

Retrofitting for ADA Design & Construction



That's what was in the plans!



Plans-
Consultant

Review-City

Final Check-
State


Inspection-City
& State

Happy-
No one.

Balance the needs. Grades!




ALDOT Standard Drawings for ADA p.734-737


 ALABAMA DEPARTMENT OF TRANSPORTATION 1409 COLISEUM BOULEVARD MONTGOMERY, AL 36130-3050	
DESIGN BUREAU SPECIAL DRAWING CURB RAMP DETAIL CALLOUTS, GENERAL NOTES FOR CURB RAMPS AND SIDEWALKS, AND DETAILS	
SPECIAL DRAWING NO. SW-618 (SHEET 1 OF 4)	DESIGN NO. 734

 ALABAMA DEPARTMENT OF TRANSPORTATION 1409 COLISEUM BOULEVARD MONTGOMERY, AL 36130-3050	
DESIGN BUREAU SPECIAL DRAWING CORNER CURB RAMPS	
SPECIAL DRAWING NO. SW-618 (SHEET 2 OF 4)	DESIGN NO. 735

VIOLATIONS MAY BE PROSECUTED TO THE FULLEST EXTENT OF THE LAW


 ALABAMA DEPARTMENT OF TRANSPORTATION 1409 COLISEUM BOULEVARD MONTGOMERY, AL 36130-3050	
DESIGN BUREAU SPECIAL DRAWING MIDBLOCK CURB RAMPS	
SPECIAL DRAWING NO. SW-618 (SHEET 3 OF 4)	DESIGN NO. 736

VIOLATIONS MAY BE PROSECUTED TO THE FULLEST EXTENT OF THE LAW

 ALABAMA DEPARTMENT OF TRANSPORTATION 1409 COLISEUM BOULEVARD MONTGOMERY, AL 36130-3050	
DESIGN BUREAU SPECIAL DRAWING SIDEWALKS & CURB RAMPS AT DRIVEWAYS, RAILROAD, MEDIAN, & ISLAND CROSSINGS	
SPECIAL DRAWING NO. SW-618 (SHEET 4 OF 4)	DESIGN NO. 737

ALDOT Std. Dwgs. –Callouts p. 734

DETAIL CALL-OUTS: 

- ①. RAMPS
15'-0" MAX LENGTH
8.3% (12:1) MAX RUNNING SLOPE
5.0% (20:1) MIN RUNNING SLOPE
2.0% (50:1) MAX CROSS SLOPE
- ②. FLARES
10.0% (10:1) MAX RUNNING SLOPE
- ③. LANDING (TURNING SPACE)
2.0% (50:1) MAX RUNNING SLOPE
2.0% (50:1) MAX CROSS SLOPE
- ④. BLENDED TRANSITIONS
5.0% (20:1) MAX RUNNING SLOPE
- ⑤. SIDEWALKS
5.0% (20:1) MAX RUNNING SLOPE
2.0% (50:1) MAX CROSS SLOPE 
- ⑥. DRIVEWAYS
8.0% (12.5:1) MAX CHANGE IN GRADE BETWEEN ROAD SURFACES AND DRIVEWAY
8.0% (12.5:1) MAX CHANGE IN GRADE BETWEEN DRIVEWAY AND SIDEWALK



**ALABAMA DEPARTMENT
OF TRANSPORTATION**
1409 COLISEUM BOULEVARD
MONTGOMERY, AL 36130-3050

DESIGN BUREAU SPECIAL DRAWING

**CURB RAMP DETAIL CALLOUTS,
GENERAL NOTES FOR CURB RAMPS
AND SIDEWALKS, AND DETAILS**

SPECIAL DRAWING NO.

SW-618 (SHEET 1 OF 4)

DWG. NO.

734

ALDOT Std. Dwgs. –Notes p. 734

GENERAL NOTES FOR CURB RAMP AND SIDEWALKS:

1. WHERE THE TURNING SPACE IS CONSTRAINED AT THE BACK-OF-SIDEWALK SUCH AS, A BUILDING ADJACENT TO THE SIDEWALK, THE TURNING SPACE SHALL BE 4'-0" MIN BY 5'-0" MIN. THE 5'-0" DIMENSION SHALL BE PROVIDED IN THE DIRECTION OF THE RAMP RUN.

MAXIMUM SLOPE OF 20:1 (5.0%).



PROVIDE A TWO (2) FEET MINIMUM TRANSITION STRIP IF ALGEBRAIC DIFFERENCES BETWEEN ROADWAY SLOPE AND CURB RAMP SLOPE ARE GREATER THAN 9:1 (11.0%). TRANSITION STRIP SHALL NOT EXCEED 2.0% (50:1).



DETECTABLE WARNING SURFACES MUST BE TWO (2) FEET IN LENGTH IN THE DIRECTION OF PEDESTRIAN TRAVEL AND EXTEND THE FULL WIDTH OF THE CURB.

10. GUTTER COUNTER SLOPE SHALL NOT EXCEED 5.0% (20:1).



WITHIN THE STREET OR HIGHWAY RIGHT-OF-WAY, THE GRADE OF THE PEDESTRIAN ACCESS ROUTES SHALL NOT EXCEED THE GENERAL GRADE ESTABLISHED FOR THE ADJACENT STREET OR HIGHWAY. WHERE PEDESTRIAN ACCESS ROUTES ARE NOT CONSIDERED WITHIN A STREET OR HIGHWAY RIGHT-OF-WAY, THEY SHALL HAVE A MAXIMUM SLOPE OF 20:1 (5.0%).



PROVIDE A TWO (2) FEET MINIMUM TRANSITION STRIP IF ALGEBRAIC DIFFERENCES BETWEEN ROADWAY SLOPE AND CURB RAMP SLOPE ARE GREATER THAN 9:1 (11.0%). TRANSITION STRIP SHALL NOT EXCEED 2.0% (50:1).



DETECTABLE WARNING SURFACES MUST BE TWO (2) FEET IN LENGTH IN THE DIRECTION OF PEDESTRIAN TRAVEL AND EXTEND THE FULL WIDTH OF THE CURB RAMP. THE DETECTABLE WARNING MATERIAL AND MANUFACTURER SHALL BE FROM THE ALABAMA DEPARTMENT OF TRANSPORTATION LIST OF QUALIFIED MATERIAL, SOURCES, AND DEVICES. THE COLOR SHALL BE BRICK RED OR A COLOR APPROVED BY THE ENGINEER THAT SHALL CONTRAST THE SURROUNDING SURFACES LIGHT-ON-DARK OR DARK-ON-LIGHT.



VERTICAL SURFACE DISCONTINUITIES SHALL BE 0.50 INCH MAXIMUM. VERTICAL SURFACE DISCONTINUITIES BETWEEN 0.25 AND 0.5 INCH SHALL BE BEVELED WITH A SLOPE NOT GREATER THAN 2:1 (50.0%).



DOMES SHALL BE PARALLEL TO THE RAMP SO THAT THE WHEELCHAIR WHEELS CAN TRAVEL BETWEEN THE DOMES.



THESE MAXIMUM SLOPES SHALL NOT BE EXCEEDED.



TO PREVENT STANDING WATER AT THE BASE OF CURB RAMP, LOCATE STORM DRAIN INLETS UPSTREAM.

ALABAMA DEPARTMENT OF TRANSPORTATION 14500 MONTGOMERY	DESIGN BUREAU 5A	CURB RAMP DETAIL GENERAL NOTES FOR SIDEWALKS, A	SPECIAL DIMENSIONS NO
			SW-618 (SHEET

Benefits of PROWAG 2011



Transportation officials recommended that additional allowances be made for typical roadway geometry. The proposed guidelines include the following allowances for typical roadway geometry:

- **(R302.5) Grade of sidewalks is permitted to equal the general grade established for the adjacent street or highway.**
- **(R302.6.1) A maximum cross slope of 5 percent is permitted for pedestrian access routes within pedestrian street crossings without yield or stop control where vehicles can proceed through the intersection without slowing or stopping.**
- **(R302.6.2) The cross slope of pedestrian access routes within midblock pedestrian street crossings is permitted to equal the street or highway grade.**
- **(R304.5.3) The cross slope of curb ramps, blended transitions, and turning spaces at pedestrian street crossings without yield or stop control where vehicles can proceed through the intersection without slowing or stopping, and at midblock pedestrian street crossings are permitted to equal the street or highway grade.**
- **(R404.2) Clear spaces required at accessible pedestrian signals and pedestrian pushbuttons and at other accessible elements are permitted to have a running slope consistent with the grade of the adjacent pedestrian access route.**

CHAPTER R2: SCOPING REQUIREMENTS

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CHAPTER R3: TECHNICAL REQUIREMENTS

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EXAMPLE: CURB Ramps/Ramp requirements are contained in R207, R304 and R407

R209 Accessible Pedestrian Signals and Pedestrian Pushbuttons

- **R209.1 General.**
 - MUTCD specifies when and where pedheads should be provided
 - MUST be accessible pedestrian signals and pedestrian pushbuttons.
 - MUTCD sections 4E.08 through 4E.13 (incorporated by reference, see R104.2).
- **R209.2 Alterations.** MUST BE Accessible when the signal controller and software are altered, or the signal head is replaced.
- **Note:** Operable parts shall comply with R403

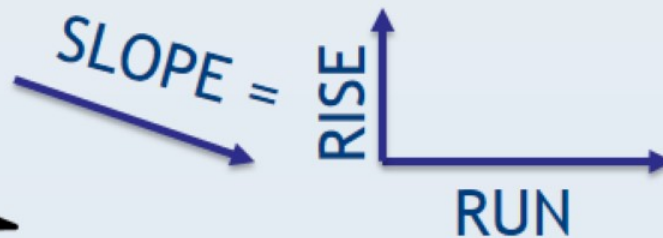
Advisory R209
.....communicates information about the WALK and DON'T WALK intervals at signalized intersections in non-visual formats (**i.e., audible tones and vibrotactile surfaces**) to pedestrians who are blind or have low vision.

