



COLORADO

Department of
Transportation



Bicycle & Pedestrian Best Practices Compliant Curb Ramps

January 2016



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Despite the fact that the Americans with Disabilities Act turned 25 years old in 2015, a high percentage of CDOT facilities are still not ADA compliant.



Background– Curb Ramps

ADA Law Requires

- **New construction** to be accessible and useable by persons with disabilities
 - *CDOT Guidance - New construction must meet PROWAG standards*
- **Alterations** to existing facilities, within the limits of a project, must provide access to the **maximum extent feasible (MEF)**
 - *CDOT Guidance - If site constraints make constructing a compliant ramp in-feasible engineers shall follow the procedure in PD 605.1 to obtain concurrence for a deviation*
- **Existing facilities** that have not been altered shall not deny access to persons with disabilities
 - *CDOT Guidance - CDOT will implement an ADA transition plan*
- **PROWAG** (Public Right-of-Way Accessibility Guidelines) establishes the criteria curb ramps must meet within the public right-of-way
 - *CDOT Guidance - CDOT will adhere to PROWAG standards*



Background– Curb Ramps What are Alterations?

Pavement Treatment Types (Maintenance vs. Alteration)

MAINTENANCE

Chip Seals

Crack Filling and Sealing

Diamond Grinding

Dowel Bar Retrofit

Fog Seals

Joint Crack Seals

Joint repairs

Pavement Patching

Scrub Sealing

Slurry Seals

Spot High-Friction Treatments

Surface Sealing

ALTERATION

Addition of New Layer of Asphalt

Cape Seals

Hot In-Place Recycling

Microsurfacing / Thin-Lift Overlay

Mill & Fill / Mill & Overlay

New Construction

Open-graded Surface Course

Rehabilitation and Reconstruction



Background– Curb Ramps Requirements during Alterations

Curb ramps within an alteration project area must be compliant or be repaired or replaced



- 1 - Required
- 2 - Not required, outside alteration area
- 3 - Required, due to barrier in path of travel
- 4 - Not required, outside alteration area

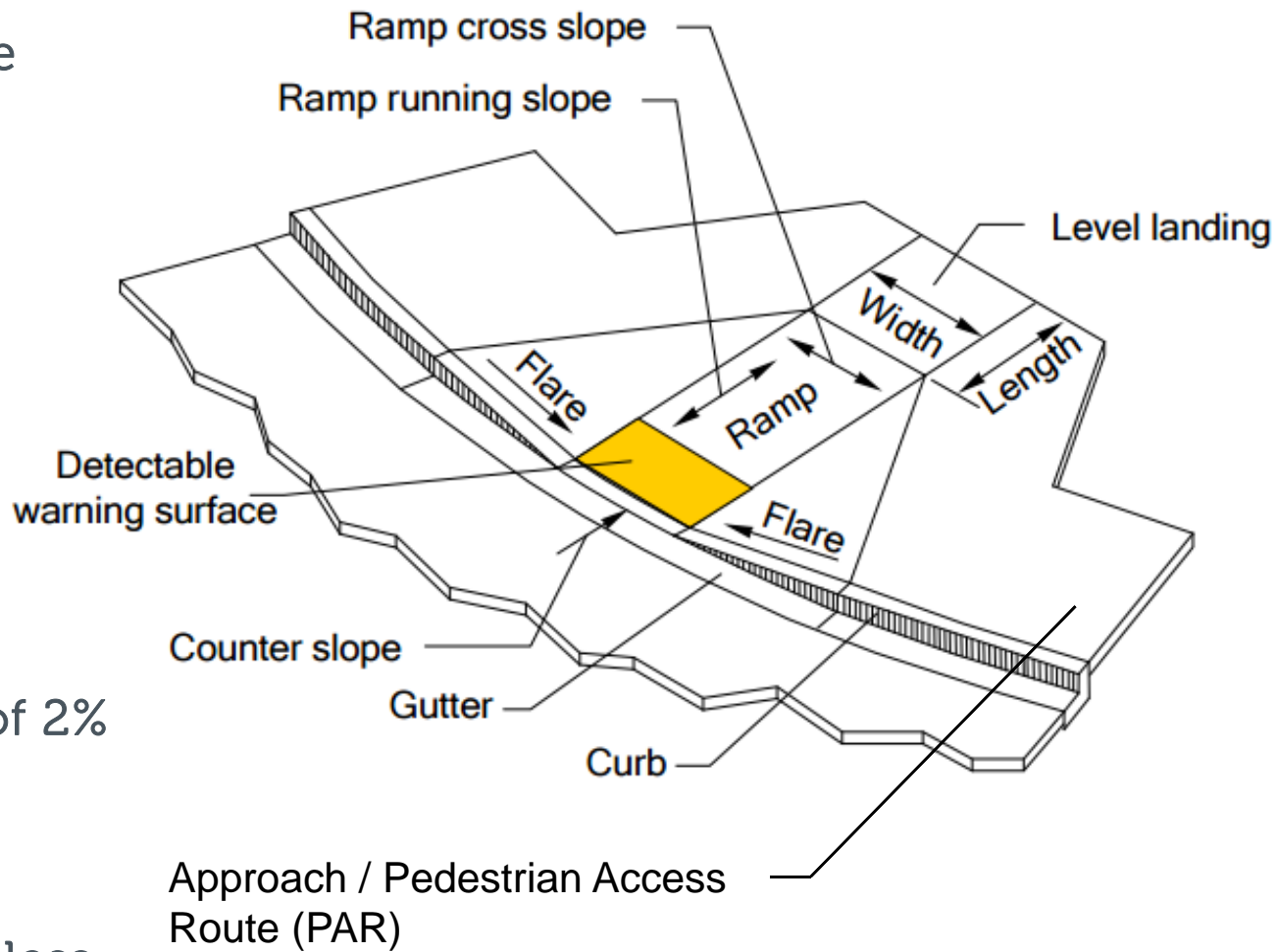


Background– Curb Ramps

Basic Ramp Requirements

- Ramp running slope of 12:1 (8.33%) or flatter
- Detectable warning surface present where curb face is missing
- 4'-0" wide minimum accessible path (5'-0" preferred)
- 10:1 (10%) maximum slope on ramp flares
- Level landing with slopes of 2% or less in any direction (4' x 4' min.)
- Ramp cross slope of 2% or less
- Counter slope of 5% or less

