



# INDIANA DEPARTMENT OF TRANSPORTATION

*Driving Indiana's Economic Growth*

## Design Memorandum No. 15-20 Technical Advisory

November 04, 2015

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

**FROM:** /s/John E. Wright  
John E. Wright  
Director  
Highway Design and Technical Support Division

**SUBJECT:** Curb Ramp Plan Details

**REVISES:** *Indiana Design Manual* Sections 51-1.04 through 51-1.08

**EFFECTIVE:** Stage 3 Submission on or after November 4, 2015

During field audits by FHWA and the Department's Title VI Program, several non-compliant curb ramps, landings, and sidewalks have been identified. Non-compliant elements must be partially or completely removed and replaced, except when achieving compliance is determined to be technically infeasible. See *Indiana Design Manual (IDM)* Section 40-8.04(01) for determining technical infeasibility.

Review of field audits has identified that additional plan detailing is needed for curb ramps, especially when project conditions are not ideal. Cross slope, running slope, placement of detectable warning elements, and landing areas have been of particular concern.

Designers should no longer call out a curb ramp solely by type on the plans. The Sidewalk Curb Ramp *Standard Drawings* represent ideal conditions, e.g. sufficient right of way, lack of obstructions, and level terrain. However, the majority of project conditions are not ideal. Each project with a curb ramp, landing or sidewalk should include sufficient plan details to construct the elements in compliance with the *Americans with Disabilities Act (ADA)*. This level of detail will also provide sufficient information during the Level One review. The plan detailing requirements for curb ramp retrofits, reconstruction, and new construction are discussed below.

## **ADAAG vs. PROWAG**

The IDM and *Standard Drawings* reflect the *Americans with Disabilities Act Accessibility Guidelines* (ADAAG) and are currently being revised to reflect the *Public Rights-of-Way Accessibility Guidelines* (PROWAG). The PROWAG accounts for conditions unique to facilities within the public right of way and is considered best practice. The PROWAG was used to develop the Department's ADA transition plan and should be used as the basis for identifying the required curb ramp, landing (turning space), and sidewalk dimensions and slopes.

While much is unchanged from the ADAAG to the PROWAG, the items listed below represent notable differences.

1. The minimum width of a curb ramp, landing, or sidewalk, is 4 feet. A 3-ft pinch point is not acceptable.
2. The grade (running slope) of the sidewalk may match the adjacent roadway profile grade.
3. A sidewalk adjacent to a roadway does not require a landing area or handrail, regardless of the roadway grade.
4. The maximum cross slope is 2.00%. There is no construction tolerance for cross slope. See the PROWAG for exceptions to cross slope requirements.
5. The maximum ramp running slope is 8.33%. There is no construction tolerance for running slope. A running slope of 10% for a 6-in. rise is not acceptable.
6. Detectable warning elements must extend the full width of the ramp. Where forming is required, a 2-in. maximum border width may be provided.
7. A landing area (turning space) must be provided at the top of each perpendicular curb ramp and the bottom of each parallel curb ramp. Ramp types A, B, C, D, E, and L are perpendicular ramps. Ramp types F and K are parallel ramps. Ramp types G and H are defined as one-way-directional perpendicular ramps, but do not require a landing area because a change in direction at the top of the ramp is not required. The minimum dimensions of the landing area are 4 ft x 4 ft. Where the landing area is constrained by a curb or other feature the minimum dimensions are 4 ft x 5 ft, with the 5-ft dimension in the direction of travel.

## **IDM Revisions**

The applicable sections of the IDM have been revised and are an attachment to this memo. Due to forthcoming restructuring of the IDM accessibility guidance, these revisions will be incorporated into the on-line version of the IDM at a later date.

## **Plan Detailing**

The following guidelines should be used to determine the extent of plan detailing required.

### **Retrofits and Reconstruction**

Each curb ramp, landing, and sidewalk 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:

- **Plan Views.** Lines representing the curb ramp, landing and sidewalk should be shown in plan view over existing survey or an aerial image.
- **Spot Elevations.** Elevations at the top and bottom of the curb ramp, each side of the landing (4 total) and each side of the sidewalk should be tabulated or detailed.
- **Dimensions.** Lengths and widths for each curb ramp, landing and sidewalk should be tabulated or detailed.
- **Slopes.** Running slopes and cross slopes for each curb ramp, landing and sidewalk should be tabulated or detailed.

