Inspecting Curb Ramps

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Agenda

- Brief Background
- Terminology/Definitions
- Necessary Tools
- Basic Requirements for Curb Ramps
  -- Perpendicular Ramps
  -- Parallel Ramps
  -- Combination Ramps
  -- Blended Transitions
- Detectable Warning Surfaces
- Top Ten Curb Ramp Mistakes

Notes

- Session prepared for general audience based on PROWAG. Some agencies go above and beyond PROWAG so be sure to follow relevant criteria for your jurisdiction.
- Session is not meant to provide examples/illustrations for every field configuration or every ADA criteria. Engineers, contractors and inspectors are responsible for understanding and complying with all local, state and federal equal access laws, including ADA.

Notes (2)

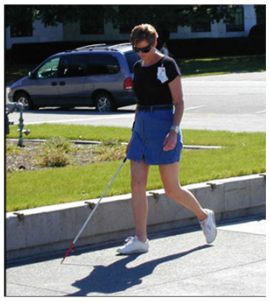
- Photos show where to measure and orientation of the level. They are not meant to show how many measurements to take since this varies from agency to agency.
- If no policy, I suggest for a 5-ft wide by 5-ft long ramp, at least 2 measurements of landing running slope and cross slope and 3 of ramp grade and cross slope. If wider and/or longer, add an additional row of measurements for each additional 2 feet of width and/or length.
- If surface does not appear planar, take additional measurements where it appears to be warped. Record steepest slope measured.

Why Is Inspection So Important?

- It's the Law! Americans with Disabilities Act (ADA)
  -- 2010 ADA Design Standards (ADAAG)
  -- Public Rights-of-Way Accessibility Guidelines (PROWAG)

- To Accommodate Users
  -- Mobility Impaired: individuals in wheelchairs, using canes, crutches or braces, using walkers
  -- Visually impaired: individuals who are blind, individuals with low-vision

Variety of Users—Each Has Different Mobility Needs



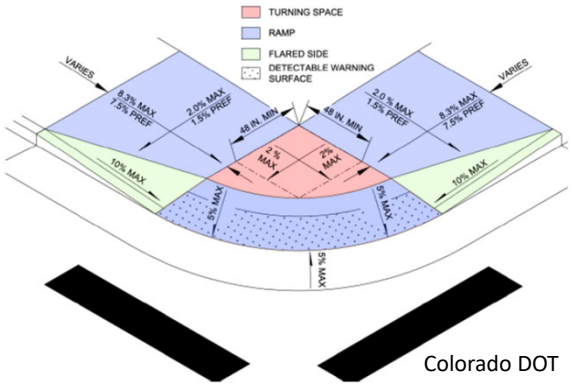
Terminology/Definitions

Note: In the following, grade refers to finished grade, not of stringline, forms or wet concrete.

Remember—There Is No Construction Tolerance!

Blended Transition

- A raised pedestrian street crossing, depressed corner, or similar connection between the pedestrian access route at the level of the sidewalk and the level of the pedestrian street crossing that has a grade of 5% or less.



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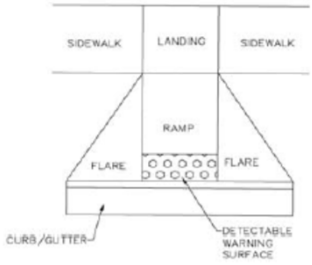
Cross Slope

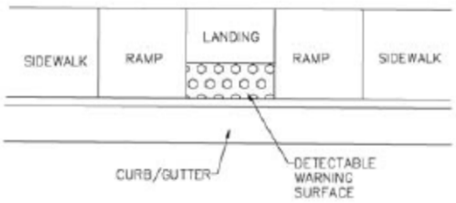
- The grade that is perpendicular to the direction of pedestrian travel.

Curb Ramp

- A ramp that cuts through or is built up to the curb to accomplish a change in elevation at a curb face. Curb ramps can be perpendicular, parallel or a combination of parallel and perpendicular ramp.