Perpendicular Curb Ramp



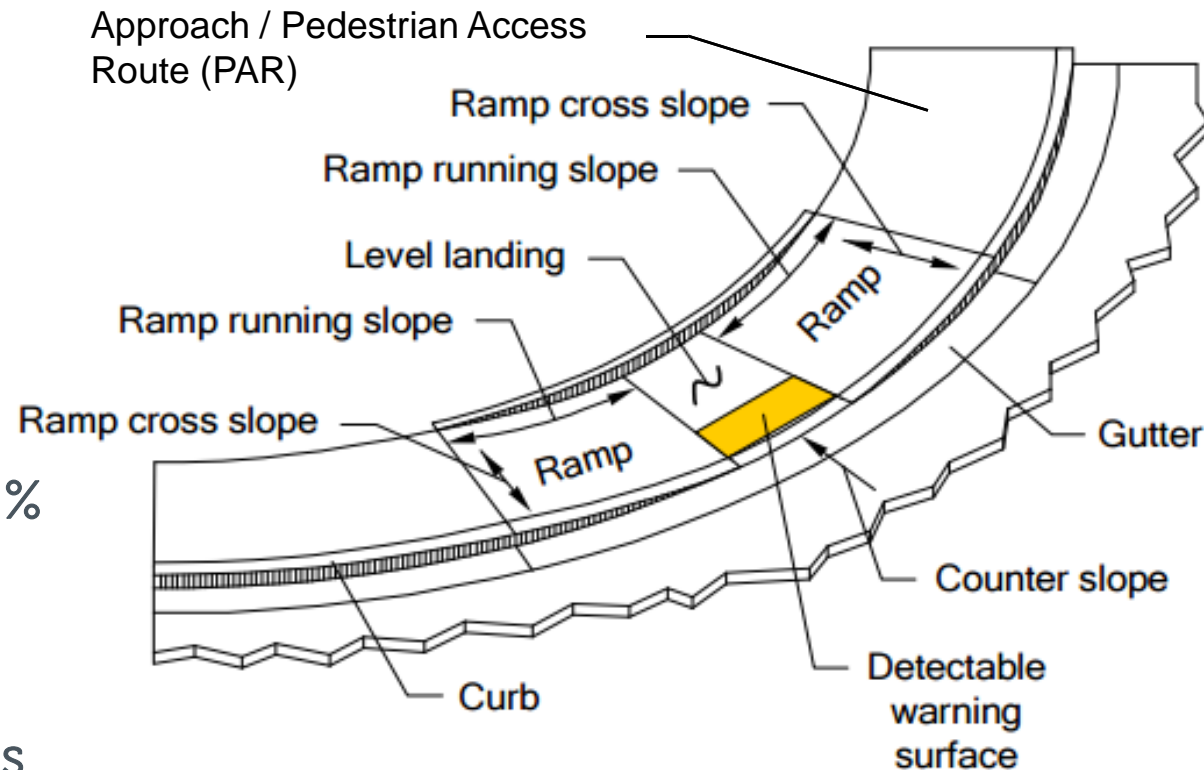


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Parallel Curb Ramp





Background– Curb Ramps

Basic Ramp Requirements

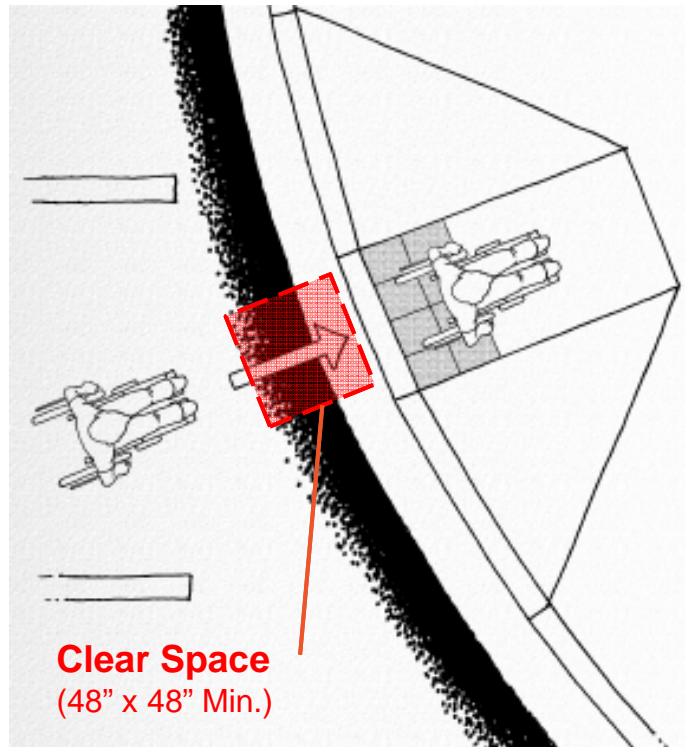
General Considerations and Exceptions

- It is recommended that running slopes and cross slopes be designed to be less than the allowed maximums to allow some tolerance for construction (for example design curb ramps with a 7.5% running slope & 1.5% cross slope).
- The curb ramp running slope shall not require the ramp length to exceed 15 feet. If more than 15 feet is required to catch grade then the ramp running slope requirement may be exceeded.
- Curb ramp cross slopes at midblock crossings are permitted to match the roadway grade.