Detectable Warnings- Visual and Tactile Contrast R305

- Detectable warning surfaces consist of truncated domes aligned in a square or radial grid pattern.
- 2 feet minimum in the direction of pedestrian travel.
- At curb ramps and blended transitions, detectable warning surfaces must extend the full width of the ramp run (excluding flared sides), blended transition, or turning space.
- At grade rail crossings not located within a street or highway, detectable warning surfaces must extend the full



Changing the Grade- Height? Or Length?



Change Height

- Easiest things to Change
- Raise Asphalt
- Raise Gutter
- Change Curbline Grade
- Change Sidewalk Grade



Change the Length

- Harder to Change
- Different Ramp Type
- Different Sidewalk Path
- Change Curb Radii
- Change Curb



Pedestrian Access Route (PAR)-WIDTH



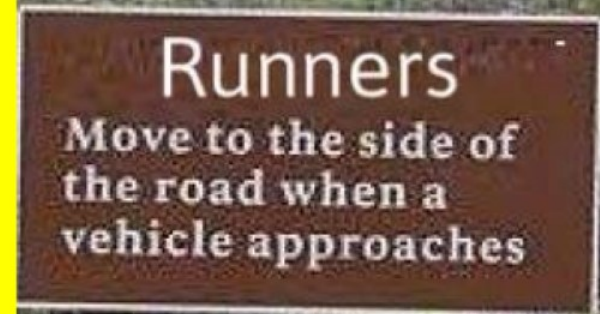
R204 A pedestrian access route is a continuous and unobstructed path of travelused by pedestrians is accessible to pedestrians with disabilities

- Pedestrian access routes 4 feet minimum with a 5ft passing space every 200 feet
- Medians and pedestrian refuge islands 5 feet minimum width (for passing space.)

Pedestrian Access Route (PAR)- Grade

R302.5 Grade.

- May follow the grade the adjacent roadway
- Away from road the grade of pedestrian access routes shall be 5 percent maximum.



R302.5.1 Pedestrian Street Crossings. Crosswalk grade shall be 5 percent maximum.

Vertical Surface Bumps- No More than 1/2"

- Raised Location in Sidewalk- Bump
- **R302.7.2** Vertical surface discontinuities shall be 13 mm (0.5 in) maximum. Vertical surface discontinuities between 6.4 mm (0.25 in) and 13 mm (0.5 in) shall be beveled with a slope not steeper than 50 percent. The bevel shall be applied across the entire vertical surface discontinuity.

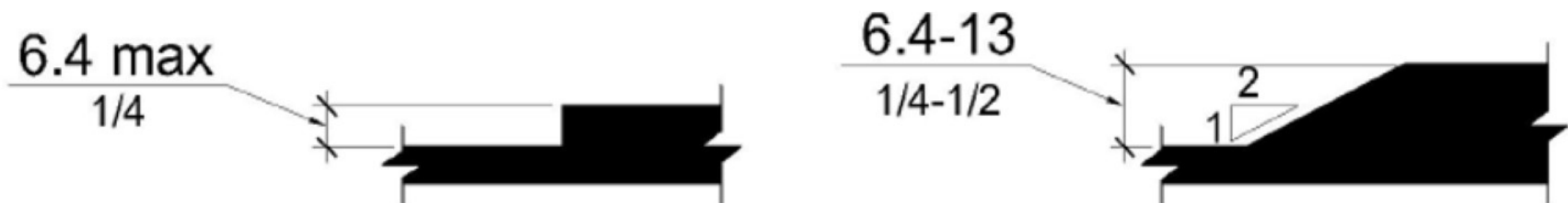


Figure R302.7.2
Vertical Surface Discontinuities

Set up Grinding or Milling

- Any Vertical rise greater than $\frac{1}{4}$ " or $\frac{1}{2}$ " bevel along the PAR must be smoothed.
- I.e. Sidewalk, Ramp, or Crosswalk.
- Setup Grinding and/or Milling



Crosswalks

- Crosswalks are part of the pedestrian access route.
 - Width: 10' recommended to ensure ramps are in crosswalk; 6 ft min per MUTCD



R302.3.1 & R305.2.4 Medians and Pedestrian Refuge Islands

- Medians & Pedestrian Refuge Islands shall:
 - contain a pedestrian access route at least 5' wide
 - be 6-feet minimum in length in the direction of pedestrian travel for refuge



PROWAG 2011- Crosswalk Cross slopes

- R302.6 Cross Slope of pedestrian access routes **shall be 2 percent maximum.**

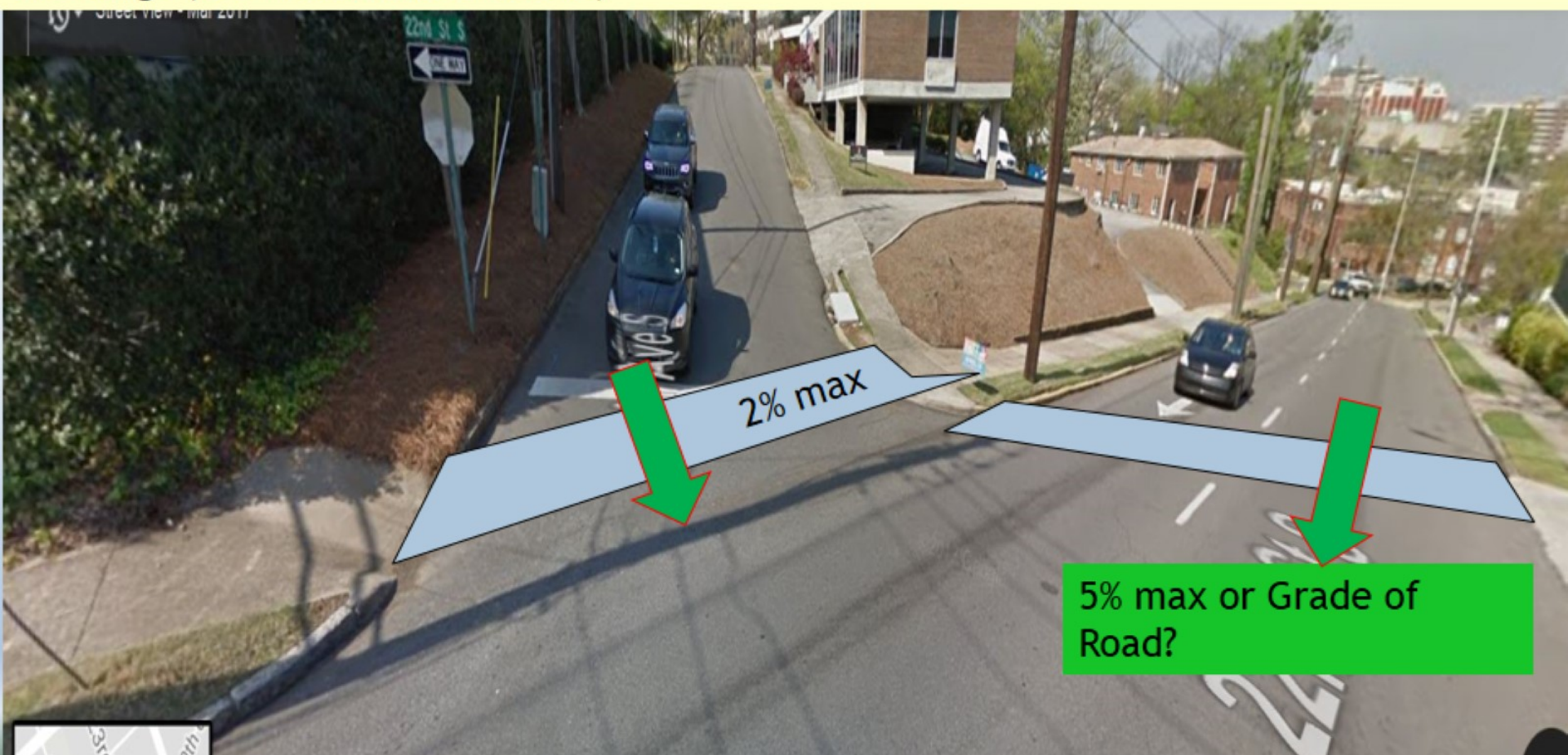
R302.6.1 A maximum cross slope of 5 percent is permitted for pedestrian access routes within pedestrian street crossings **without yield or stop control** where vehicles can proceed through the intersection without slowing or stopping.

- (R302.6.2) The cross slope of pedestrian access routes within midblock pedestrian street crossings is permitted to **equal the street or highway grade.**
- (R304.5.3) The cross slope of curb ramps, blended transitions, and turning spaces at pedestrian street crossings without yield or stop control where vehicles can proceed through the intersection without slowing or stopping, and at midblock pedestrian street crossings are permitted to equal the street or highway grade.



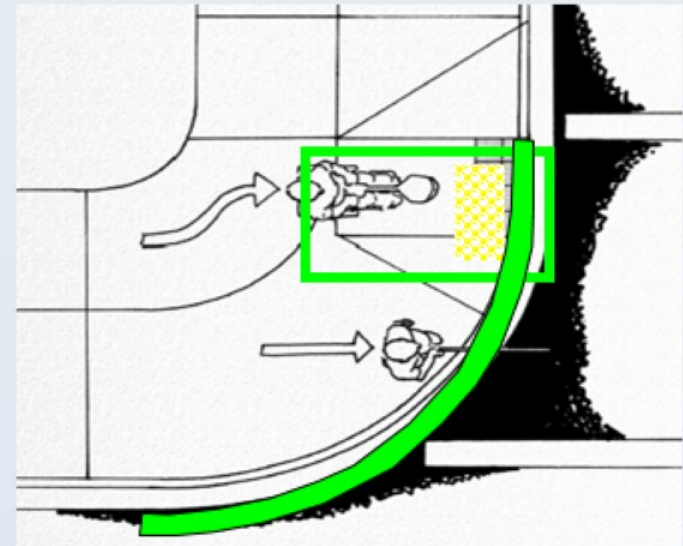
PAR –Crosswalk cross slope must be 2% at STOP Signs

A maximum grade of 5 percent and maximum **cross slope** of 2 percent are required otherwise for pedestrian access routes within sidewalks and pedestrian street crossings (see R302.5 and R302.6)



Curb Ramp

- 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 but do not indicate direction



Curb Ramps Required in all Directions



Where pedestrians can cross street a curb ramp is required in all directions at intersections. MUTCD makes marking crosswalk optional.