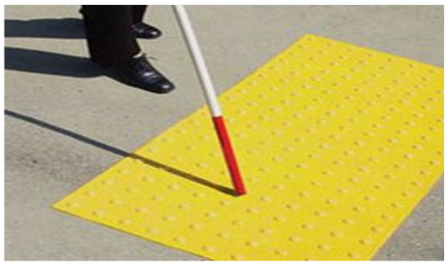
Perpendicular Ramp



Parallel Ramp

Detectable Warning Surface (DWS)

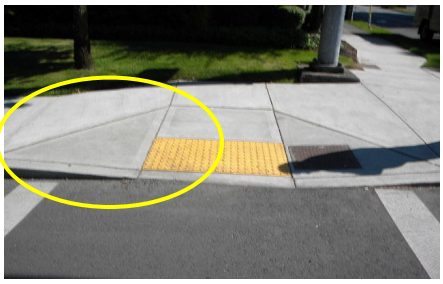
- Consists of truncated domes aligned in a square or radial grid pattern. The surface must contrast visually with adjacent gutter, street/road.
- Must be placed at all intersections to streets the entire width of the ramp.
- Provides an indication to individuals with disabilities that they are transitioning from the pedestrian realm to a vehicular way.



Flares

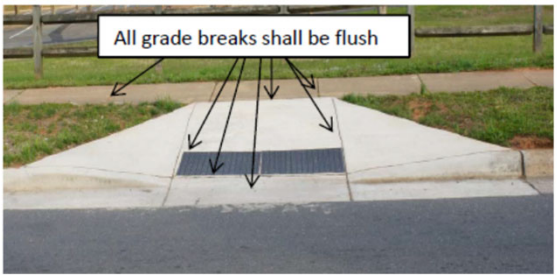
- A gradual widening of the side of a curb ramp on one end
- Flares are needed when the surface adjacent to sides of a ramp is a paved surface where pedestrians are likely to walk
- Maximum slope of the flare is 10%, measured parallel to curb

Flare



Grade Breaks

- The line where two surface planes with different grades meet.
- Surfaces can generally be considered planar when all of the measured cross slopes and running slopes on a surface are equal. If there are low spots greater than ¼" under a 2-foot level, then the surface will not be considered planar.

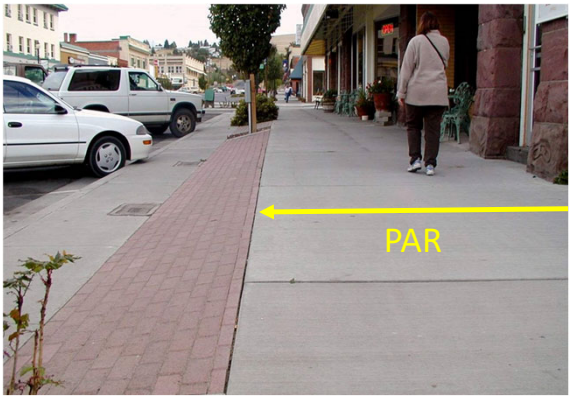


Landing

- A level area where movement and/or turning maneuvers take place.

Pedestrian Access Route (PAR)

- A continuous and unobstructed path of travel provided for pedestrians with disabilities within or coinciding with a pedestrian circulation path.



Obstructions

- Utility poles, hydrants, signs, ped pushbuttons and other street furniture that reduce the effective width should be noted for the Pedestrian Access Route.

- Clear width must be maintained around obstructions (no pinch points).
- Pedestrian Access Route of 4 feet is required by PROWAG.

Running Slope

- The grade that is parallel to the direction of pedestrian travel.

Make Sure the TTC Zone is Compliant

- PROWAG and MUTCD, Part 6 Apply
- Alternate Pedestrian Access Route?
- Maintain Pedestrian Usability
- Cane-Detectable Barricades

Be Sure You Have the Necessary Tools

- **Digital levels** (details to follow)
- **Engineer's metal measuring tape**, capable of measuring in tenths or hundredths of a foot.
- Record linear dimensions to nearest tenth of a foot, unless otherwise directed.
- **Writing/recording tool**
- **Temporary pavement markers**

Digital Levels

- **24-inch tool**

- **6-inch tool**, for measuring slopes on portions of curb ramp, gutter pan or adjacent surfaces that cannot accommodate a 24-inch level.