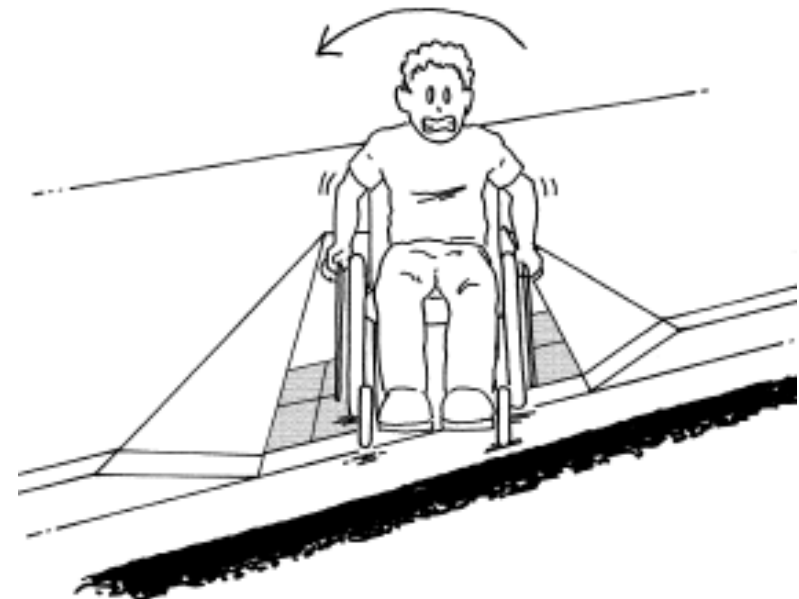
Best Practice – Curb Ramps Grade Breaks

- ➔ Design ramps with grade breaks that are perpendicular to the path of travel



Ramps are easier for wheelchair users to traverse if grade breaks are perpendicular to the path of travel

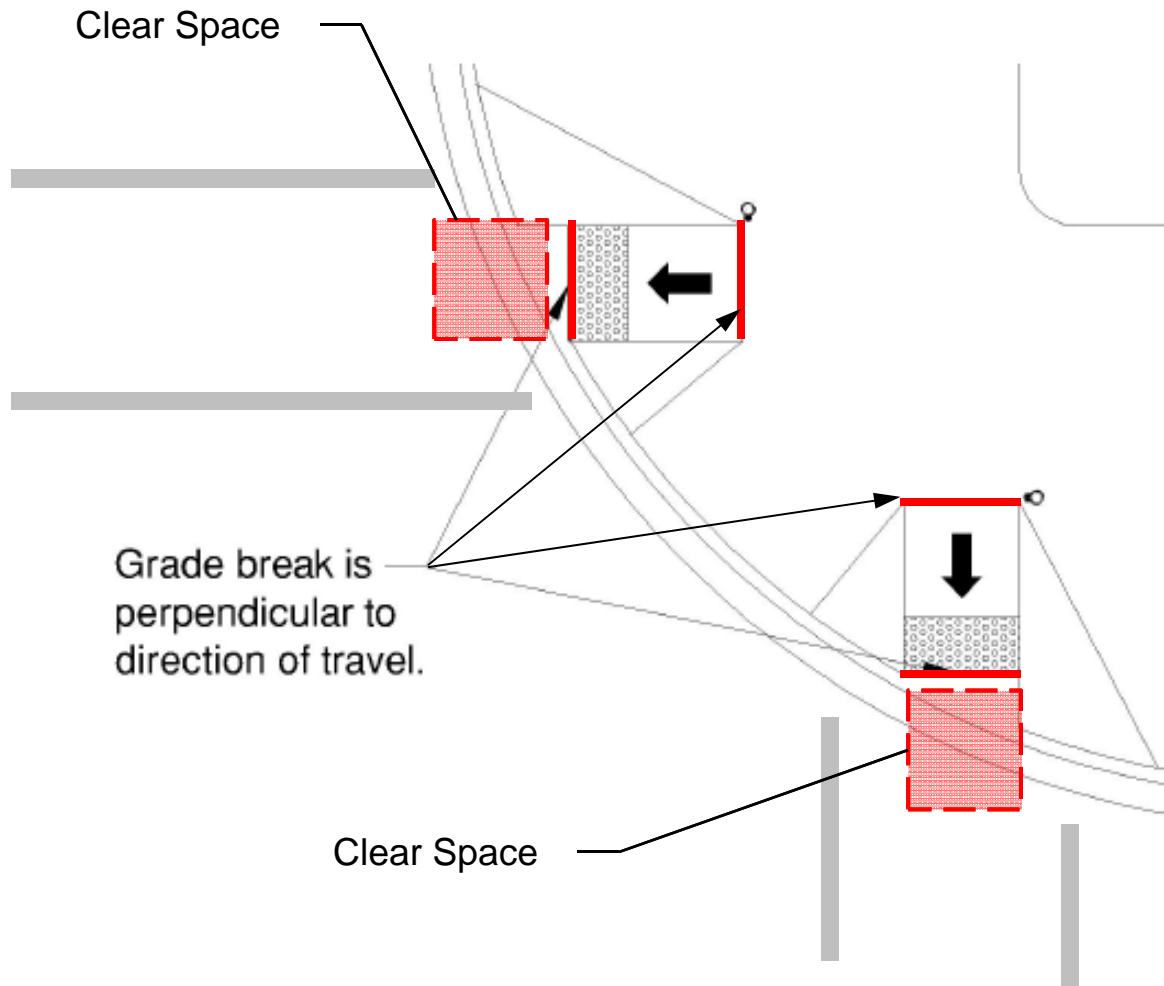
A wheelchair becomes unstable when one front wheel strikes before the other.