R207 Curb Ramps and Blended Transitions

- **R207.1 General.** A curb ramp, blended transition, or a combination of curb ramps and blended transitions complying with R304 shall connect the pedestrian access routes at each pedestrian street crossing. The curb ramp (excluding any flared sides) or blended transition shall be contained wholly within the width of the pedestrian street crossing served.

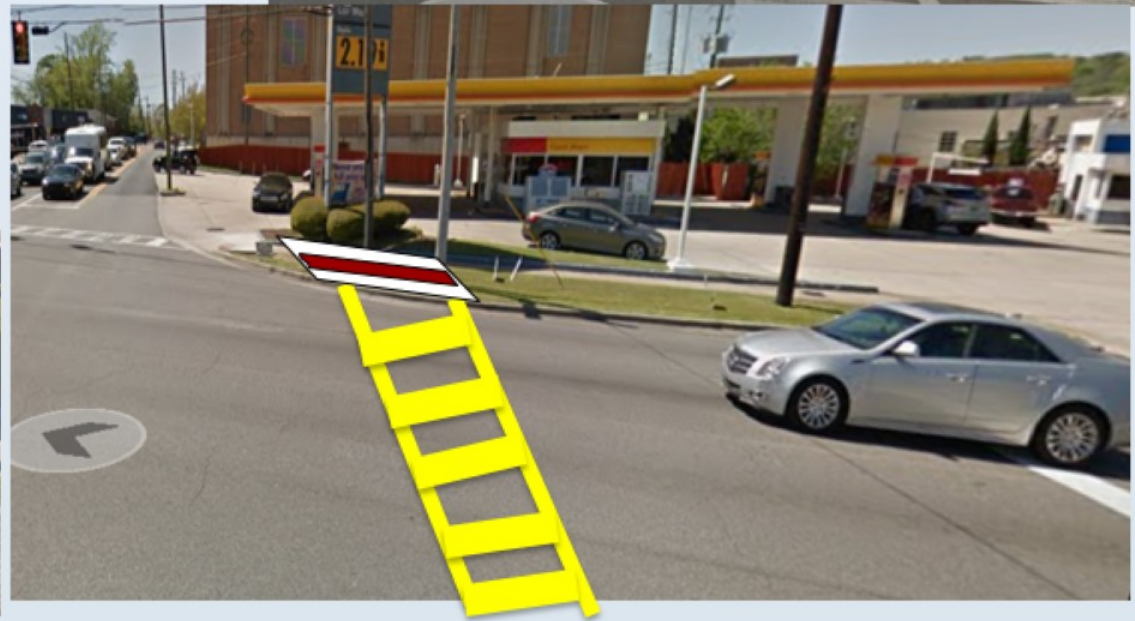
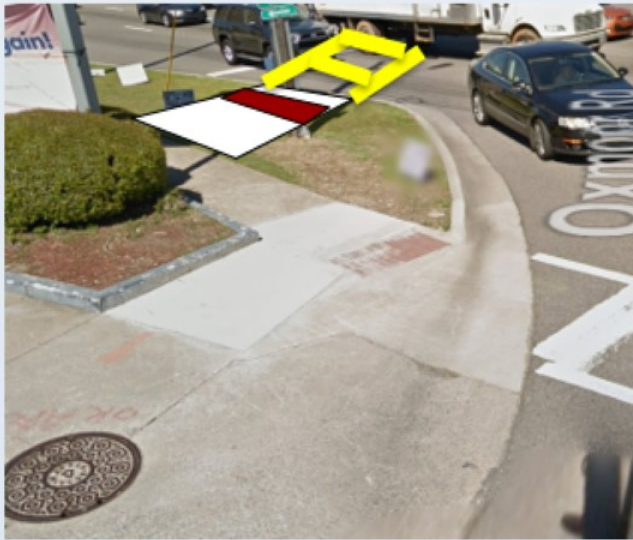


Curb Ramp Alignment

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



Curb Ramps in all Directions



Curb Ramp Types in ADA R207,R304,R409

ADA Categorization of Curb Ramps- Generally in relation to the Road

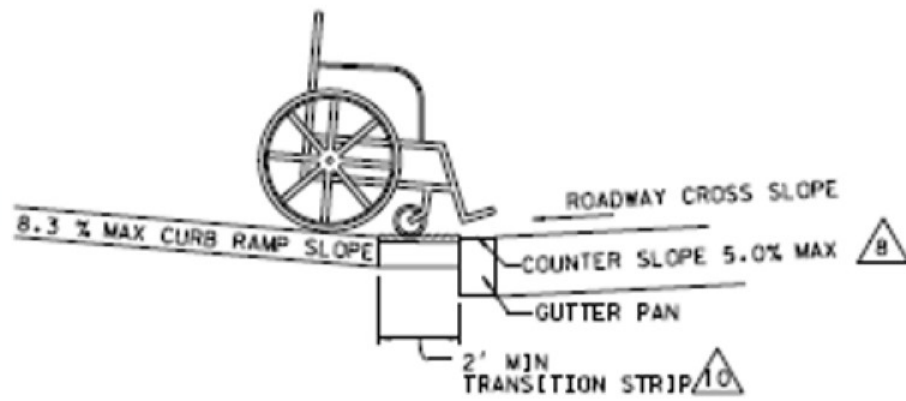
- Perpendicular - horizontal -At a right angle to the street pavement or curblane.
- Parallel - horizontal- inline with the traffic lane/ street.
- Diagonal - horizontal- diagonal with the intersection
- Combination- vertical multiple slopes not referenced in PROWAG - but used in practice to meet required grades.

Change of Grade (Counter Slopes)

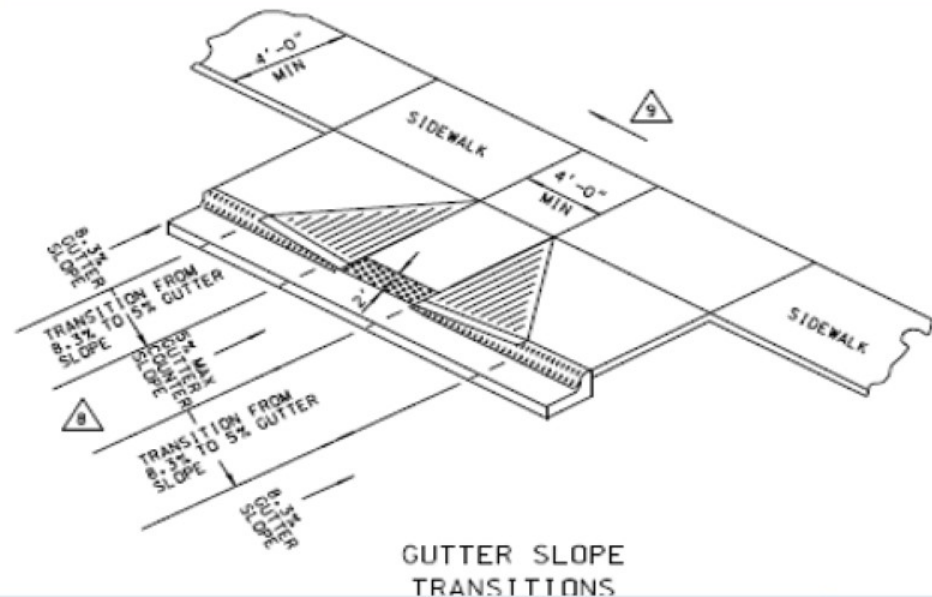
Without the flat area, a wheelchair can get stuck at the bottom of the ramp or flip forward or backward



ALDOT Grade Break Details - p.734



CHANGE OF GRADE
LIMITATIONS



7. RAMP AND CURB RAMP GRADE(SLOPE IN THE DIRECTION OF PEDESTRIAN TRAVEL) SHALL NOT EXCEED 8.3% (12:1).

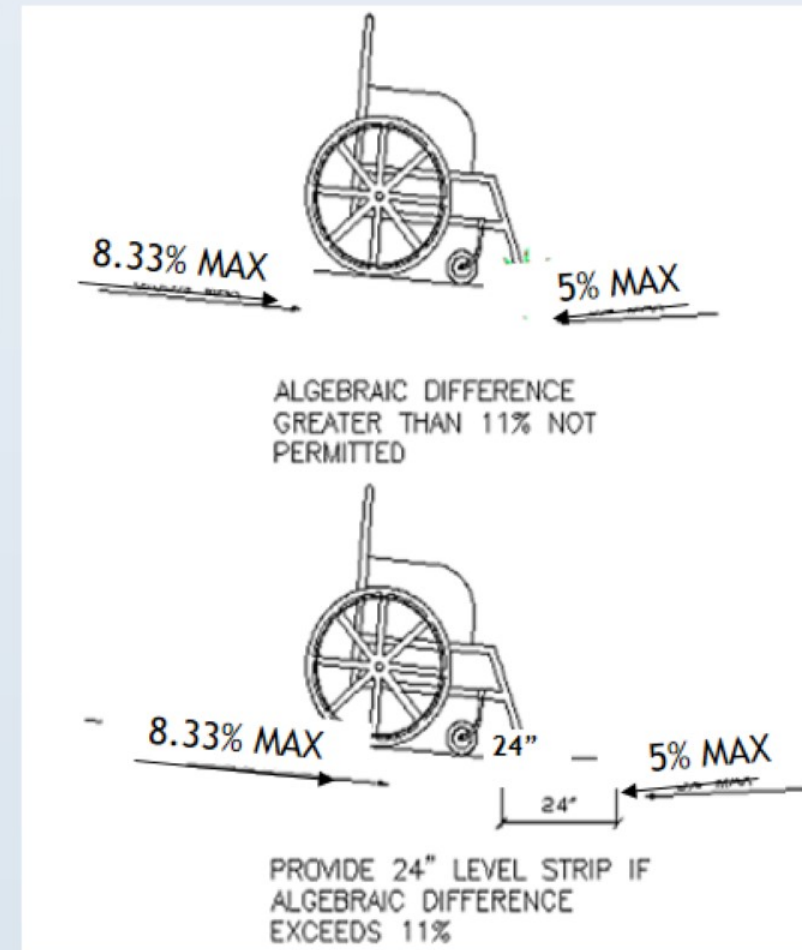
8. GUTTER COUNTER SLOPE SHALL NOT EXCEED 5.0% (20:1).

