimum clear width of a ramp or blended transition is 4 ft. For a median cut through or median curb ramp, the minimum width is 5 ft. Where a curb ramp is used in conjunction with a shared-use path, it is preferred that the curb ramp width match the width of the shared-use path. See [Figure 51-C](#), Curb Ramp Components and Design Elements.
2. **Running Slope [R304.2.2 and R304.3.2 and R304.4.1]**. The running slope of a ramp or blended transition is measured parallel to the direction of pedestrian travel. Providing the least slope possible is preferred. This will reduce the likelihood of exceeding the maximum allowable running slope during construction.
  - a. Ramp. A ramp has a maximum running slope of 8.33%. A maximum running slope of 8% is preferred and should be used as a design practice to reduce the likelihood of exceeding the maximum allowable running slope during construction.
  - b. Blended Transition. A blended transition has a maximum running slope of 5%. A maximum running slope of 4.5% is preferred and should be used as a design practice to reduce the likelihood of exceeding the maximum allowable running slope during construction.

A running slope of 2% or less is considered level.

The running slope need not cause the ramp to exceed 15 ft in length. Where the ramp is “chasing the grade,” it may be terminated at the 15-ft length and a steeper grade used to tie back to the existing sidewalk. The running slope of the sidewalk outside of the 15-ft ramp should not exceed the roadway profile grade plus 2% or should be ended at a logical termini location.

3. Cross Slope [R304.5.3]. Cross slope is measured perpendicular to the direction of pedestrian travel. The maximum allowable cross slope of a ramp, blended transition, turning space, or clear space is 2.0%. A maximum cross slope of 1.5% is preferred and should be used as a design practice to reduce the likelihood of exceeding the maximum allowable cross slope during construction.

The cross slope may exceed 2.0% where it is acceptable for the pedestrian street crossing cross slope to exceed 2.0%. See Section 51-1.05 for pedestrian street crossing. See [Figure 51-E](#), Cross Slope at Pedestrian Street Crossing.

4. Counter Slope [R304.5.4]. The counter slope is a slope opposite to the general running slope of the ramp or sidewalk, typically the cross slope of the gutter or roadway at the foot of the ramp or blended transition. The counter slope must not exceed 5%. This maximum allows the rate of grade change not to exceed 13% when the maximum ramp running slope is used. Excessive rate of grade change compromises the ground clearance of a wheelchair footrest and may cause the wheelchair to tip.

Where the rate-of-grade change exceeds 11%, a 2-ft level area should be provided adjacent the counter slope. See [Figure 51-1F](#), Counter Slope and Rate of Grade Change.

5. Grade Break [R304.5.2]. The grade break at the top and bottom of a ramp must be perpendicular to the direction of the ramp running slope. This requirement is of particular importance where the curb is curved. It may be necessary at a corner with a larger radius to indent the grade break from the back of the curb to meet this requirement. Grade breaks are not permitted on the surface of the ramp.

Where a curb is curved, the perpendicular curb ramp running slope meets the grade break at a right angle. On large radius corners, it will be necessary to indent the grade break on one side of the curb ramp in order for the curb ramp to meet the break at a right angle.

#### **51-1.04(03) Types of Sidewalk Curb Ramps [Rev. Mar. 2016]**

Details for placement of curb ramps and an illustration showing applicable locations for each curb ramp type are found on the INDOT *Standard Drawings* series 604-SWCR. Curb ramp design elements and criteria are discussed in Section 51-1.04(02).

Curb ramps are categorized by their orientation to the sidewalk or street.

1. Perpendicular Curb Ramp. Perpendicular curb ramps are the preferred design. A perpendicular curb ramp has a running slope that cuts through or is built up to the curb at right angles and serves a single direction of pedestrian traffic. See [Figure 51-1G](#), Perpendicular Curb Ramp.
  - a. Components. Perpendicular curb ramps include a single ramp and may have flared sides or returned curbs. A turning space is required at the top of the ramp. A clear space is required at the bottom of the ramp. Detectable warning surfaces are required. Crosswalk markings are preferred.
  - b. Selection Considerations. A distance of 10 - 12 feet from the back of curb to the back of sidewalk is necessary to accommodate a perpendicular curb ramp assuming it is adjacent to a 6 in. curb.

Taller curb height, a constraint at the back of sidewalk, and a running slope less than 8.33% will all increase the total lengths required between the curb and back of sidewalk.

Where an existing sidewalk cannot be widened to accommodate a perpendicular or tiered perpendicular curb ramp, a parallel curb ramp should be considered. A tiered perpendicular curb ramp consists of lowering the sidewalk prior to the curb ramp using sidewalk transitions. See [Figure 51-1G](#), Perpendicular and Tiered Perpendicular Curb Ramps..

2. Parallel Curb Ramp. Parallel curb ramps are a preferred design. A parallel curb ramp has a running slope that is in line with the direction of sidewalk travel. The ramps lower the sidewalk to a turning space where a turn is made to enter the pedestrian street crossing. See [Figure 51-1H](#), Parallel Curb Ramps.
  - a. Components. Parallel curb ramps include two ramps and typically do not have flared sides or returned curbs. A turning space is required at the bottom of the ramps. A curb may be required at the back edge of the ramp to retain soil or delineate a building or other constraint adjacent to the ramp. A clear space is required at the bottom of the turning space if placed at an intersection. A midblock crossing does not require a clear space. Detectable warning surfaces are required. Crosswalk markings are preferred.
  - b. Selection Considerations. A parallel ramp is typically used at a midblock crossing, and requires that the sidewalk be at least 4 ft wide. For narrow sidewalks at an intersection, paired parallel curb ramps can be placed. A paired

parallel curb ramp should not be installed where it is possible to install paired perpendicular curb ramps.

3. Median Pedestrian Crossing A median pedestrian crossing consists of a raised median at the intersection or midblock location to separate pedestrians from traffic. See [Figure 51-1I](#), Median Pedestrian Crossings.
  - a. Components. A median pedestrian crossing can be cut through at street level or consist of a series of perpendicular curb ramps. The cut-through configuration can provide useful cues to the direction of travel. Detectable warning surfaces are required within a median that has a width greater than or equal to 6 ft. Crosswalk markings are preferred.
4. Blended Transition Curb Ramp. A blended transition curb ramp is a connection between the level of the pedestrian walkway or sidewalk and the level of the pedestrian street crossing that has a running slope of 5% or less. A blended transition curb ramp serves more than one direction of pedestrian traffic. See [Figure 51-1J](#), Blended Transition Curb Ramp.
  - a. Components. A blended transition curb ramp includes a single blended transition and may have flared sides. A turning space is not required behind the blended transition, however, where the blended transition running slope exceeds 2.00%, a 4-ft minimum sidewalk should continue behind the blended transition. Detectable warning surfaces are required where the blended transition is flush with the pedestrian street crossing. Crosswalk markings are required.
  - b. Selection Considerations. A blended transition curb ramp is suitable for a range of sidewalk conditions, however they provide limited directionality for visually impaired users. Safety considerations need to be evaluated for possible increased interaction with turning vehicles.
5. One-Way Directional Curb Ramp. A one-way directional ramp is a single perpendicular curb ramp that serves a single direction of pedestrian traffic. There is no change in direction at the top or bottom of these ramps. See [Figure 51-1K](#), One-Way Directional Perpendicular Curb Ramp.
  - a. Components. The components of a perpendicular curb ramp apply except that a turning space is not required at the top of the ramp. Crosswalk markings are preferred.



- b. Selection Considerations. A one-way directional ramp may be specified only at a corner where the PAR continues across a single intersecting roadway with no change in direction.
6. Depressed Corner Curb Ramp. A depressed corner curb ramp is a single parallel curb ramp that serves two directions of pedestrian traffic. See [Figure 51-1L](#), Depressed Corner Curb Ramp.
  - a. Components. The components of a parallel curb ramp apply. Crosswalk markings are preferred.
  - b. Selection Considerations. A depressed corner curb ramp is suitable for a range of sidewalk conditions, however, they provide limited directionality for visually impaired users. Safety considerations need to be evaluated for possible increased interaction with turning vehicles.
7. Diagonal Curb Ramp. A diagonal curb ramp is a single perpendicular curb ramp located at the apex of the corner at an intersection, and serves two directions of pedestrian traffic. See [Figure 51-1M](#), Diagonal Curb Ramps.
  - a. Components. The components of a perpendicular ramp apply. Crosswalk markings are required.
  - b. Selection Considerations. A diagonal curb ramp should not be specified for new construction. Although diagonal curb ramps may save construction costs, they create potential safety hazards and mobility problems for pedestrians including reduced maneuverability and increased interaction with turning vehicles. For alterations where existing physical constraints prevent paired curb ramps from being installed at an intersection, a diagonal ramp may be specified. Each diagonal curb ramp, excluding flared sides and the clear space at the bottom of the ramp, must be wholly contained within the crosswalk markings and outside the parallel vehicle travel lane. Where both the turning space and clear space cannot be provided, a diagonal ramp is not appropriate for the site.

#### **51-1.04(04) Curb Ramp Plan Requirements [Added Mar. 2016]**

Each curb ramp to be retrofit into an existing facility (e.g. a sidewalk that does not have a curb ramp) or reconstructed (e.g. an existing non-compliant curb ramp) should be detailed as follows:

1. Plan Views. Lines representing the curb ramp and DWS should be shown in plan view over existing survey or an aerial image. Use of an aerial image should consider the effect on file size.
2. Spot Elevations. Elevations at each side of the top and bottom of the ramp, turning space, and flared side should be tabulated or detailed.
3. Dimensions. Lengths and widths for each ramp, turning space, DWS, flared side, and return curb should be tabulated or detailed.
4. Slopes. Running slopes and cross slopes for each ramp, turning space, and flared side should be tabulated or detailed. The preferred slopes should be used in design and shown on the plans.

For new construction, a curb ramp should be detailed using a detail drawing, table, or a combination of the two. The detail drawing or table should include the curb ramp location, and required curb ramp components and design element criteria, e.g. width, length, cross slope, running slope and flared side slope.

New construction assumes a new alignment or significant modification to an existing cross section and adequate right of way. Areas that fall outside the typical cross section, e.g. where the beginning and end of the project tie into an existing cross section, should be detailed as described for retrofits and reconstruction.