### **New Construction**

For new construction a compliant curb ramp, landing and sidewalk can be detailed by calling out a standard curb ramp type and sidewalk 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.

### **Standard Specifications Revisions**

Revisions to Section 604 of the *Standard Specifications* are required to incorporate the PROWAG guidance. Until a recurring special provision is available from the Recurring Special Provisions Menu, designers should incorporate the unique special provision (USP) *Curb Ramps, Landings, and Detectable Warning Elements* into each contract with a curb ramp, sidewalk or detectable warning element. This guidance applies equally to contracts that fall outside the effective date of this memo. The USP is available on the Department's [Unique Special Provisions Samples Index](#).

### **Questions**

Questions regarding curb ramp, landing and sidewalk details should be directed to John Wright, Director of Highway Design and Technical Support, via email at [jwright@indot.in.gov](mailto:jwright@indot.in.gov).

#### **51-1.04 Accessible Route**

An accessible route is a continuous, unobstructed path connecting all accessible elements and spaces in a building, facility, or site. A site is defined as a parcel of land bounded by a property line or a designated portion of a public right of way. A facility is defined as all portions of a building, structure, site improvement, complex, equipment, road, walk, passageway, parking lot, or other real or personal property on a site. An interior accessible route may include a corridor, floor, ramp, elevator, lift, or clear floor space at a fixture. An exterior accessible route may include parking access aisle, curb ramp, crosswalk at vehicular way, walk, ramp, or and lift.

An accessible route should be provided as follows.

1. At least one accessible route within the boundary of the site should be provided from each public transportation stop, accessible parking, accessible passenger-loading zone, or public street or sidewalk to the accessible building entrance it serves. The accessible route should, to the maximum extent feasible, coincide with the route for the general public.
2. At least one accessible route should connect accessible buildings, facilities, elements, or spaces that are on the same site.
3. At least one accessible route should connect accessible buildings or facility entrances with all accessible spaces and elements and with all accessible dwelling units within each building or facility.

The application of the accessible-route criteria applies to definitive sites which are related to highway purposes. These include a rest area, recreational area, park-and-ride lot, etc. Sections 51-1.05 and 45-1.06 provide the accessibility requirements for a sidewalk.

#### **51-1.05 Sidewalk**

Each sidewalk must comply with the ~~ADA Guidelines~~ *Public Rights-of-Way Accessibility Guidelines (PROWAG)* as described as follows.

The placement of a sidewalk should not require an exception to other Level One design criteria, such as shoulder width or travel-lane width. Additional Information may be required.

Replaced sections of sidewalk should be shown, with starting and ending stationing or starting stationing plus length.

Where a new or replacement sidewalk begins from an existing one, the new or replacement sidewalk's profile grade should approximate that of the existing sidewalk.

Earth cross slopes on either side of a sidewalk should be flat enough that there are no dropoffs.

Construction limits and right of way should be adequate to tie into the existing terrain.

A paper survey line is acceptable.

If a survey has not been made, the designer should determine appropriate elevations.

If an intersection is not being entirely reconfigured, correct access should be indicated for each quadrant.

Curb-ramp types should be shown, with their alignment with the existing or new sidewalk.

All curb ramps should be field checked. The INDOT *Standard Drawings* will not address every situation. Curb ramps should not have to be field designed.

#### **51-1.05(01) Sidewalk on Accessible Route**

1. Width. The minimum clear width should be 3 4 ft., ~~except at a door, where the minimum width should be 5 ft.~~ *Use of the minimum clear width requires a passing space as described below.*
2. Passing Space. If a sidewalk has less than 5 ft clear width, passing spaces of at least 5 ft by 5 ft should be located at an interval not to exceed 200 ft. A T-intersection between two walks is an acceptable passing space.
3. Surface. The sidewalk surface should be stable, firm, and slip-resistant. The longitudinal gradient should be flush and free of abrupt changes. However, 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. and 1/2 in. should be beveled with a slope not greater than 50%. A change in level of 1/2 in. or greater should be accommodated with a ramp.