9. WITHIN THE STREET OR HIGHWAY RIGHT-OF-WAY, THE GRADE OF THE PEDESTRIAN ACCESS ROUTES SHALL NOT EXCEED THE GENERAL GRADE ESTABLISHED FOR THE ADJACENT STREET OR HIGHWAY. WHERE PEDESTRIAN ACCESS ROUTES ARE NOT CONTAINED WITHIN A STREET OR HIGHWAY RIGHT-OF-WAY, THEY SHALL HAVE A MAXIMUM SLOPE OF 20:1 (5.0%).

10. PROVIDE A TWO (2) FEET MINIMUM TRANSITION STRIP IF ALGEBRAIC DIFFERENCES BETWEEN ROADWAY SLOPE AND CURB RAMP SLOPE ARE GREATER THAN 9:1 (11.0%). TRANSITION STRIP SHALL NOT EXCEED 2.0% (50:1).

Change of Grade, Counter Slopes R304.5.2&4

- Less is better
- Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run.
- Breaks are not permitted on ramp or turning space on the surface of ramp runs and turning spaces.
- Gutter Slope maximum allowed 5%
- Maximum grade break at bottom of ramp and gutter/street is 13.3%



Obstacles in the ramp grade.

Grade breaks at the top and bottom of curb ramp runs shall be perpendicular to the direction of the ramp run.



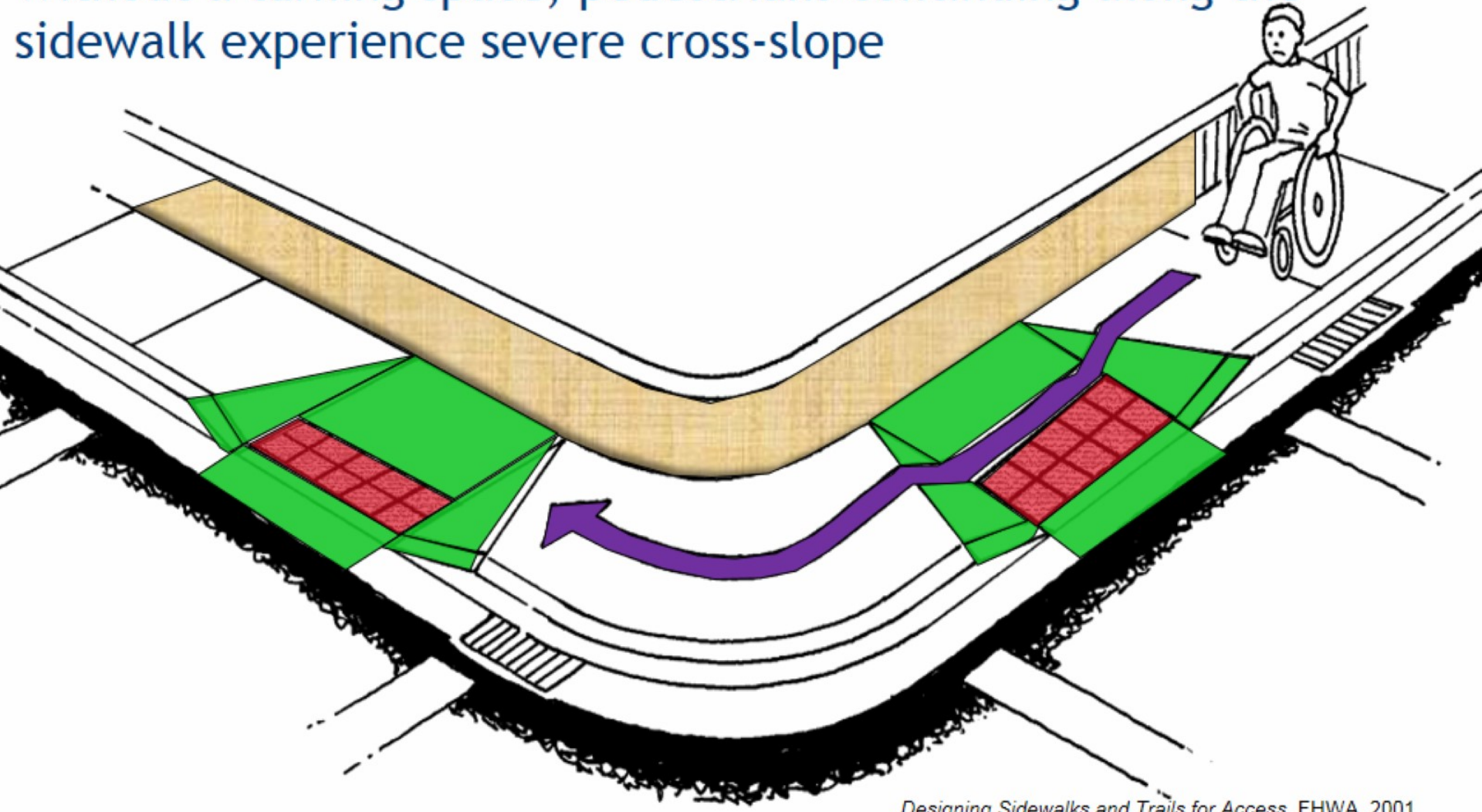
R 304.5.1 Curb Ramp Width

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



Turning Space

Without a turning space, pedestrians continuing along the sidewalk experience severe cross-slope

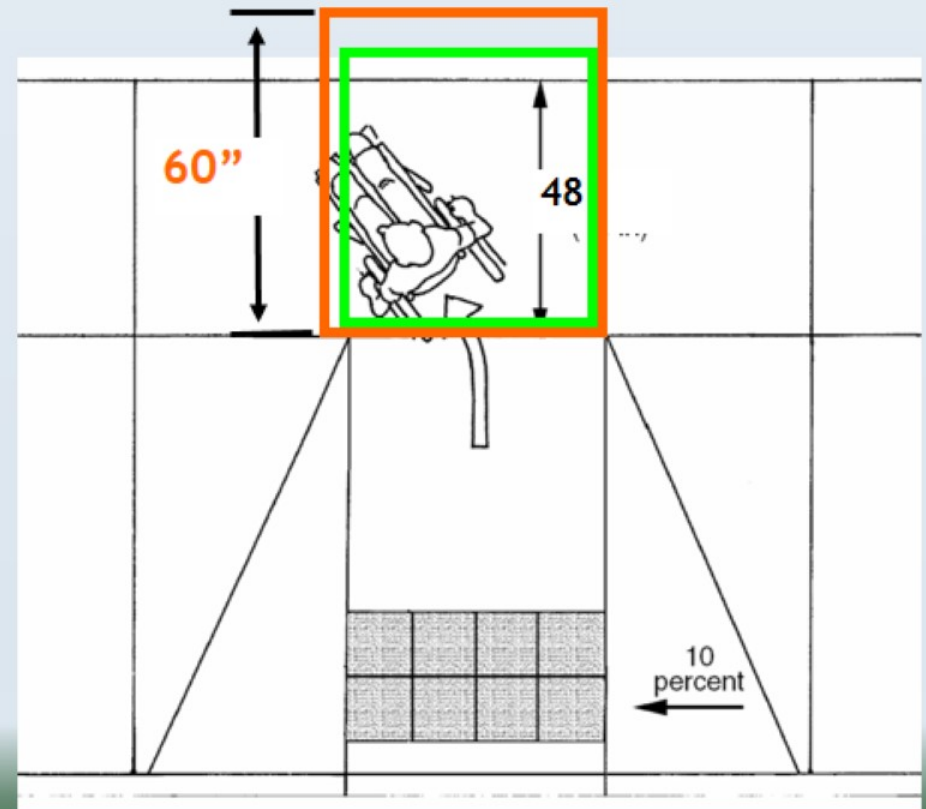


Designing Sidewalks and Trails for Access, FHWA, 2001

Turning Space Dimension

R304.2.1 & R304.3.1

- Turning space should be 4 feet x 4 feet minimum
- Turning area may overlap or serve multiple ramps
- 60" min. in direction of pedestrian crossing when constrained
- Best practice: 60" x 60"



Perpendicular Ramp-Landing Area.



Turning Space



ALDOT Std. Dwg. P734
Landing area NOTE #1-

Without a turning space, user must turn while climbing, which is difficult for many users, and not compliant with the ADA.

Turning Space- Solutions?



ROW- retaining wall, signal? Raise Asphalt, Gutter, lower sidewalk/parallel ramp?