An approved Determination of Technical Infeasibility or Technical Inquiry must accompany each curb ramp that does not meet the ADA requirements. Examples of non-compliance include missing components, e.g. DWS or turning space, or a design element falling outside of the minimum or maximum criteria. See Section 40-8.04(01) Item 3 for requesting a Determination of Technical Infeasibility or Technical Inquiry.

#### **51-1.05 Pedestrian Street Crossing [R302.5 and R302.6] [Added Mar. 2016]**

The pedestrian street crossing is the continuation of the PAR across a roadway.

The cross slope of the pedestrian street crossing is the same as the profile grade of the roadway through the crossing. The maximum allowable cross slope of a pedestrian street crossing is as follows.

1. Where the pedestrian street crossing contains yield or stop control, e.g. a yield sign or stop sign, the maximum cross slope is 2%.

2. Where the pedestrian street crossing does not contain yield or stop control, e.g. signalized, the maximum cross slope is 5%.
3. Where the pedestrian street crossing is located at a midblock crossing, the maximum cross slope is the roadway profile grade. See [Figure 51-E](#), Cross Slope at Pedestrian Street Crossing.

The grade of the pedestrian street crossing is the same as the cross slope of the roadway through the crossing. The maximum allowable grade of a pedestrian street crossing is 5%.

#### **51-1.06 Accessible Pedestrian Signals [R209 and R307] [Added Mar. 2016]**

Accessible pedestrian signals (APS) are devices that communicate information about the WALK and DON'T WALK intervals at signalized intersections in a non-visual format. They are essential for a pedestrian who is blind or has low vision to effectively navigate the crossing.

During all new signal installations, modernization intersection improvements and projects that incorporate pedestrian heads, the Department will determine whether pedestrian heads are appropriate for the location. If pedestrian heads are appropriate, an APS Study consistent with methodology outlined in the *Indiana Manual of Traffic Control Devices* (IMUTCD) will be conducted by the designer or district traffic engineer to assess whether there are any compelling reasons, such as technical infeasibility or risk to pedestrian safety, that would prohibit the installation of APS signals. See Section 502-3.04(05).

An APS *Guide to Best Practice* is available from the National Cooperative Highway Research Program, Project 3-62 at [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_w117a.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w117a.pdf).

#### **51-1.06(01) Pedestrian Pushbuttons [R209 and R307 and R403] [Added. Mar. 2016]**

Where a pedestrian pushbutton is installed, the following will apply.

1. Location. The location of an APS is critical to proper function. Engineering judgment is required to determine the best way to install APS at a given intersection and crossing. Differences in curb radius, width of right of way, presence of a buffer, curb ramp design and location, and existing infrastructure on corners make each installation different.

The APS should be located between 1.5 ft and 6 ft from the edge of the curb, shoulder or pavement. Where constraints make it impractical to place the pushbutton within this location, it must not be farther than 10 ft from the edge of curb, shoulder or pavement. See IMUTCD 4E.08. The pushbutton must not be blocked by obstructions, e.g. behind

guardrail or curb. The pushbutton location must not obstruct the PAR such that a minimum 4-ft width cannot be maintained.

Where two APS are provided on the same corner of a signalized intersection, the APS should be separated by 10 ft. Where constraints prevent a 10-ft separation, the APS may be placed closer together or on the same pole. If APS are not separated by 10 ft, special features must be included on the APS; see IMUTCD 4E.10.

Where a median cut through is less than 6 ft in the direction of pedestrian travel and the pedestrian street crossing is signalized, the signal should be timed for a complete crossing of the street.

The IMUTCD 4E.08 provides details for the location of pedestrian pushbuttons.

2. Clear Space. A level clear space adjacent to the pushbutton with minimum clear dimensions of 4 ft by 4 ft must be provided to allow a forward or parallel approach to the control by a wheelchair user. The running slope of the clear space may be consistent with the grade of the adjacent PAR.
3. Mounting Height. The push button must be located between 42 in. and 48 in. above grade and within a 10-in. horizontal reach. See IMUTCD 4E.08.
4. Actuator. The actuator must have a 2-in. minimum diameter and contrast visually with the housing. A vibrotactile arrow should be mounted on the actuator or the housing directly above or below the actuator. Recurring special provision (RSP) 805-T-201 calls for a stainless steel or aluminum housing. It must be operable with one hand without grasping, pinching or twisting of the wrist and require no more than 5 pounds of force to actuate.
5. Orientation. The control face and vibrotactile arrow must be with the direction of travel for the pedestrian street crossing it serves.

### **51-1.07 Transit Stops and Transit Shelters [R213 and R308] [Rev. Mar. 2016]**

Locating transit stops at signalized intersections is recommended to increase usability for pedestrians with disabilities. Where transit stops or transit shelters are provided, the following will apply.

1. Transit Stop. A new transit stop may be constructed at sidewalk or street level. Where transit stops serve vehicles with more than one car, accessible boarding and exiting areas must be provided for each car. Boarding and exiting area criteria are as follows.
  - a. Dimensions. The minimum clear length is 8 ft, measured perpendicularly from the curb or roadway edge. The minimum clear width is 5 ft, measured parallel to the roadway.
  - b. Grade. The grade of boarding and exiting area parallel to the roadway must match the roadway grade to the extent practical. The grade perpendicular to the roadway must not exceed 2%. A maximum grade of 1.5% is preferred and should be used as a design practice to reduce the likelihood of exceeding the maximum allowable cross slope during construction
  - c. Connection. Boarding and exiting areas must be connected to the street, sidewalk, or pedestrian path by a PAR.
2. Transit Shelter. Where a new or replacement transit shelter is provided, it must be connected by a PAR to a boarding and exiting area. The transit shelter may be located within or outside of the boarding area. However, the shelter must not reduce the width of the PAR to less than 4 ft. Clear space requirements must be in accordance with PROWAG section R404.
3. Signage. Each new transit-route identification sign should be sized based on the maximum dimensions permitted by federal, State, or local regulations or ordinances.

#### **51-1.08 On-Street Parking [R214 and R309] [Rev. Mar. 2016]**

Where on-street parking is marked or metered, the on-street parking design should be in accordance with the accessibility criteria as follows.

1. Minimum Number. [Figure 51-1N](#), Minimum Number of Accessible Spaces, provides the criteria for the minimum number of on-street accessibility spaces.
2. Location. On-street accessible parking spaces should be dispersed throughout the project area. Accessible parking spaces should be located where the street has the least crown and grade and close to key destinations. The sidewalk adjacent to a parallel parking space should be free of signs, street furniture and other obstructions to allow for vehicle side-lift or ramp operation.

3. Parallel Parking Adjacent Wide Sidewalk. A minimum parking space width of 8 ft with an access aisle of 5-ft width should be provided where the width of the adjacent sidewalk is 14 ft or greater. The travel lane should not encroach into the access aisle. [Figure 51-1 O](#), Accessible On-Street Parking, illustrates the parking configuration.
4. Parallel Parking Adjacent Narrow Sidewalk. A minimum parking space width of 8 ft should be provided. An access aisle is not required. When an access aisle is not provided, the accessible parking space should be located at the end of the block face.
5. Perpendicular or Angled Parking. A minimum parking space width of 8 ft with an access aisle of 8.0 ft should be provided at street level the full length of the parking space. Two parking spaces are allowed to share a common access aisle.
6. Signage. Each accessible parking space must be identified by the international symbol of access. The sign requirements are contained in the *Manual of Uniform Traffic Control Devices* (MUTCD). For parallel parking spaces, the signs must be placed at either the head or the foot of the parking space. Signs must not obstruct the PAR.
7. Curb Ramp. A curb ramp in accordance with Section 51-1.04(02) must connect the access aisle to the PAR. The curb ramp should not be located within the area of the access aisle. A parking space adjacent to an intersection may be served by the sidewalk curb ramp at the intersection, provided that the path of travel from the access aisle to the sidewalk curb ramp is within the pedestrian street crossing area.
8. Parking Meter. At an accessible parking space, the parking meter must be located at the head or foot of the parking space so that there is no interference with the operation of a vehicle side-lift or a passenger-side transfer. The parking meter must not obstruct the PAR.

#### **51-1.09 Ramp [407 and 409] [Rev. Mar. 2016]**

A part of an accessible route with a running slope steeper than 5% should be considered a ramp and must be in accordance with the PROWAG. This includes providing handrails. These requirements do not apply to sidewalks or curb ramps within the public rights of way. The following criteria apply to a ramp on an accessible route.

1. Running Slope. The running slope must be between 5% and 8.33%; however, the flattest possible slope should be used.

2. Cross Slope and Surface. The cross slope of a ramp surface must not exceed 2.0%. The ramp surface must be in accordance with the sidewalk-surface criteria described in Section 51-1.03(02).
3. Width. A width of 5 ft is recommended to facilitate maintenance and snow removal for outdoor conditions. The minimum clear width of a ramp is 3 ft. Where handrail is installed, the minimum clear width must be provided and the ramp or landing width extended 1.0 ft beyond the inside face of the handrail. This extension prevents wheelchair casters and crutches tips from slipping off the ramp surface.
4. Rise. The rise for any ramp must not exceed 2.5 ft.
5. Landing. A ramp must have a level landing at the bottom and top of each ramp. A landing must be in accordance with the following.
  - a. The width must be at least as wide as the widest ramp leading to it.
  - b. The clear length must be a minimum of 5 ft.
  - c. Where the ramp changes direction at a landing, the minimum required dimensions are 5 ft by 5 ft.
  - d. Slopes must not exceed 2% in any direction.
6. Handrail [409]. If a ramp has a rise greater than 6 in. or a horizontal projection greater than 6 ft, it must have handrails on both sides. A handrail is not required for a curb ramp or sidewalk within public rights of way. A handrail must be in accordance with the following.
  - a. Handrails should be provided along both sides of a ramp segment. The inside handrail on a switchback or dogleg ramp must be continuous.
  - b. If a handrail is not continuous, it must extend at least 1 ft beyond the top and bottom of the ramp and be parallel with the floor or ground surface.
  - c. The clear space between the handrail and the wall must be 1.5 in.
  - d. The gripping surface must be continuous along the top and side. The bottom of the handrail gripping surface must not be obstructed for more than 20% of the length.

The gripping surface and any surface adjacent to it must be smooth and free of sharp or abrasive elements.