Gratings should not be placed within the walking surface. If, however, gratings are located in the walking surface, they should have openings of not greater than 1/2 in. in one direction. If gratings have elongated openings, they should be placed so that the long dimension is perpendicular to the dominant direction of travel.

4. Cross Slope. The cross slope should not exceed 2.00%. *There is no construction tolerance for cross slope.* ~~If the longitudinal gradient exceeds 5%, the sidewalk must be in accordance with the accessibility criteria for a ramp (see Section 51-1.07).~~
5. Protruding Object. An object projecting from a wall (e.g., sign, telephone, canopy) with its leading edge between  $\geq 2.25$  ft and ~~6.5~~ 6.7 ft above the finished sidewalk should not protrude more than 4 in. into any portion of the sidewalk. A freestanding object mounted on posts or pylons may overhang its mountings up to a maximum of ~~1-ft 4 in.~~ if located between  $\geq 2.25$  ft and ~~6.5~~ 6.7 ft above the sidewalk or ground surface. An object of less than  $\geq 2.25$  ft or greater than ~~6.5~~ 6.7 ft may protrude to any distance provided that the effective width of the sidewalk is maintained. Where the vertical clearance is less than ~~6.5~~ 6.7 ft, a barrier should be provided to warn a visually-impaired person.
6. Separation. A sidewalk should be separated from roadways with a curb, planted parkway or other barrier, which should be continuous except where interrupted by a drive, alley, or connection to a handicapped-accessible element.
7. Bus Stop. Where a bus-passenger loading area or bus shelter is provided on or adjacent to a sidewalk, it should be in accordance with the criteria described in Section 51-1.02.
8. Curb Ramp. Each curb ramp on an accessible route should be in accordance with the criteria described in Section 51-1.08.

#### **51-1.05(02) Sidewalk on Public Right of Way**

Each such sidewalk should be in accordance with the criteria described in Section 51-1.05(01). However, the ~~ADA Guidelines~~-PROWAG provides some flexibility to meet the adjacent roadway conditions and to provide a practical design. The criteria described in Section 51-1.05(01) should be used, with the additional requirements as follows:

1. Longitudinal Slope. The flattest longitudinal slope practical should be provided. Preferably, the longitudinal slope should not be steeper than 8% or the longitudinal slope of the adjacent roadway. ~~A sidewalk slope of 5% or flatter does not require the use of handrails as defined in Section 51-1.07. Regardless of slope, a sidewalk following the grade of the adjacent roadway does not require the use of a landing area or handrail.~~

2. Separation. A sidewalk adjacent to the curb or roadway **may should** be offset to avoid a non-conforming cross slope at a drive apron by diverting the sidewalk around the apron.
3. Street Furniture. Street furniture such as a signal-controller cabinet, light standard, strain pole, utility pole, mailbox, sign support, etc., should not be placed within the required sidewalk width. **In a location where it is impractical to provide the minimum sidewalk width, an accessible width of 3 ft should be maintained.**

### **51-1.06 Stairway**

A stairway should not be part of an exterior accessible route or a sidewalk on public right of way because it cannot be safely negotiated by an individual in a wheelchair. Where a stairway is used as part of an access route to a building or facility not subject to the ADA requirements, it should be designed to be accessible by other handicapped individuals. Therefore, the design of a stairway should be in accordance with *ADA Guidelines* Section 4.9. This includes, for example, providing handrails. **The designer should review the INDOT Standard Drawings for additional details on the design of a stairway.**

### **51-1.07 Ramp**

**The following guidelines are intended for ramps that serve as site or building access and do not apply to sidewalks or sidewalk curb ramps within the public right of way.** A part of an accessible route with a slope steeper than 5% should be considered a ramp and should be in accordance with the *ADA Guidelines*. This includes providing handrails. The following criteria apply to a ramp on an accessible route.