Turning Space

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



Turning Space-Obstacles

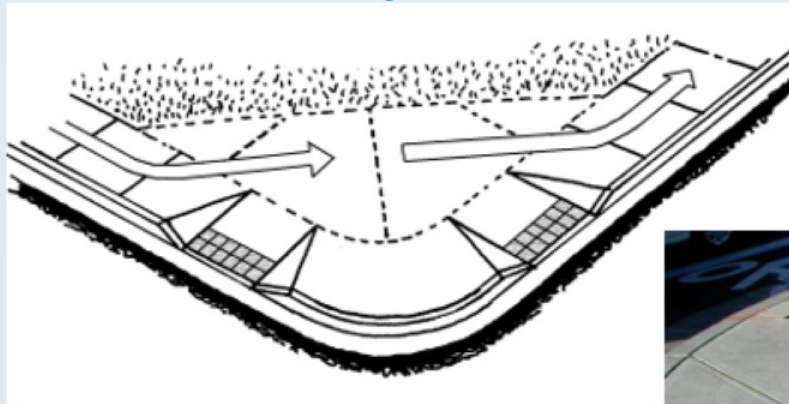


Designing Pedestrian Facilities for Accessibility

Retrofitting for ADA Design and Construction

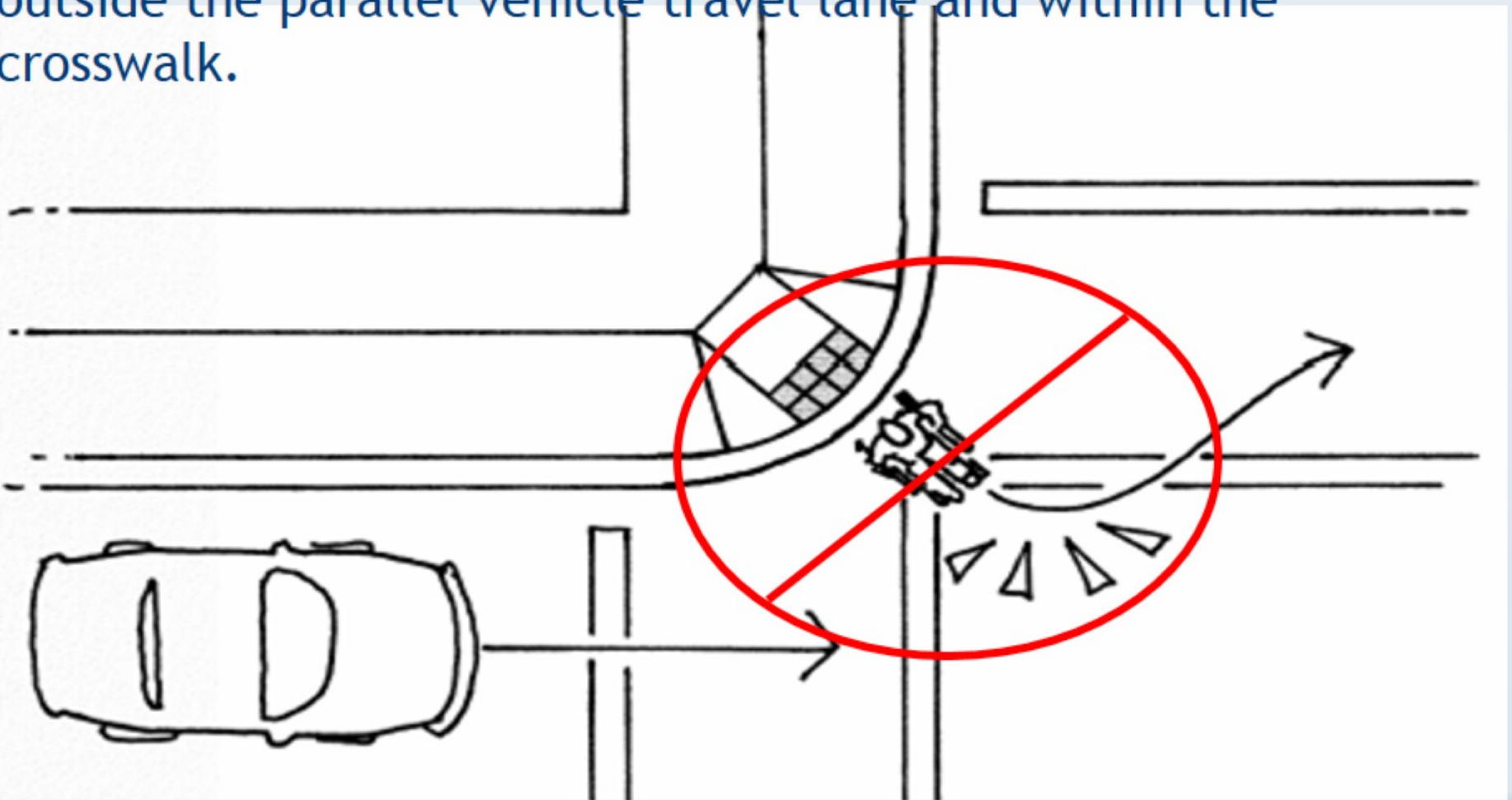
Turning Space

Non-compliant curb ramps without a turning space may be retrofitted by adding a turning space behind the curb ramps



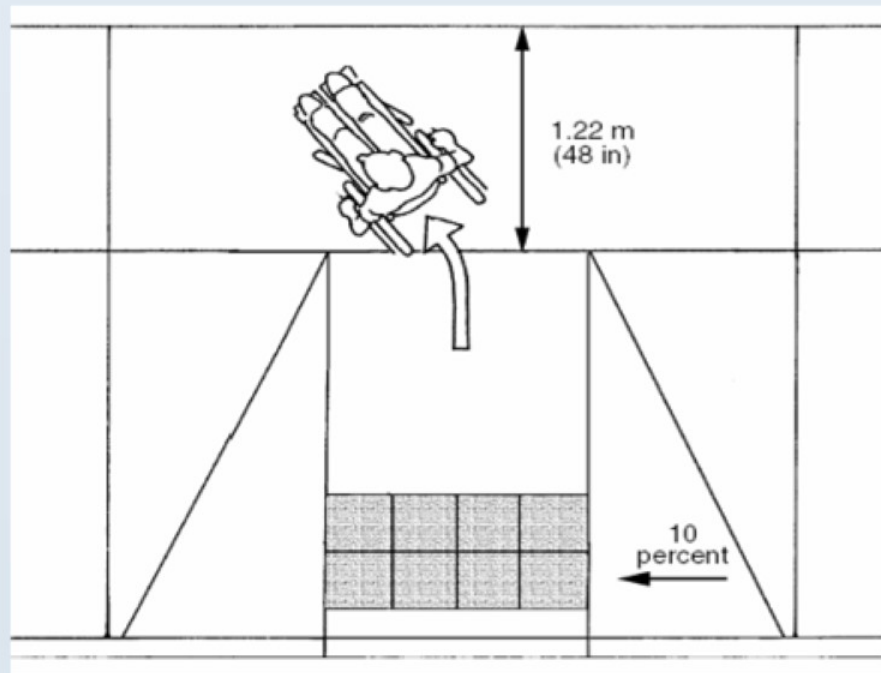
R304.5.5 Clear Space

Bottom of curb ramp must have 48 x 48 inch clear space wholly outside the parallel vehicle travel lane and within the crosswalk.



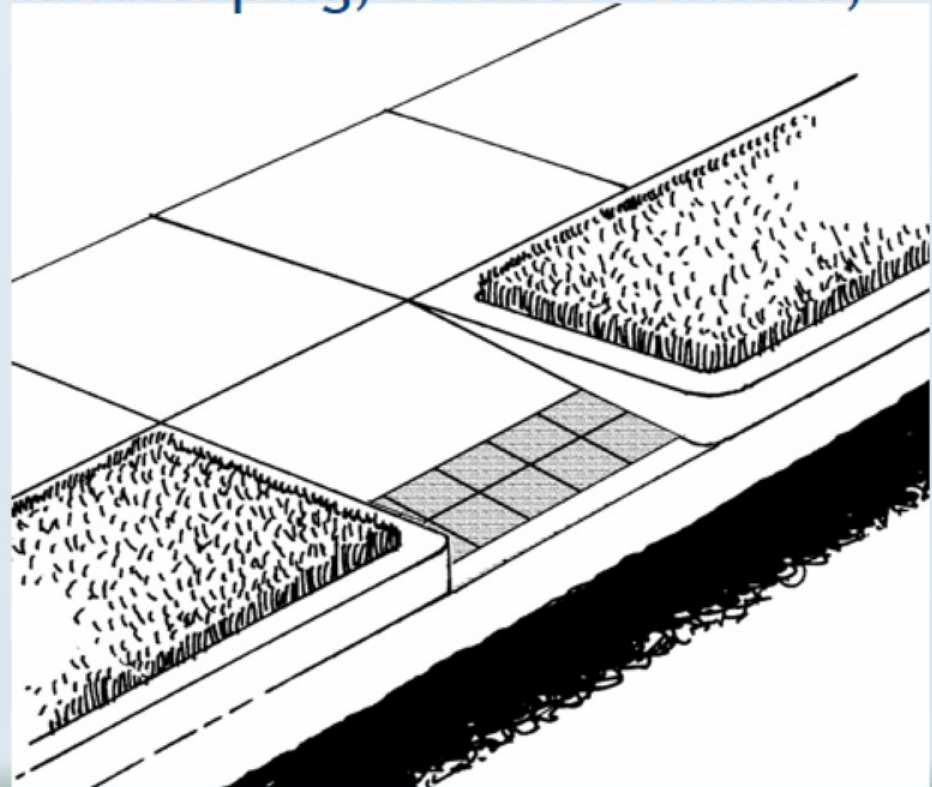
R304.2.3 Perpendicular Curb Ramp Flared Sides (R303)

- 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 are not part of the pedestrian access route.



Advisory R304.2.3 No Flare Sides

- Returned curbs provide useful directional cues when aligned with the pedestrian street crossing
- Flares are not needed if the sides of the curb ramp are protected from cross travel by landscaping, street furniture, chains, fences or railings



No Flared Sides can be easier to build.