- e. The top of the gripping surface must be mounted between 34 in. and 38 in. above the ramp surface.
  - f. The end must be either rounded or returned smoothly to the floor, wall, or post.
  - g. A handrail must not rotate within its fittings.
7. Edge Protection. A ramp or landing with a drop-off must have a curb, wall, railing, or projecting surface that prevents wheelchair casters and crutch tips from slipping off the ramp. A curb must be of minimum height of 2 in. A barrier must prevent passage of a 4-in. diameter sphere where any portion is within 4 in. of the ground surface
8. Outdoor Conditions. An outdoor ramp and its approaches must be designed so that water will not accumulate on the walking surface.

#### **51-1.10 Stairway [R408 ] [Rev. Mar. 2016]**

A stairway must not be part of a PAR, but may be part of the larger pedestrian circulation path. See Section 51-1.02.

Where a stairway is provided within a building or as part of an access route to a building or facility, it must be accessible. Components include treads, tread surface, risers, nosing and handrails.

Where handrails are provided, they must be in accordance with PROWAG Section 409.

#### **51-1.11 Building [Rev. Mar. 2016]**

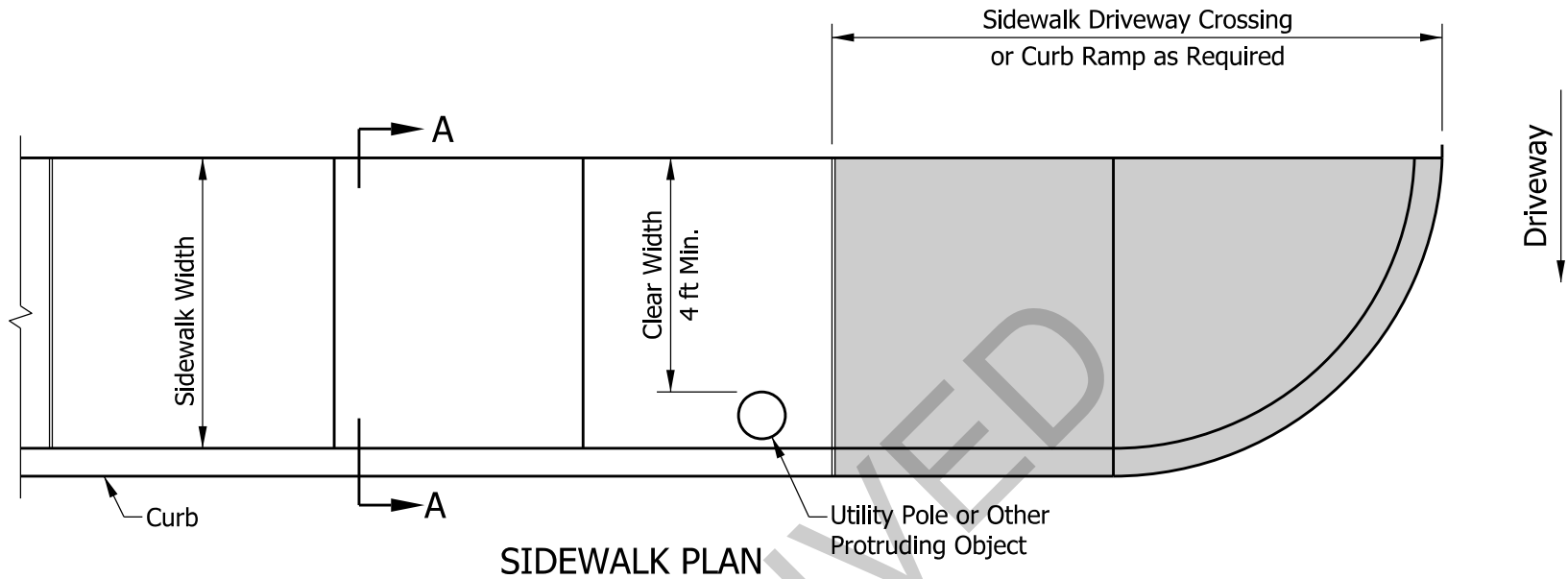
For interior accessibility criteria, the following will apply:

- 1. New. Each new building, airport terminal, rest area, weigh station, or transit station (e.g., station for rapid rail, light rail, commuter rail, intercity bus, intercity rail, high-speed rail, or other fixed guideway systems) must meet the accessibility criteria set forth in the *2010 ADA Standards for Accessible Design* (2010 Standards). The designer should review the 2010 Standards to determine the appropriate accessibility requirements for the building interior, including rest rooms, drinking fountains, elevators, telephones and other facility features.

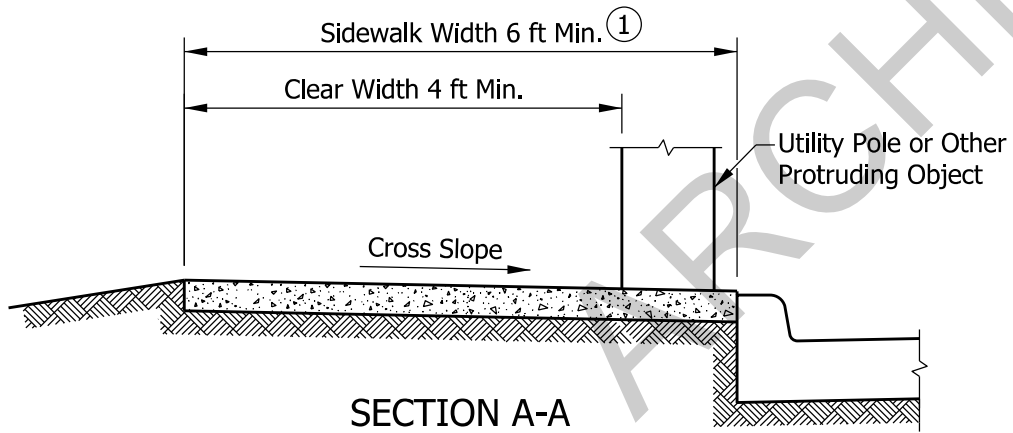


2. Existing. For alterations made to an existing building or facility, the design must meet the accessibility requirements to the maximum extent feasible. The designer should review the *2010 ADAAG* to determine the appropriate criteria.

ARCHIVED



**SIDEWALK PLAN**



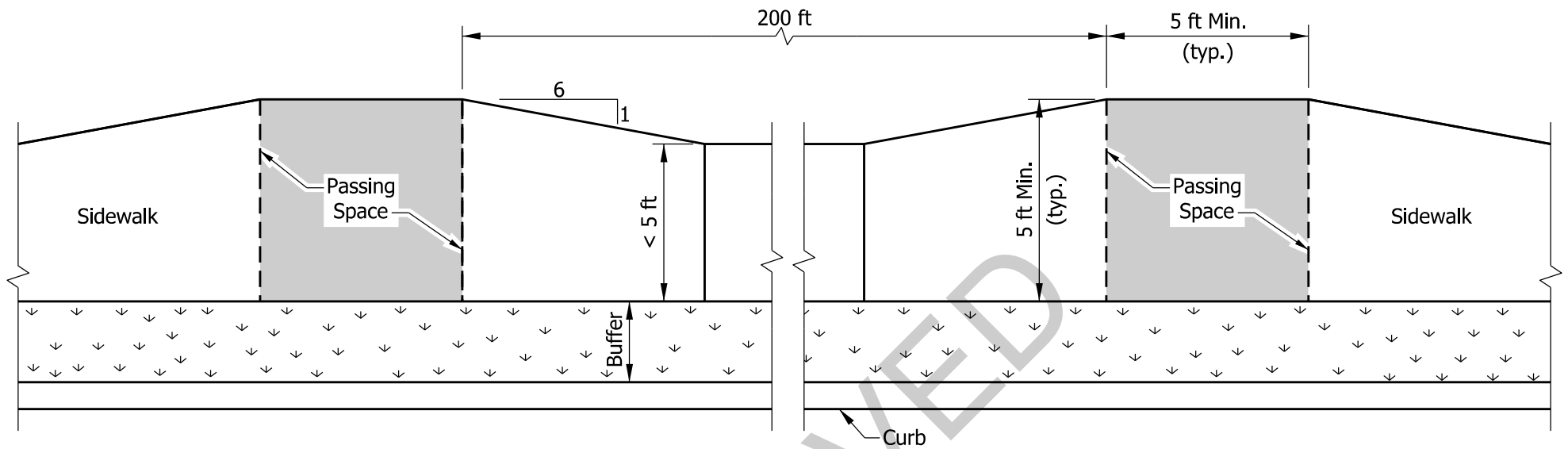
**SECTION A-A**

**NOTES:**

- ① The minimum width of a sidewalk adjacent to a buffer is 5 ft. The minimum width of a sidewalk adjacent the curb is 6 ft. Where the sidewalk width is less than 5 ft a passing space is required every 200 ft. The passing space minimum clear dimensions are 5 ft by 5 ft. See Figure 51-1B, Sidewalk Passing Space.
- 2. The sidewalk grade may meet but not exceed the grade of the adjacent roadway.