Best Practice – Curb Ramps Grade Breaks

- ➔ Design ramps with grade breaks that are perpendicular to the path of travel



- Directional ramps are preferential to ramps which are perpendicular to the corner radius
- Grade breaks at the top and bottom of ramp should be perpendicular to path of travel
- Beyond the bottom grade break a clear space (4' x 4' min.) shall be provided and wholly outside the parallel vehicle travel lane

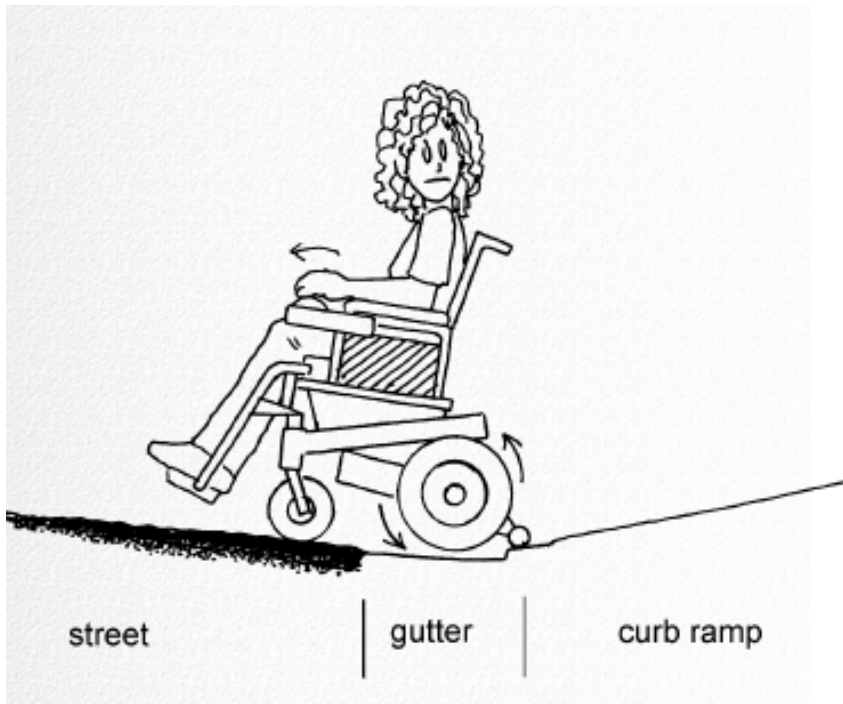


Best Practice – Curb Ramps

Flush Surfaces

➔ Transitions from ramps to gutter and street should be flush and free of level changes

- Transitions from ramps to gutter, street, and sidewalk should be flush
- Lips or vertical discontinuities can create access barriers or cause wheeled users to become stuck

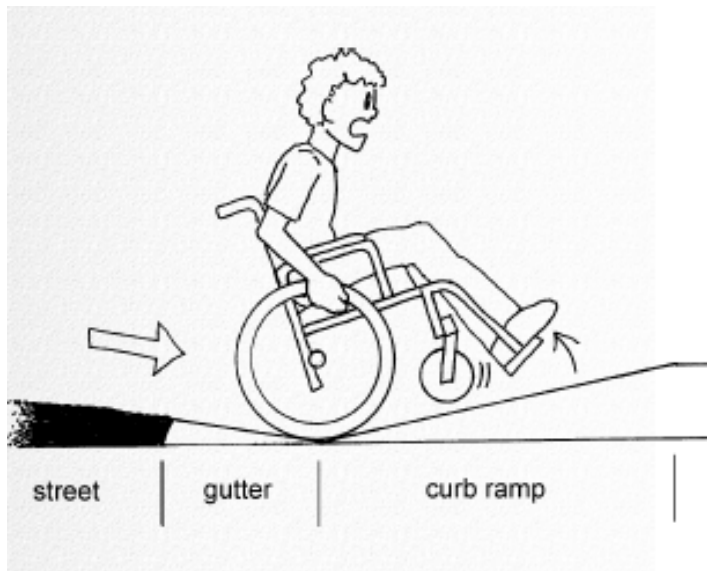
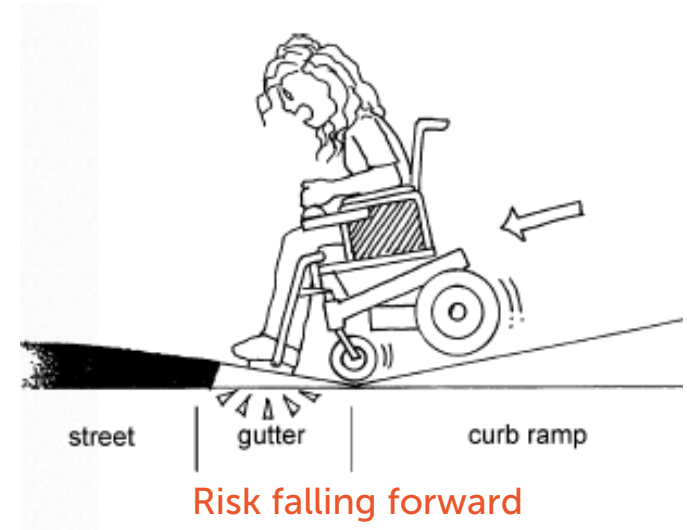




Best Practice – Curb Ramps Change of Grade

➔ Avoid changes in grade greater than 13.33%

- Clearance may be an issue at abrupt changes in grade. Wheelchairs often have footrests or anti-tip wheels that are positioned close to the ground
- The algebraic difference of the counter slope (gutter pan) and the ramp slope should not exceed 13.33
(-5% - 8.33% = 13.33)



