

Designing Pedestrian Facilities for Accessibility

Module 3

PROWAG: R303 Curb Ramps & Blended Transitions



Curb Ramps & Other Transitions

- Purpose:
 - Allow pedestrians to transition between the street and sidewalks, islands, etc.
- Typically installed at:
 - Intersections (1 ramp at each end of each crosswalk)
 - Mid-block crossings (including trail crossings)
 - Accessible on-street parking spaces
 - Passenger loading zones & bus stops



Curb Ramps

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- First required by the Rehabilitation Act of 1973, Section 504
- The implementing regulations under Title II of the ADA require curb ramps for existing facilities, as well as for all new construction



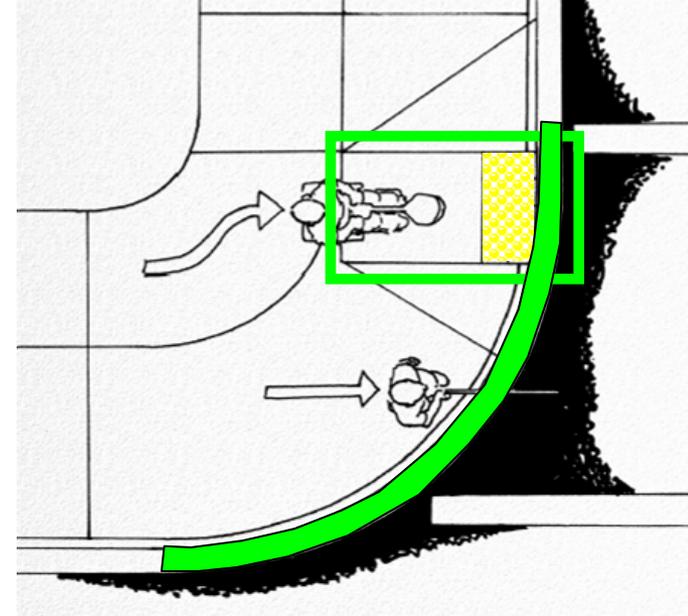
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Curb Ramp Conundrum

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- Curbs: cue for pedestrians who are blind or with low vision
- Curbs are a barrier for persons in wheelchairs
- Curb ramps remove the barrier for wheelchairs
- Detectable warnings are a “replacement” cue to indicate location of the street



Design Issues for Pedestrians Who use a Wheelchair

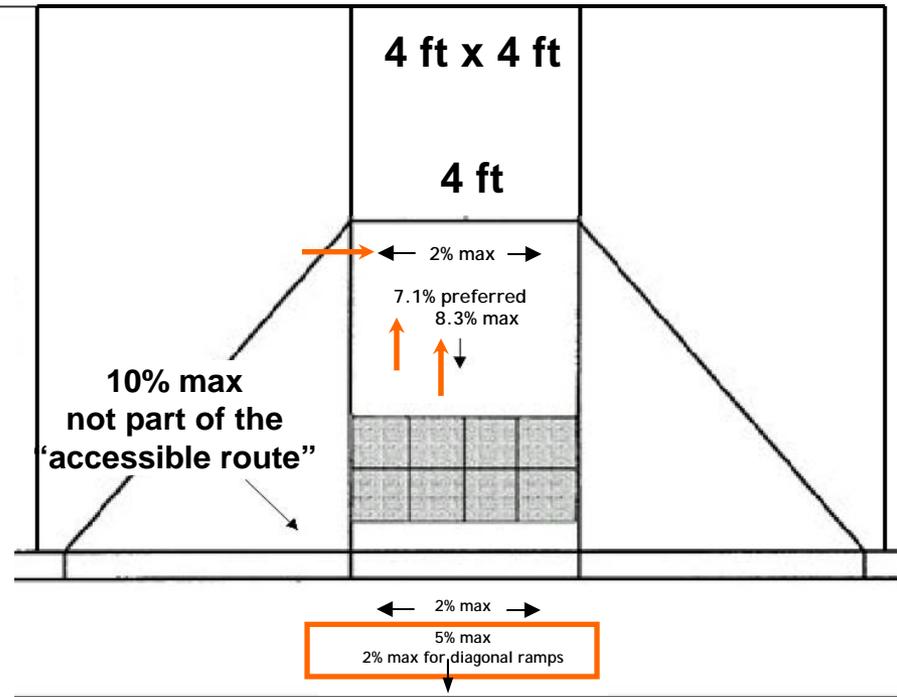
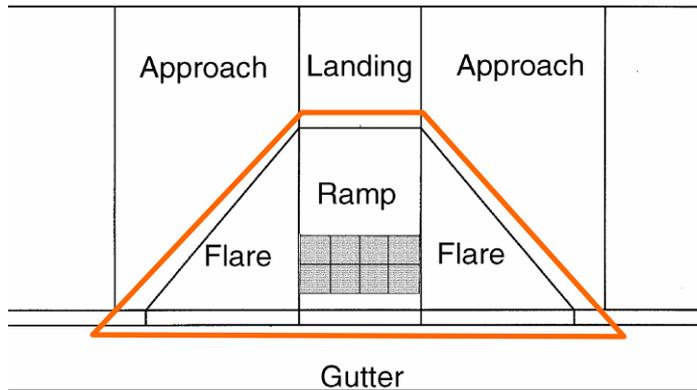
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- US Access Board Video (click link below)
 - [who use wheelchairs](#) 10 min
 - Copy the following address into browser if you encounter any problems
 - <http://fhwa.na3.acrobat.com/abwheelchair/>
 - Remember to turn on your speakers
 - Also it may take a minute or two to load



