Acknowledgement

http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4b.cfm

Designing Sidewalks and Trails for Access

Part II of II: Best Practices Design Guide

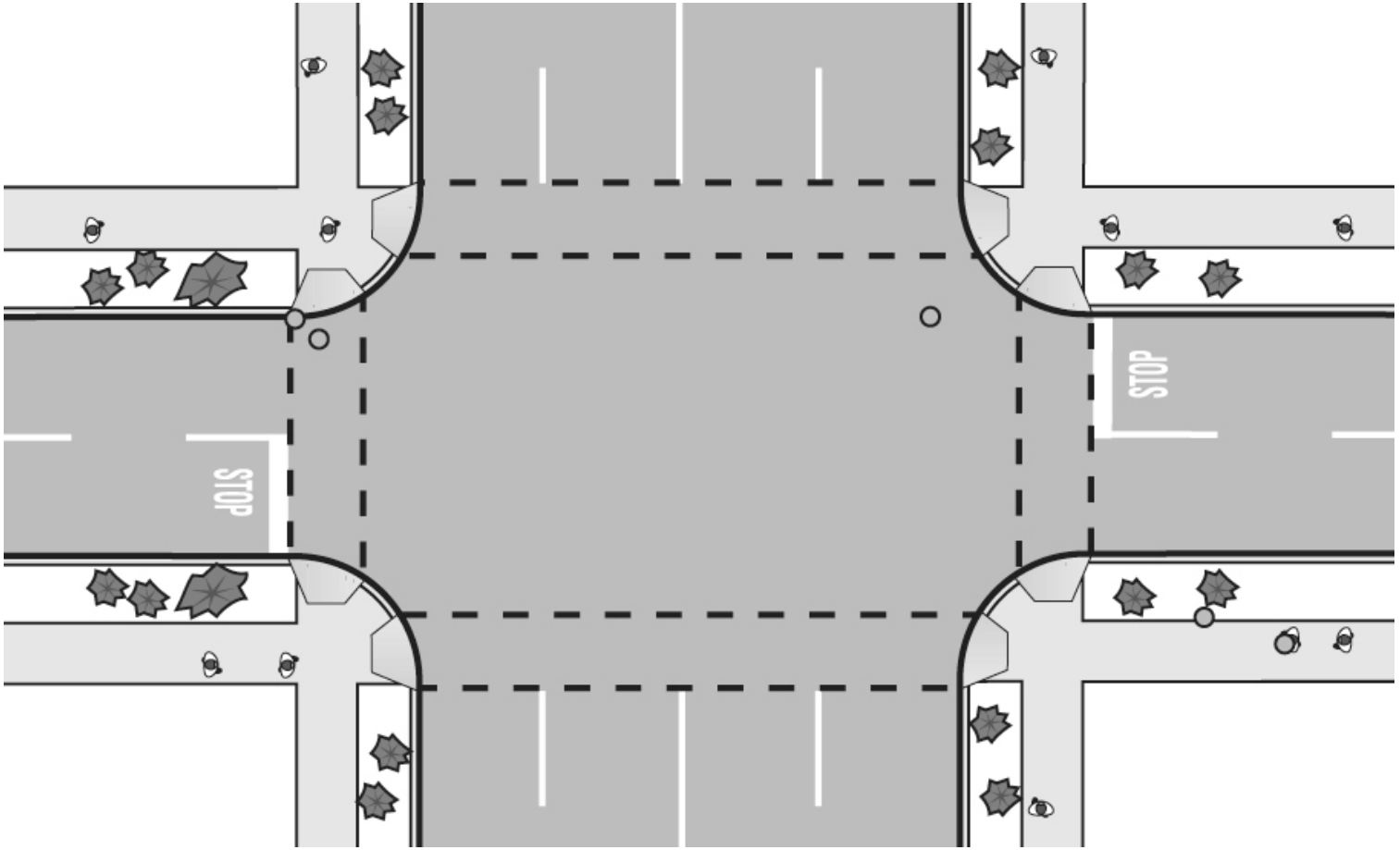
Revisions to ADAAG: Chapter 4 Ramps and Curb Ramps

Pedestrian Access Route

Pedestrian Access Route

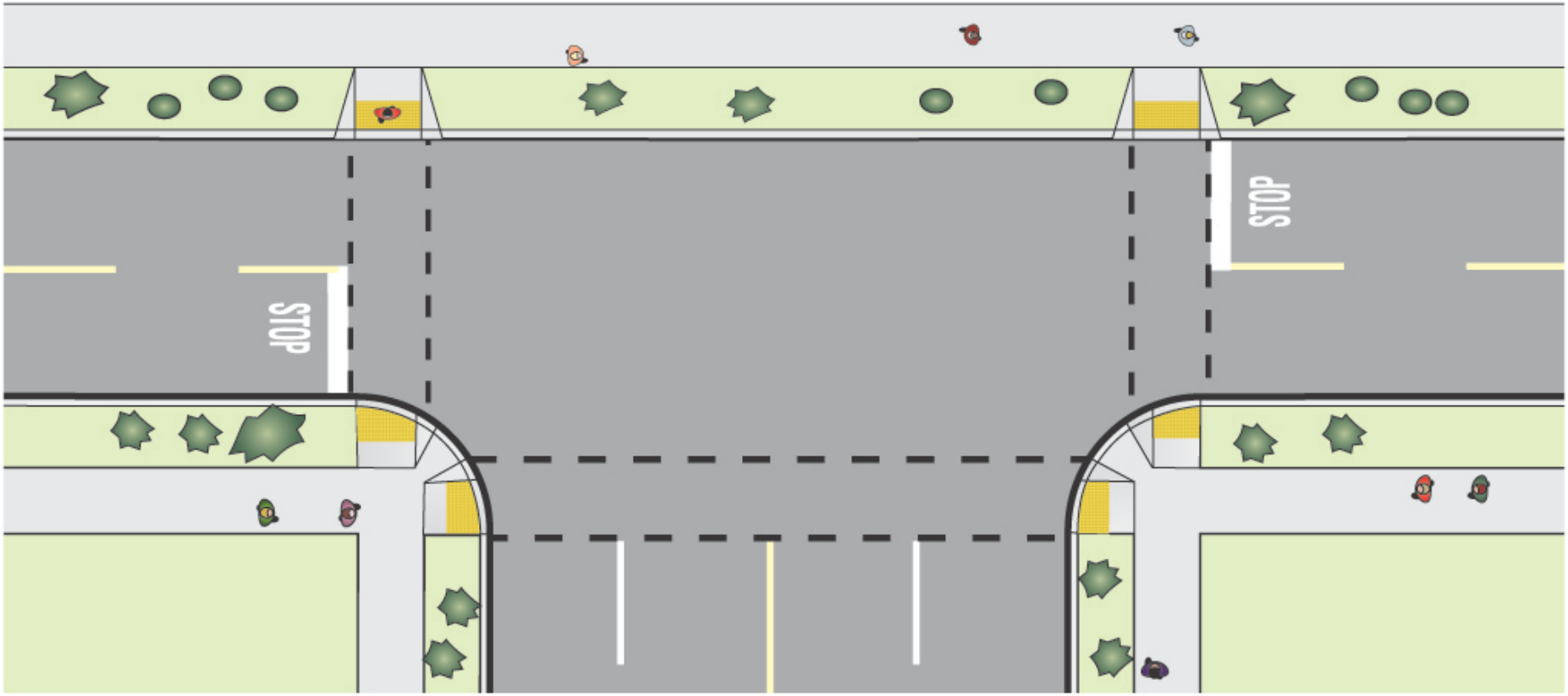
- Curb Ramps
- Sidewalks
- Crosswalks
- Signal Activation
- Work Zones
- Parking spaces
- Parking Lots
- Ingress/egress to buildings

