

INDIANA DEPARTMENT OF TRANSPORTATION



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DESIGN MEMORANDUM No. 03-01 TECHNICAL ADVISORY

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

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SUBJECT: Sidewalk Curb Ramps

SUPERSEDES: Indiana Design Manual Section 51-1.08

EFFECTIVE: September 16, 2003, Letting

Curb ramps and other provisions for the physically impaired are required on all projects involving the provision of curbs and sidewalks at all pedestrian crosswalks. A pedestrian crosswalk is defined as the portion of a street ordinarily included within the prolongation or connections of lateral lines of sidewalks at intersections. It also includes any portion of a highway or street distinctly indicated as a crossing for pedestrians by lines or other markings on the 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. Location

When determining the need for a curb ramp, the designer should consider the following:

1. For each project except signing, pavement marking, roadway lighting, and preventative maintenance paving, curb ramps are to be constructed at all crosswalks which extend from a paved sidewalk in an intersection. They are to be provided on all intersection corners with sidewalks. At T-intersections, 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 a 4R or new construction project, curb ramps should be provided along all sidewalk corridors, e.g., at alleys and drives.

2. There should be full continuity of use throughout; i.e., opposing ramps should always be provided even if part of the sidewalk is outside the project limits.
3. Curb ramps should be located or protected to prevent their obstruction by parked vehicles.
4. Curb ramps should be located directly opposite one another for each crosswalk, and should be placed within the crosswalk lines.
5. A diagonal curb ramp should be wholly contained within the crosswalk lines, including any flared sides. There should be at least 1.2 m (4 ft) between the gutter line and the corner of the two intersecting crosswalk lines as delineated within the intersection pavement area. See Figure 03-01A for an illustration of these criteria.
6. The curb ramp and associated landings should not be compromised by other highway features (e.g., guardrail, catch basins, utility poles, signs, etc.). The ramp should be designed such that turning or maneuvering is not required on the ramp surface.
7. Curb ramps are required at all curbed intersections with connecting sidewalks. However, a Level One waiver of the Americans with Disabilities Act requirements request may be approved for locations where there are valid reasons to restrict or prohibit all pedestrian access.
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 any flow across the crosswalk.

B. Pedestrian Signal Controls

If a pedestrian crosswalk and curb ramp are present at an intersection with a traffic signal that has pedestrian detectors (pushbuttons), the following will apply:

1. Location. Controls 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. Controls should be placed so as not to create an obstruction to the curb ramp.
2. Surface. A sidewalk area of 1.2 m by 1.2 m (4 ft by 4 ft) should be provided to allow a forward or parallel approach to the controls. In a restricted area, such sidewalk area may be reduced to 0.9 m by 0.9 m (3 ft by 3 ft).

C. Detectable Warning Devices

Most sidewalk curb ramps are to include detectable warning devices. These consist of a standardized surface feature to warn people with vision impairments that they are approaching a street or driveway. The color and texture of these devices contrast visually with adjoining surfaces. Details and explanations are shown in the INDOT *Standard Drawings* and *Standard Specifications*, respectively.

D. Types of Sidewalk Curb Ramps

Details for placement of curb ramps are shown on the INDOT *Standard Drawings*. Figure 03-01A is an illustration showing appropriate locations for all curb ramp types. 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 wide enough sidewalk to provide a 12:1 running slope. 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 1200 mm to 900 mm (48 in. to 36 in.), and the running slope may be increased to 10:1 for a maximum 150 mm (6 in.) rise. If it is not possible to provide a level landing, a perpendicular curb ramp should not be specified. New construction should always provide adequate right of way for a perpendicular curb ramp. See the INDOT *Standard Drawings* for improved access to a perpendicular curb ramp.

A perpendicular curb ramp is the preferred curb ramp design. 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.
 - b. Type C. This type should be specified where a curb ramp is required outside the pedestrian walkway, in the utility or planting strip.
 - c. Type D. This type should be specified where a curb ramp is required near an obstruction which can not be removed.
2. Diagonal Curb Ramp. A diagonal curb ramp is a single 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 1200 mm (48 in.) 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 1200 mm to 900 mm (48 in. to 36 in.) and the running slope may be increased to 10:1 for a maximum 150 mm (6 in.) rise. Diagonal curb ramps should not be used in new construction. 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, and the corner radius is greater than 3 m (10 ft). At the bottom of the ramp, the perimeter length is 2.4 m (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 or planting strip, and an obstruction which cannot be removed is present. This type should be specified where the corner radius is less than 7.5 m (25 ft).
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. A parallel curb ramp may be specified for a narrow sidewalk, steep terrain, or at locations 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. The standard parallel curb ramps are as follows:
- a. Type F. This type should be specified where the corner radius is less than 7.5 m (25 ft).
 - b. 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 the sidewalk is separated from the curb by a buffer strip.
4. Depressed-Corners Curb Ramp. Depressed corners gradually lower the level of the sidewalk to meet the grade of the street or driveway. Depressed corners are often designed as an expanded diagonal curb ramp that extends around the entire corner at an intersection. This curb ramp should be specified at a corner where the sidewalk is in one direction only. This design should not be used in new construction. The standard depressed-corners curb ramps are as follows:
- a. Type G. This type should be specified where a curb ramp is required outside the pedestrian walkway, in the utility or planting strip, and the sidewalk is separated from the curb.
 - b. Type H. This type should be specified where a curb ramp is required entirely within the pedestrian walkway.