**SIDEWALK CLEAR WIDTH**

**Figure 51-1A**



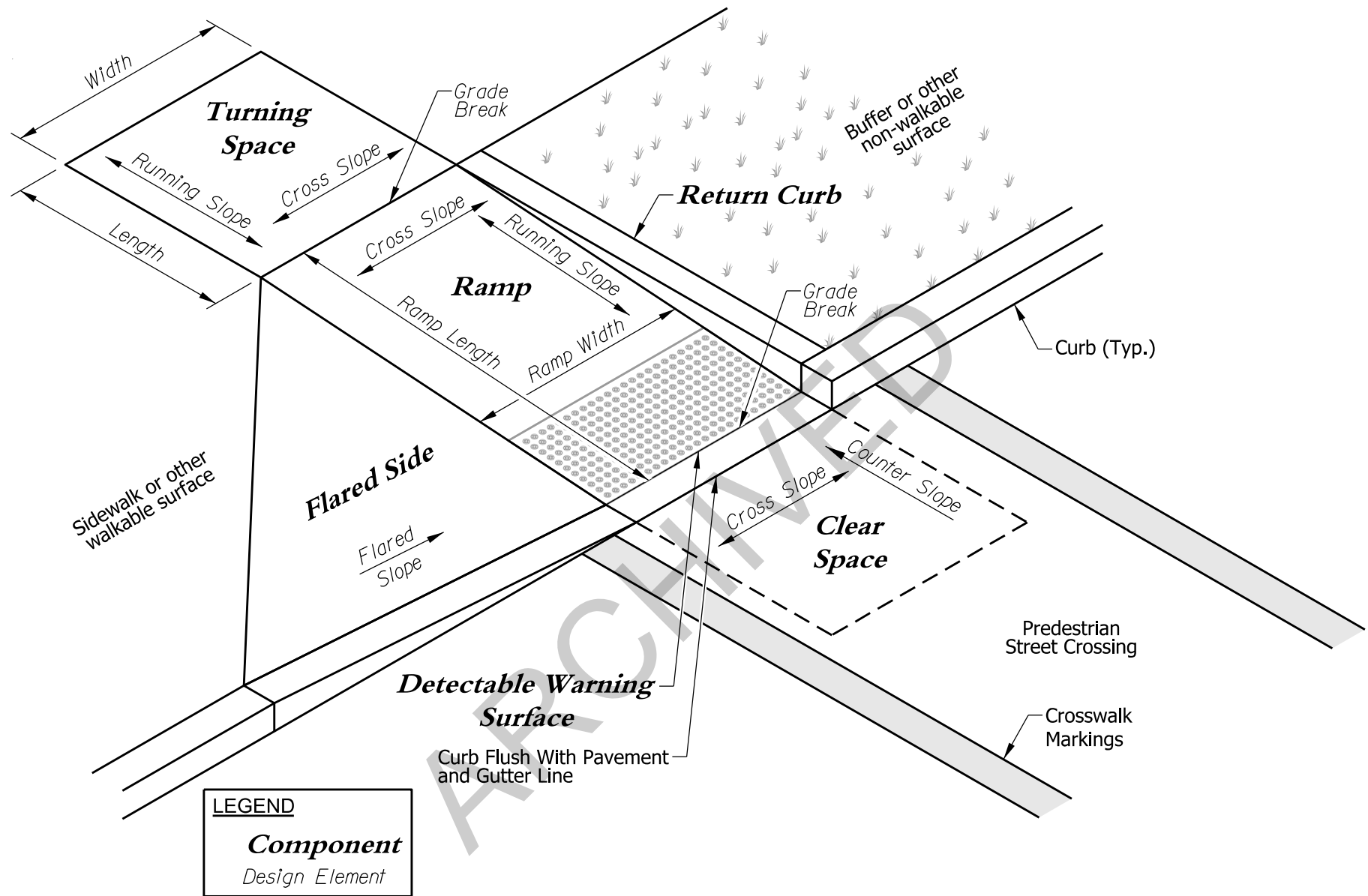
SIDEWALK WIDTH < 5 ft for MORE THAN 200 ft

NOTES:

1. The minimum width of a sidewalk adjacent to a buffer is 5 ft. The minimum width of a sidewalk adjacent the curb is 6 ft. Where the sidewalk width is less than 5 ft a passing space is required every 200 ft. The passing space minimum clear dimensions are 5 ft by 5 ft.
2. The sidewalk grade may meet but not exceed the grade of the adjacent roadway.

**SIDEWALK PASSING SPACE**

Figure 51-1B



## CURB RAMP COMPONENTS, DESIGN ELEMENTS, AND DESIGN CRITERIA

Figure 51-1C  
(page 1 of 3)

Component	Curb Ramp Type				
	Perpendicular Curb Ramp	Parallel Curb Ramp	Blended Transition Curb Ramp	Depressed Corner Curb Ramp	Diagonal Curb Ramp
Ramp	Required	Required	n/a	Required	Required
Blended Transition	n/a	n/a	Required	n/a	n/a
Turning Space	Top of Ramp (1)	Bottom of Ramp	n/a	Bottom of Ramp	Top of Ramp
Clear Space	Required	Required (2)	Required	Required (2)	Required
Detectable Warning Surface	Required	Required	Required	Required	Required
Flared Side	Required (3)	n/a	Required (3)	Required (3)	Required (3)
Return Curb	Required (4)	n/a	Required (4)	Required (4)	Required (4)
Crosswalk Markings	Preferred	Preferred	Required	Preferred	Required

(1) A turning space is not required for a one-way directional curb ramp where there is no change of direction at the top of the ramp.

(2) The clear space is coincident with turning space.

(3) A flared side is required where the curb ramp is adjacent a walkable surface and acceptable where curb ramp is adjacent a non-walkable surface.

(4) A return curb is acceptable where the curb ramp is adjacent a non-walkable surface or walkable surface with street furniture or other features that make the area non-walkable. Not acceptable where curb ramp is adjacent a walkable surface.

## CURB RAMP COMPONENTS, DESIGN ELEMENTS, AND DESIGN CRITERIA

Figure 51-1C

(page 2 of 3)

Component	Design Element	Design Criteria
Ramp	Width	4 ft min
	Running Slope	8.00% preferred ( 8.33% max)
	Cross Slope	1.50% preferred (2.00% max) (1)
	Length	15 ft max
Blended Transition	Width	4 ft min
	Running Slope	1.50% preferred ( 2.00% max) (2)
	Cross Slope	1.50% preferred (2.00% max) (1)
Turning Space	Clear Dimension	4 ft x 4 ft min (3)
	Running Slope	1.50% preferred (2.00% max)
	Cross Slope	1.50% preferred (2.00% max) (1)
Clear Space	Clear Dimension	4 ft x 4 ft (4) (5)
	Counter Slope	5.00% max (6)
Detectable Warning Surface	Width	full ramp, blended transition, or turning space width (7)
	Depth	2 ft in direction of pedestrian travel
	Location	back of curb (8) (9)
Flared Side	Slope	10.00% max
	Location	(10)
Return Curb	Location	(11)

(1) The cross slope may exceed 2.00% where it is acceptable for the pedestrian street crossing cross slope to exceed 2.00% in accordance with Section 51-1.05.

(2) Where a 4 ft sidewalk is provided at the back of the blended transition the maximum allowable running slope is 5.00% (4.50% preferred).

(3) Where the turning space is constrained at the back of sidewalk the minimum clear dimension is 4 ft x 5 ft. The 5-ft dimension is in the direction of the ramp running slope.

(4) The clear space is provided within the pedestrian street crossing and wholly outside the parallel vehicle travel lane for perpendicular curb ramps, blended transition curb ramps and diagonal curb ramps.

(5) The clear space is coincident with the turning space for parallel curb ramps and depressed corner curb ramps.

(6) Where the algebraic difference between the ramp running slope and counter slope is greater than 11.00%, a 2 ft minimum level strip should be provided at the bottom of the ramp. See Figure 51-1E, Change of Grade.

(7) The detectable warning surface is placed the entire width of the ramp, blended transition, or turning space.

(8) The detectable warning surface location and orientation depends on the distance from the bottom ramp grade break to the back of curb.

(9) Where the median width is less than 6 ft, a detectable warning surface should not be placed.

(10) A flared side is required where a curb ramp is adjacent a walkable surface. A flared side is acceptable where a curb ramp is adjacent a non-walkable surface.

(11) A return curb is acceptable where the curb ramp is adjacent a non-walkable surface or walkable surface with street furniture or other features that make the area non-walkable. Not acceptable where curb ramp is adjacent a walkable surface.

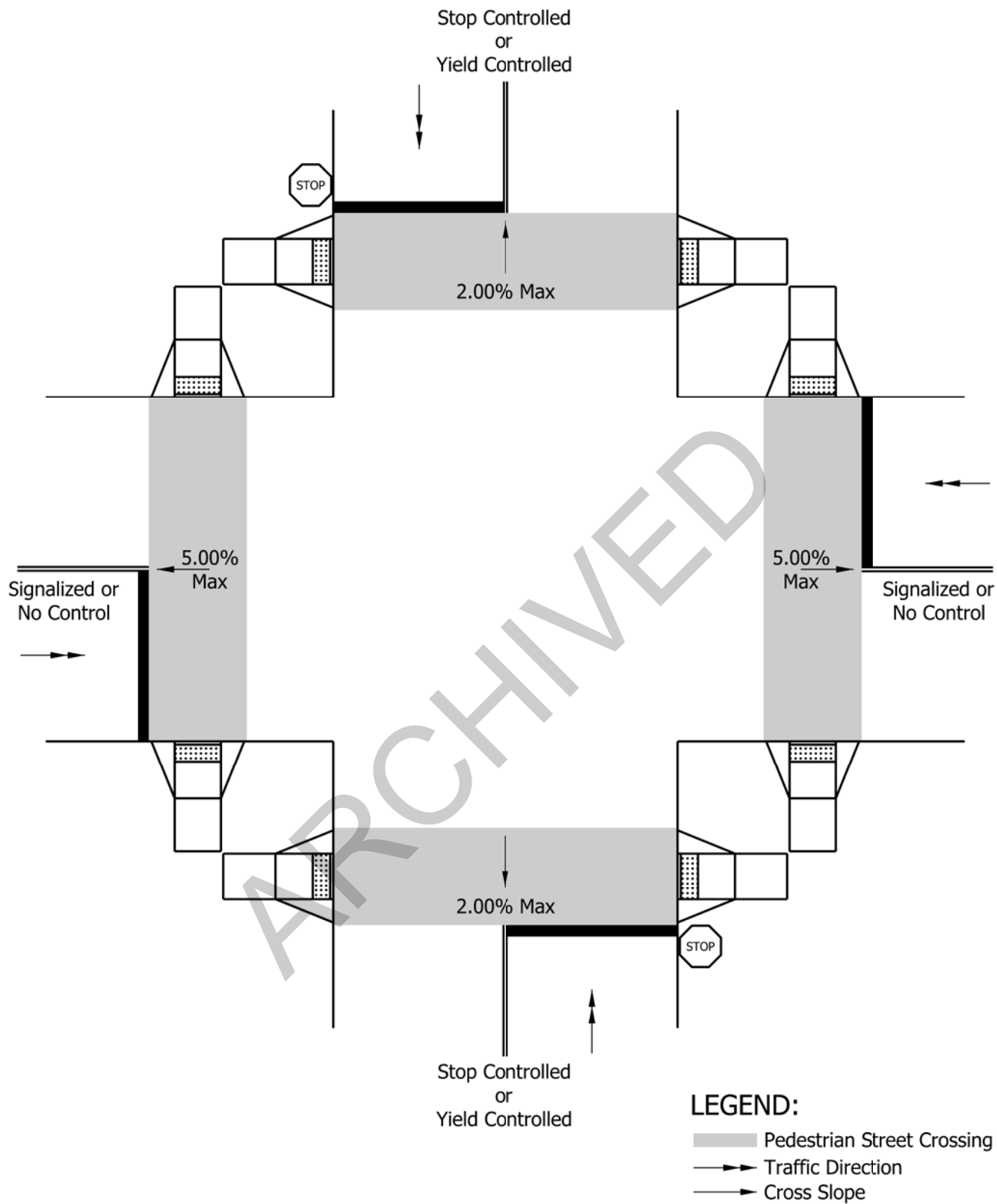
## CURB RAMP COMPONENTS, DESIGN ELEMENTS, AND DESIGN CRITERIA

Figure 51-1C  
(page 3 of 3)