Risk tipping backwards

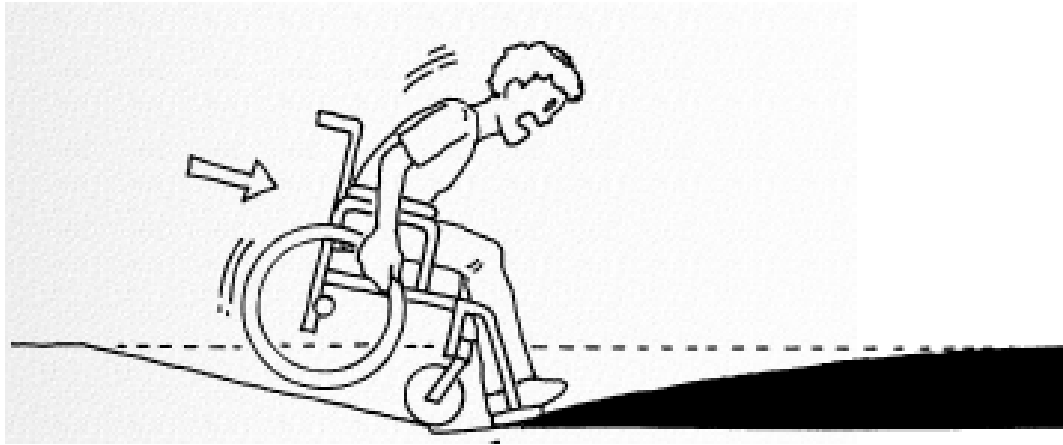




Best Practice – Curb Ramps

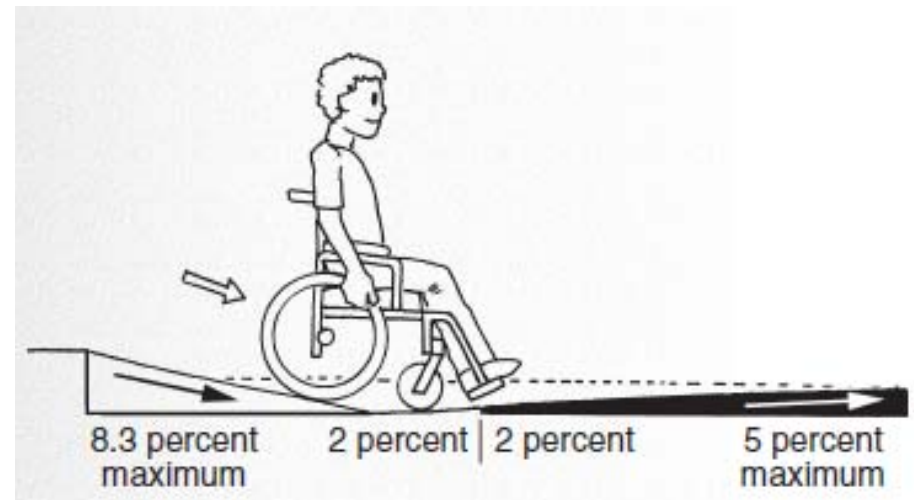
Pavement Overlays

➔ Avoid changes in grade greater than 13.33%



Overlaying existing asphalt without milling away the old asphalt can create steep slopes near the gutter-pan line

Milling away asphalt before resurfacing results in flatter slopes between curb ramps, gutters, and the street



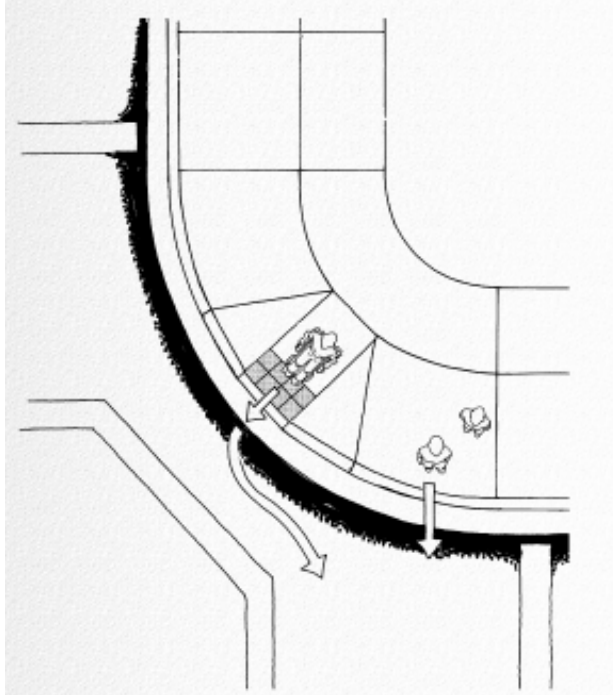


Best Practice – Curb Ramps

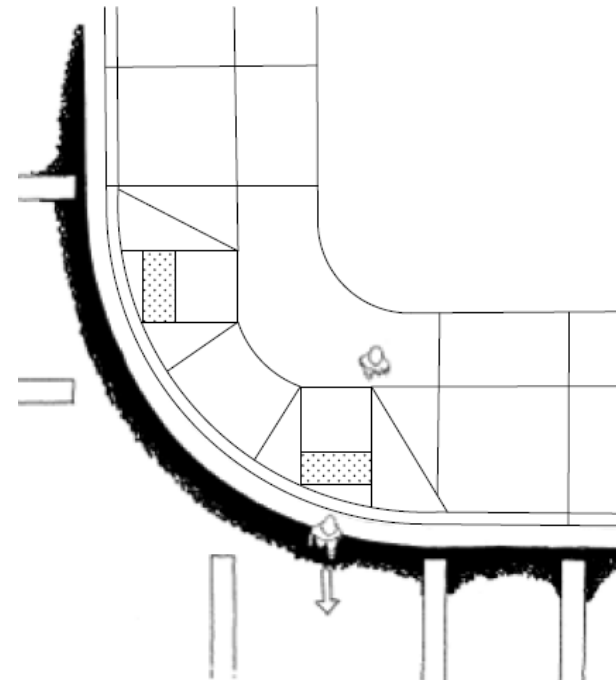
Curb Ramp Placement

➔ Align curb ramps with crosswalks so there is a direct line of travel from the top of the curb ramp to the center of the roadway and the receiving ramp

- Allowable in retrofit situations
- Less obvious to motorists which crossing direction is intended by pedestrian
- Separate ramps that align with each crossing are preferred
- Required on new construction
- Ramps should be placed within the marked crosswalk