Use of Digital Levels

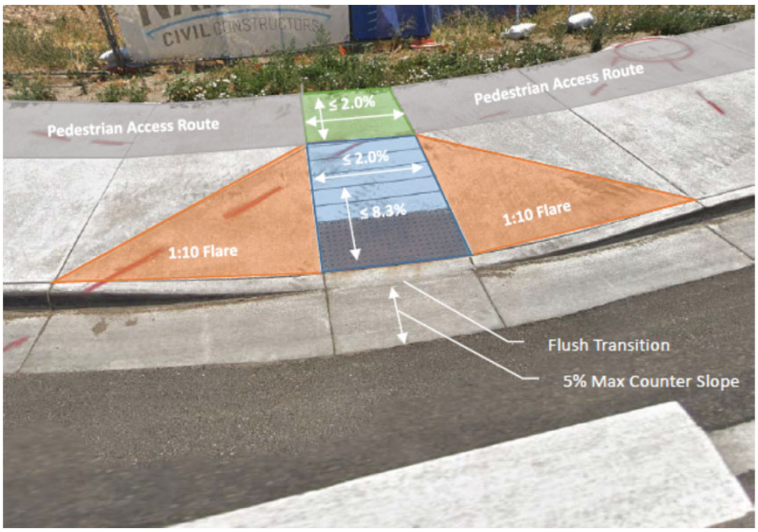
- Calibrate (according to manufacturer's recommendations) at time of inspection.
- Calibrate daily, after substantial shock and/or after 20 degree F temperature change.
- All slope measurements shall be **in percentage mode** and recorded to nearest 10th of a precent relative to a true horizontal plane (zero).

Measure Your Forms

Measure Post-Construction to Ensure Compliance

Basic Requirements for Curb Ramps

Perpendicular Curb Ramp



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Perpendicular Curb Ramp Measurements

- Suggested Landing Running Slope = 1.5% (max. 2.1%)
- Suggested Landing Cross Slope = 1.5% (max. 2.1%)
- Landing Length = match curb ramp width
- Landing Width = match sidewalk width
- Suggested Ramp Running Slope = 7.5% (max 8.33%) (gutter slope and ramp running slope should be the same)

Perpendicular Curb Ramp Measurements (cont'd)

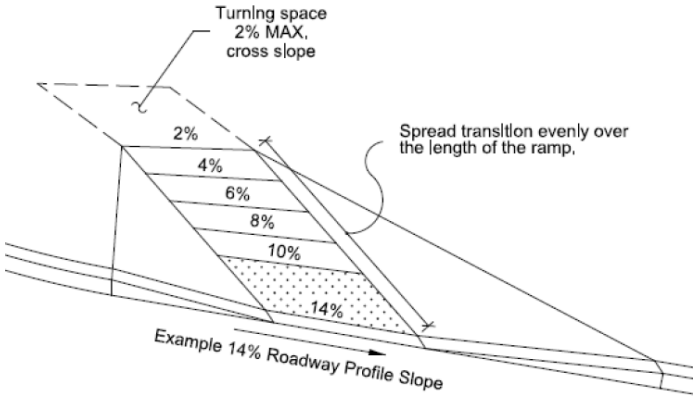
- Flare slope = 10% or less, measured parallel to curb
- DWS = 2-foot length for full width of ramp
- Sidewalk Cross Slope = 2.1% or less
- Counter Gutter Slope = 5.00% or less

Ramp Cross Slope

- If roadway is Stop/Yield control: 2.1% max.
- If roadway is signalized or uncontrolled: 5% max.
- For a midblock crossing, can match street grade