1. Slope and Rise. The flattest possible slope should be used. Figure [51-1D](#), Allowable Ramp Dimensions, New Construction, provides the maximum allowable ramp slope for new construction. A curb ramp or ramp to be constructed on an existing site or in an existing building or facility may have the slope and rise shown in Figure [51-1E](#), Allowable Ramp Dimensions for Existing Site, Building, or Facility, if space limitations prohibit the use of a slope of 8% or flatter.
2. Width. The minimum clear width should be 3 ft.
3. Landing. A ramp should have a level landing at the bottom and top of each run. A landing should be in accordance with the following.
  - a. It should be at least as wide as the ramp run leading to it.

- b. The clear length should be a minimum of 5 ft.
  - c. If a ramp changes direction at a landing, the minimum landing size should be 5 ft by 5 ft.
4. Handrail. If a ramp run has a rise greater than 0.5 ft or a horizontal projection greater than 6 ft, it should have handrails on both sides. A handrail is not required for a curb ramp. A handrail should be in accordance with the following.
- a. Handrails shall be provided along both sides of a ramp segment. The inside handrail on a switchback or dogleg ramp should be continuous.
  - b. If a handrail is not continuous, it should extend at least 1 ft beyond the top and bottom of the ramp segment and should be parallel with the floor or ground surface.
  - c. The clear space between the handrail and the wall should be 1½ in.
  - d. The gripping surface should be continuous.
  - e. The top of the gripping surface should be mounted between 2.8 ft and 3.2 ft above the ramp surface.
  - f. The end should be either rounded or returned smoothly to the floor, wall, or post.
  - g. A handrail should not rotate within its fittings.
5. Cross Slope and Surface. The cross slope of a ramp surface should not be steeper than 2.00%. *There is no construction tolerance for cross slope.* The ramp surface should be in accordance with the sidewalk surface criteria described in Section 51-1.05.
6. Edge Protection. A ramp or landing with a drop-off should have a curb, wall, railing, or projecting surface that prevents people from slipping off the ramp. A curb should be of minimum height of 2 in.
7. Outdoor Conditions. An outdoor ramp and its approaches should be designed so that water will not accumulate on the walking surface.

### **51-1.08 Sidewalk Curb Ramp [Rev. Feb. 2014]**

Highway or street resurface, rehabilitation, or improvement work in a suburban, intermediate, or urban (built-up) area in a city or town often requires the providing of adjacent curbs and sidewalks, or the repair or replacement of these facilities. In such an area, especially an urban (built-up) area, the faces of commercial or public buildings are often constructed on or close to the right-of-way or property line.

The Department, along with each local public agency, under Americans with Disabilities Act (ADA) Title II, is required to provide ADA-accessible facilities within the public right of way where a public facility such as a public building, curb and sidewalk, a rest area, a weigh station, etc., are currently located or are to be provided.

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 Act Title III to provide an ADA-accessible facility on its private property.

Curb or sidewalk repair or replacement may require a change in the sidewalk elevation within the public right of way. INDOT is responsible for ascertaining that ADA requirements are addressed on INDOT 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 ADA-compliant and compatible with the adjacent public right-of-way sidewalk.

A project which includes curbs and sidewalks at pedestrian crosswalks will require sidewalk curb ramps to eliminate physical barriers for ease of access to such crosswalks. A pedestrian crosswalk is defined as the portion of a street ordinarily included within the prolongation or connection of lateral lines of sidewalks at an intersection. It also includes any portion of a highway or street distinctly indicated as a crossing for pedestrians by means of lines or other markings on the pavement surface.

A curb ramp provides a sloped area within a public sidewalk that allows pedestrians to accomplish a change from sidewalk level to street level. A curb ramp typically includes the ramp and flared sides and specific surface treatments, but does not include the landings at the top and bottom of the ramp.

A curb ramp should be placed at each crosswalk which extends from a paved sidewalk in each intersection with a curbed public roadway or curbed signalized commercial drive. A curb ramp should not be used at a private drive, alley, or unsignalized commercial drive. Instead, a sidewalk elevation transition as shown on the INDOT *Standard Drawings* should be placed. At a T-intersection, the designer should ensure that curb ramps are located on the side opposite the minor intersecting road if a sidewalk is present or is to be provided.

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 [51-1 I](#) for a list of Alteration vs. Maintenance activities.