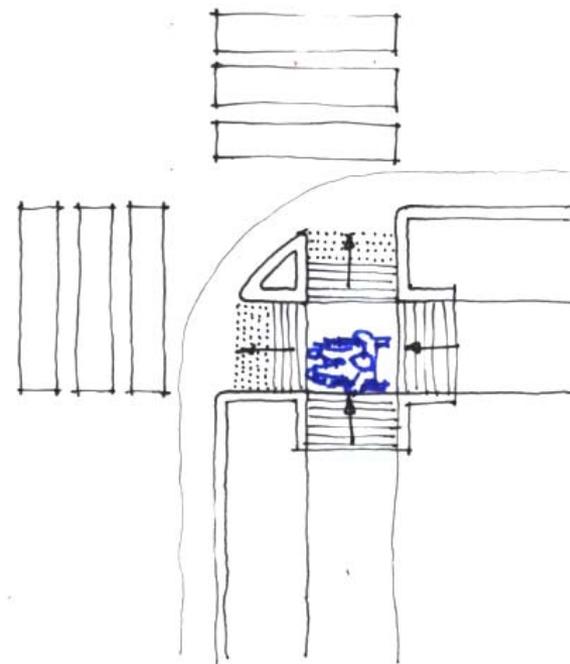
Curb Ramp Components

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Ramp Alignment

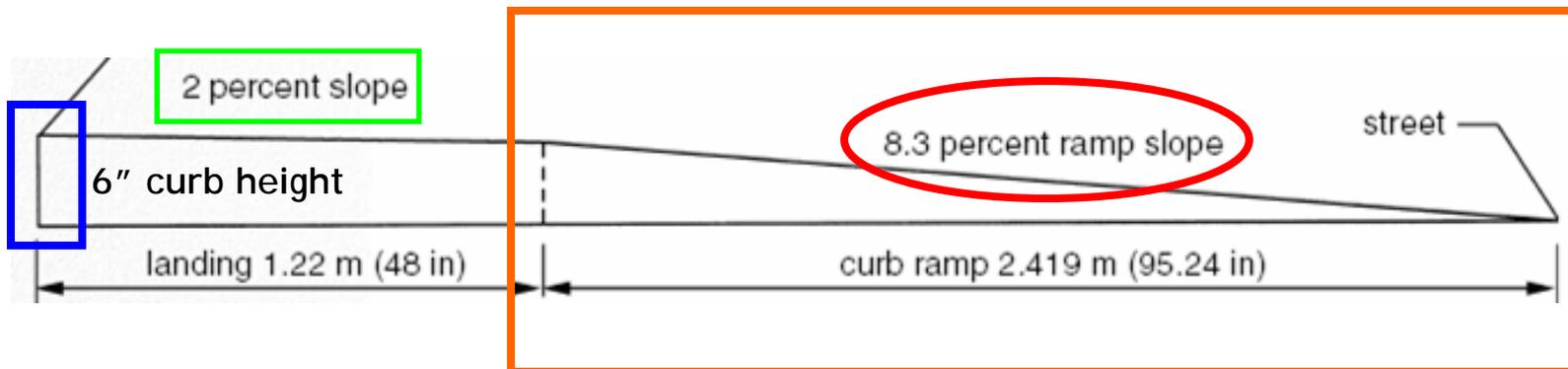
- Ramps aligned with crosswalks help wheelchair users orient themselves to cross the street
- On small radius corner, ramp can be aligned with crosswalk and be perpendicular to curb



Ramp Length

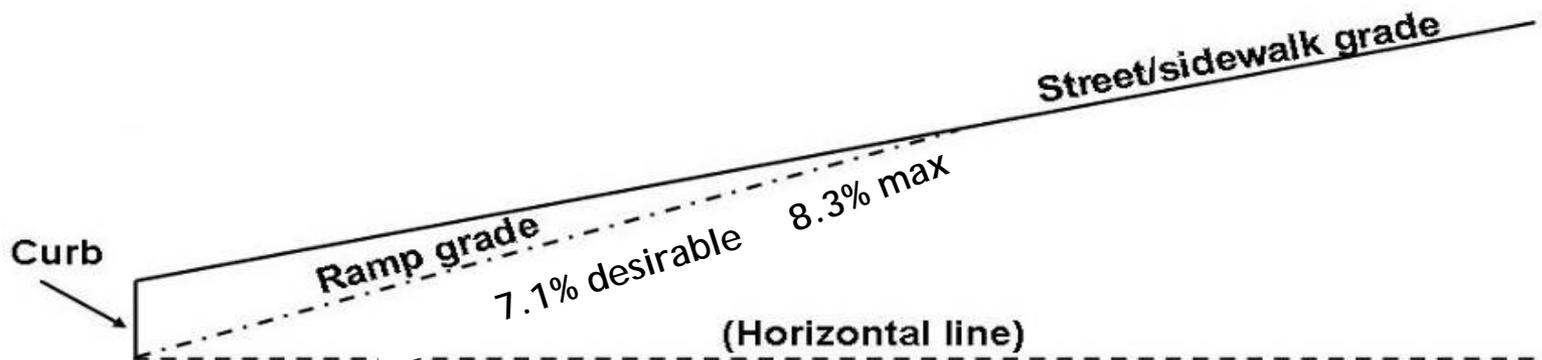
$$\text{Ramp Length} = \frac{\text{curb height } 6''}{(\text{ramp slope } 8.3\% - (\text{sidewalk cross slope } 2\%))}$$

- Sample ramp length calculation
 - $6'' / (8.3\% - 2\%) = 7' 11''$
- Higher curb or flatter ramp grade = longer ramp



Ramp Grade

- Recommended maximum grade to allow for construction tolerance - 7.1%
- Maximum grade - 8.3%
- Least slope possible is preferred
- When “chasing grade,” ramp length need not exceed 15', but slope must be uniform (PROWAG)



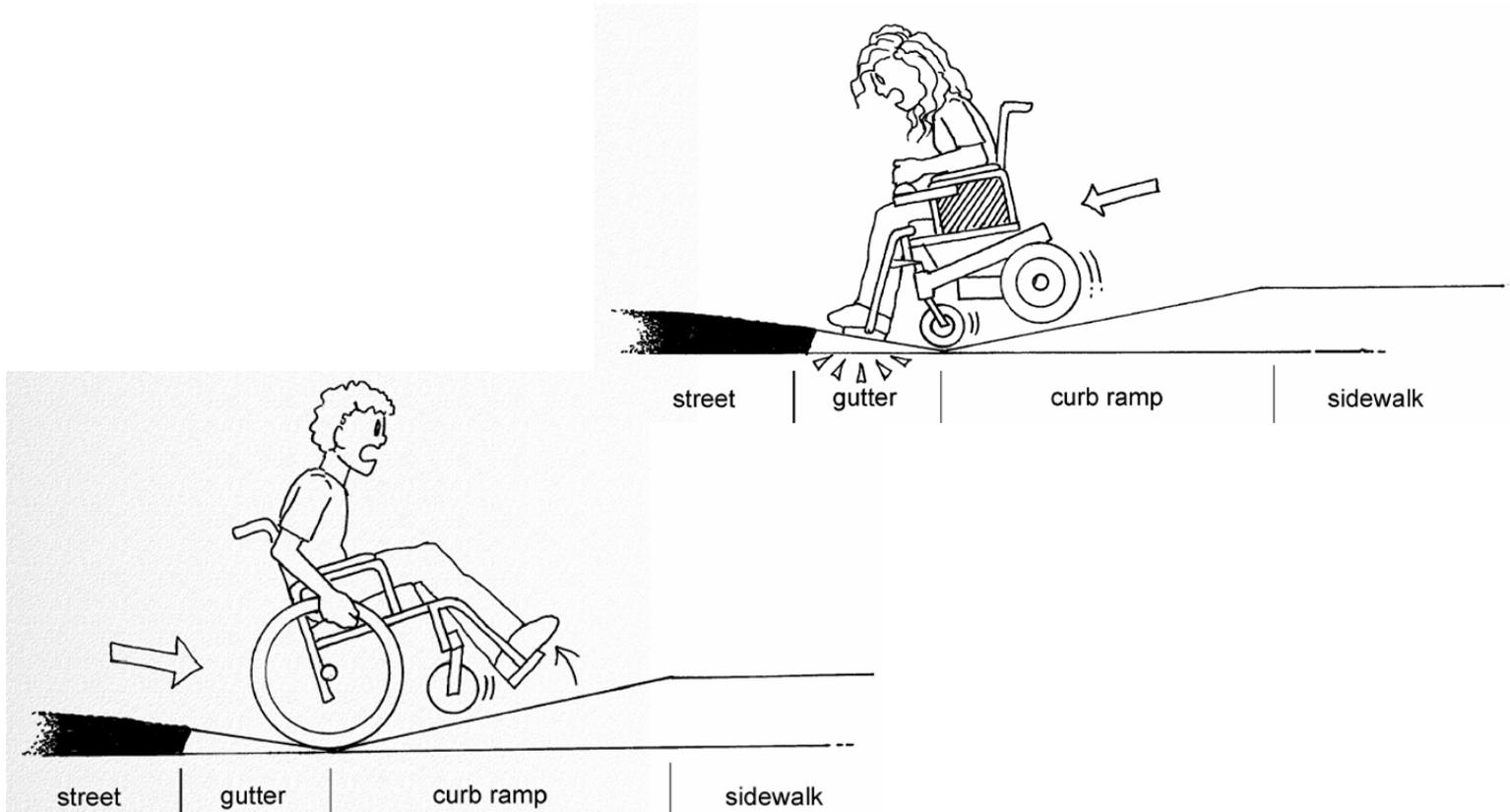
Change of Grade

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Abrupt changes of grade are difficult to use and can cause wheelchairs to flip over backward or forward