Alteration	Maintenance
Open-Graded Surface Course Mill and Fill, Mill and Overlay Hot-in-Place Recycling Microsurfacing, Thin-Lift Overlay Addition of New Layer of Asphalt Asphalt and Concrete Rehabilitation and Reconstruction New Construction	Crack Sealing and Filling Surface Sealing Chip Seal Slurry Seal Fog Seal Scrub Seal Joint-Crack Seal Joint Repair Dowel Bar Retrofit Spot High – Friction Treatment Diamond Grinding Pavement Patch

## ALTERATIONS VS. MAINTENANCE ACTIVITIES

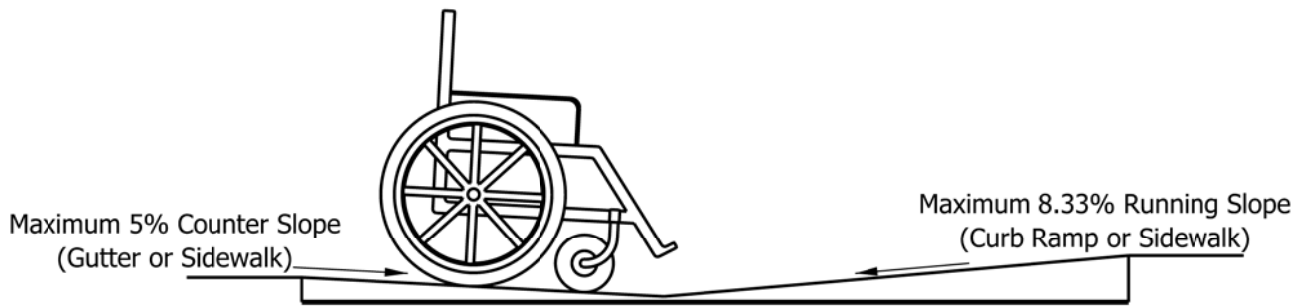
Figure 51-1D



## CROSS SLOPE AT PEDESTRIAN STREET CROSSING

Figure 51-1E



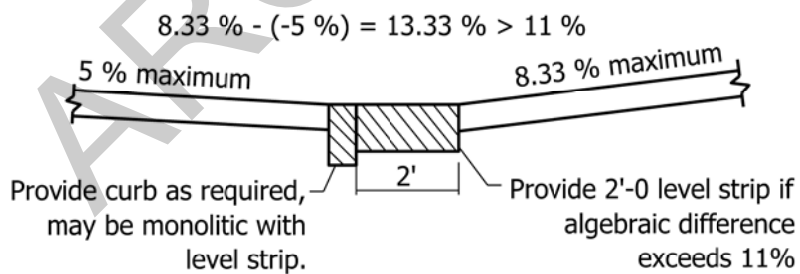


The algebraic difference between a curb ramp slope and the gutter or pavement slope must not exceed 13.33%. A 2-ft wide level strip is recommended when the rate of grade change exceeds 11%. See the INDOT *Standard Drawings*.

$$\Delta G = S - CS$$

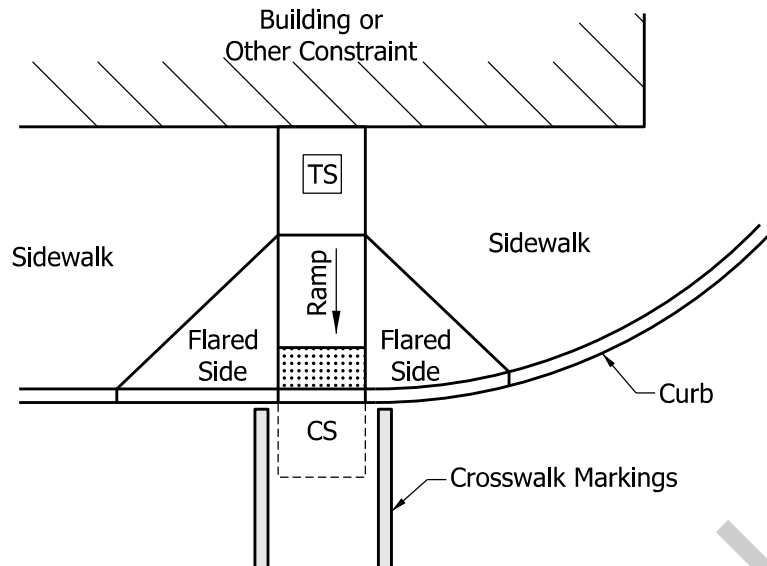
Where:

- $\Delta G$  = Rate of Grade Change
- S = Running Slope of Curb Ramp or Sidewalk, %(Positive)
- CS = Counter Slope of Gutter or Sidewalk, %(Negative)