Undesirable



Preferred





Best Practice – Curb Ramps

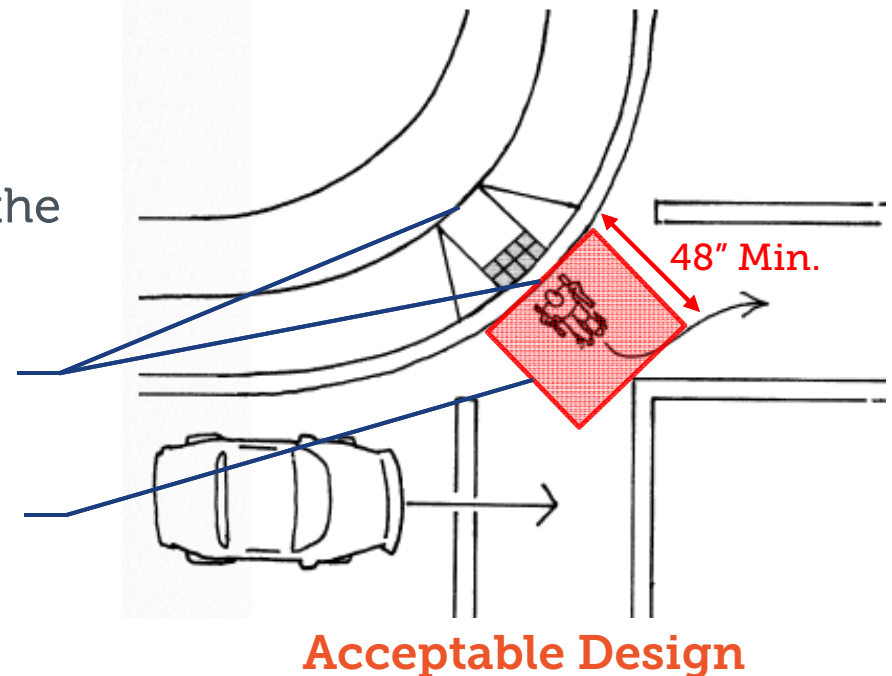
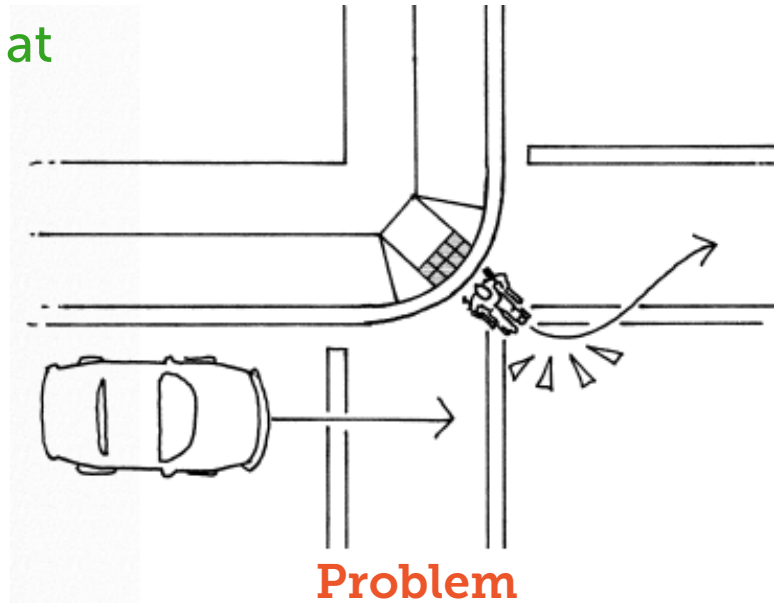
Single Diagonal Ramp

➔ Provide a level maneuvering area or landing at the bottom of a diagonal curb ramp

- Diagonal curb ramps are not ideal and are permitted only on alteration projects with MEF justification
- To be acceptable diagonal curb ramps must provide a 48" clear space, wholly outside the travel lane, which allows users to have enough room to maneuver towards the crosswalk
- 48" clear space must be contained within the crosswalk

Grade breaks should be perpendicular to the path of travel

Level landing/turning space located outside of path of travel of motor vehicles (Slopes 2% or less)