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Change of Grade

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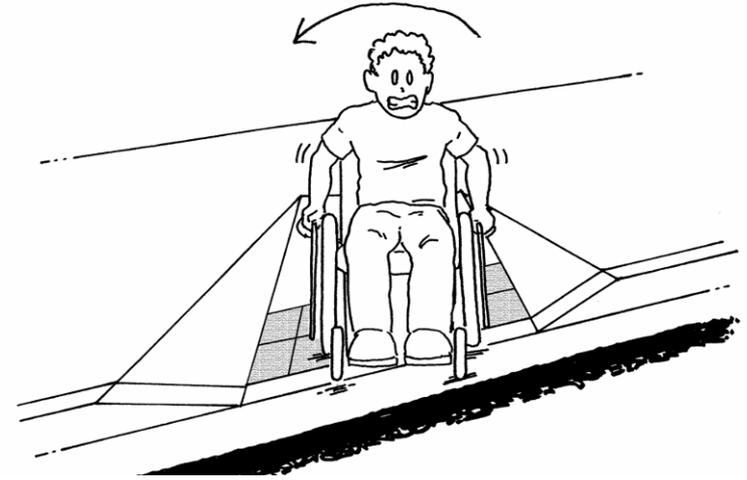
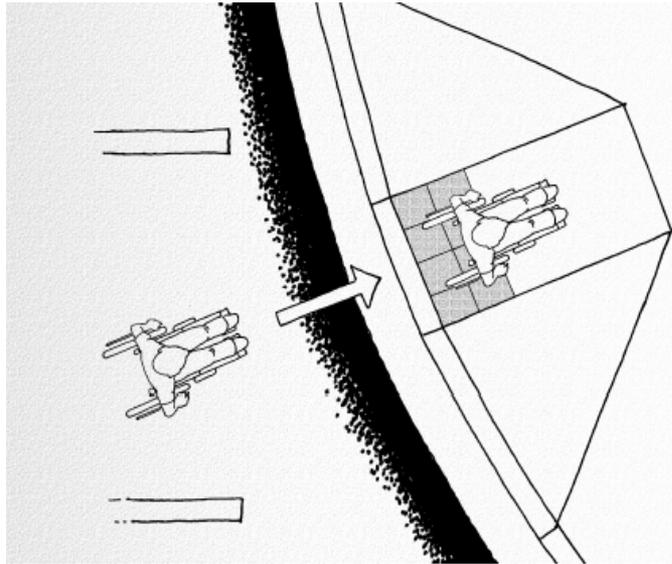
Without the flat area, a wheelchair can get stuck at the bottom of the ramp or flip forward or backward



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Ramp Alignment

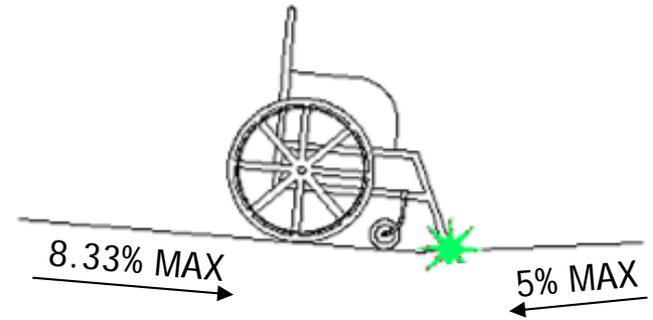
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Change of Grade

- PROWAG allows 8.3% ramp plus 5% grade at the adjacent street = 13.3%



- Recommendation calls for:
 - 11% maximum
 - Provide 2' level area if greater than 11%

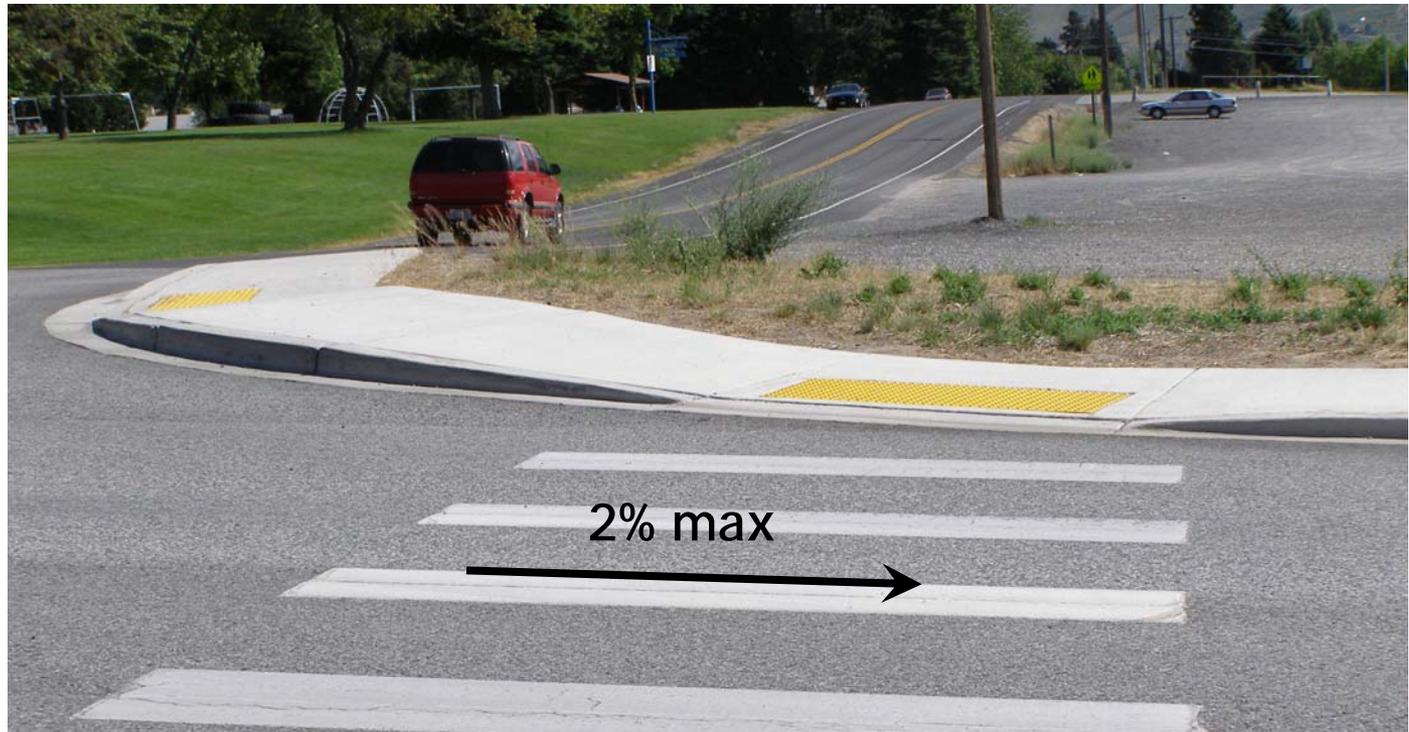


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R303.2.1.2 Cross Slope

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The cross slope at intersections shall be 2 percent maximum. The cross slope at midblock crossings shall be permitted to be warped to meet street or highway grade.