Crosswalks Defined



Ramps MUST be provided at every legal crosswalk (even if you think it's "unsafe")

Crosswalks Defined



Curb Ramps and Transitions

Devil is in the Details

Cross Slopes

Built Environment

- Construction Tolerances
- Cross slopes
- Ramps
- Curb Ramps
- Intersections

Cross Slope Construction

- Portland Cement Concrete tolerance is +0.2 percent
- Training of contractors and inspectors really important!!

Providing the least possible slope below the 1:12 (8.33%) maximum offers better usability for a wider range of users. Specifying a running slope of 7.5% maximum and a cross slope of 1.5% maximum for exterior ramps will accommodate most irregularities or variances due to construction methods or materials according to a study sponsored by the Access Board ("Dimensional Tolerances in Construction and for Surface Accessibility" by David Kent Ballast.)

Cross Slope

- Running cross slope is average cross slope over a distance of about 2 feet
- Rapid changes in cross slope are hazardous
- Don’t need a cross slope on a ramp (it will drain!)
- 1.5 % ODOT
- 2.0% ADAAG[1]

1. ADA Standards for Accessible Design

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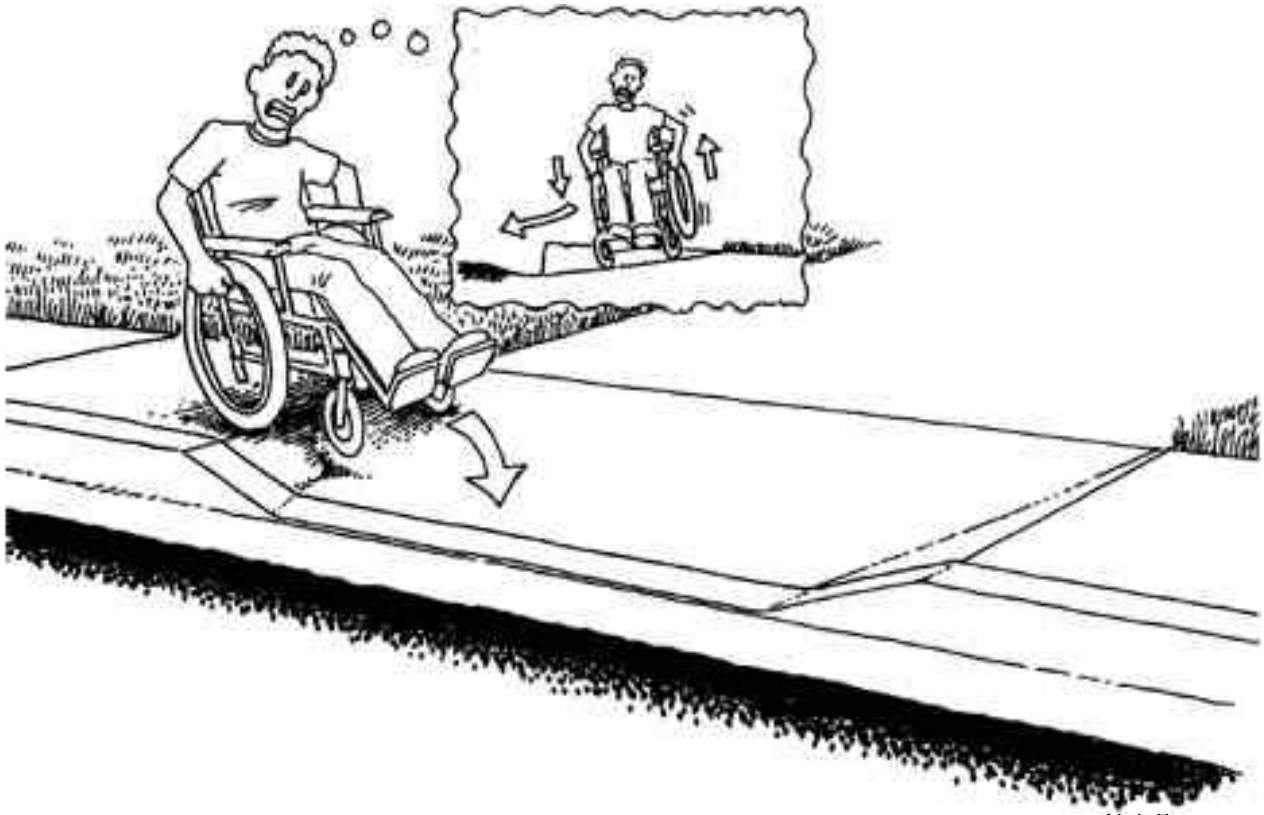
Cross Slope Management



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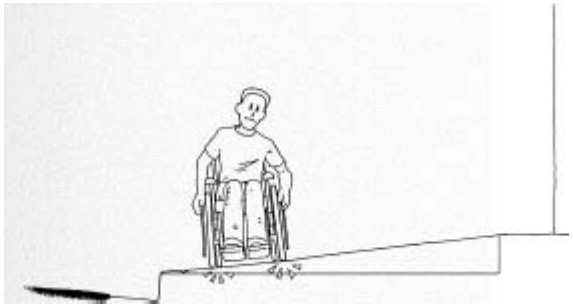
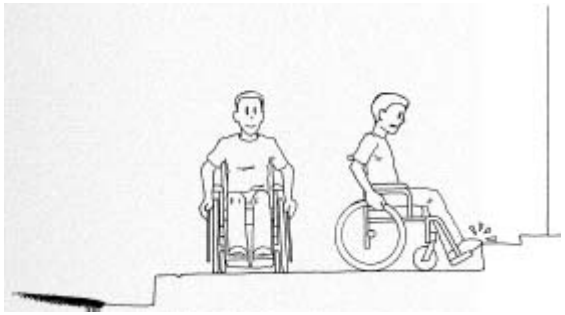
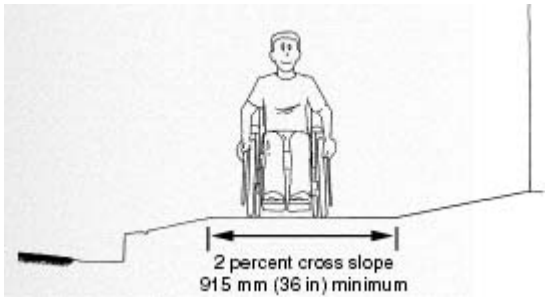
Other Cross Slope Issues