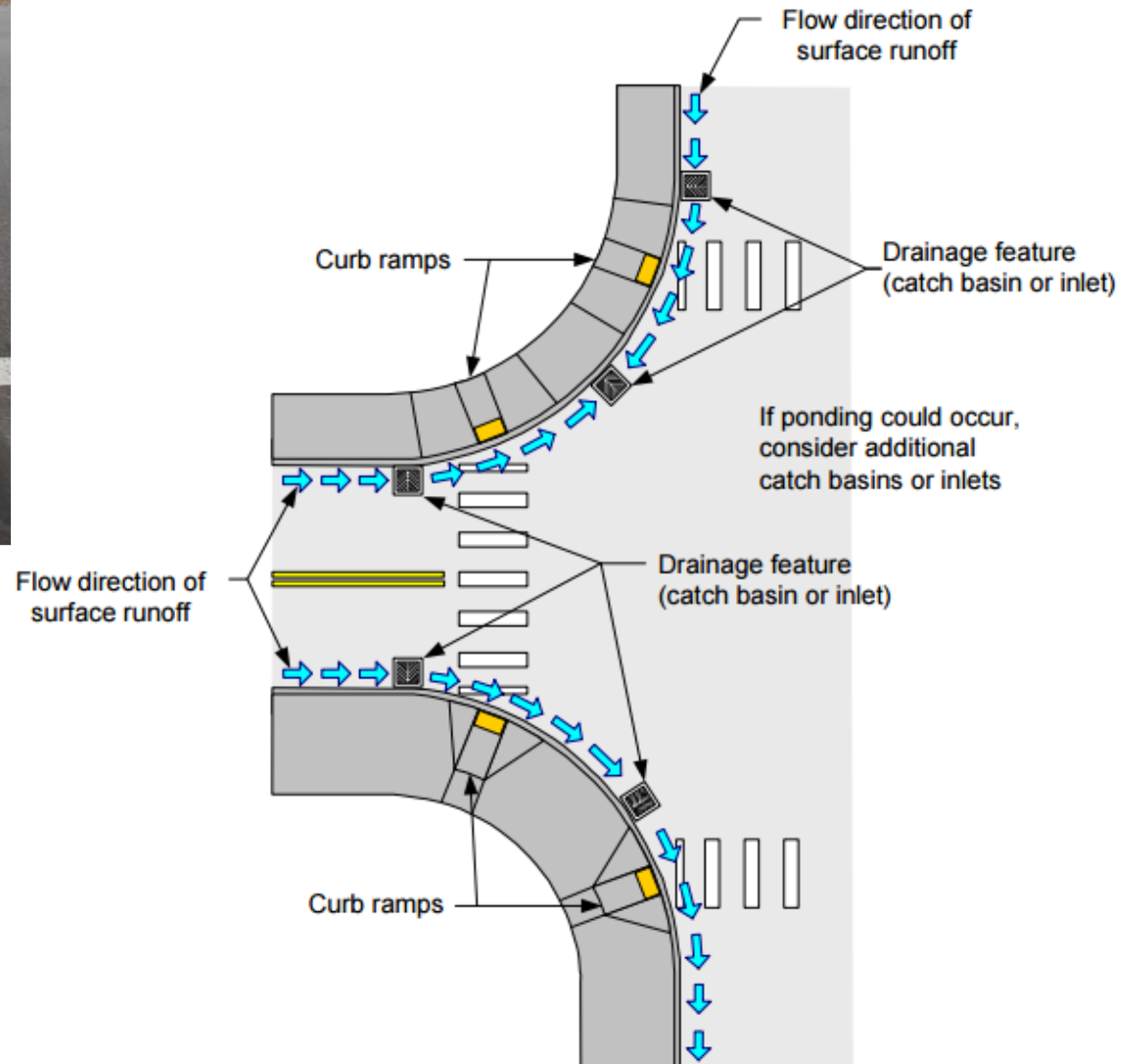
Best Practice – Curb Ramps Drainage



Problem

Curb ramps where water ponds or does not drain are inconvenient and unsafe (when water freezes) for sidewalk users

➔ Locate drainage inlets uphill from curb ramps to prevent ponding in the path of travel





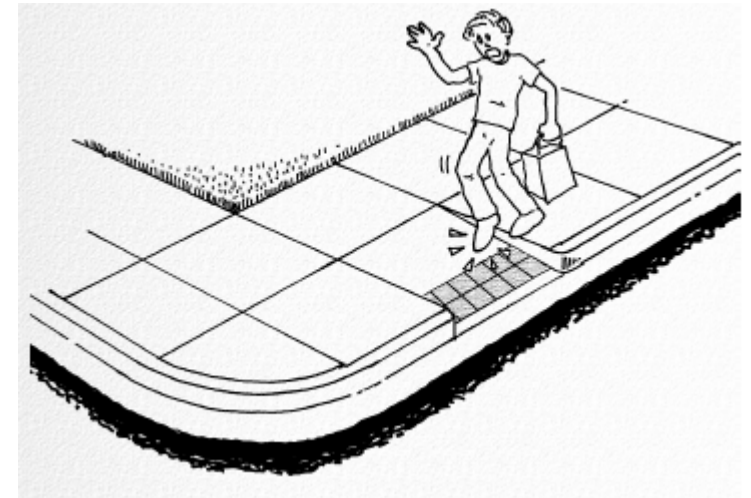
Best Practice – Curb Ramps Returned Curbs & Flares

➔ Returned curbs should only be used where pedestrians cannot or do not have access to walk across the ramp

