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
• 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
Curb Ramp Conundrum

- 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

- 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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Curb Ramp Components

- Approach
- Landing
- Approach

- Ramp
- Flare
- Flare

Gutter

- 4 ft x 4 ft
- 4 ft
- 4 ft

- 10% max
- 7.1% preferred
- 8.3% max

- Not part of the ‘accessible route’

- 2% max
- 5% max

- 2% max for diagonal ramps

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Previous  Next
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

\[
\text{Ramp Length} = \frac{\text{curb height}}{\text{ramp slope}} - \frac{\text{sidewalk cross slope}}{8.3\% - 2\%} = 7' 11''
\]

- 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)
Abrupt changes of grade are difficult to use and can cause wheelchairs to flip over backward or forward.
Change of Grade

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

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

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

This square area is the level landing that serves both ramps.
Level Landings

Without landing, user must turn while climbing, which is difficult for many users
Without landing, pedestrians continuing along the sidewalk experience severe cross-slope.
Level Landings

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Level Landings

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

Flares not needed in landscaped areas

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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

Add inlets upstream of ramps
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Drainage at Curb Ramps

Widened gutter pan flattened to 2% at ramp
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.
Perpendicular Curb Ramp

This is the level landing serving both ramps.
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
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.
• 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
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
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.
Blended Transitions

- Sidewalk elevation lowers to street with gradual change in slope
Blended Transitions

- Disadvantages
  - Children, persons with cognitive impairments, guide dogs may not distinguish street edge
  - May allow turning vehicles to encroach onto sidewalk
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.
Congratulations you have completed module 3 of the Designing Pedestrian Facilities for Accessibility course.

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