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Ramp Cross Slope

- Ramp cross slope shall not exceed 2.0 percent (1:48) - Zero is best
- Combined running slope and cross slope makes climbing ramps more difficult
- Since ramp running slope is significant, cross-slope should be minimized



Gutter Slope

(Parallel to the curb and the roadway)

- Becomes a cross slope for pedestrians
- Slope should not exceed 2% at the curb ramp*
- Some slope is needed for drainage



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Gutter Counter Slope (Slope opposite the ramp grade)

- Becomes a running grade for pedestrians
- Slope should not exceed 5% (1:20) at the curb ramp
- 2% maximum for diagonal ramps



Ramp Width

- PROWAG min: 4'
- Wider ramps are better: full crosswalk or sidewalk width



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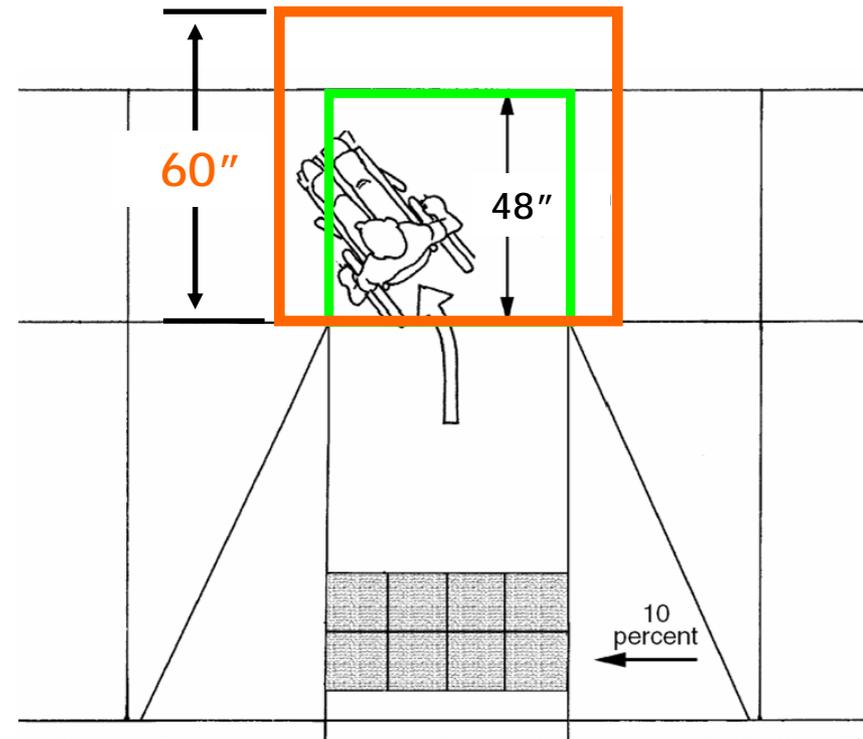
R303.2.1.3 Landing

- Min. 4.0 ft. by 4.0 ft. landing shall be provided at the top of the curb ramp and shall be permitted to overlap other landings and clear space.
- Running and cross slopes at intersections shall be 2 percent maximum.
- Running and cross slope at midblock crossings shall be permitted to be warped to meet street or highway grade.



Landing Dimension and Slope

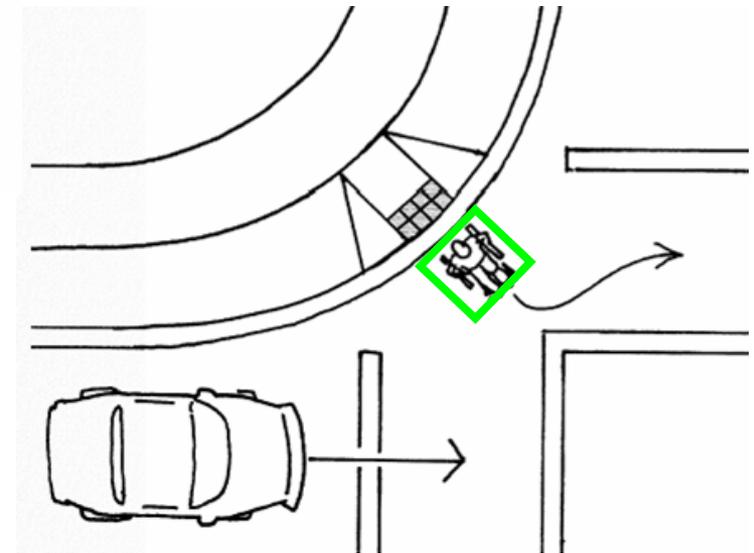
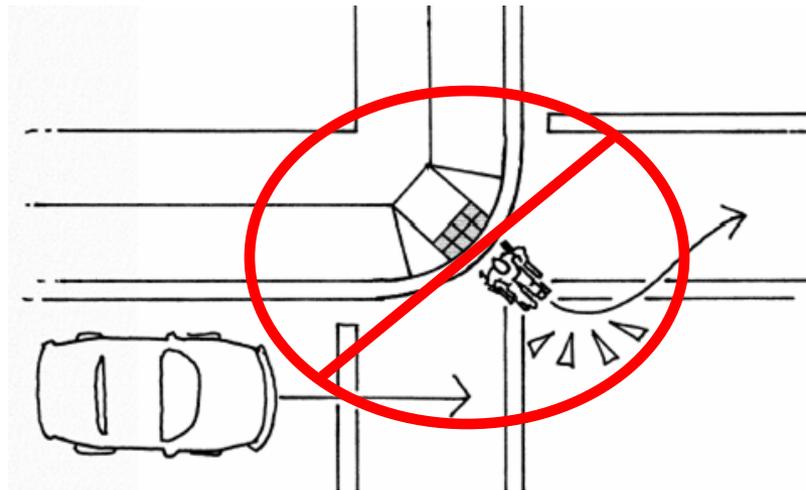
- Landing should be the width of the ramp and at least 48" deep.
- Landing slope: 2.0% max. in any direction
- Landings may overlap or serve multiple ramps



Bottom Landing

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Bottom of ramp must have 48 x 48 inch level (2% max) clear space outside of vehicle travel lanes