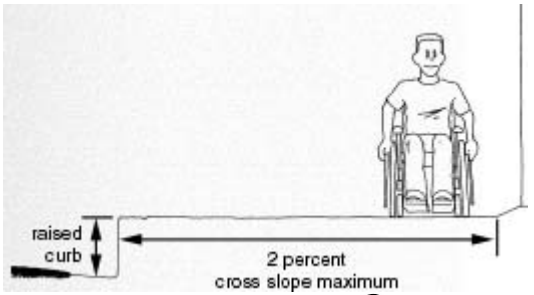
Street –Building Interfaces





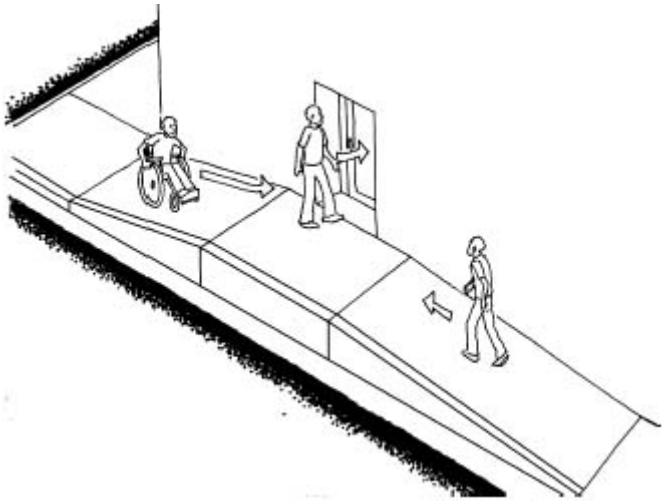
Suggested Mitigation



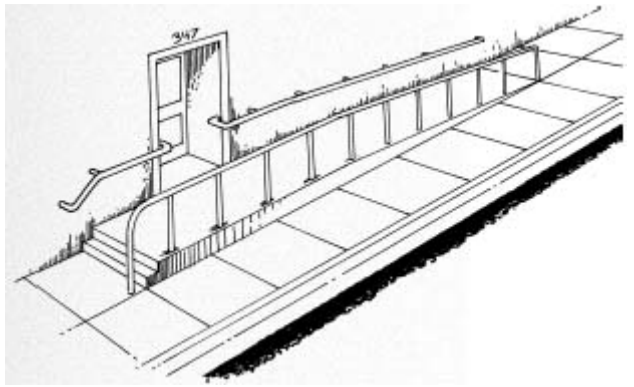


Unintended Consequences

Parked cars may not be able to open doors



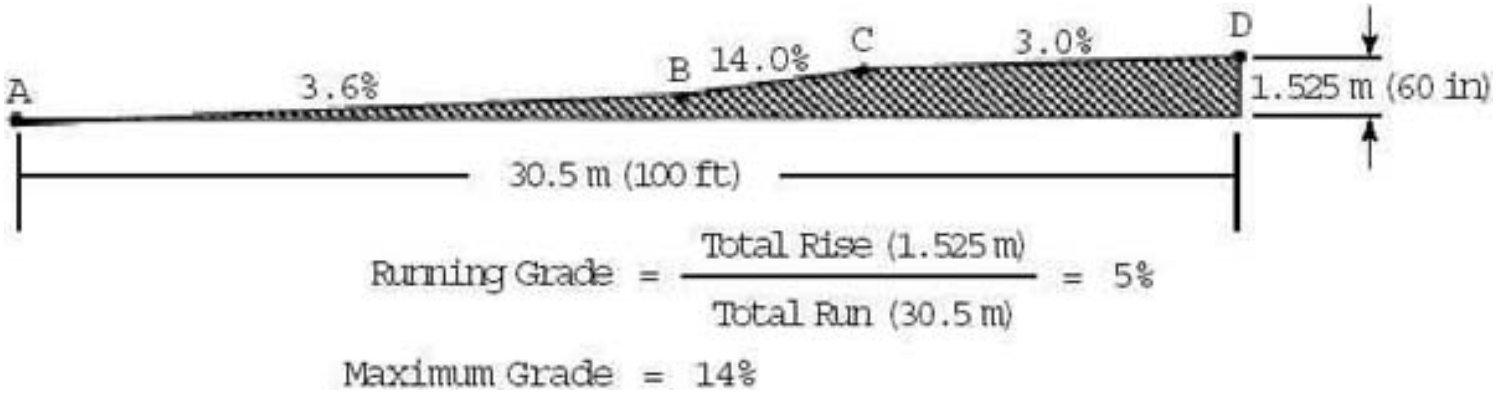
Better design



Ramp Slopes

Maximum grades can make a sidewalk difficult to traverse, even if the overall running grade is moderate.

[http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/chap4a.cfm#acc]



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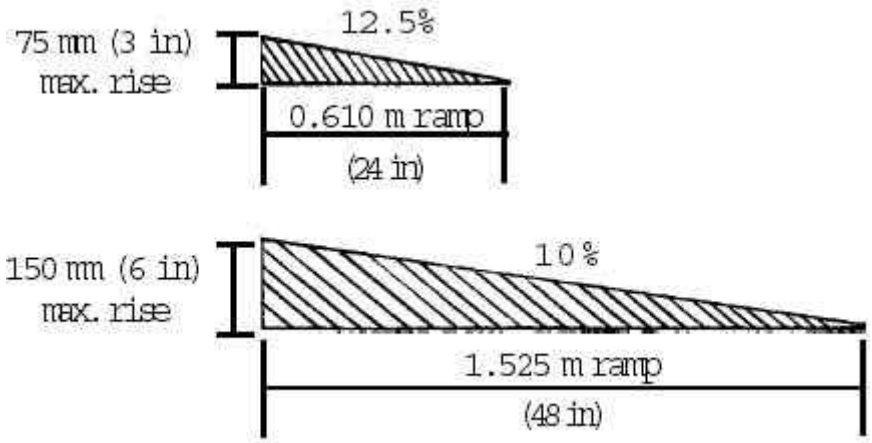
Ramp-Slopes

8.33% (1:12) max except:

- For max 6 inch rise – slope up to 10% (1:10)
- For 3 inch rise up to 12.5% (1:8)
- Maximum single run is 15 feet



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RAMPS

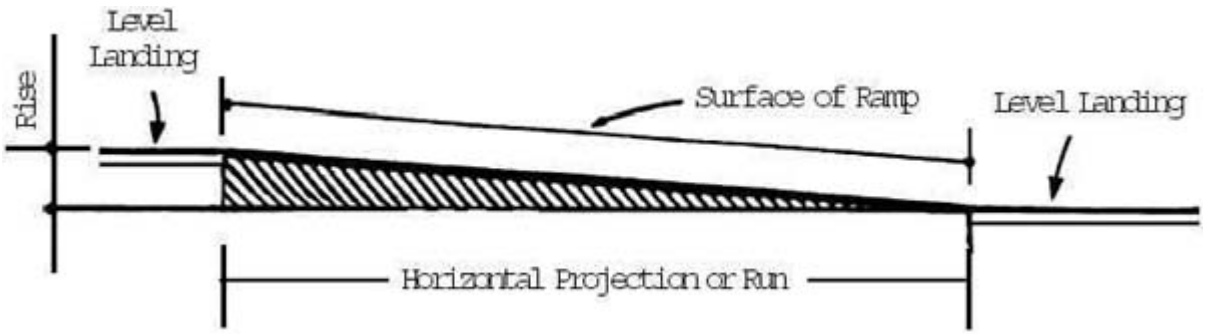
Long ramps must have LEVEL landings

(vertical rise must be 30 inches max.

that would be a horizontal distance of 360 feet!)

Must provide level rest areas-How many ?

=24



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Reality - Newport, OR

Curb Ramps

- Landing –Level
- Approach on accessible path
- Flare: sloped transition

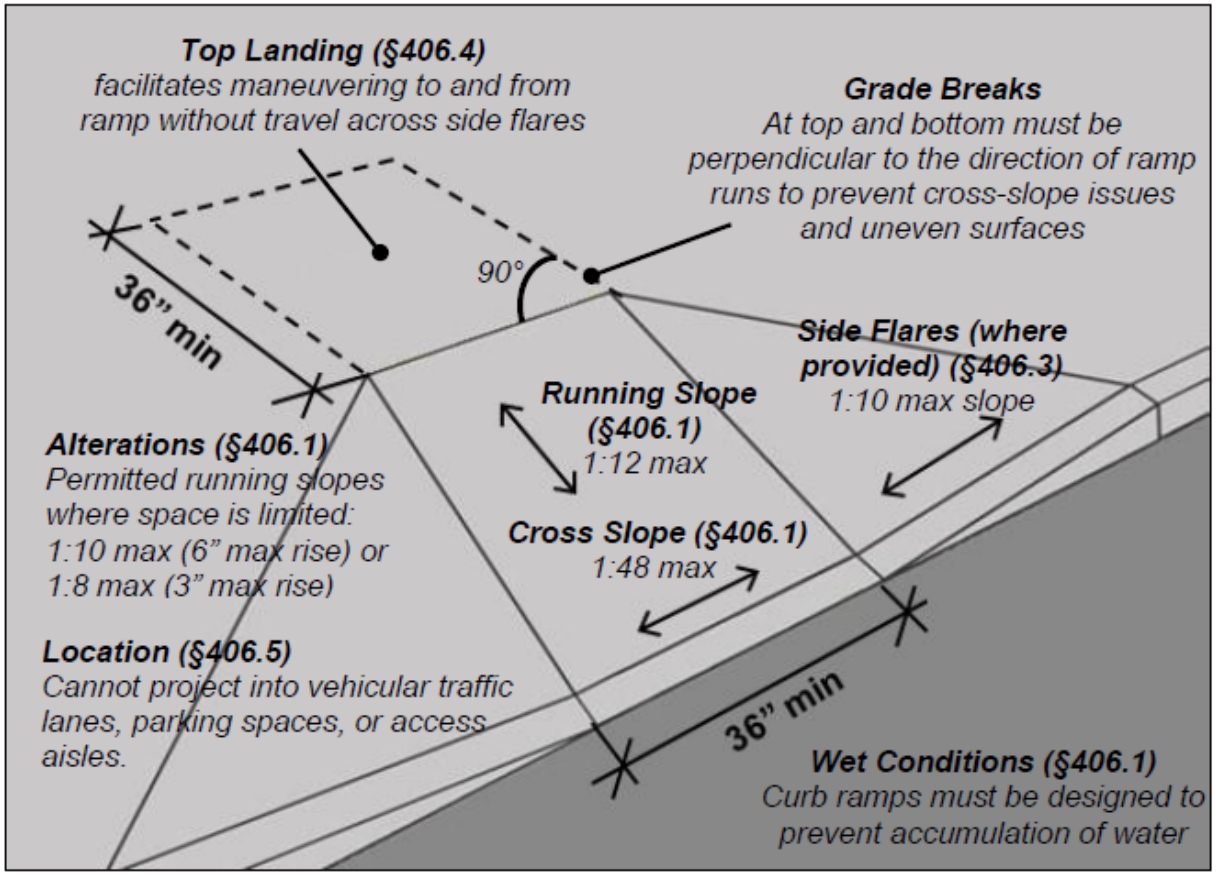
(Not on accessible path, but still may be hazard for low vision)

- Ramps: transition
- Gutter

Curb Ramps

- Size to accommodate volume (match sidewalk width)
- At least 48” wide (does not include flares)
- AASHTO: 39 inches
- Ramps that are too wide or gradual – problem for low vision
- Need 2 ft. wide detectable warning (domes)near or at bottom of ramp

Curb Ramps



[ADAAG Chapter 4 Ramps and Curb Ramps]

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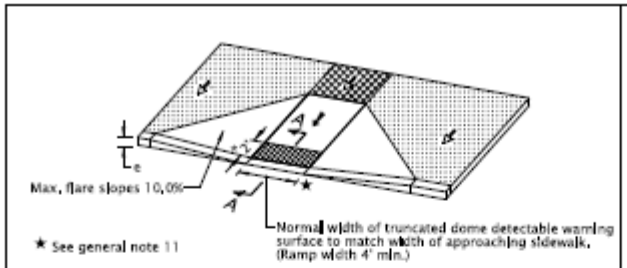
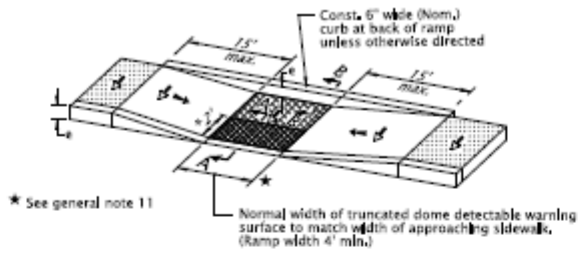
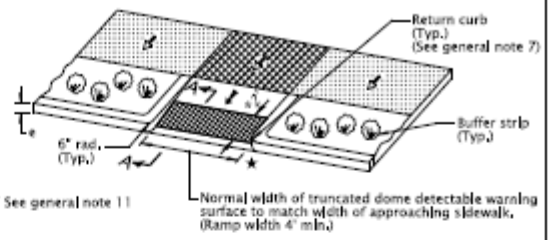
ODOT Standard Drawing for Sidewalk Ramp Detail