Note

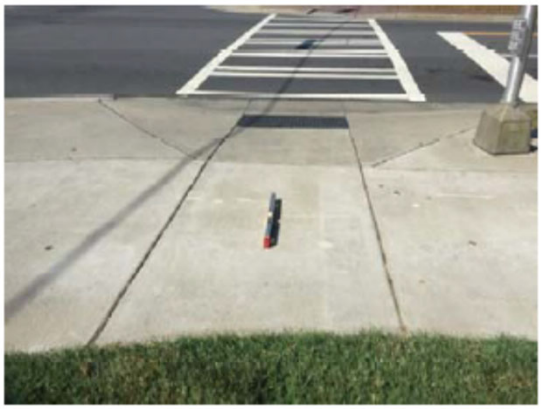
Design/construction modifications may be required for curb ramps to be installed along a roadway with longitudinal grade exceeding 5%.



Note (2)

- Not everyone agrees design on previous page is acceptable.
- Maximum rate of change of cross slope for such a ramp is unclear. Research is needed on this topic.
- Be thoughtful about what is happening at such locations

Where to Measure Each Element—Step 1

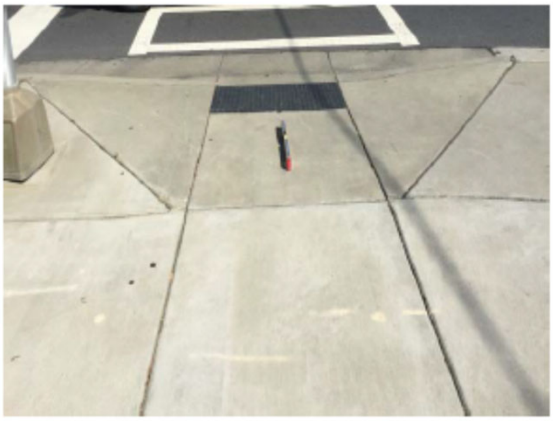


- Check landing cross slope
- Place level on the landing, perpendicular to the road

Where to Measure Each Element—Step 2

- Check landing running slope
- Place level on the landing parallel to road

Where to Measure Each Element—Step 3

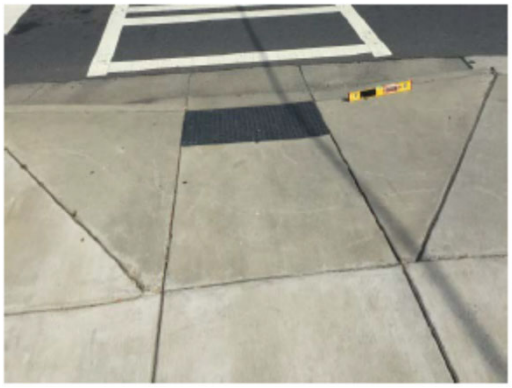


- Check ramp running slope
- Place level on the left, right and center of the ramp perpendicular to the road

Where to Measure Each Element—Step 4

- Check ramp cross slope
- Place level on the front and back of the ramp parallel to the road

Where to Measure Each Element—Step 5



- Check left flare slope
- Place level on the left flare at the back of curb parallel to the road

Where to Measure Each Element—Step 6

- Check right flare slope
- Place level on the right flare at the back of curb parallel to the road

Step 7 -- Check Running Slopes in Gutter Area

- Curb running slope and ramp running slope should be the same

Where to Measure Each Element—Step 7

Curb Running Slope

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- Average grade of the curb surface perpendicular to the flow line
- Place level on the top of the curb, perpendicular to face of curb.