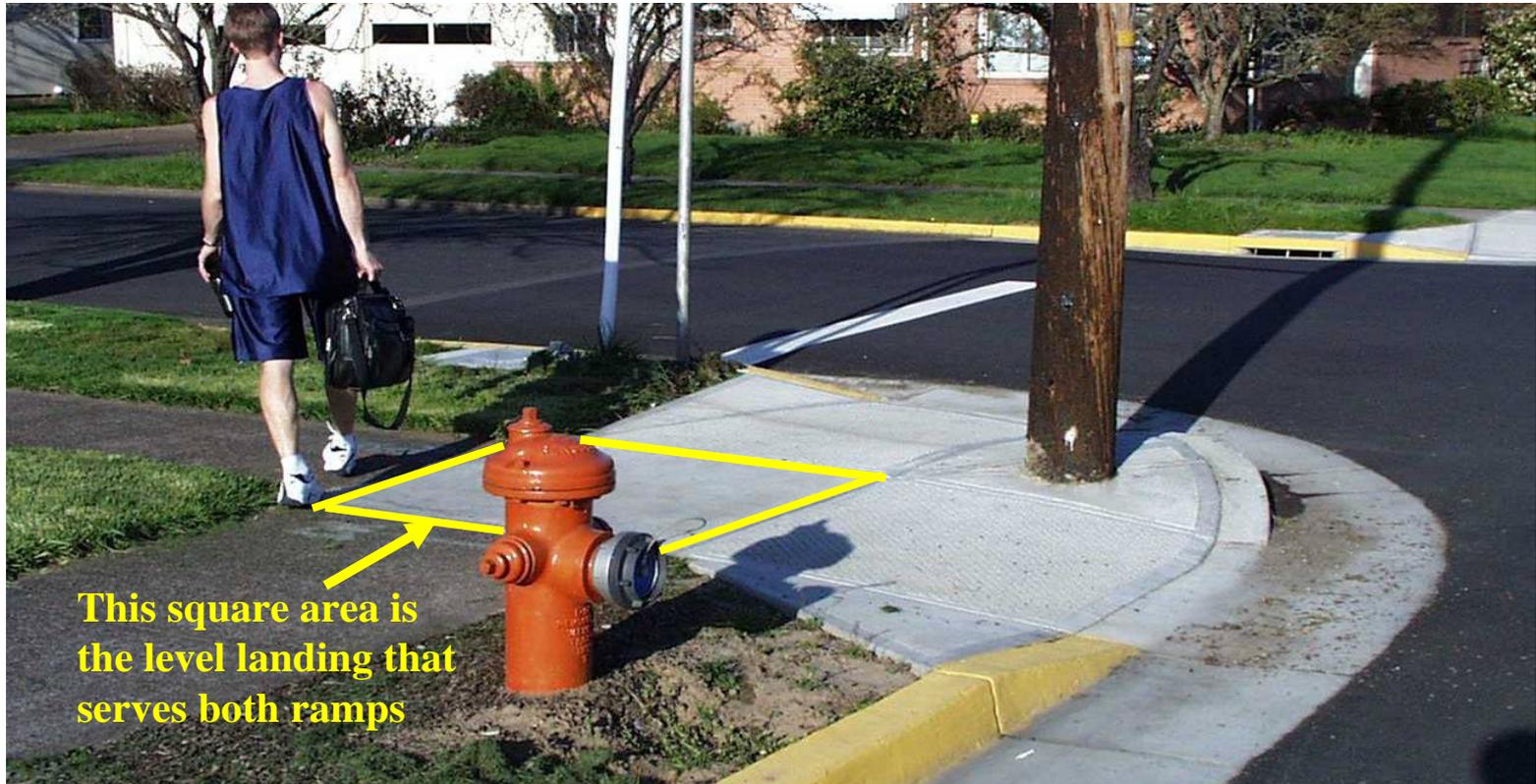


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Level Landings

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Planter strip & small radius make it easy to place 2 ramps per corner lined up with sidewalks, obstacle-free, and with landings



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Level Landings

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Without landing, user must turn while climbing, which is difficult for many users

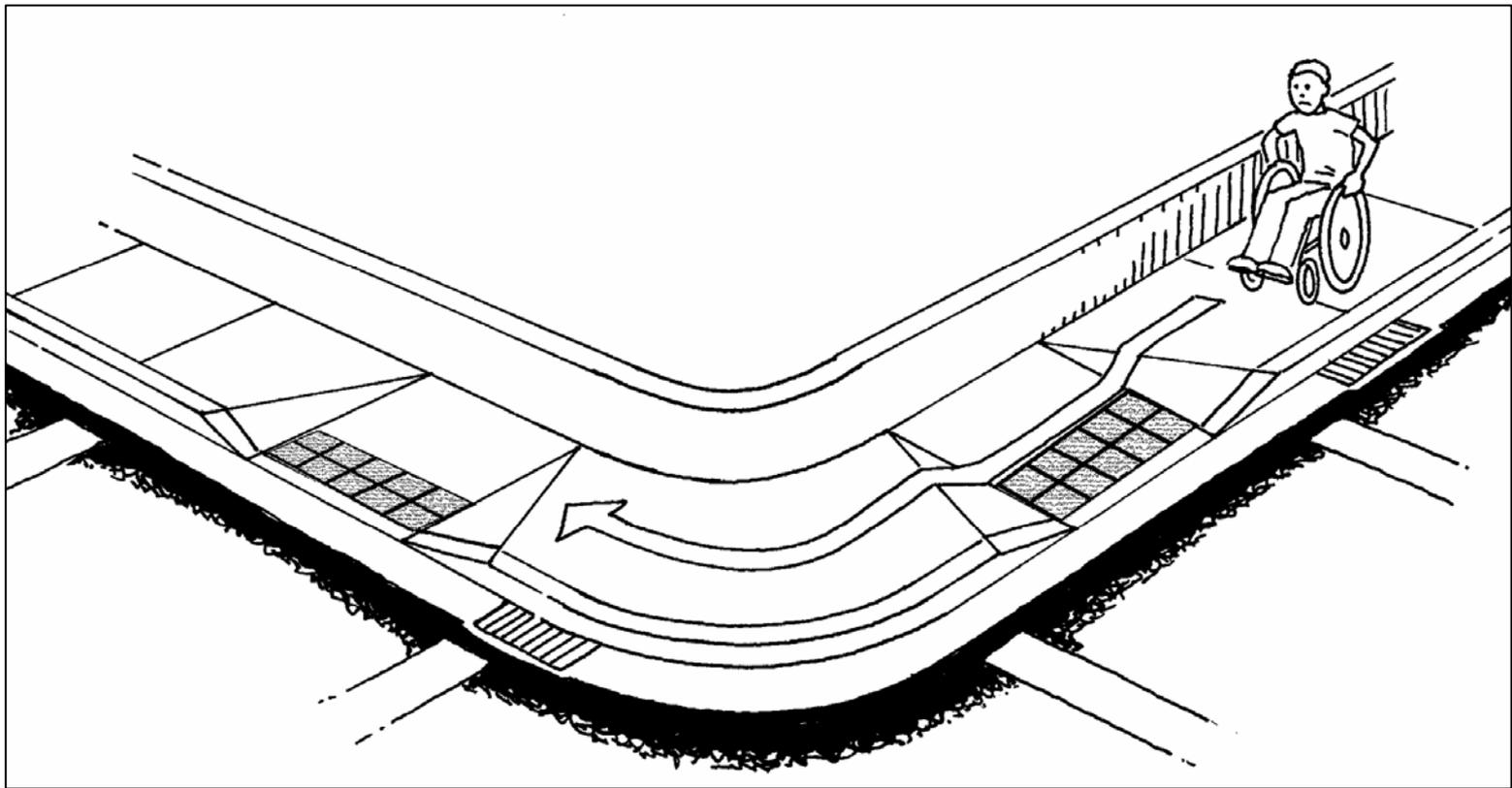


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Level Landings

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Without landing, pedestrians continuing along the sidewalk experience severe cross-slope



Level Landings

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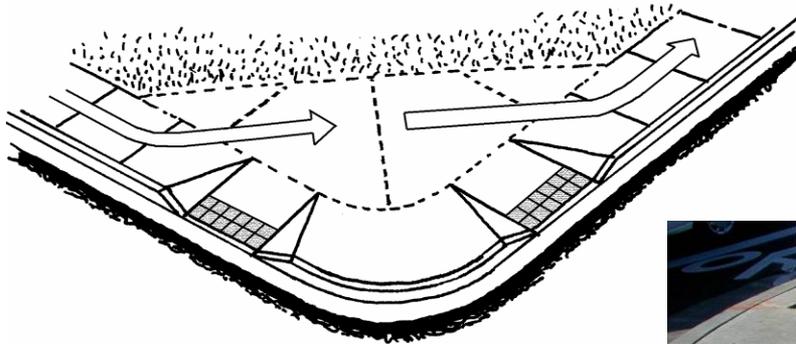


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Level Landings

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Non-compliant ramps without landings can be retrofitted by adding landing behind the ramps



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R303.2.1.4 Flares

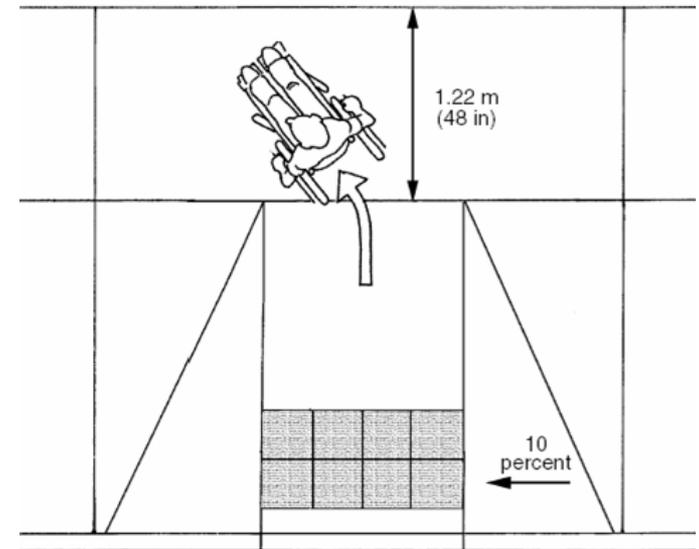
Flared sides with a slope of 10 percent maximum, measured parallel to the curb line, shall be provided where a pedestrian circulation path crosses the curb ramp.