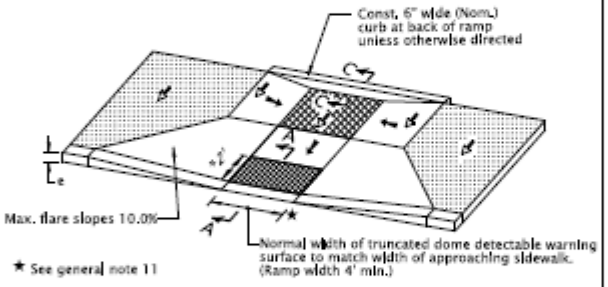
PERPENDICULAR SIDEWALK RAMP DETAIL
(Use "Parallel Sidewalk Ramp Detail" or "Combination Sidewalk Ramp Detail" when reqd. turning space cannot be obtained)



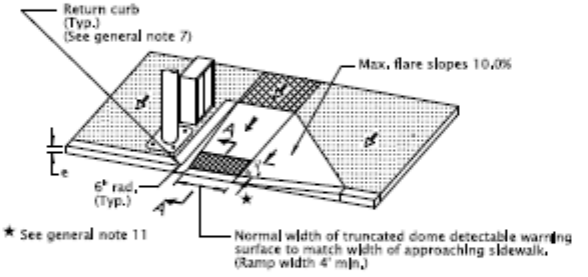
PARALLEL SIDEWALK RAMP DETAIL



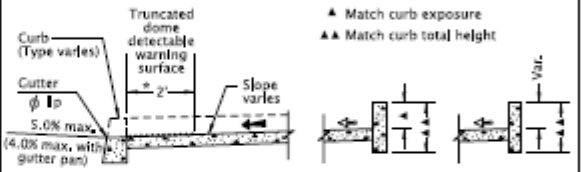
PERPENDICULAR SIDEWALK RAMP DETAIL
(THROUGH BUFFER STRIP)



COMBINATION SIDEWALK RAMP DETAIL



PERPENDICULAR SIDEWALK RAMP DETAIL (WITH SINGLE FLARE)
(Use "Parallel Sidewalk Ramp Detail" or "Combination Sidewalk Ramp Detail" when reqd. turning space cannot be obtained)



Sidewalk

Turning space
Min. level area 4'x4'
4'x5' when constrained (with longer dimension in direction of pedestrian street crossing). For the purposes of this application, a max. 2.0% finished surface slope (for drainage) is considered level.

Truncated dome detectable warning surface

Slope 1.5% max. (Max. 2.0% finished surface slope) (Normal sidewalk cross slope)

Slope 7.5% max. (Max. 8.3% finished surface slope) (Ramp length 15' max., measured along finished surface slope)

*2' See general note 5

GENERAL NOTES FOR ALL DETAILS:

1. Sidewalk ramp details are based on United States Access Board Standards.
2. See Std. Dwgs. RD700 & RD701 for curbs, See Std. Dwg. RD720 for sidewalks, See Std. Dwgs. TM503 & TM530 for crosswalk markings, widths, etc.
3. Tooled joints are required at all sidewalk ramp slope break lines.
4. Sidewalk curb ramp slopes shown are relative to the true level horizon (Zero bubble).
5. Place truncated dome detectable warning surface in the lower 2' adjacent to traffic of throat of ramp only. For details not shown, see Std. Dwg. RD759.
6. Side flares that are not part of the path of travel may be any slope.
7. Return curb may be provided in lieu of flared slope only if protected from cross travel by landscaping or fixed barrier.
8. For the purpose of this drawing, a curb ramp is considered "perpendicular" if the angle between the longitudinal axis of the ramp and a line tangent to the curb at the ramp center is 75° or greater.
9. Ramps for paths intersecting a roadway should be full width of path, excluding flares. When a ramp is used to provide bicycle access from a roadway to a sidewalk, the ramp should be 8' wide.
10. For sidewalk ramp placement options, see Std. Dwgs. RD756 & RD757.
11. Check the gutter flow depth at ramp locations to assure that the design flood does not overtop the back of sidewalk at ramp. If overtopping occurs place an inlet at upstream side of ramp or perform other approved design mitigation.
12. Only use details allowed by jurisdiction.
13. Site conditions normally require a project specific design. See project plans for details not shown.

CALC. BOOK NO. N/A

BASELINE REPORT DATE 23-JAN-2017

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

OREGON STANDARD DRAWINGS

SIDEWALK RAMP DETAILS

2018

DATE	REVISION DESCRIPTION

rd755.dgn 25-JUL-2017

RD755

Effective Date: December 1, 2017 – May 31, 2018

RD755

ODOT Pay Limits

Pay Limits

Pay Limits include all ramp elements including ramp runs and turn spaces, PLUS the next adjacent sidewalk transition panels and two feet out into the street in front of the ramp (red areas).

Make grade transitions outside the pay limits

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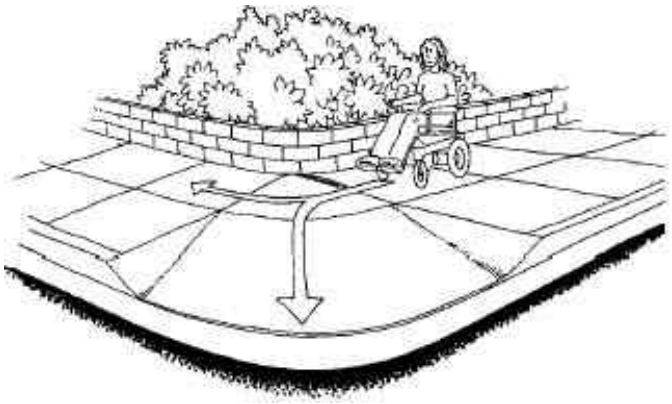
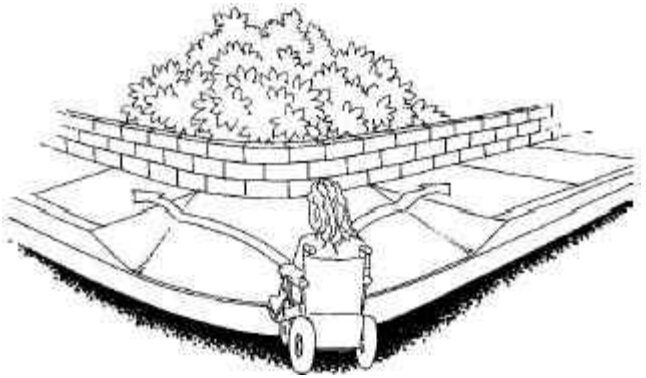
Landing