Where to Measure Each Element—Step 7

Counter Slope

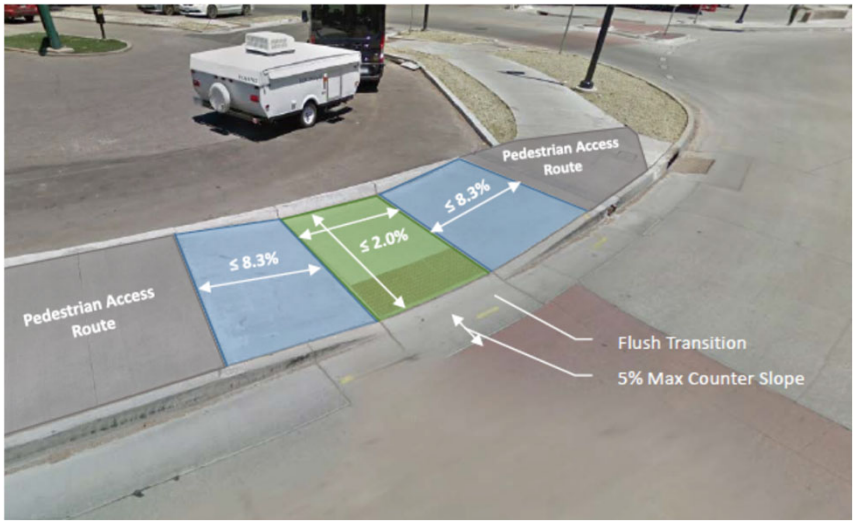
Oregon DOT

- Counter slope is grade of the street or gutter pan perpendicular to the street or gutter pan.
- Use 2-ft level if it fits; otherwise use 6-inch level.
- Counter slopes must be measured perpendicular to the gutter flow line.

Wheelchairs and Gutter Pans

Vertical discontinuities may seem insignificant to able-bodied pedestrians but pose challenges to those using assistive mobility devices and should not be present at the transition from the curb ramp to the street crossing.

Parallel Curb Ramp



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Parallel Curb Ramp Measurements

- Suggested Landing Running Slope = 1.5% (max. 2.1%)
- Landing Width and Length = 4 ft
- Ramp Cross Slope = suggested 1.5% (2.1% max.)

Parallel Curb Ramp Measurements (cont'd)

- DWS = 2-foot length for full width of ramp
- Sidewalk Cross Slope = 2.1% or less
- Counter Gutter Slope = 5.00% or less
- Vertical curb behind landing (if necessary)

Ramp Cross Slope

- The cross slope of parallel curb ramp runs is 2.1% maximum.

Where to Measure Each Element—Step 1

- Check landing running slope
- Place level at back and front of landing parallel to road

Where to Measure Each Element—Step 2

- Check landing cross slope
- Place level perpendicular to road on the left, right and center

Where to Measure Each Element—Step 3

- Check ramp left running slope
- Place level at the curb parallel with the road

Where to Measure Each Element—Step 4

- Check ramp (left) cross slope
- Place level at left and right side of left ramp perpendicular to road

Where to Measure Each Element—Step 5

- Check ramp (right) running slope
- Place level at the curb parallel with the road

Where to Measure Each Element—Step 6

- Check ramp (right) cross slope
- Place level at left and right side of right ramp perpendicular to road

Where to Measure Each Element—Step 7
Curb Running Slope

Oregon DOT

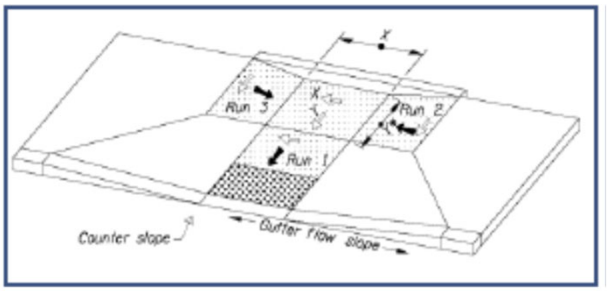
- Average grade of the curb surface perpendicular to the flow line
- Place level on the top of the curb, perpendicular to face of curb.

Where to Measure Each Element—Step 7
Counter Slope

Oregon DOT

- Counter slope is grade of the street or gutter pan perpendicular to the street or gutter pan.
- Use 2-ft level if it fits; otherwise use 6-inch level.
- Counter slopes must be measured perpendicular to the gutter flow line.