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Flares

- Not part of the accessible route
- Flares should be used on all curbside sidewalks
- Flare slope: 10% (1:10) max. (ADAAG 4.7.5)
- If landing is less than 48", flare slope 8.33% (1:12) max.

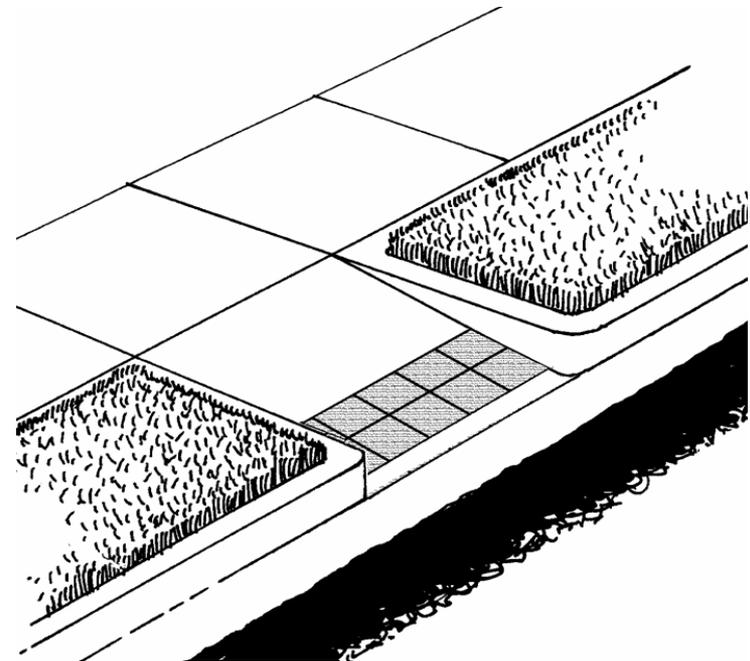


No Flare Curb Ramps

- Flares are not necessary where furniture zone is landscaped - curbs are sufficient (ADAAG 4.7.5).
- Curbs help guide users down the ramp. Protecting the sides of curb ramps with planting, signs, or street furniture allow curbs to be used to help promote wayfinding



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Flares

Flares not needed in landscaped areas



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Surfaces

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Ramps should be smooth, texture makes them hard to climb



Poor design



Better design

Drainage at Curb Ramps

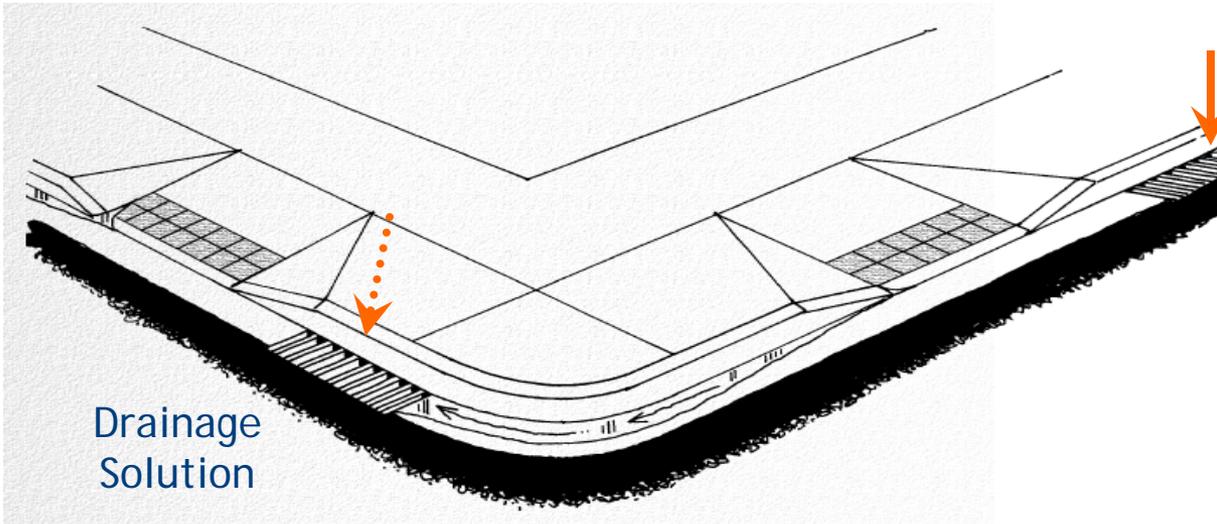
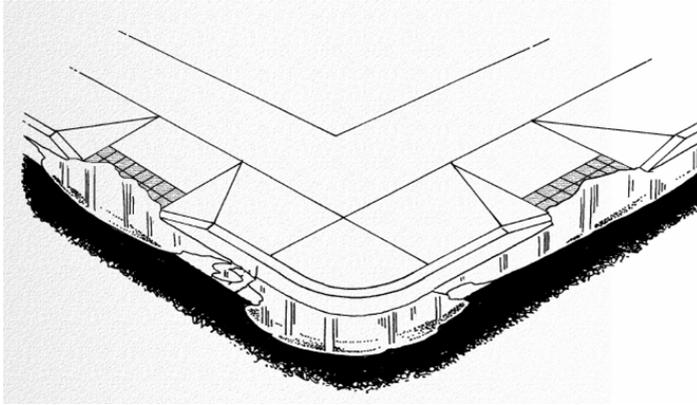
- Drainage can be difficult because gutter grade should not exceed 2%
- To prevent standing water at the base of ramps:
 - Place inlets upstream of ramps
 - Widen the gutter pan and flatten at the ramp
 - The gutter pan counter slope must be flatter than the running slope of the ramp; a steeper gutter cross slope can resume outside the ramp



Drainage at Curb Ramps

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Add inlets upstream of ramps