### **51-1.08(01) Location**

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

1. Curb ramps should be located directly opposite one another for each crosswalk, and should be placed within the transverse limits of crosswalk lines, where crosswalk lines are used.

The placement of curb ramps affects the placement of crosswalk lines and vehicle stop lines. Conversely, the location of existing crosswalk lines and stop lines affect the placement of curb ramps. Some of the crosswalk-line constraints are shown in Figure [51-1E](#), Types of Curb Ramps at Marked Crossings, and on the INDOT *Standard Drawings*. The *Manual on Uniform Traffic Control Devices* contains additional constraints on crosswalk- and stop-line placement.

2. Each curb ramp should be designed and placed to provide continuity of the sidewalk corridor direction of travel while providing pedestrians the shortest but most direct route across a street.
3. The designer should ensure that the landing area at the bottom of each curb ramp does not encroach upon through-lane vehicle traffic which has the right of way at the same time a pedestrian is attempting to use the crosswalk parallel to it.
4. The curb ramp and associated landings should not be compromised by other highway features (e.g., guardrail, catch basin, utility pole, fire hydrant, sign or signal support, etc.).
5. There should be full continuity of use throughout. Opposing curb ramps should always be provided in all required intersection quadrants, including an intersection with some quadrants outside the project limits.
6. A curb ramp should be located or protected to prevent its obstruction by a parked vehicle.

7. ~~Approval of a Level One waiver of the accessibility requirements for physically impaired individuals is required for each location where there are valid reasons to restrict or prohibit pedestrian access. Such waiver is described in Section 40-8.04(01) Item 2. A Determination of Technical Infeasibility is required for each location where a curb ramp, landing or sidewalk cannot be constructed in compliance with the ADA. Technical Infeasibility requests are described in Section 40-8.04(01) Item 3.~~
8. The normal gutter flow line should be maintained through the curb-ramp area. Appropriate drainage structures should be placed as needed to intercept the flow prior to the curb-ramp area. 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 crosswalk.
9. Where modifications to the details shown on the INDOT *Standard Drawings* are required so that a curb ramp can be better accommodated, such details and the required pay quantities should be shown on the plans.
10. The impact of utility location on curb-ramp placement and construction should be minimized. The designer is responsible for being aware of potential utility conflicts. If utilities are present, coordination should be in accordance with Chapter 104.

#### **51-1.08(02) Types of Sidewalk Curb Ramps**

Details for placement of curb ramps and an illustration showing appropriate locations for each curb ramp type are shown on the INDOT *Standard Drawings*. Determining which curb ramp is most appropriate depends on the exact conditions of the site. Curb ramps are categorized below by their structural design and how they are positioned to the sidewalk or street.

1. Perpendicular Curb Ramp. This curb ramp is perpendicular to the curb and requires a sidewalk wide enough to provide an 8% running slope. This is the preferred design. The length of the ramp depends on the height of the curb where the ramp is to be located. Details of a ramp with an integral curb and of a ramp with a separate curb are shown on the INDOT *Standard Drawings*. A landing should be provided at the top of the ramp. ~~If site infeasibility precludes construction as shown on the INDOT *Standard Drawings*, the level landing width may be decreased from 4 ft to 3 ft, and the running slope may be steepened to 10% for a maximum 6 in. rise. The minimum dimensions of the landing area (turning space) are 4 ft x 4 ft, except as follows. Where the landing area is constrained the minimum dimensions are 4 ft x 5 ft, with the 5-ft dimension in the direction of travel.~~

New construction should provide adequate right of way for a perpendicular curb ramp. Some portion of the curb ramp, typically one of the flared sides, may appear within the curved intersection corner. See the INDOT *Standard Drawings* for details of improved access to a perpendicular curb ramp.