Combination Curb Ramp



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Combination Curb Ramp Measurements

- Suggested Landing Running Slope = 1.5% (max. 2.1%)
- Landing Cross Slope = See Cross Slope Criteria
- Landing Length = match curb ramp width (min. 4 ft)
- Landing Width = match sidewalk width (min. 4 ft)
- Suggested Ramp (Left/Right/Center) Running Slope=7.5% (max. 8.3%)
- Suggested Ramp (Left/Right) Cross Slope = 1.5% (max. 2.1%)

Combination Curb Ramp Measurements (cont'd)

- DWS = 2-foot length for full width of ramp
- Sidewalk Cross Slope = 2.1% or less
- Counter Gutter Slope = 5.00% or less

Ramp Cross Slope

- If roadway is Stop/Yield control: 2.1% max.
- If roadway is signalized or uncontrolled: 5% max.
- For a midblock crossing, can match street grade

Where to Measure Each Element—Step 1

- Check landing running slope
- Place level left, right and center of landing perpendicular to road

Where to Measure Each Element—Step 2

- Check landing cross slope
- Place level at back and front of landing parallel to road

Where to Measure Each Element—Step 3

- Check ramp (left) running slope
- Place level at back and front of sidewalk on left ramp parallel to road

Where to Measure Each Element—Step 4

- Check ramp (left) cross slope
- Place level at left and right on left ramp perpendicular to road

Where to Measure Each Element—Step 5

- Check ramp (right) running slope
- Place level at back and front of sidewalk on right ramp parallel to road

Where to Measure Each Element—Step 6

- Check ramp (right) cross slope
- Place level at left and right on right ramp perpendicular to road

Where to Measure Each Element—Step 7

- Check ramp (center) running slope
- Place level on right, left and in the middle of the center ramp perpendicular to road

Where to Measure Each Element—Step 8

- Check ramp (center) cross slope
- Place level at front and back of center ramp parallel to road

Where to Measure Each Element—Step 9
Curb Running Slope

Oregon DOT

- Average grade of the curb surface perpendicular to the flow line
- Place level on the top of the curb, perpendicular to face of curb.

Where to Measure Each Element—Step 9
Counter Slope

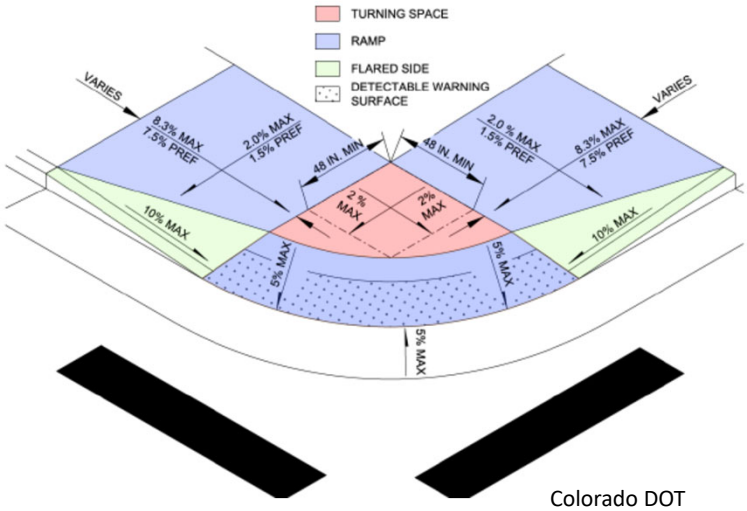
Oregon DOT

- Counter slope is grade of the street or gutter pan perpendicular to the street or gutter pan.
- Use 2-ft level if it fits; otherwise use 6-inch level.
- Counter slopes must be measured perpendicular to the gutter flow line.

There Could Be Combination Ramps in Both Parallel and Perpendicular Directions

In that case, all ramps need to be measured and any ramp exceeding 8.33% is non-compliant

Blended Transition



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Blended Transition Measurements

- Running Slope = 5.00% max
- DWS = 2-foot length for full width of blended transition
- Sidewalk Cross Slope = 2.1% or less
- Counter Gutter Slope = 5.00% or less

Cross Slope

- The cross slope of a blended transition must be equal to or less than the cross slope of the crosswalk it serves.