5. Median Curb Ramp, Type L. This type should be specified where a raised median of 2.4 m (8 ft) or greater width obstructs the crosswalk. Where the median width is less than 2.4 m (8 ft), a detail should be shown on the plans.
6. Deleted Curb Ramp Types. Where curb ramp type J has been specified, type A should be specified instead. Curb ramp types M, N, and O also should no longer be specified as their details have been deleted from the INDOT *Standard Drawings*.

E. Selection

The following provides several suggestions for selecting the appropriate curb ramp.

1. Crosswalk Markings and Stop Lines. The placement of curb ramps affects the placement of pedestrian crosswalk and vehicle stop lines. Conversely, the location of existing crosswalk and stop lines affect the placement of curb ramps. Some of the crosswalk-line constraints are shown in Figure 03-01A and in the INDOT *Standard Drawings*. The Indiana and Federal *Manuals on Uniform Traffic Control Devices* contain additional constraints on crosswalk- and stop-line placement.
2. Obstructions. It is desirable to move the 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 the physically impaired person using the curb ramp. Where obstructions are present, such as signal controller boxes, planters, signal pole bases, etc., a curb ramp type D or E may be used. No obstruction should be permitted within the paved flared sides of a curb ramp.
3. Sidewalk and Buffer Strip Widths. The INDOT *Standard Drawings* show minimum sidewalk widths and buffer strip widths. These minimum widths are intended for new construction and reconstruction. Curb ramp types F and K may be used where an existing sidewalk cannot be widened to the minimum width.
4. Diagonal Curb Ramps. The usage of diagonal curb ramp types B, E, and F should be avoided wherever practical. It is preferable to use another type of curb ramp or combination of ramps rather than to use a diagonal curb ramp. Curb ramp types B, E, or F should only be specified if a field investigation warrants their use for alterations affecting existing sidewalks. Specific constraints for crosswalk markings and stop line placement are shown in the INDOT *Standard Drawings*.
5. 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, at $7.1 \pm 1.2\%$, with a maximum of 8.33%. Details regarding curb ramp slopes are shown in Figure 03-01B.
- c. The ramp and gutter cross slope should be 2%.

F. Curb Ramp Lengths and Slopes

Curb ramps should be designed with a maximum slope of 12:1, or 8.33%. See Figure 03-01C 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.

Change In Elevation, mm	Ramp Length, m	Change In Elevation, in.	Ramp Length, ft.
100	1.6	4	5.25
125	2.0	5	6.50
150	2.4	6	8.00
175	2.8	7	9.25
200	3.2	8	10.50"

LENGTHS OF PERPENDICULAR CURB RAMPS

Figure 03-01C

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.

Metric:
$$L_{CR} = \frac{h}{\cos \mathbf{q} (G_R - G_S)}$$
 English:
$$L_{CR} = \frac{h}{12 \cos \mathbf{q} (G_R - G_S)}$$

Where:

L_{CR} = Curb ramp length, m (ft)

H = Change in elevation, m (in.)

G_R = Curb ramp grade, % / 100

G_S = Sidewalk cross grade, % / 100

\mathbf{q} = Angle to which the curb ramp is out of perpendicular to the curb

F. Algebraic Difference Between Curb Ramp and Gutter Slopes

The algebraic difference between a curb ramp slope and the gutter or pavement slope should be less than 11%. If this is not possible, a 0.6-m (2-ft) wide level strip should be provided between the grades. See the INDOT *Standard Drawings*.

$$)G = *G_R - G_G*$$

Where:

)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)G ≥ 11%.

G. Pay Limits, Quantities, and Pay Items

The pay unit remains square meter (square yard). The pay limits for curb ramps are shown on the INDOT *Standard Drawings*. Quantities for curb or curb and gutter within the curb ramp limits should be incorporated into the project's appropriate curb or curb-and-gutter quantities. Quantities for sidewalk required outside the curb ramp pay limits, including those for additional landing area, should be incorporated into the project concrete sidewalk quantities. If flared sides are sod instead of concrete, such sodding should be incorporated into the project sodding quantities.

The pay item names for curb ramps are unchanged. The pay items for curb ramp types J, M, N, and O have been obsoleted.