Drainage
Solution

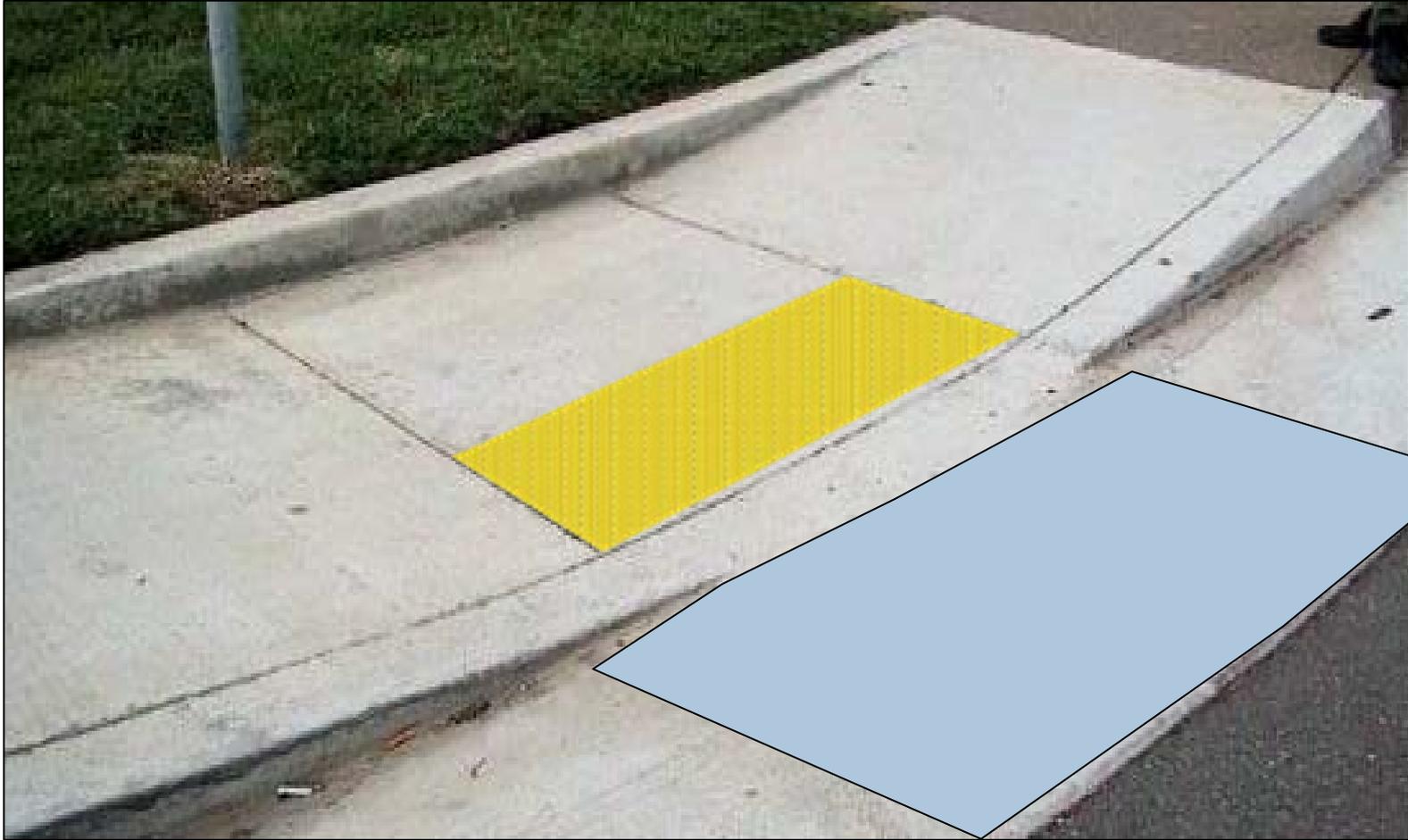


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Drainage at Curb Ramps

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Widened gutter pan flattened to 2% at ramp



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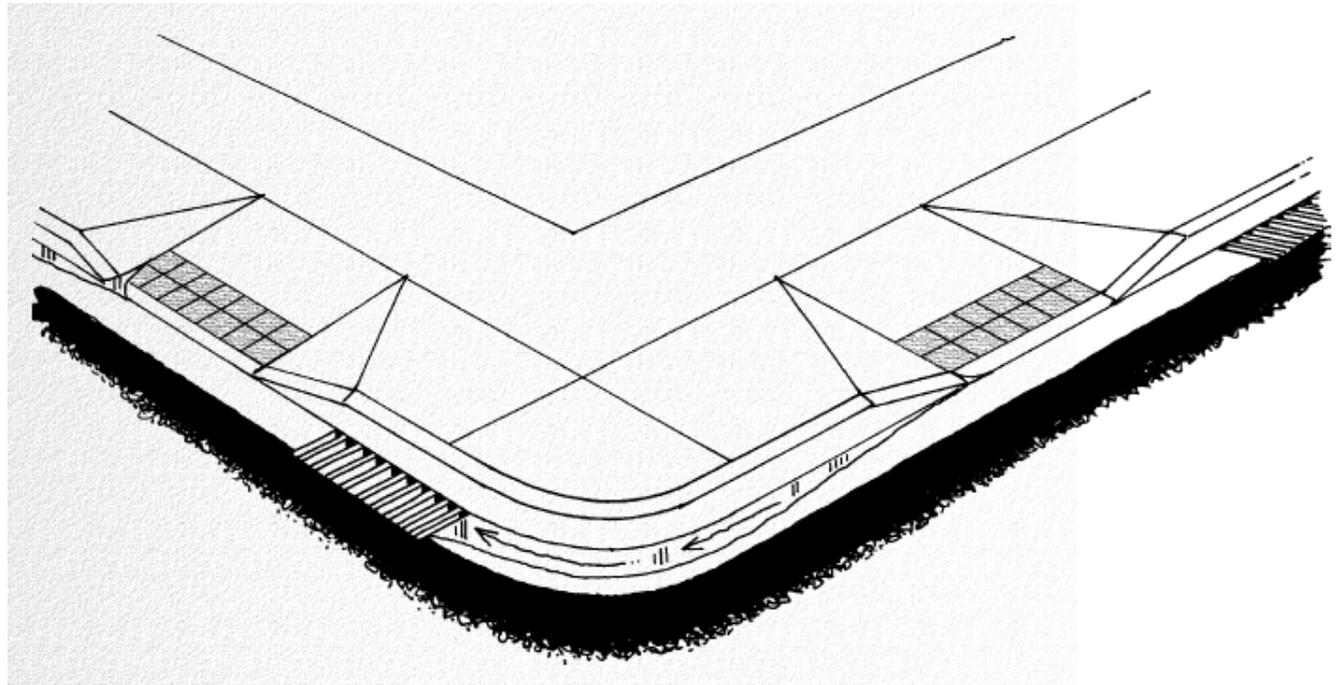
R303.2 Types

- R303.2.1 - Perpendicular curb ramps
- R303.2.2 - Parallel curb ramps
- R303.2.3 - Blended transitions



R303.2.1 Perpendicular Curb Ramps

- Perpendicular curb ramps shall have a running slope that cuts through or is built up to the curb at right angles or meets the gutter grade break at right angles.



Typical midblock perpendicular ramp with a level landing

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Perpendicular Curb Ramp

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Perpendicular Curb Ramps

- Disadvantages

- Difficult to provide a good path of travel on large radius corners
- Require a lot of space - a wide sidewalk, a curb extension, or a planter strip may be needed to accommodate the curb ramp and the level landing



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R303.2.2 Parallel Curb Ramps

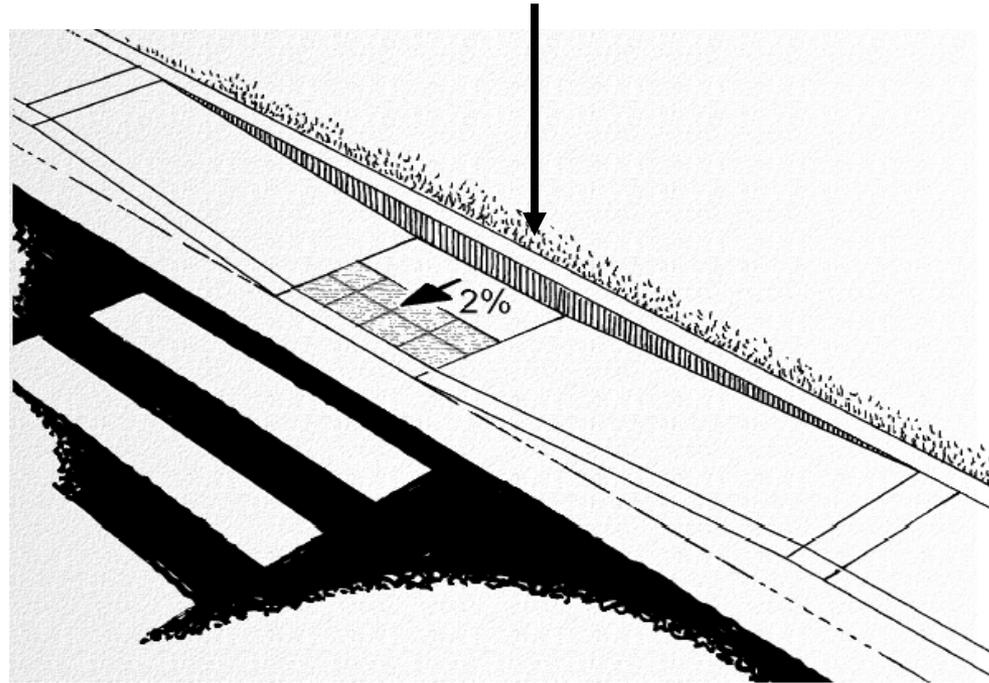
- Parallel curb ramps shall comply with R303.2.2, and shall have a running slope that is in-line with the direction of sidewalk travel.