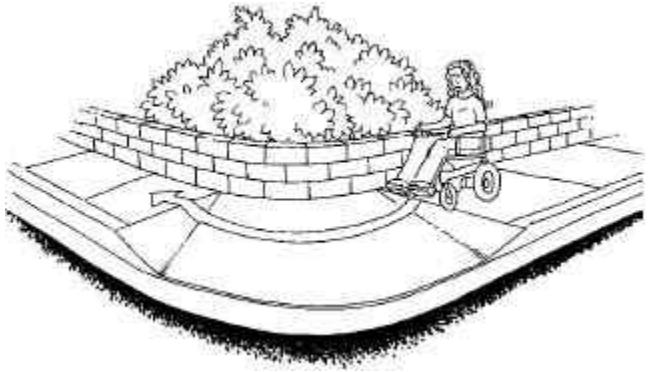
- Must be level
- Minimum width ~~36 inches~~ 48 inches preferred

{What might be a problem here? What could be a mitigation?}



- Ooups!





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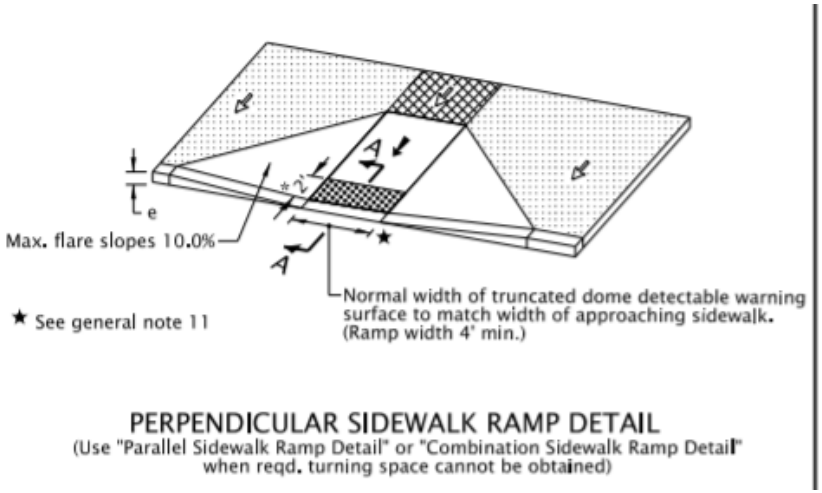
FLARES

- Problem for distracted and low vision pedestrians
- NOTE: that ODOT standard is 48 inches not 36 inches for Landing
- Best if detectable by cane



PERPENDICULAR SIDEWALK RAMP DETAIL
(Use "Parallel Sidewalk Ramp Detail" or "Combination Sidewalk Ramp Detail" when reqd. turning space cannot be obtained)

[ADAAG Chapter 4 Ramps and Curb Ramps]

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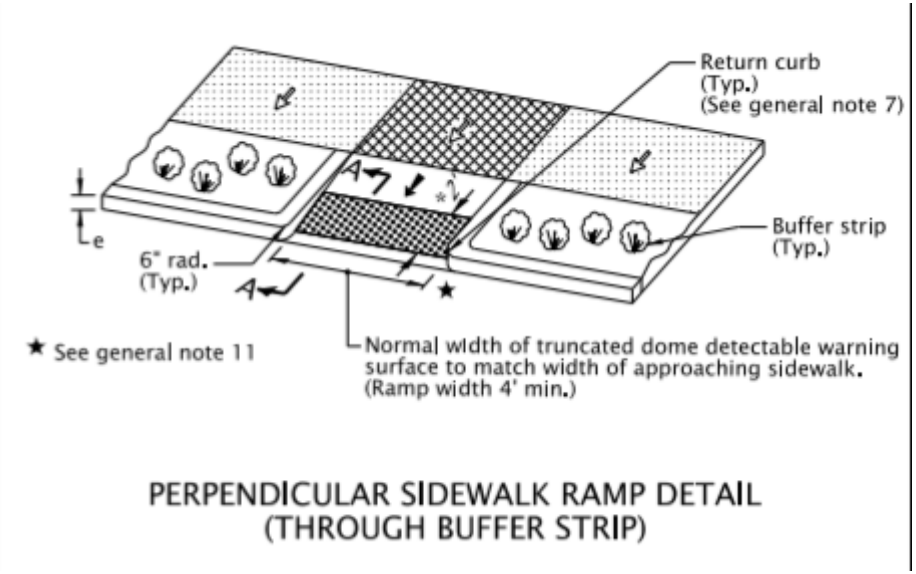
Good Flare Design

- Planting strip
- Detectable –cues and clues



PERPENDICULAR SIDEWALK RAMP DETAIL
(THROUGH BUFFER STRIP)

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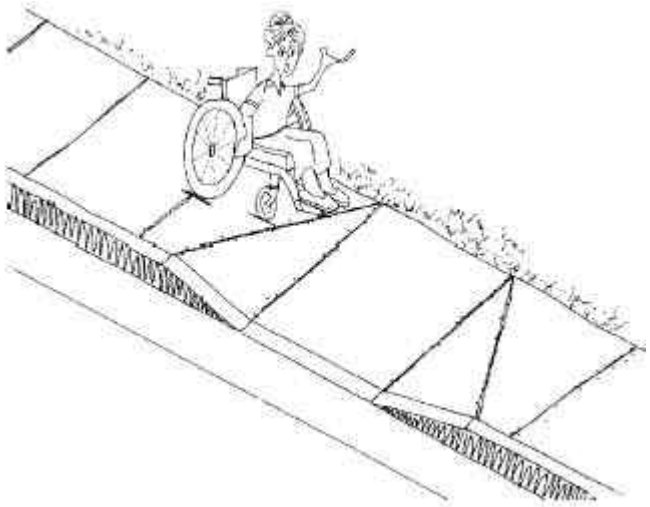
Curb Ramp Types

- Perpendicular to curb face-need level landing
- Curb extension many additional benefits
- Parallel
- Diagonal
- Perpendicular - no landing