Flared sides not needed in landscaped areas



Drainage at Curb Ramps

- To prevent standing water at the base of curb ramps:
 - Place inlets upstream of ramps
 - Widen the gutter pan and flatten at the curb ramp
 - The gutter pan counter slope must be flatter than the running slope of the curb ramp; a steeper gutter cross slope can resume outside the curb ramp

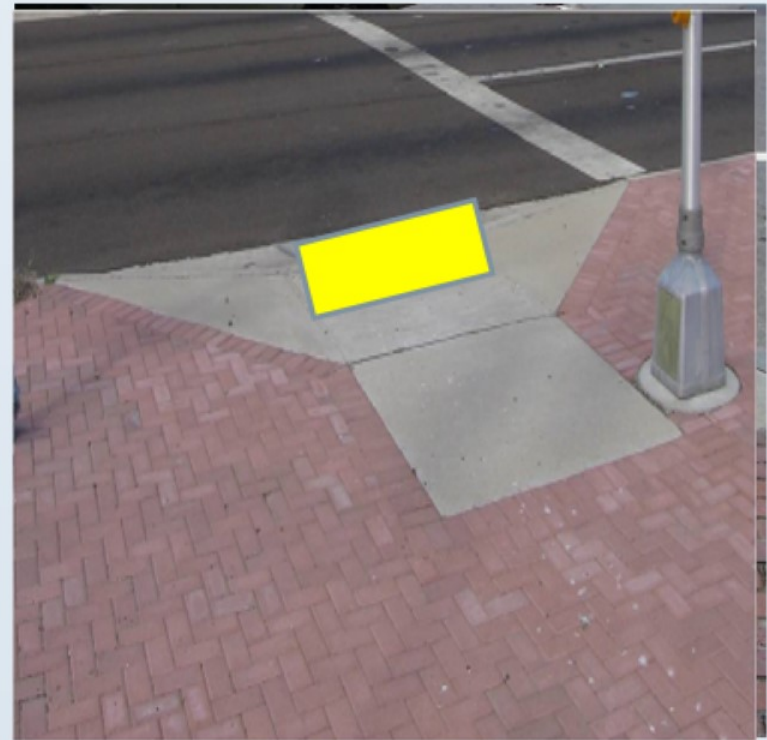


R302.7 Surfaces

Curb ramp surface should be smooth, texture makes them hard to climb



Poor design



Better design

Perpendicular Curb Ramp



*This is the level turning space
serving both ramps*

Perpendicular Curb Ramps

- Advantages
 - Least likely to pond and trap sediment
 - User has setback from traffic while waiting to cross
- 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

R304.3 Parallel Curb Ramps

- Parallel curb ramps shall have a running slope that is in-line with the direction of sidewalk travel.
- Grade: 5-8.3%
- Min. 4'x4' turning space at bottom of ramp



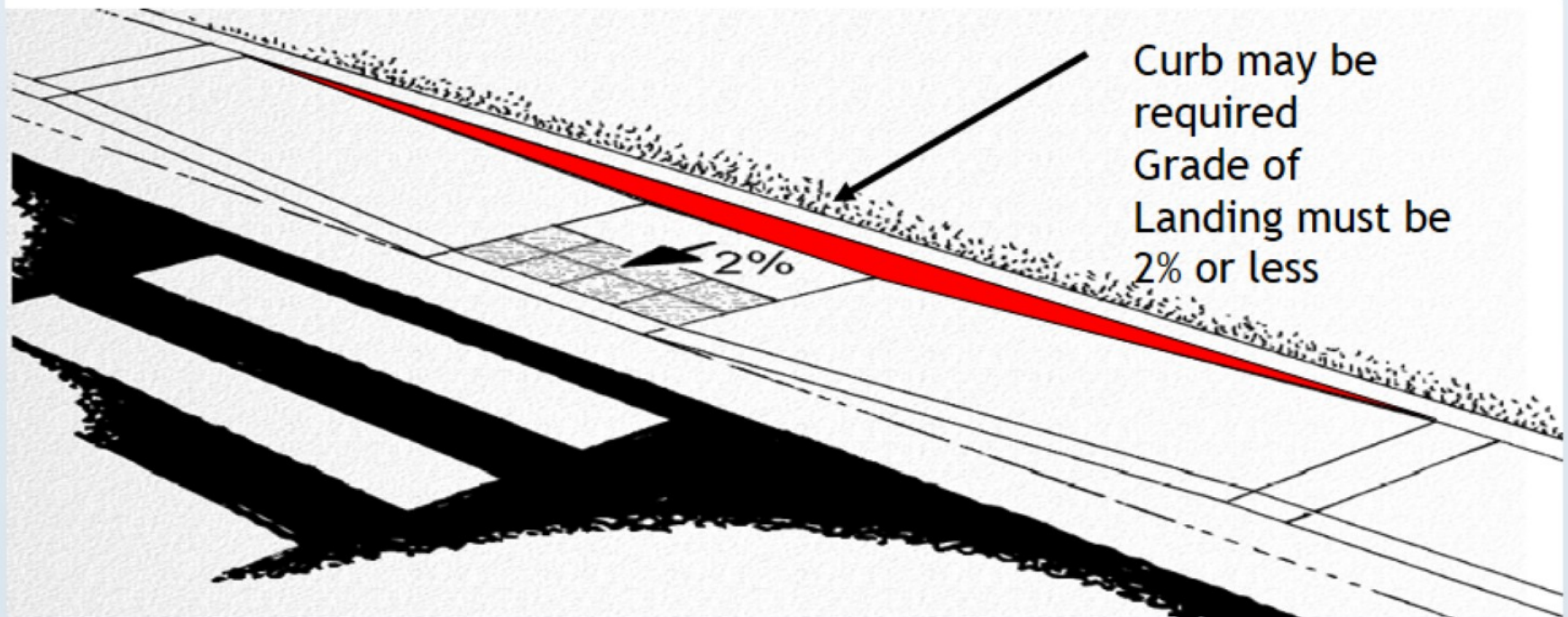
Parallel Curb Ramps-Advantages

- Advantages
 - Fits within narrow ROW
- Disadvantages
 - Users continuing along the sidewalk must negotiate ramp grades
 - Careful attention must be given to the construction of the bottom turning space to limit accumulation of water and/or debris

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

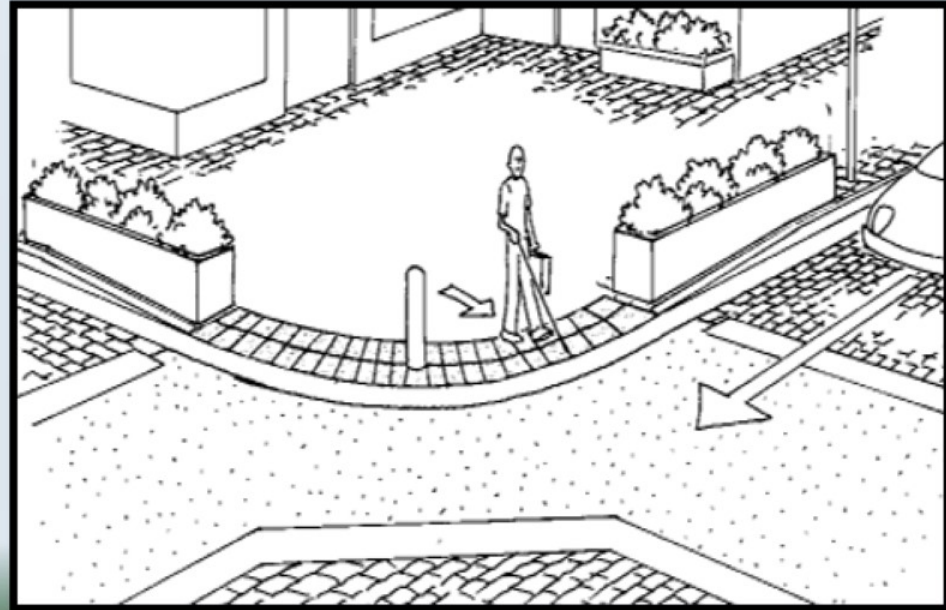
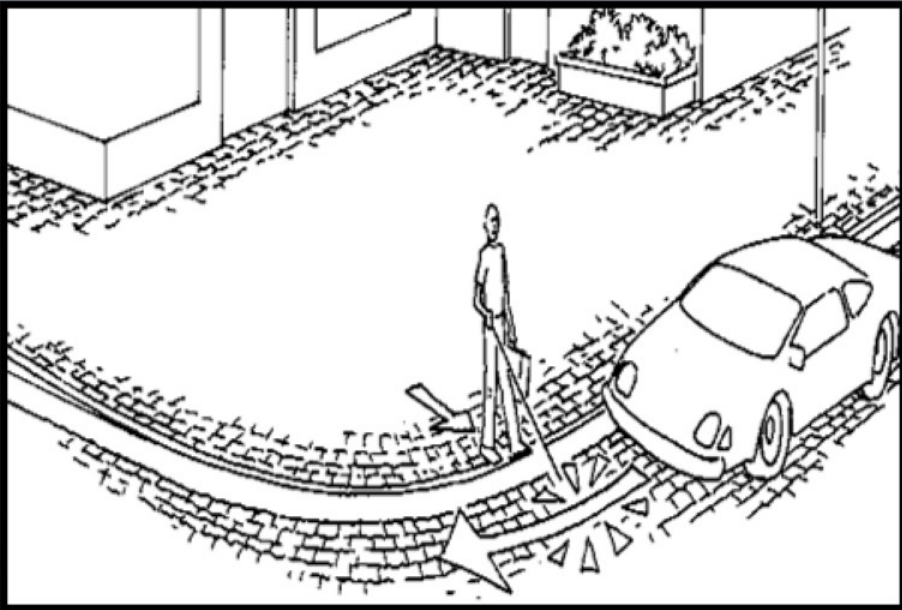


R304.4 Blended Transitions

- Running slope - 5 percent maximum
- Cross Slope as published (same revisions expected)
 - If Stop/Yield control: 2% max.
 - Otherwise: 5% max.
- No turning space is required