Where to Measure Each Element—Step 1

- Check ramp cross slope
- Place level perpendicular to road in front of domes

Where to Measure Each Element—Step 2

- Check ramp running slope
- Place level parallel to road

Where to Measure Each Element—Step 3
Curb Running Slope

Oregon DOT

- Average grade of the curb surface perpendicular to the flow line
- Place level on the top of the curb, perpendicular to face of curb.

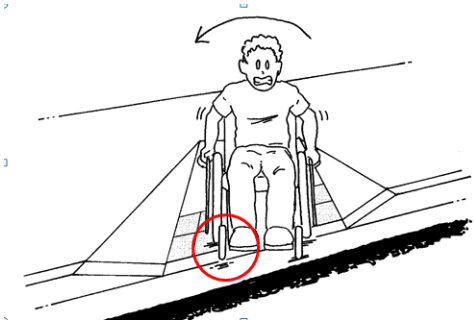
Where to Measure Each Element—Step 3
Counter Slope

Oregon DOT

- Counter slope is grade of the street or gutter pan perpendicular to the street or gutter pan.
- Use 2-ft level if it fits; otherwise use 6-inch level.
- Counter slopes must be measured perpendicular to the gutter flow line.

Key Curb Ramp Basics

- Must design the ramp for each location and not simply refer to a standard drawing. Most ramps do not look like the 'cookie cutter' ramps shown here.
- Grade breaks must be perpendicular to the direction of travel.



Key Curb Ramp Basics

- Flush transitions—no lips
- Curb ramps must extend the full width of a shared use path.

Key Curb Ramp Basics

If crossing is prohibited, it should be closed off to all pedestrians.

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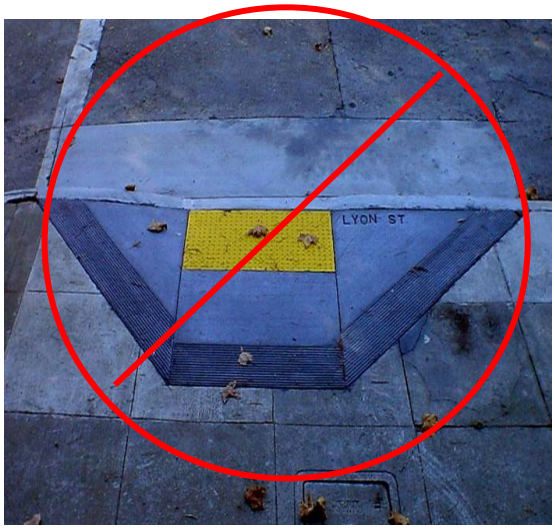
Detectable Warning Surfaces (DWS)

- DWS shall contrast visually with adjacent gutter, street or highway, or PAR surface, either light-on-dark or dark-on-light.
- Avoid using black DWS.

Detectable Warning Surfaces (2)

- DWS are like parentheses—they occur in pairs. Need to close them and the re-open them.
- Must have 2 ft min. smooth surface between successive DWS.

Ramps/Flares Should Not Be Scored



Truncated Domes

SHALL be the full width of the ramp, anywhere the sidewalk is flush with the roadway.

What About DWS at Driveways?

- Must evaluate each driveway separately
- DWS required where driveways are controlled with YIELD or STOP controls or traffic signals
- For other driveways, use DWS where the driveway looks/acts like a street
  Factors to consider in making the decision:
  -- sight distance (can drivers see peds?)
  -- traffic volume (both ADT and peak hour volumes)
  -- curb radius (and corresponding vehicle speeds)
- Overuse of DWS only causes confusion for the visually impaired. Also causes discomfort for those with other disabilities.

Top Ten Curb Ramp Mistakes

(in no particular order)

Ramp Not Flush with Gutter Pan

Gutter Pan Not Flush with Street in Crosswalk

Obstructions/Protruding Objects

No Level Landing

DWS Not Flush with Walking Surface

DWS Not Full Width of Ramp

Ramp Does Not Fit Within Crosswalk

No Level Area for Pushbutton

No Receiving Ramp

Return Curb Mis-Used

Thank You!

Questions?

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