Should have a ramp flare to eliminate tripping hazard



Poor Curb Ramp Design



Problem



Good Design

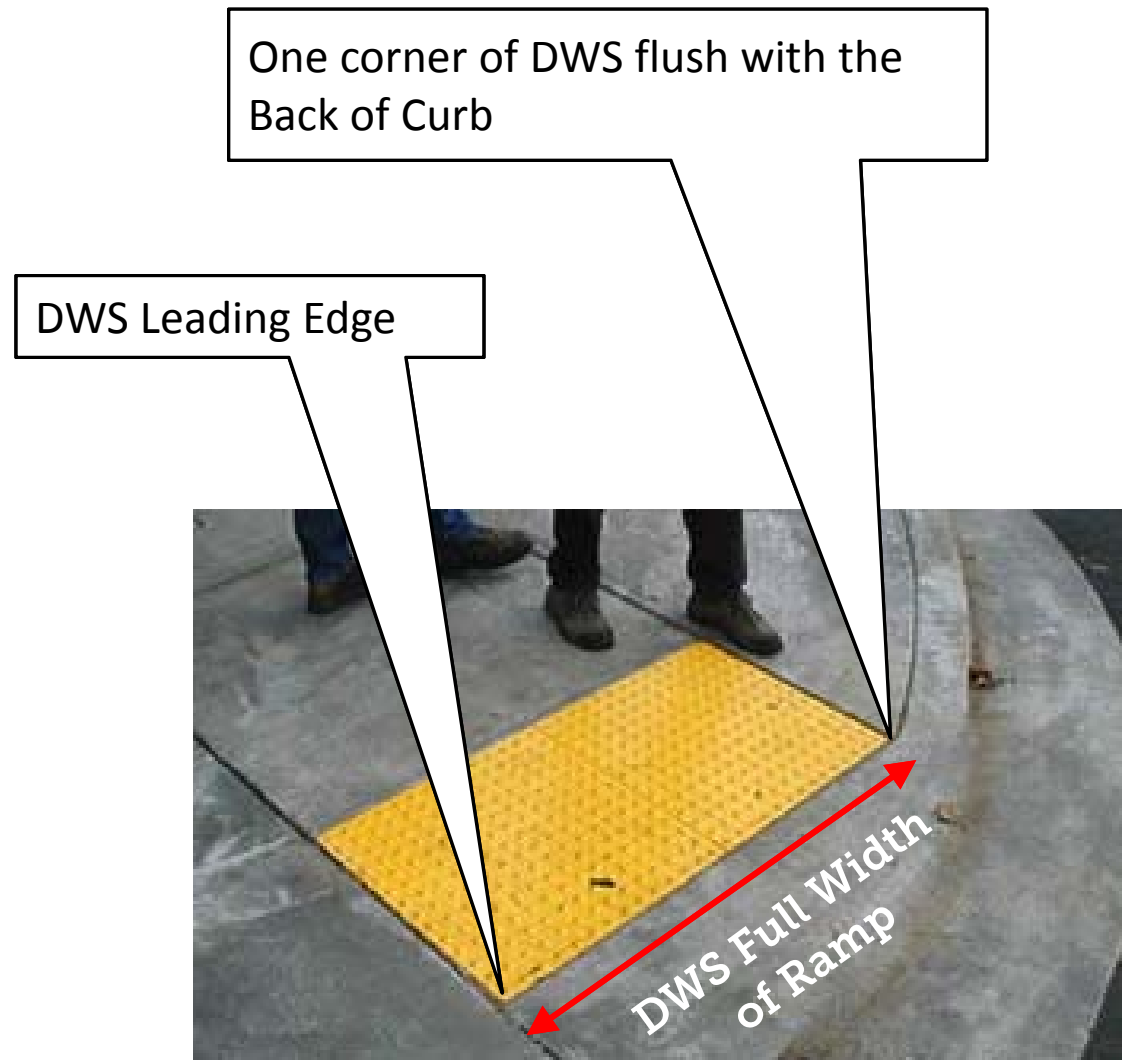


Best Practice – Curb Ramps

Detectable Warnings

➔ Clearly identify the boundary between the curb ramp and the street with a detectable warning

- Detectable warning surfaces (DWS) shall consist of truncated domes (PROWAG R305.1)
- Truncated domes should be parallel to the path of travel so wheelchairs can “track” between the domes
- DWS shall contrast visually with adjacent surfaces (light on dark – dark on light)
- DWS’s are intended to delineate the area where the curb face disappears, not provide wayfinding for the visually impaired





Best Practices – Curb Ramps

Detectable Warnings

- ➔ Clearly identify the boundary between the curb ramp and the street with a detectable warning

When distance between grade break and back of curb is greater than 5' the DWS should be placed along back of curb

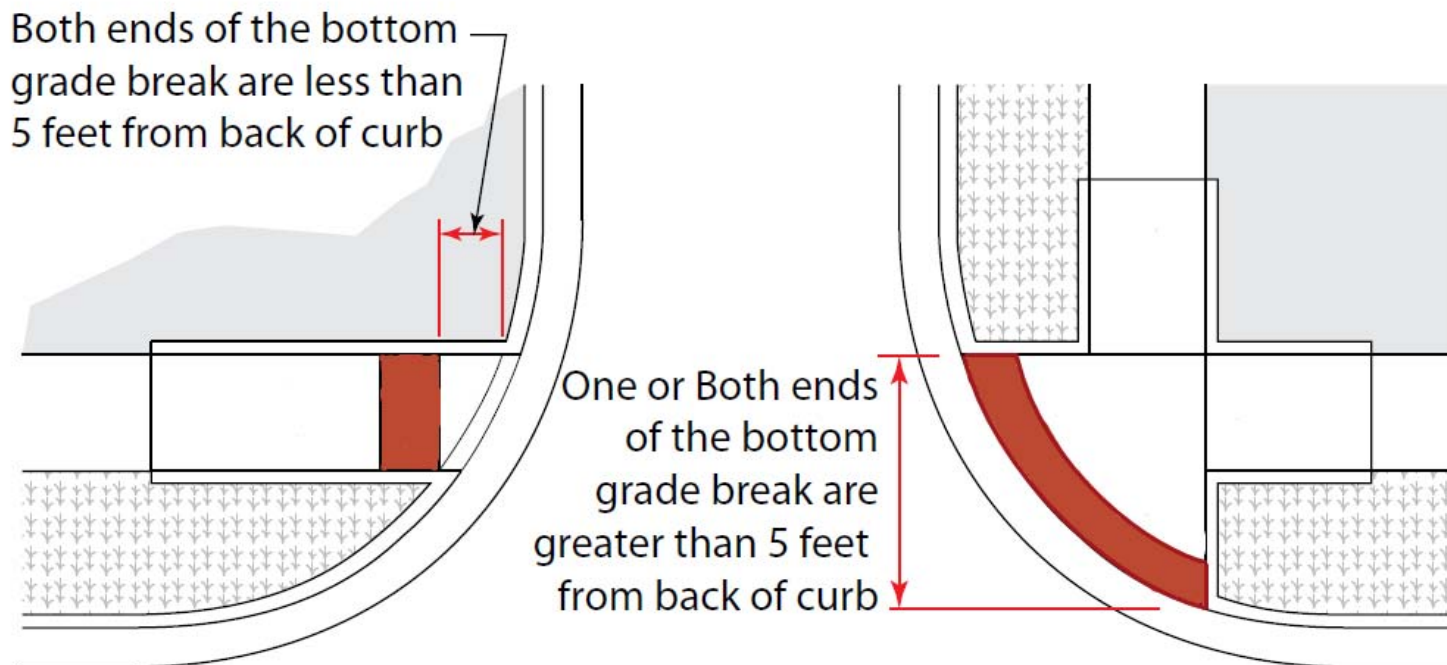


Figure R305.2.1
Perpendicular Curb Ramps



Best Practice – Curb Ramps

Additional Resources

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- United States Access Board
<http://www.access-board.gov/>
 - Public Rights-of-Way (PROWAG) Draft Guidelines
<https://www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way/proposed-rights-of-way-guidelines>
 - FHWA Designing Sidewalks and Trails for Access (Chapter 7 Curb Ramps)
https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks207.cfm
 - CDOT's ADA Website
<https://www.codot.gov/business/civilrights/accessibility/ada>
 - CDOT's Bike/Ped Website
<https://www.codot.gov/programs/bikeped>
 - CDOT M&S Standard Plans
<https://www.codot.gov/business/designsupport/standard-plans>



Best Practice – Curb Ramps Questions?

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