Perpendicular

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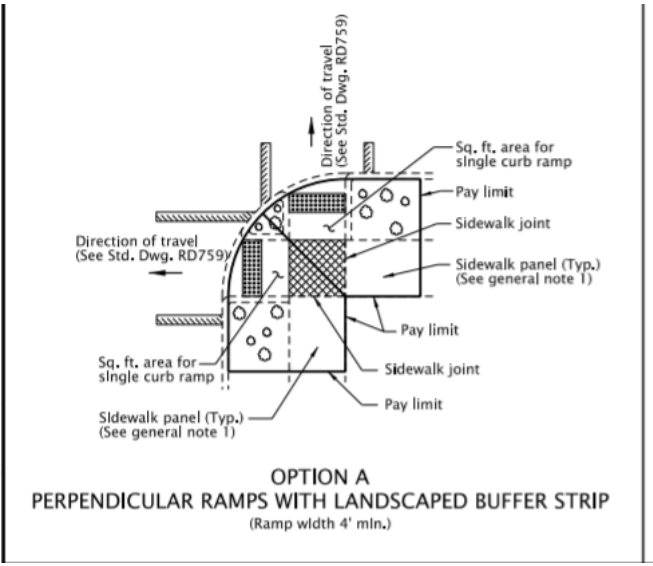
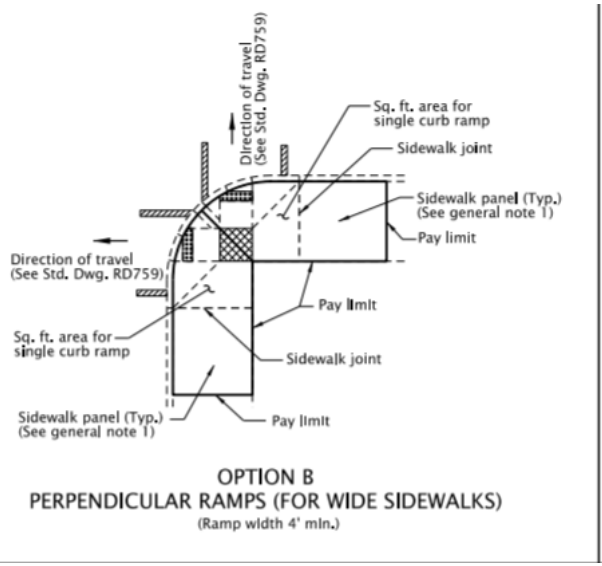
Perpendicular

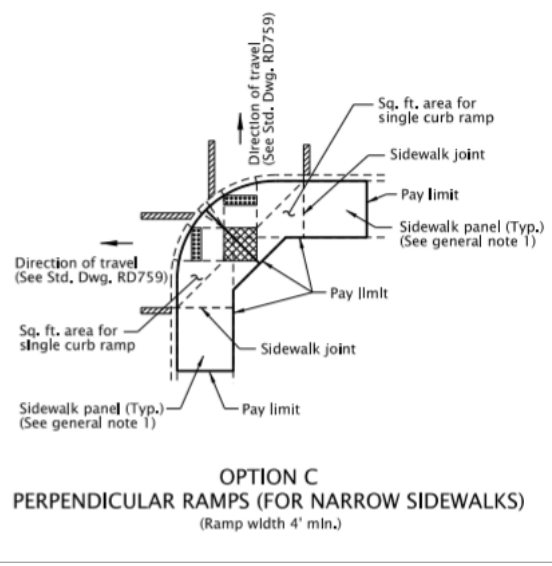
- Aligned with crosswalk
- Landings
- {What improvements do you suggest?}



OPTION A
PERPENDICULAR RAMPS WITH LANDSCAPED BUFFER STRIP
(Ramp width 4' min.)



OPTION B
PERPENDICULAR RAMPS (FOR WIDE SIDEWALKS)
(Ramp width 4' min.)



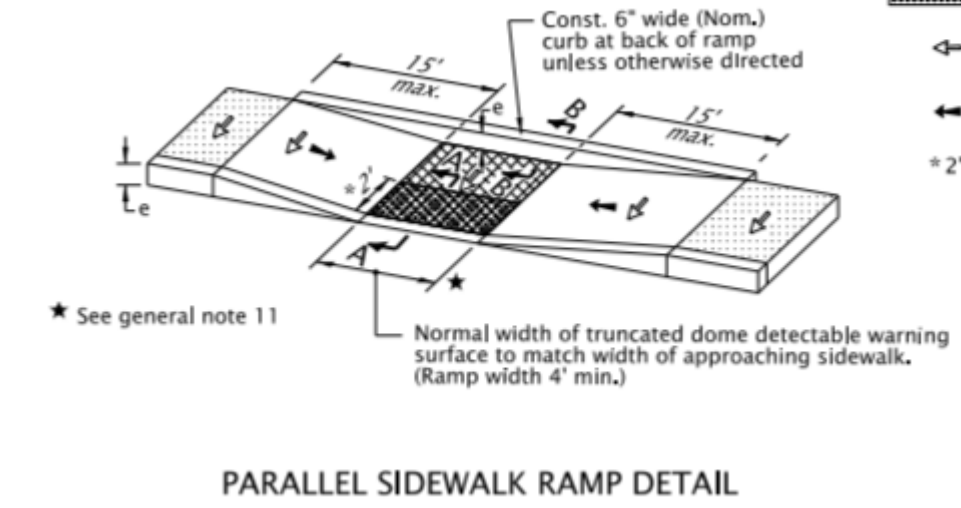
OPTION C
PERPENDICULAR RAMPS (FOR NARROW SIDEWALKS)
(Ramp width 4' min.)

ODOT Standard drawing RD 752.

Parallel

Parallel Curb Cuts

- May have ponding/debris problems
- Two ramp grades
- Detection



PARALLEL SIDEWALK RAMP DETAIL

Sidewalk

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Slope 7.5% max. (Max. 8.3% finished surface slope)
(Ramp length 15' max., measured along finished surface slope)