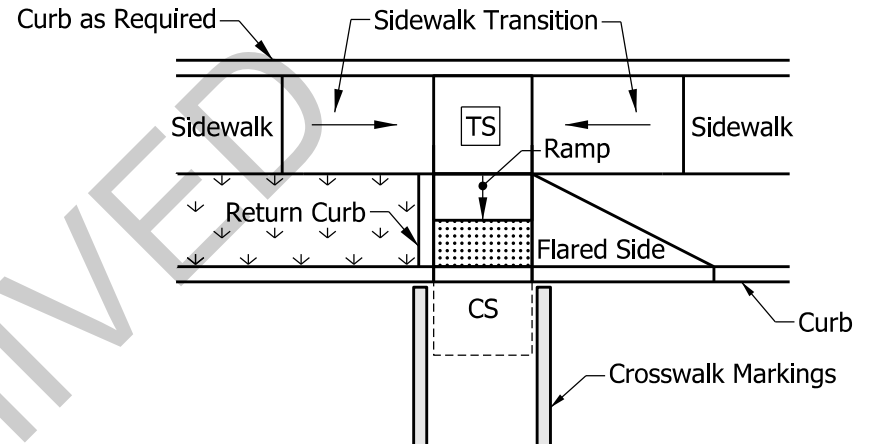


## COUNTER SLOPE AND RATE OF GRADE CHANGE

Figure 51-1F



PERPENDICULAR CURB RAMP  
ADJACENT WALKABLE SURFACE



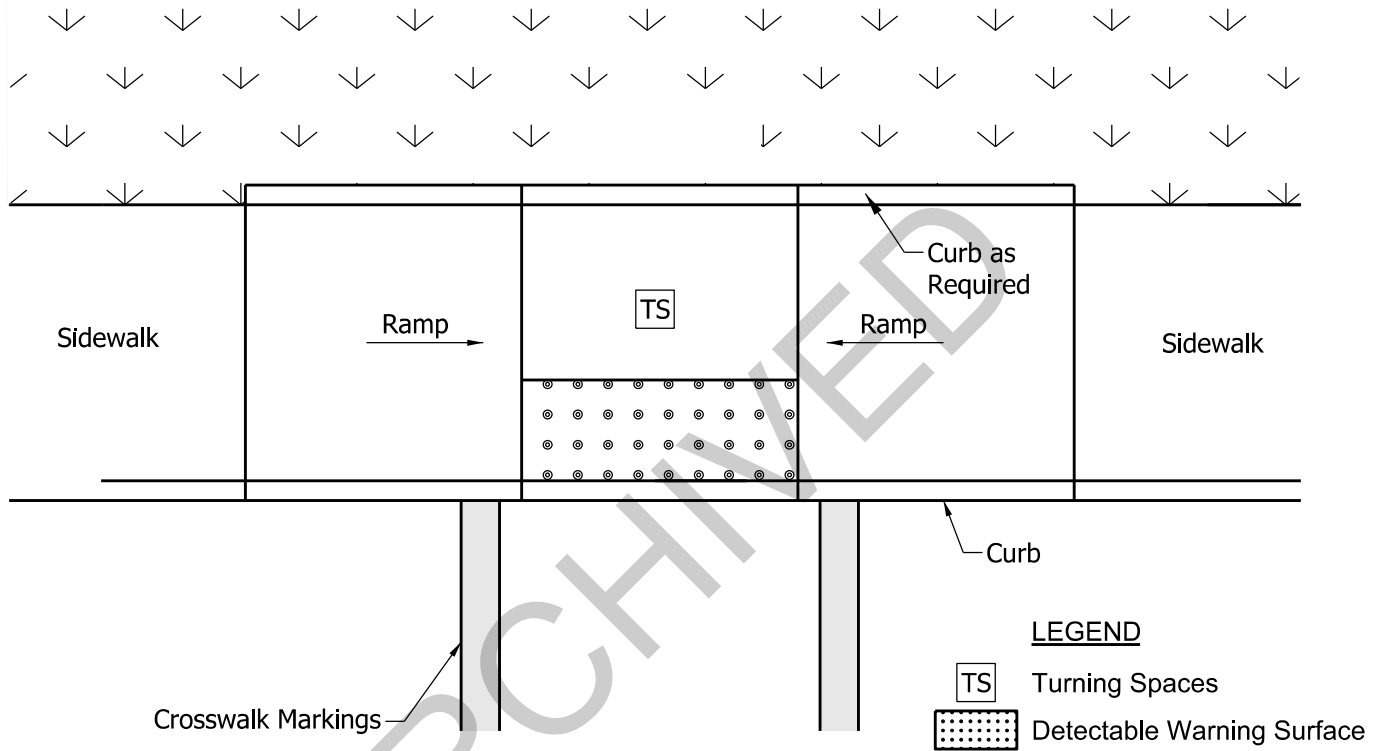
TIERED PERPENDICULAR CURB RAMP

LEGEND

- TS Turning Space
- Detectable Warning Surface
- CS Clear Space

PERPENDICULAR CURB RAMP

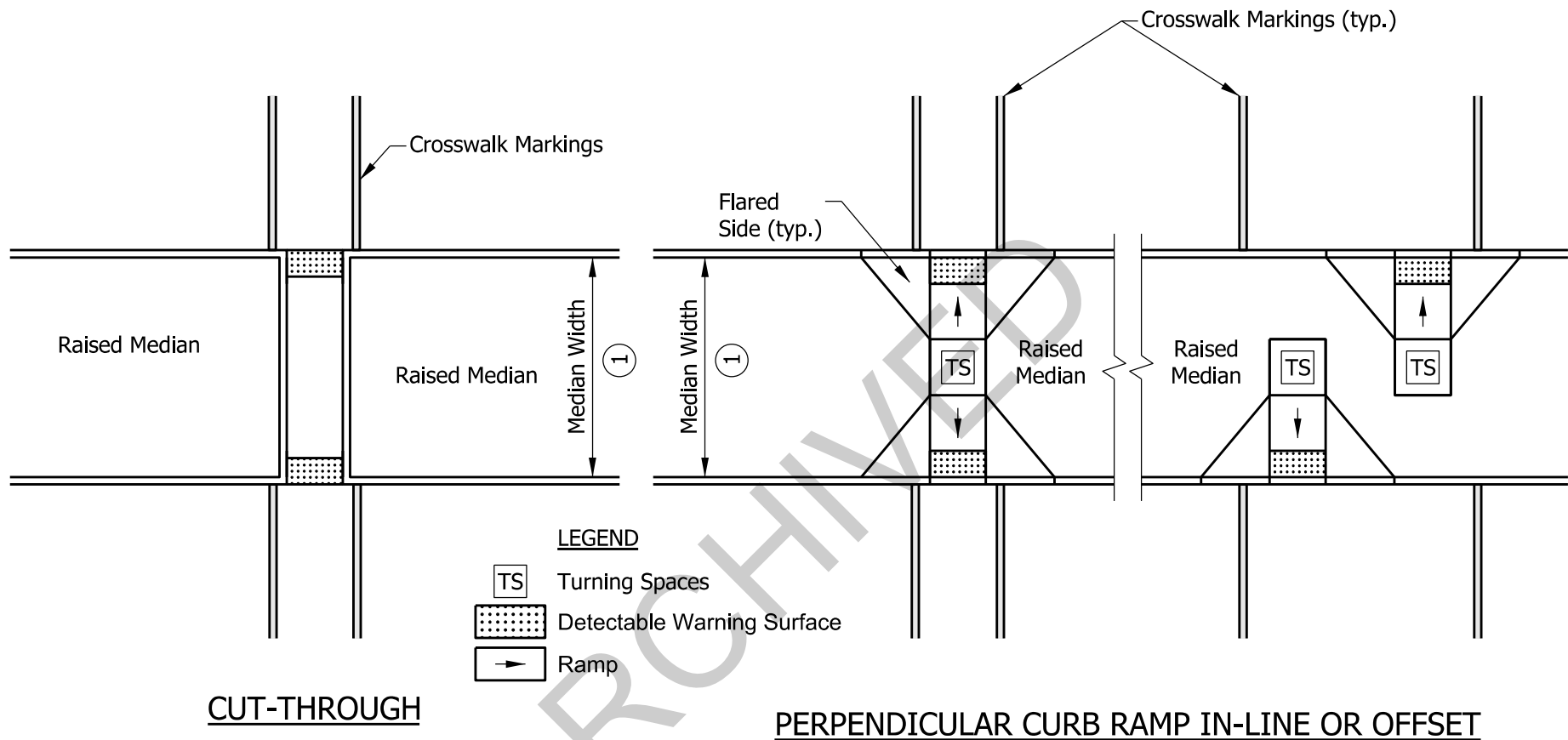
Figure 51-G



MIDBLOCK CROSSING CURB RAMP

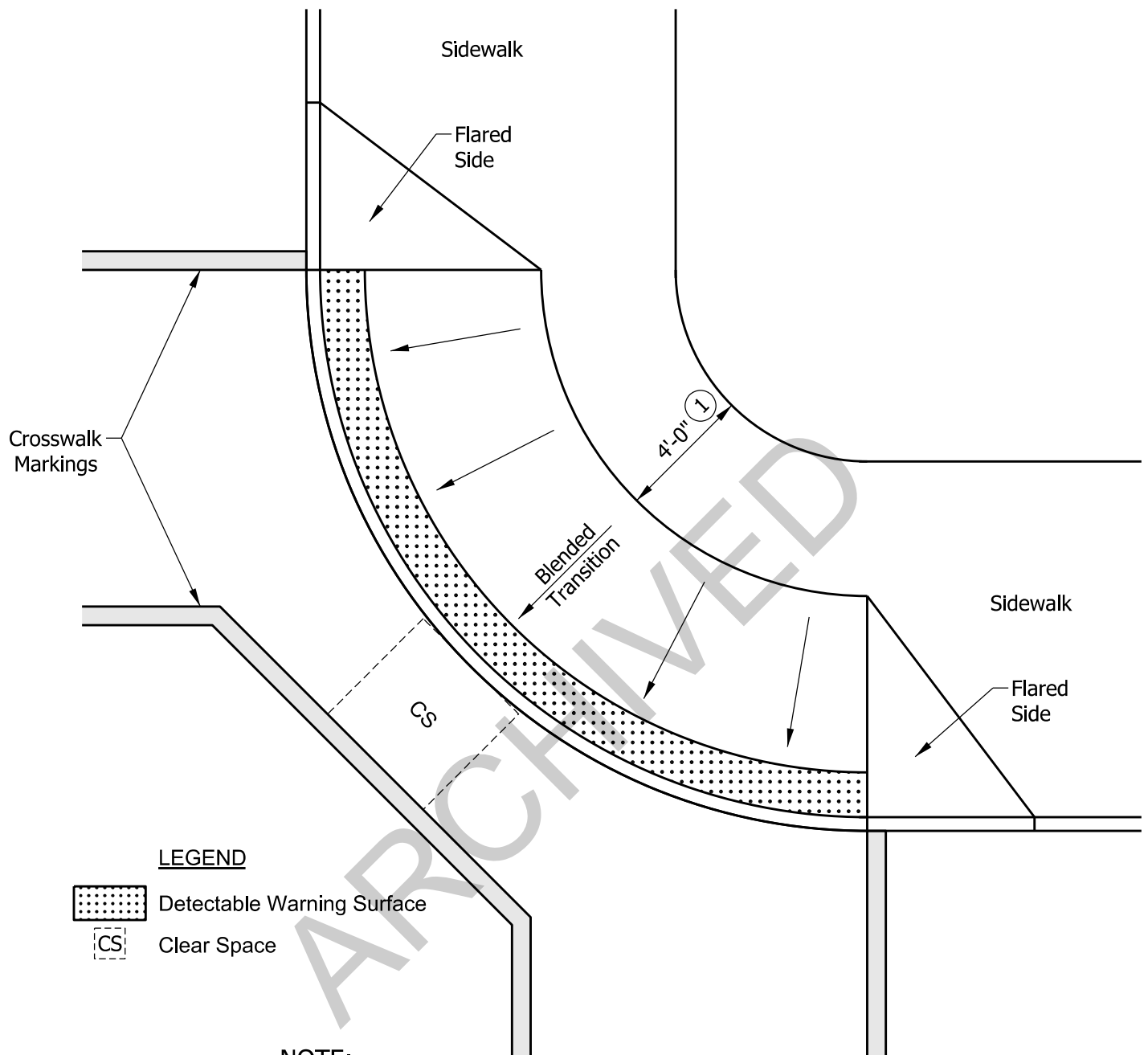
PARALLEL CURB RAMP



Figure 51-1H



## MEDIAN PEDESTRIAN CROSSINGS

Figure 51-1 I



- LEGEND**
-  Detectable Warning Surface
  -  Clear Space

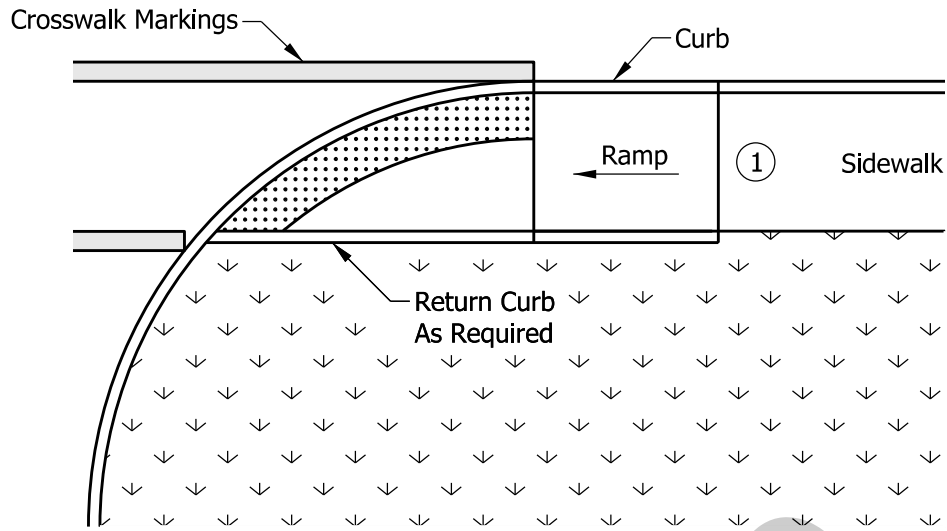
**NOTE:**

- ① A 4 ft sidewalk is required at the back of the blended transition where the running slope exceeds 2%.