The standard perpendicular curb ramps are as follows:

- a. Type A. This type should be specified where a curb ramp is required entirely within the pedestrian walkway. It is the preferred type where the sidewalk is adjacent to the curb.
  - b. Type C. This type should be specified where a curb ramp is required outside the pedestrian walkway, in the utility strip. It is the preferred type where there is a utility strip between the sidewalk and the curb.
  - c. Type D. This type should be specified where a curb ramp is required near an obstruction which cannot be removed. It is the preferred type for this situation, and may be used with or without a utility strip present.
2. Diagonal Curb Ramp. A diagonal curb ramp is a single *perpendicular* curb ramp that is located at the apex of the corner at an intersection, and serves two intersecting crossing directions. Since the ramp is diagonal to the path of travel, it is only accessible if level landing or maneuvering spaces are provided at both the top and bottom of the ramp. If creating a level landing is too difficult or a 4-ft clear space cannot be provided, a diagonal curb ramp should not be considered. ~~If site infeasibility precludes construction as shown on the INDOT *Standard Drawings*, the landing width may be decreased from 4 ft to 3 ft and the running slope may be steepened to 10% for a maximum 6 in. rise. The minimum dimensions of the landing area (turning space) are 4 ft x 4 ft, except as follows. Where the landing area is constrained the minimum dimensions are 4 ft x 5 ft, with the 5-ft dimension in the direction of travel.~~

A diagonal curb ramp should only be used where a standard perpendicular or parallel curb ramps are infeasible and no other option is available, or if a field investigation warrants its use for alterations affecting existing sidewalks. *A diagonal curb ramp should not be used in new construction.*

If a diagonal curb ramp is to be used, durable crosswalk markings are required on the street pavement. Specific constraints for crosswalk markings and stop-lines placement are shown on Figure [51-1F](#), Types of Curb Ramps at Marked Crossings. Each diagonal curb ramp should be wholly contained within the crosswalk lines, including any flared sides. There should be at least 4 ft between the gutter line and

the corner of the two intersecting crosswalk lines as delineated within the intersection pavement area. See Figure [51-1F](#) for an illustration of these criteria.

The standard diagonal curb ramps are as follows:

- a. Type B. This type should be specified where a curb ramp is required entirely within the pedestrian walkway, the corner radius is greater than 10 ft, and placement of a Type A ramp is infeasible. At the bottom of the ramp, the perimeter length is 8 ft, regardless of the corner radius.
- b. Type E. This type should be specified where a curb ramp is required outside the pedestrian walkway in the utility strip, the corner radius is greater than 10 ft, and placement of a Type B ramp is infeasible.

This type should also be specified where a curb ramp is required outside the pedestrian walkway in the utility strip, the corner radius is greater than 10 ft, an obstruction which cannot be removed is present, and placement of a Type C ramp is infeasible.

At the bottom of the ramp, the perimeter length is 8 ft, regardless of the corner radius.

3. Parallel Curb Ramp. A parallel curb ramp has two ramps leading down towards a center level landing at the bottom between both ramps. ~~and has level landings at the top of each ramp.~~ *The minimum dimensions of the landing area (turning space) are 4 ft x 4 ft, except as follows. Where the landing area is constrained by a curb or other feature the minimum dimensions are 4 ft x 5 ft, with the 5-ft dimension in the direction of travel.*

A parallel curb ramp may be specified for a narrow sidewalk, steep terrain, or at a location with a high curb, as the ramp can easily be lengthened to reduce the grades. A parallel curb ramp should not be installed where it is possible to install two perpendicular curb ramps. A wall or curb may be required along the back edge of the ramp as shown on the INDOT *Standard Drawings*. The designer should show details for such wall or curb on the plans and include a unique special provision.

A parallel curb ramp should only be used where a perpendicular curb ramp is infeasible and no other option is available.

The standard parallel curb ramp is type F. This type should be specified where the corner radius at least 15 ft but less than 25 ft, and only if a field investigation warrants its use for alterations affecting existing sidewalks.

4. Depressed-Corners Curb Ramp. Depressed corners gradually lower the level of the sidewalk to meet the grade of the road, street, or signalized approach. This curb ramp should be specified only at a corner where the sidewalk parallels only one of the intersecting roadways.

The standard depressed-corners curb ramps are as follows:

- a. Type H. This type should be specified where the sidewalk is adjacent to the curb.
  - b. Type G. This type should be specified where there is a utility strip between the sidewalk and the curb.
5. Mid-Block Curb Ramp, Type K. This type should be specified at a mid-block location. It may be used where the sidewalk is adjacent to the curb or where there is a utility strip between the sidewalk and the curb.
  6. Median Curb Ramp, Type L. This type should be specified where a raised paved or unpaved median of 8 ft or wider obstructs the crosswalk. Where the median is narrower than 8 ft, a detail should be shown on the plans.