Blended Transitions

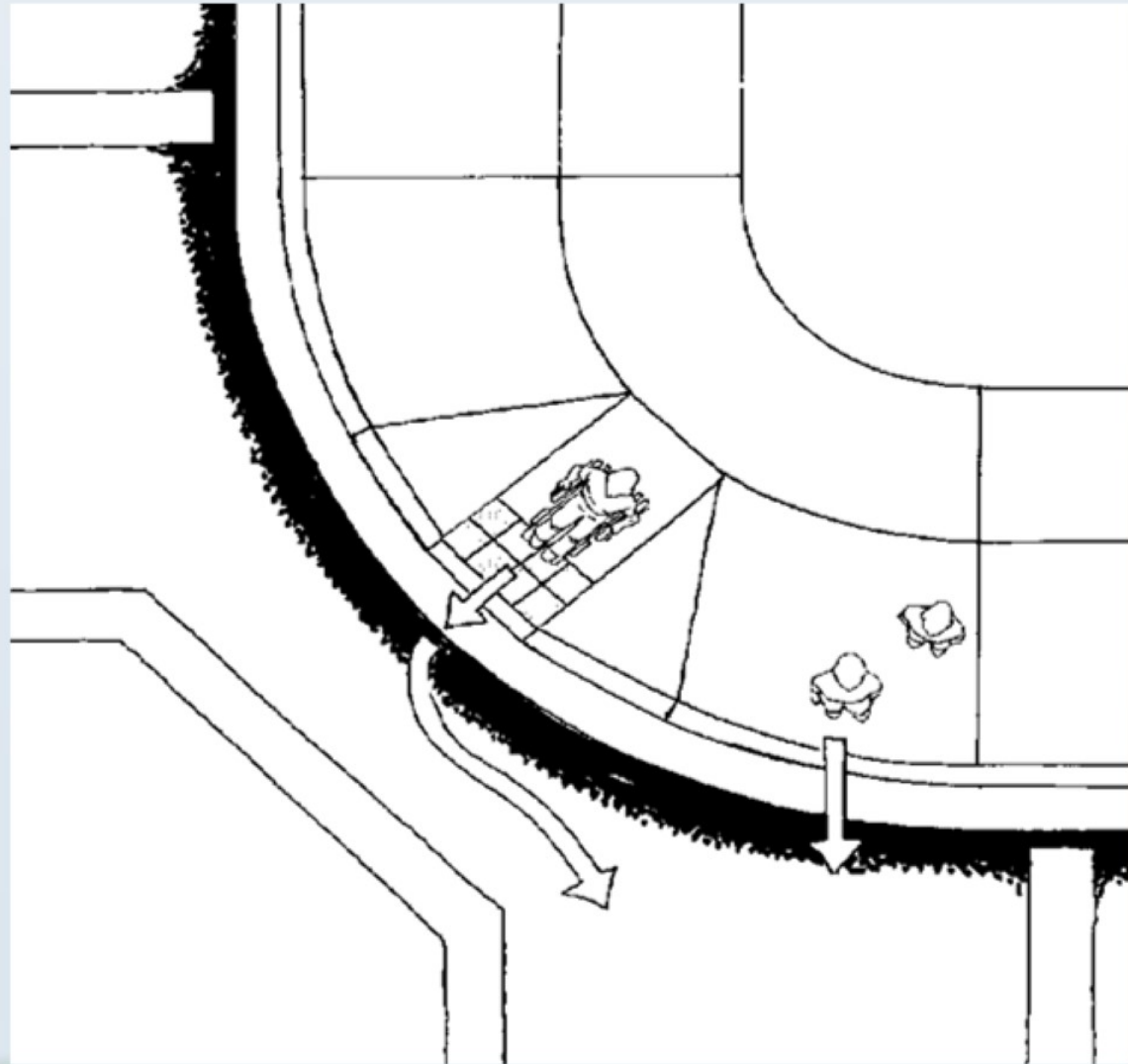


Blended Transitions

- Sidewalk elevation lowers to street with gradual change in slope
- Advantages
 - No turning space required
- 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

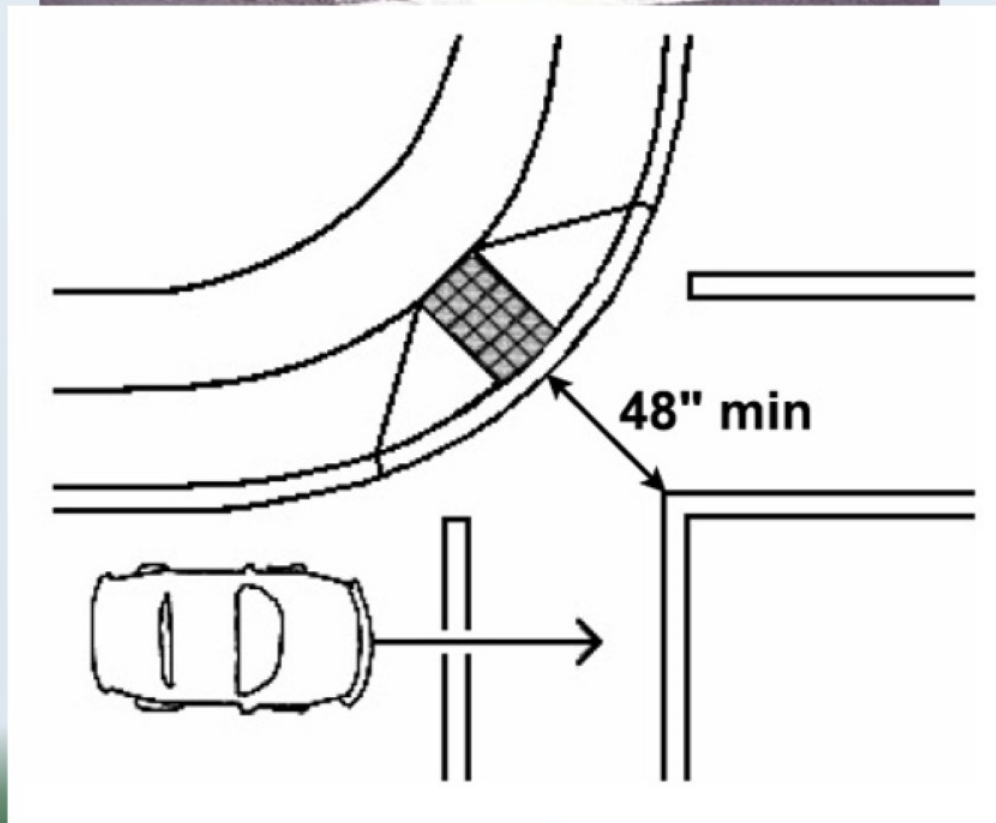
- Diagonal curb ramp is a single ramp located at the apex of the corner that serves both crosswalks
- Unacceptable in new construction
- Curb ramp must land within the crosswalk that it serves; diagonal curb ramps don't and are not permitted under 2011 NPRM



Diagonal Curb Ramp

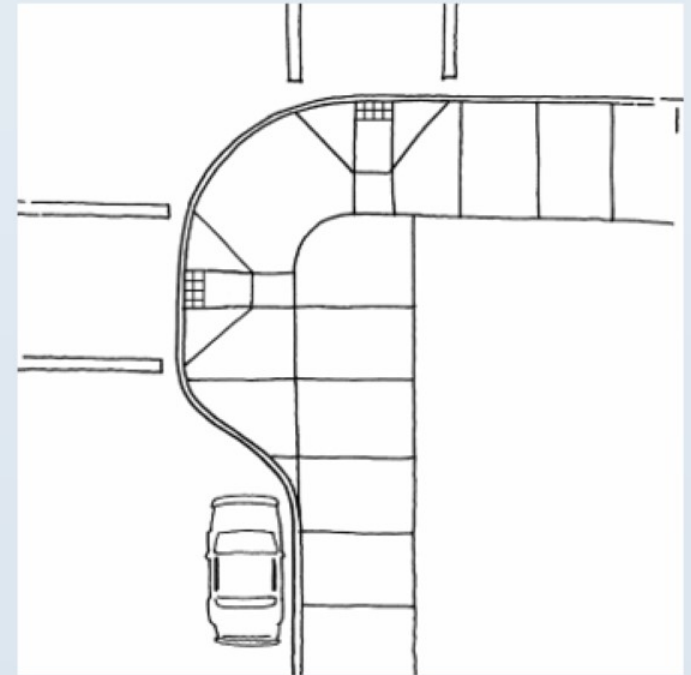
- Disadvantages

- 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
- Do not serve either crosswalk well