Parallel Curb Ramps

- The ramp is parallel to the curb and the pedestrian's direction of travel on the sidewalk

Curb at rear not required, but retains soil and provides edge for pedestrians with visual impairments



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Parallel Curb Ramps

- Disadvantages

- Users continuing along the sidewalk must negotiate ramp grades
- Careful attention must be given to the construction of the bottom landing to limit accumulation of water and/or debris



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R303.2.3 Blended Transitions

- Blended transitions shall comply with R303.3. Running slope shall be 5 percent maximum and cross slope shall be 2 percent maximum.

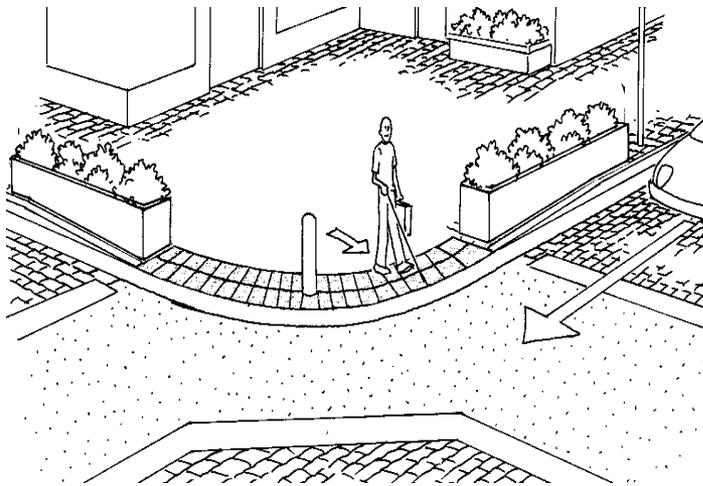


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Blended Transitions

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- Sidewalk elevation lowers to street with gradual change in slope

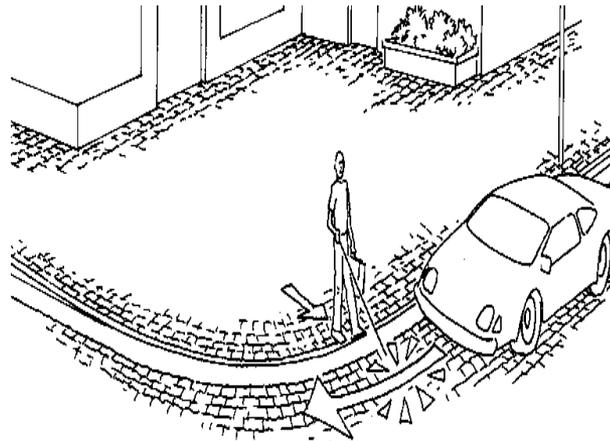


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Blended Transitions

- Disadvantages

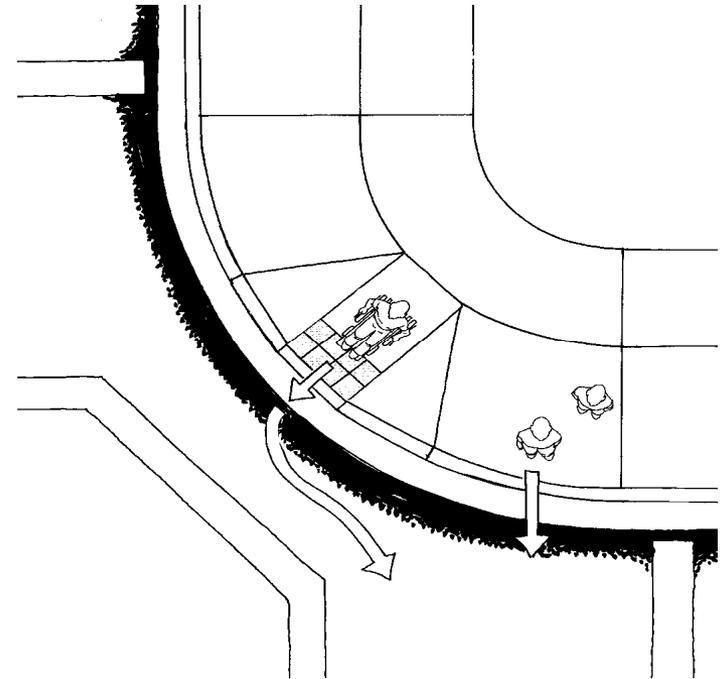
- Children, persons with cognitive impairments, guide dogs may not distinguish street edge
- May allow turning vehicles to encroach onto sidewalk



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Diagonal (single) Curb Ramp

- Diagonal ramp is a single ramp (usually perpendicular) located at the apex of the corner
- Should be avoided in new construction
- Maybe OK for alterations:
 - Utility barriers
 - Non signalized intersections
 - Low traffic volume residential



Diagonal Curb Ramp

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Diagonal Curb Ramp

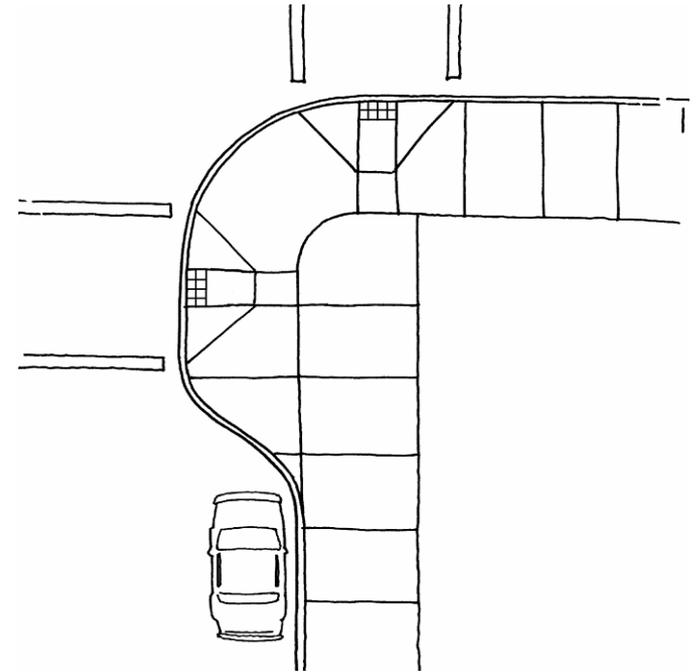
- Disadvantages

- Forces wheelchair users out of crosswalk
- Causes persons who are blind or with low vision to cross diagonally - projecting pedestrians into the center of an intersection



Curb Extensions

- Instead of built-up ramps, use curb extensions with perpendicular ramps at locations with on street parking



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End of Module 3

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Congratulations you have completed module 3 of the
Designing Pedestrian Facilities for Accessibility
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