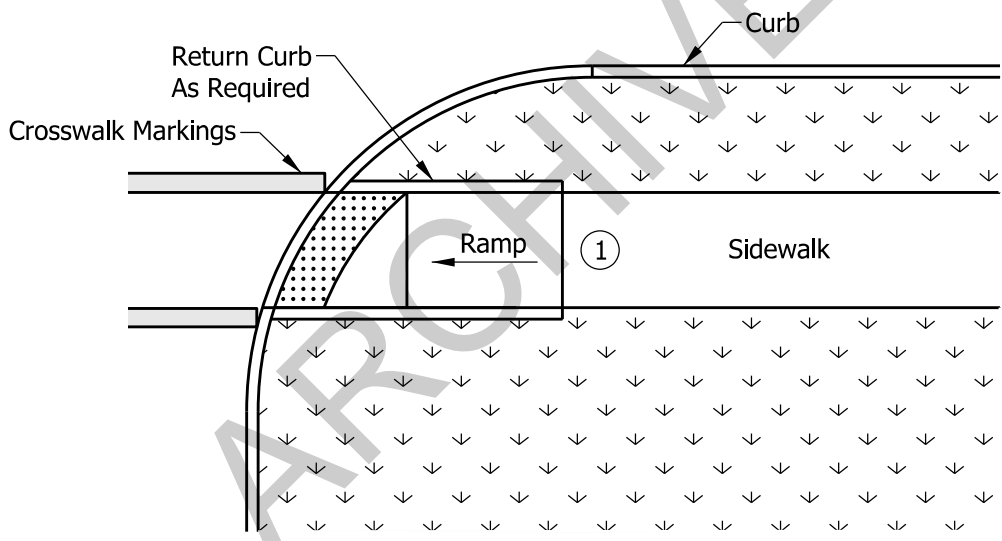
**CURB RAMP WITH 4 ft SIDEWALK BEHIND BLENDED TRANSITION**

**BLENDED TRANSITION CURB RAMP**

Figure 51-1J



**SIDEWALK ADJACENT CURB**



**NOTE:**                      **SIDEWALK WITH BUFFER**

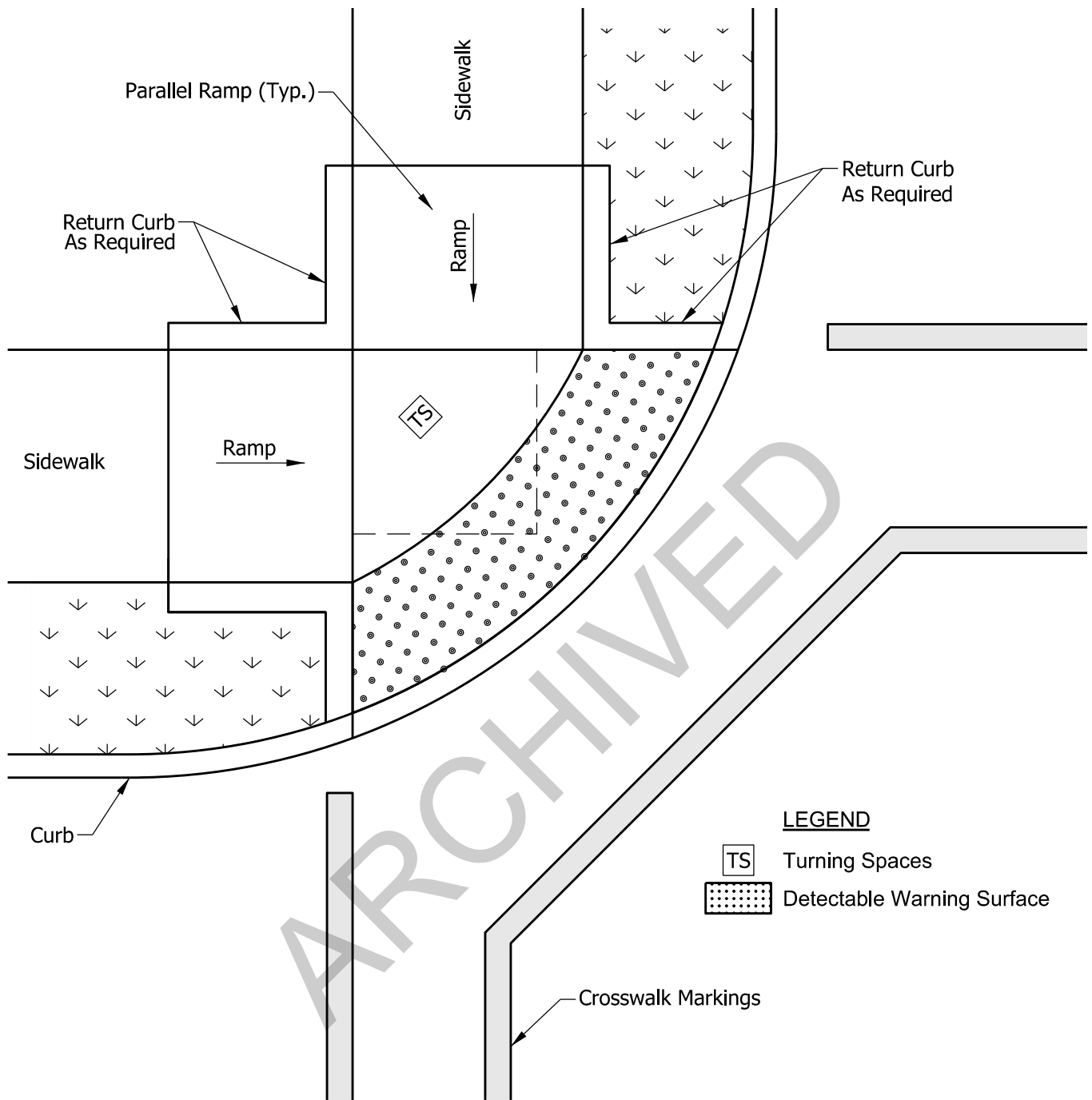
① Turning space is not required at the top of the ramp for a one-way directional perpendicular curb ramp.

**LEGEND**



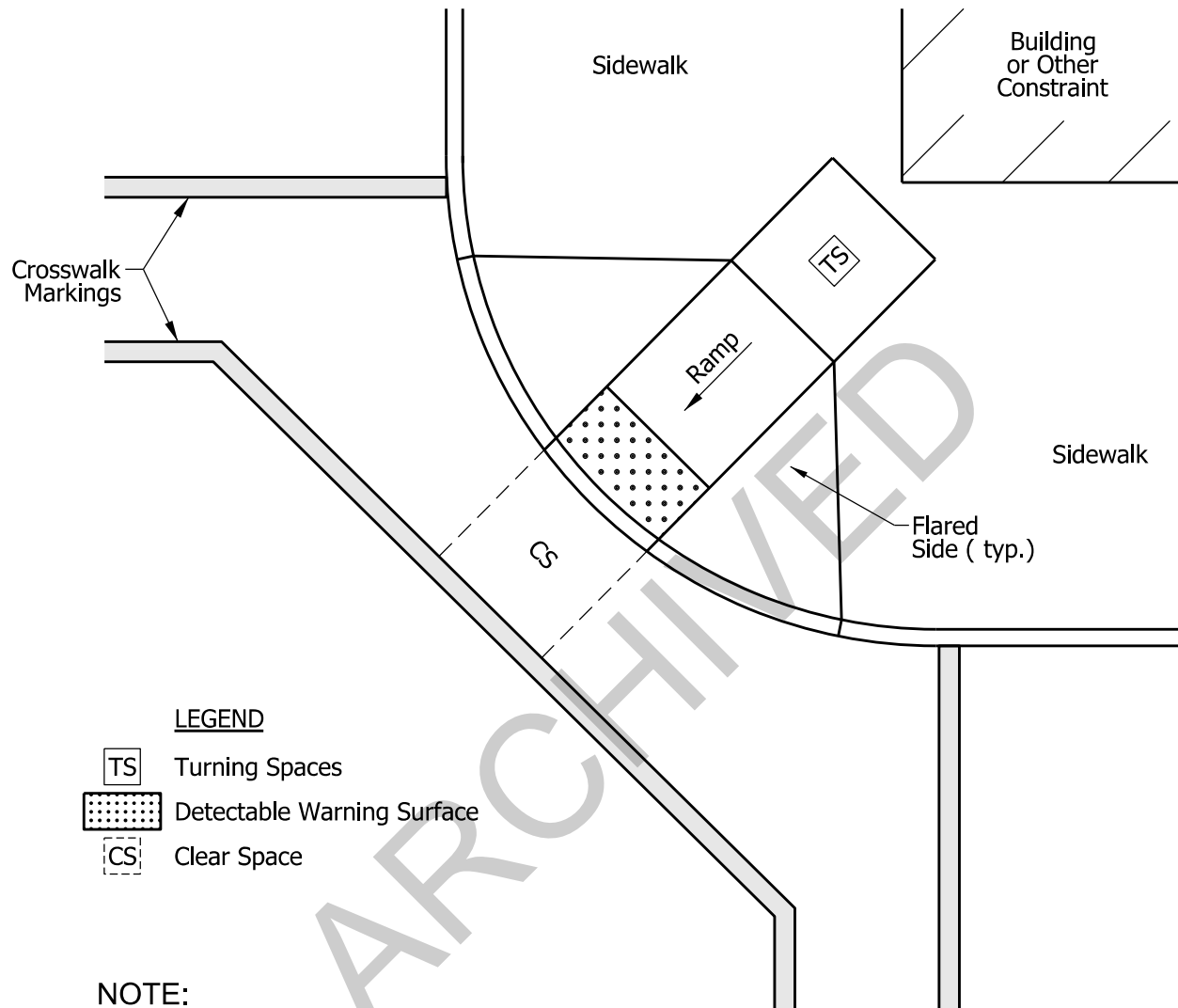
**ONE-WAY DIRECTIONAL PERPENDICULAR CURB RAMPS**

**Figure 51-1K**



DEPRESSED CORNER CURB RAMP

Figure 51-1L



LEGEND

- TS Turning Spaces
- Detectable Warning Surface
- CS Clear Space

NOTE:

1. A diagonal curb ramp should not be specified for new construction.

## DIAGONAL CURB RAMP

Figure 51-1M



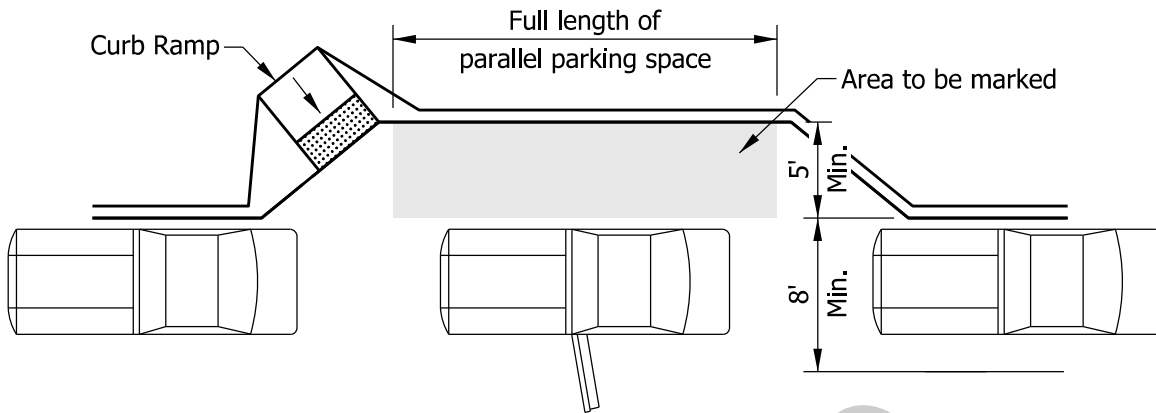
Total No. of Marked or Metered Parking Spaces on Block Perimeter	Minimum Required Number of Accessible Parking Spaces
1 through 25	1
26 through 50	2
51 through 75	3
76 through 100	4
101 through 125	5
151 through 200	6
201 and over	4 % of total

Notes:

1. The IMUTCD contains provisions for marking on-street parking spaces
2. Metered parking includes parking metered by parking pay stations.
3. Where parking on part of the block perimeter is altered, the minimum number of accessible parking spaces required is based on the total number of marked or metered parking spaces on the block perimeter.