#### **51-1.08(03) Selection Guidelines**

The following provides guidelines for selecting the appropriate curb ramp.

1. Sidewalk or Utility-Strip Width. The INDOT *Standard Drawings* show minimum sidewalk widths and utility-strip widths. These minimum widths are intended for new construction and reconstruction, typically to construct a perpendicular curb ramp. A parallel curb ramp type F may be used where an existing sidewalk cannot be widened to the minimum width.
2. Obstruction. It is desirable to move an obstruction wherever practical. Where it is not practical to move the obstruction, the direction of traffic relative to the placement of the curb ramp should be considered. It is important that drivers can see a physically-impaired person using a curb ramp. Where an obstruction is present, such as a signal controller box, planter, signal pole base, etc., a perpendicular curb ramp type D should be used. No obstruction should be permitted within flared paved curb-ramp sides.
3. Best Practices. The following should be considered.

- a. A level maneuvering area or landing should be provided at the top of each curb ramp.
- b. The ramp slope should be perpendicular to the curb, with a maximum steepness of 8.33%. Details regarding curb-ramp slope are shown on the *INDOT Standard Drawings*.
- c. The counterslope of the gutter area or street at the flat of a curb ramp should be a 5% or flatter.
- d. ~~Curb ramp geometries to be used are summarized in Figure 51-1G.~~

#### 51-1.08(04) Curb-Ramp Lengths and Slopes

A curb ramp should be designed with a steepest slope of 8.33%. See Figure 51-1H, Lengths of Perpendicular Curb Ramps, to determine the length of a curb ramp which is perpendicular to the curb. The figure assumes a 2% sidewalk cross slope and a level longitudinal grade.

For a curb ramp which is not perpendicular to the curb, the following formula should be used to determine its length. The formula assumes a 2% sidewalk cross slope and a level longitudinal grade.

$$L_{CR} = \frac{h}{\cos \theta (G_R - G_S)} \quad \text{[Equation 51-1.1]}$$

Where:

$L_{CR}$  = Curb-ramp length, ft

H = Change in elevation, ft

$G_R$  = Curb ramp grade, % / 100

$G_S$  = Sidewalk cross grade, % / 100

$\theta$  = Angle to which the curb ramp is out of perpendicular to the curb

#### 51-1.08(05) Algebraic Difference Between Curb Ramp and Gutter Slope

The algebraic difference between a curb ramp slope and the gutter or pavement slope should be 11% or flatter. If this is not possible, a 2-ft wide level strip should be provided between the grades. See the *INDOT Standard Drawings*.

$$\Delta G = |G_R - G_G|$$

1.2]

[Equation 51-

Where:

$\Delta G$  = Algebraic grade difference, %

$G_R$  = Ramp grade, %

$G_G$  = Gutter grade, %

$|G_R - G_G|$  = Absolute value of grade difference, %

A level strip is required if  $\Delta G$  is steeper than 11%.

### 51-1.08(06) Detectable Warning Device

Each sidewalk curb ramp is to include a detectable warning device. This consists of a standardized surface feature to warn people with vision impairments that they are approaching a street or drive. The color and texture of the device must contrast visually with adjoining surfaces. Details and explanations are shown on the *INDOT Standard Drawings* and the *INDOT Standard Specifications*, respectively.

### 51-1.08(07) Pedestrian Signal Control

If a pedestrian crosswalk and curb ramp are present at an intersection with a traffic signal that has a pedestrian signal activated by pushbuttons, the following will apply.

1. Location. A pushbutton control should be located as close as practical to the curb ramp and, to the maximum extent feasible, should permit operation from a level area immediately adjacent to the controls. The control should be placed so as not to create an obstruction to the curb ramp.
2. Surface. A **minimum** sidewalk area of 4 ft by 4 ft should be provided to allow a forward or parallel approach to the control. **In a restricted area, such sidewalk area may be reduced to 3 ft by 3 ft.**