Curb Extensions

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



PAR - Crosswalk must be 2% at STOP Signs

1099 22nd St S

Birmingham, Alabama

Street View - Mar 2017

HOW - May have to adjust radius, change footprint

2% max

5% max



Combination Ramp

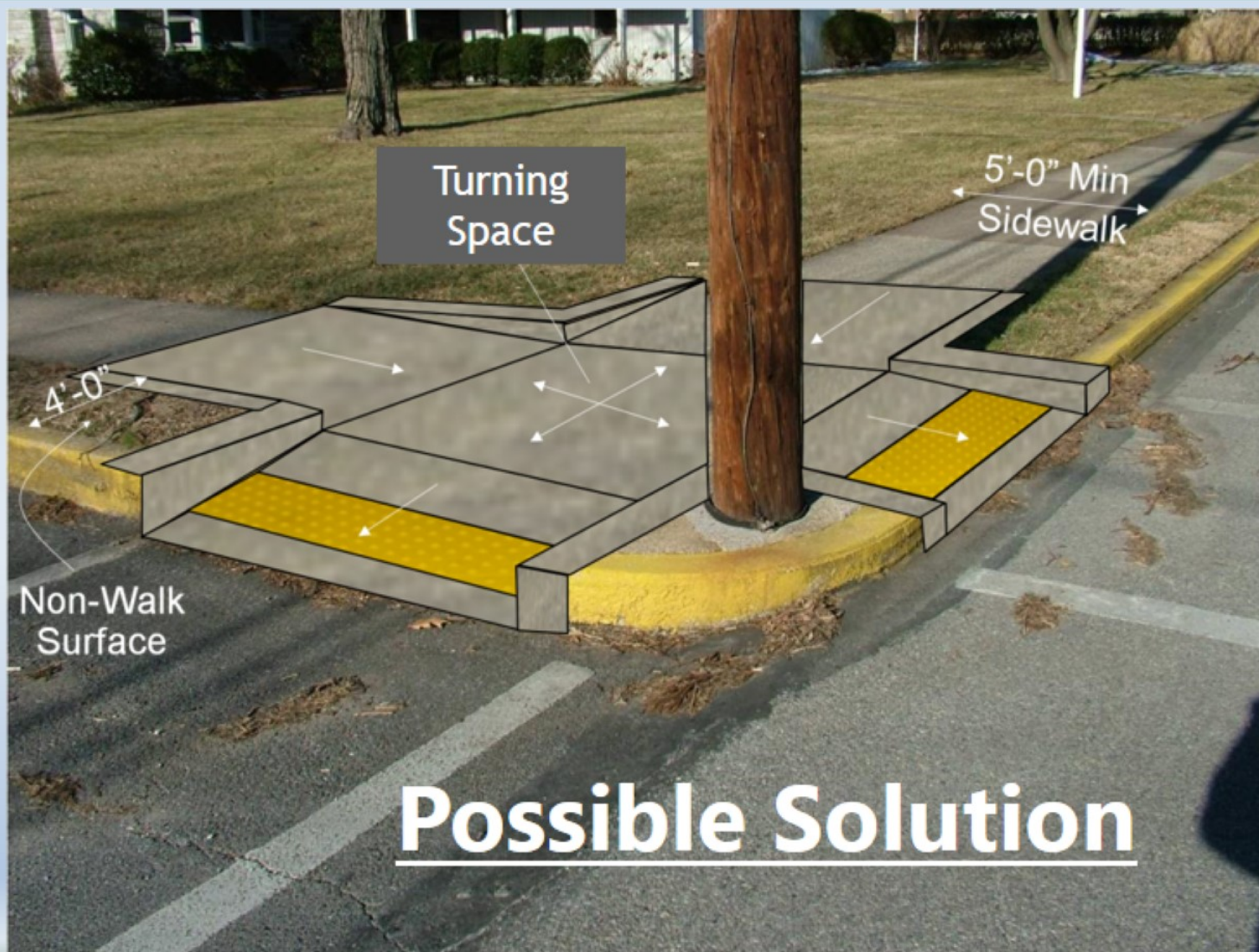


Example #1



Existing Condition

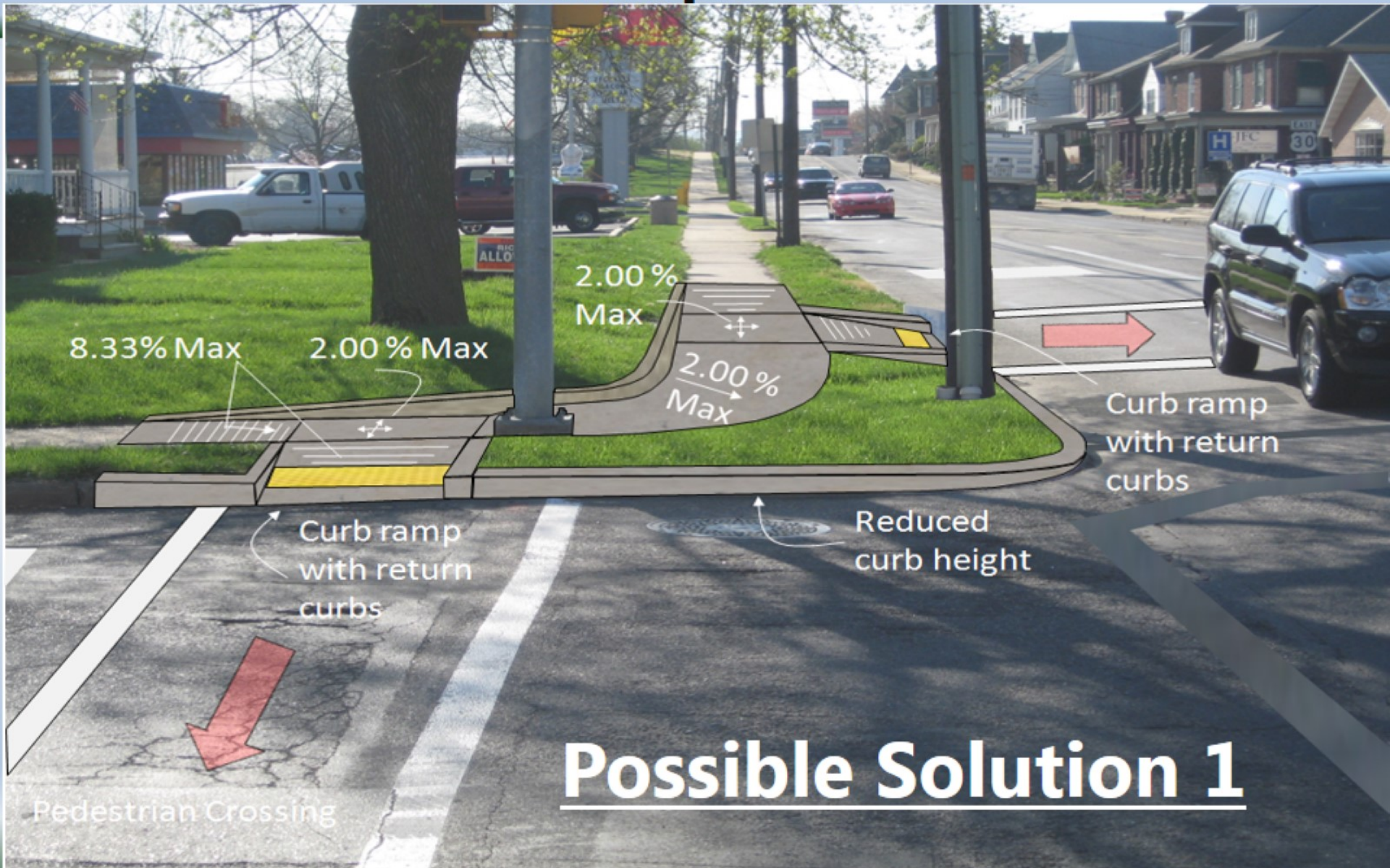
Example #1



Example #2



Example #2



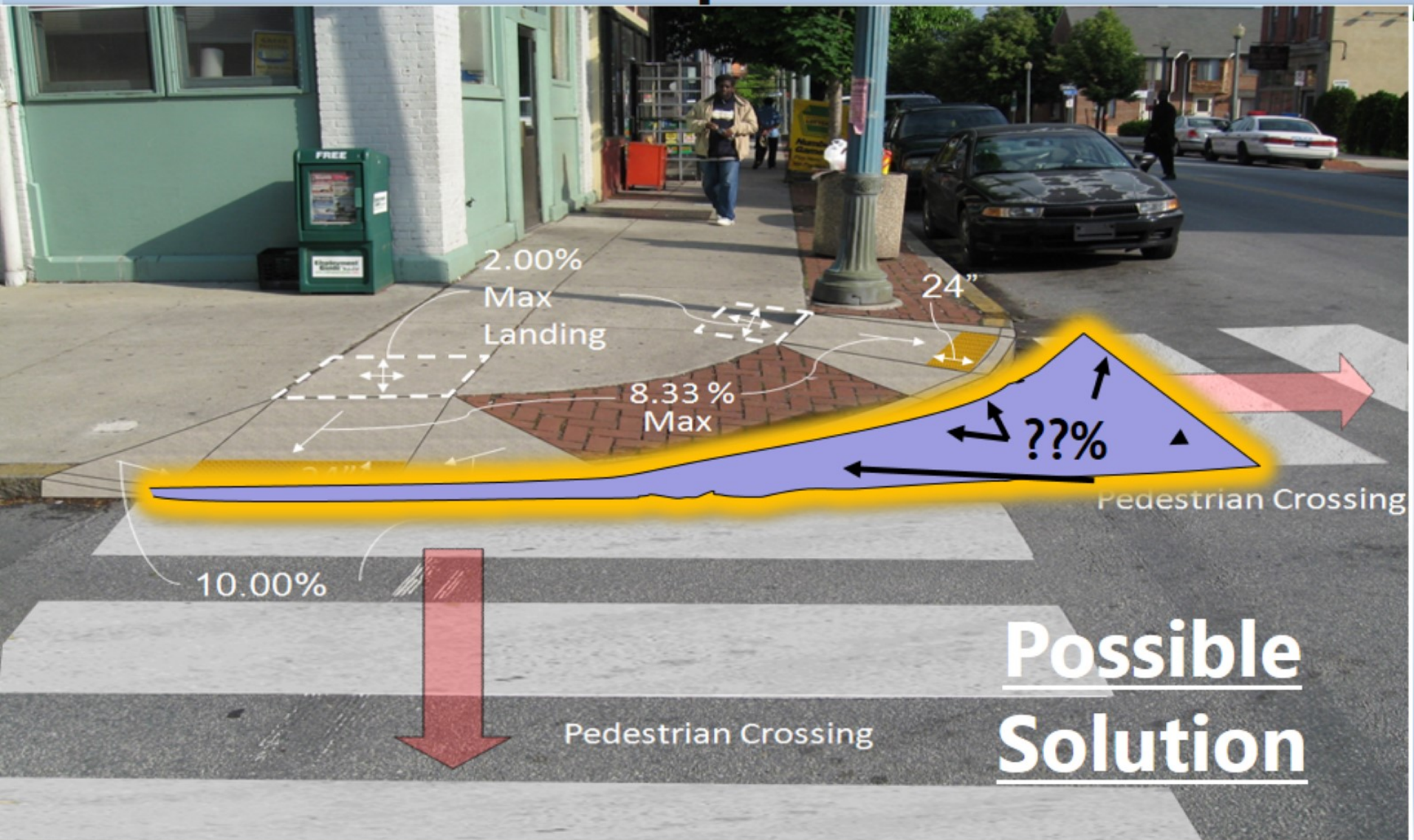
Example #2



Example #3



Example #3



Domes, Button, Grade, Break?



FINAL Summary

- Change the Design- Review construction plans
 - Construction Plans should have sufficient: Grades/ Spot Elevations.
 - Simple cross sections or line sections from the edge of pavement developed during design can simplify construction.
 - Change turn radius, sidewalk path, drainage during design.
- Make it fit
 - Change grades of Asphalt, Curb, and/or sidewalk to make ramps fit better.
 - Add grinding and or milling to projects.

Questions

Clint Andrews, P.E.
Planning & Programs Team Leader
FHWA-Alabama Division
334-274-6346
Clint.Andrews@dot.gov