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.
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

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
Parallel Curb Ramp

**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)
- 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
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.

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

Ramps are easier for wheelchair users to traverse if grade breaks are perpendicular to the path of travel.
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
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)
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
- Separate ramps that align with each crossing are preferred
- Required on new construction
- Ramps should be placed within the marked crosswalk

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

Best Practice – Curb Ramps

Drainage

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

**Problem**

**Poor Curb Ramp Design**

**Good Design**
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 dissapears, not provide wayfinding for the visually impaired
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.

Both ends of the bottom grade break are less than 5 feet from back of curb.

One or Both ends of the bottom grade break are greater than 5 feet from back of curb.

Figure R305.2.1
Perpendicular Curb Ramps
Best Practice – Curb Ramps

Additional Resources

- United States Access Board
  http://www.access-board.gov/


- 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?

Greg Martinez, CDOT ADA Title II Analyst
4201 East Arkansas, Room 150
Denver, CO 80222
303-512-4142
greg.martinez@state.co.us

Ken Brubaker, CDOT Bike/Ped Engineer
4201 East Arkansas, Shumate Bldg.
Denver, CO 80222
303-757-9804
kenneth.brubaker@state.co.us