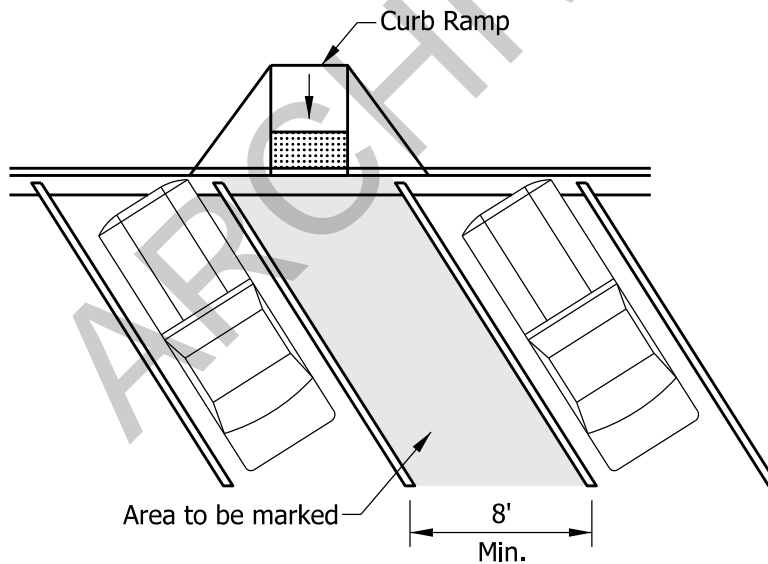
ON-STREET PARKING  
MINIMUM NUMBER OF ACCESSIBLE SPACES

Figure 51-1N



Single accessible parallel parking space with driver-side access demonstrated; passenger side access can be provided by parking in line with standard on-street spaces.

## PARALLEL PARKING ADJACENT WIDE SIDEWALK



## PERPENDICULAR OR ANGLED PARKING

### ACCESSIBLE PARKING

Figure 51-1 O

3. ADA Compliance. When an element of a pedestrian access route (PAR) cannot be constructed in full compliance with the ADA standards, one of the following must be submitted.:

- a. Technical Infeasibility Request: A technical infeasibility request should be submitted when an element of the PAR cannot fully comply due to an existing constraint that cannot be removed or adjusted, e.g. a building. This type of request should be rare for new and reconstruction projects, but may be applicable to a resurface or other alteration project

Technical Infeasibility Request Example: As part of a resurface project, a non-compliant curb ramp is located at an intersection that is constrained by a building designated as historic. The existing curb ramp does not contain a turning space and the running slope of the ramp is greater than 8.33%. The building location is such that only a non-compliant turning space can be constructed and the running slope cannot be reduced without impacting the building. A technical infeasibility requested should be submitted for review.

In this case, compliance is technically infeasible. Compliance is only required to the extent that it does not threaten or destroy the historic feature. The approved technical infeasibility request should be filed with the project coordination files and with the Level One computations. The element will be removed from the owner's transition plan inventory list.

- b. Technical Inquiry: A technical inquiry should be submitted when an existing physical constraint makes it impractical, within the scope of work, for an element of the PAR to fully comply. This type of request is most commonly associated with resurface or other alteration projects where constructing the element to full compliance falls outside the scope of work.

For all projects, a technical inquiry may be submitted for an ADA question, clarification on an ADA policy, or best practice proposal.

Technical Inquiry Example: As part of a resurface project, a non-compliant curb ramp is located at an intersection that is constrained by right of way and utilities. The existing curb ramp does not contain a turning space and the grade of the ramp is greater than 8.33%. The right of way limits and utility locations are such that only a non-compliant turning space can be constructed and the ramp running slope can be lessened but not made fully compliant. Full compliance would require the acquisition of right of way and the relocation of utilities, which are not

part of the scope of work. A technical inquiry request should be submitted for review.

The curb ramp should be made compliant to the maximum extent practical. The approved technical inquiry should be filed with the project coordination files and with the Level One computations. The element will remain on the owner's transition plan inventory list to be addressed by a future project.

A determination of technical infeasibility and technical inquiry does not constitute a waiver of the ADA requirements, but rather serves as a process of sufficiently documenting alternatives considered, existing constraints, and costs associated with compliance for later use, if necessary, as the basis for a defense regarding a complaint or litigation.

The Department's ADA Committee will review requests in accordance with the *Technical Infeasibility Policy*. The Committee will review requests for determination of technical infeasibility and inquiry for projects that contain federal-aid funds or are 100% State-funded. The determination of technical infeasibility and technical inquiries are the responsibility of the Local Public Agency (LPA) for 100% locally-funded projects.

A request for determination of technical infeasibility or inquiry should be sent to the Director of Highway Design & Technical Services. In addition, the Title VI/ADA Program Manager must receive a copy of the request. The request submission should include the following:

- a. DES Number, if available;
- b. project location and description of the scope of the project;
- c. a detailed explanation of the element and ADA standard that cannot be met.
- d. a detailed explanation of why the standard cannot be met;
- e. (For technical infeasibility requests only) a detailed explanation of at least two options considered before requesting a determination of technical infeasibility and why these options were not pursued further;
- f. a recommendation for a proposed solution. This should include an explanation why the proposed solution is the best fit for the given circumstances and how it provides accessibility to the maximum extent feasible;
- g. an itemization of the costs to construct the element compliantly and comparison to the overall project cost; and
- h. pictures and/or drawings of the actual project location and proposed solutions.

#### 45-1.06(02) Sidewalk Design Criteria [Rev. Mar. 2016]

A sidewalk within the public right of way must be in accordance with the Public Right of Way Accessibility Guidelines (PROWAG). See Section 51-1.03 for sidewalk accessibility requirements. Designers should also consider the following:

1. Width. A typical sidewalk is 5 ft wide with a 5-ft buffer area between the roadway and sidewalk. If there is no buffer area provided, the sidewalk should be 6 ft wide to accommodate any appurtenances which may be included in the sidewalk (see Item 4 below).

A high pedestrian volume may warrant a greater width in, for example, a commercial area or school zone. The designer may conduct a detailed capacity analysis to determine the sidewalk width. *Highway Capacity Manual* Chapter 13 should be reviewed for this analysis.

2. Urban Area. In a central business district, the entire area between a curb and a building is used as a paved sidewalk.
3. Appurtenance. The designer should consider the impacts of a roadside appurtenance within the sidewalk, e.g., street furniture, fire hydrant, parking meter, utility pole, signs. These elements reduce the clear width and may interfere with pedestrian activity. If such an appurtenance is placed within the sidewalk, the sidewalk clear width must be at least 4 feet or the sidewalk should be widened accordingly.
4. Cross Slope. The maximum cross slope is 2.00%. For design purposes the cross slope should be set at 1.5% to reduce the likelihood of the maximum being exceeded during construction.
5. Buffer Area. If the available right of way is sufficient, a buffer area between the curb and sidewalk is desirable. This area provides space for snow storage and allows for a greater separation between vehicle and pedestrian. The buffer area should be at least 5 ft wide to be effective and should desirably be wider. Although occasionally unavoidable, placing roadside appurtenances within the buffer area is undesirable. The proximity to the traveled way increases the likelihood of a vehicle/fixed-object crash.
6. Sidewalk on Bridge. Section 404-4.02(03) provides criteria for the selection and location of bridge and pedestrian railing where a sidewalk is present. Section 49-9.02 provides information for shielding the end of a bridge railing.

#### **46-11.02(04) Drive Grade [Rev. Mar. 2016]**

For a class I, III, VI, or VII drive, the maximum algebraic difference in drive grades should not exceed 8% for a crest vertical curve, or 12% for a sag vertical curve. For a class II, IV, or V drive, the maximum algebraic difference in drive grades should not exceed 11% for a crest vertical curve, or 14% for a sag vertical curve.

If it is known that a large emergency vehicle or other large vehicle will be using a drive, or if the algebraic differences exceed those noted above, the fit of the drive grade should be checked against the vehicle templates.

Drive grades should be shown and drive PVI's should be identified on the cross-sections sheets.

Where a drive is intersected by a sidewalk, the maximum drive grade is 2% for a minimum 4-ft width of the sidewalk. The preferred grade is 1.50% and should be used as a design practice to reduce the likelihood of exceeding the maximum during construction. See Section 46-11.02(07) for additional information.

#### **46-11.02(07) Sidewalk-Driveway Crossings [Rev. Mar. 2016]**

1. Where a sidewalk intersects a commercial drive that contains stop or yield control, a curb ramp should be used.
2. Where a sidewalk intersects a residential drive or commercial drive that does not contain stop or yield control, a sidewalk transition should be used.

In general, the difference between a sidewalk transition and a curb ramp is the need for a detectable warning surface. INDOT *Standard Drawings* Series E 604-SWCR and 604-SWDK contain curb ramp details and sidewalk-driveway crossing details, respectively.