*2' See general note 5

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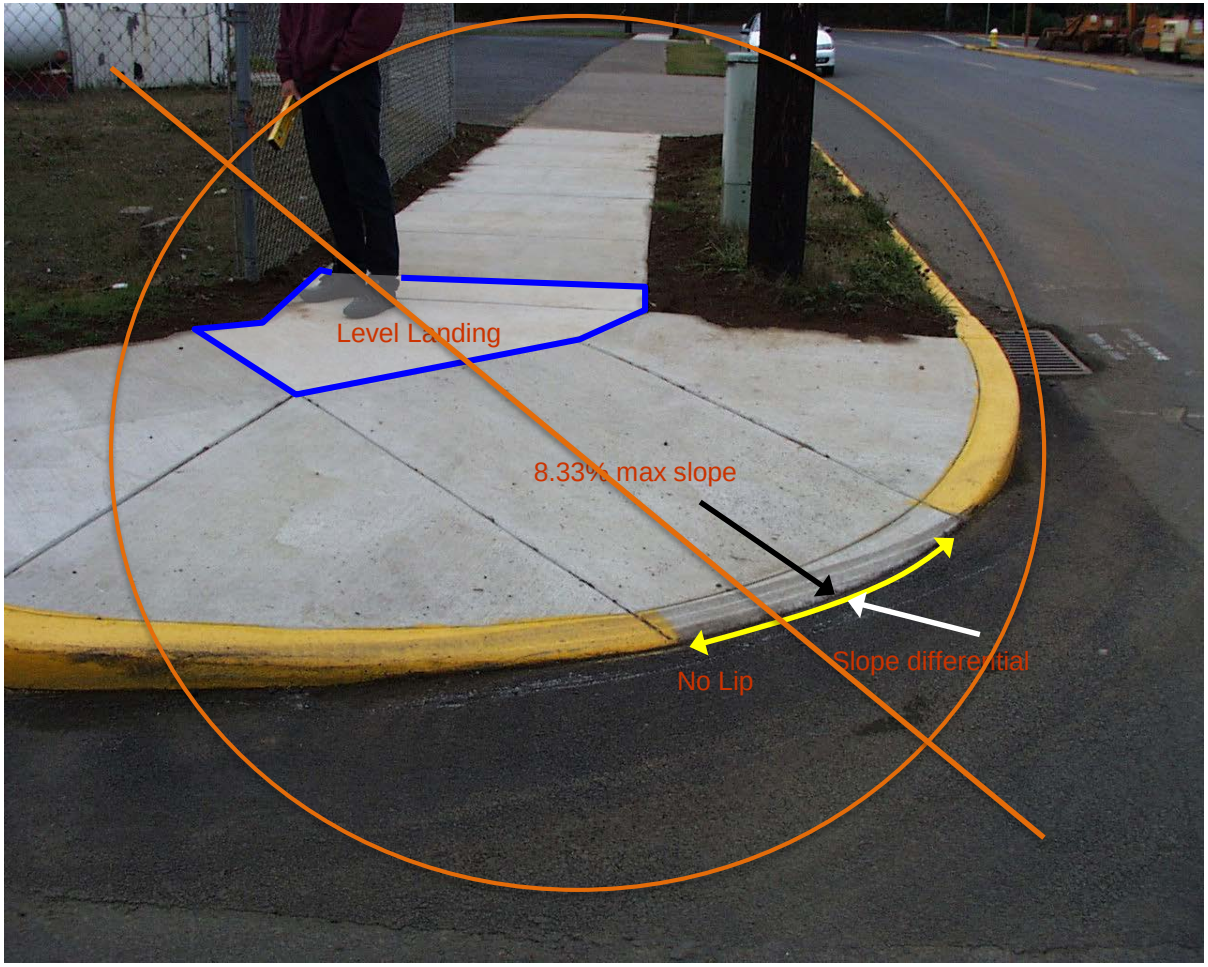
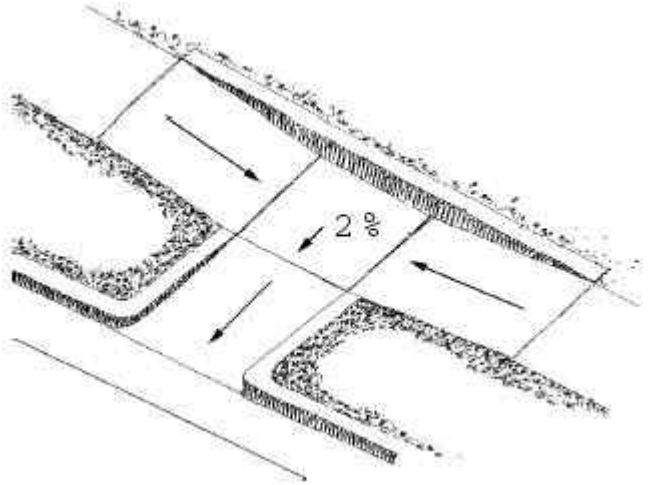


Diagonal

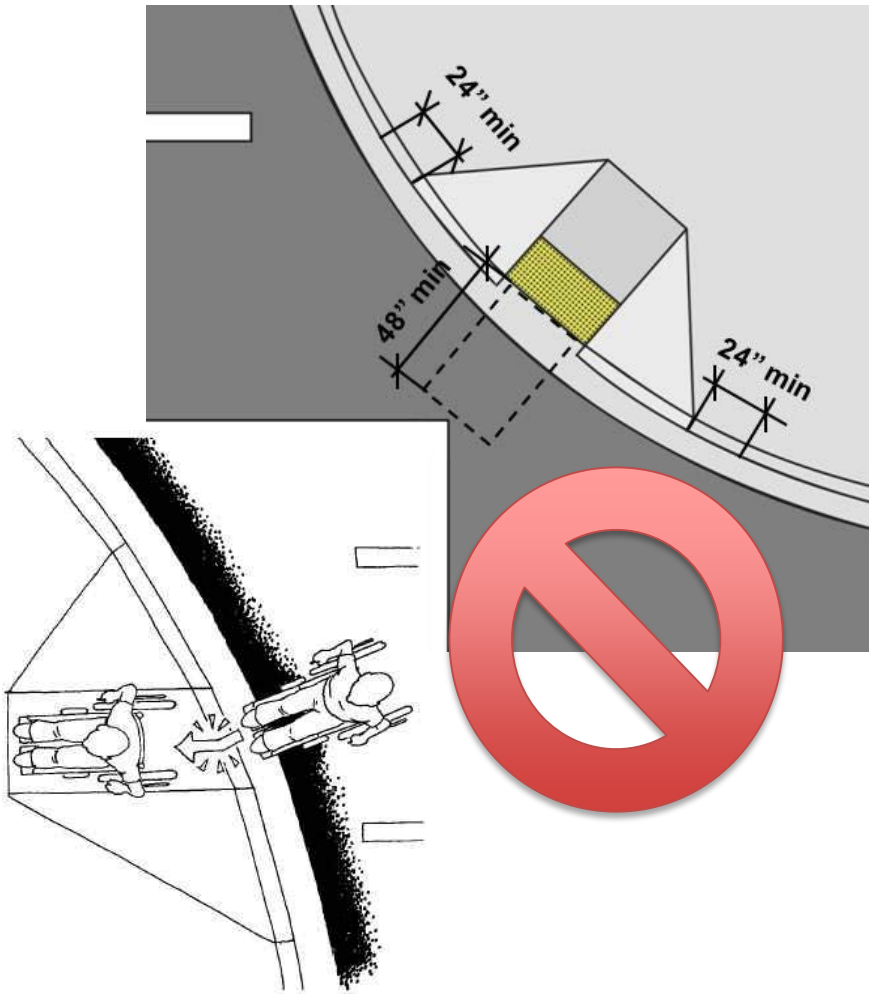
Combination Curb Ramps

- Both perpendicular and parallel
- Reduce ramp grades on sidewalk



Diagonal Curb Cut

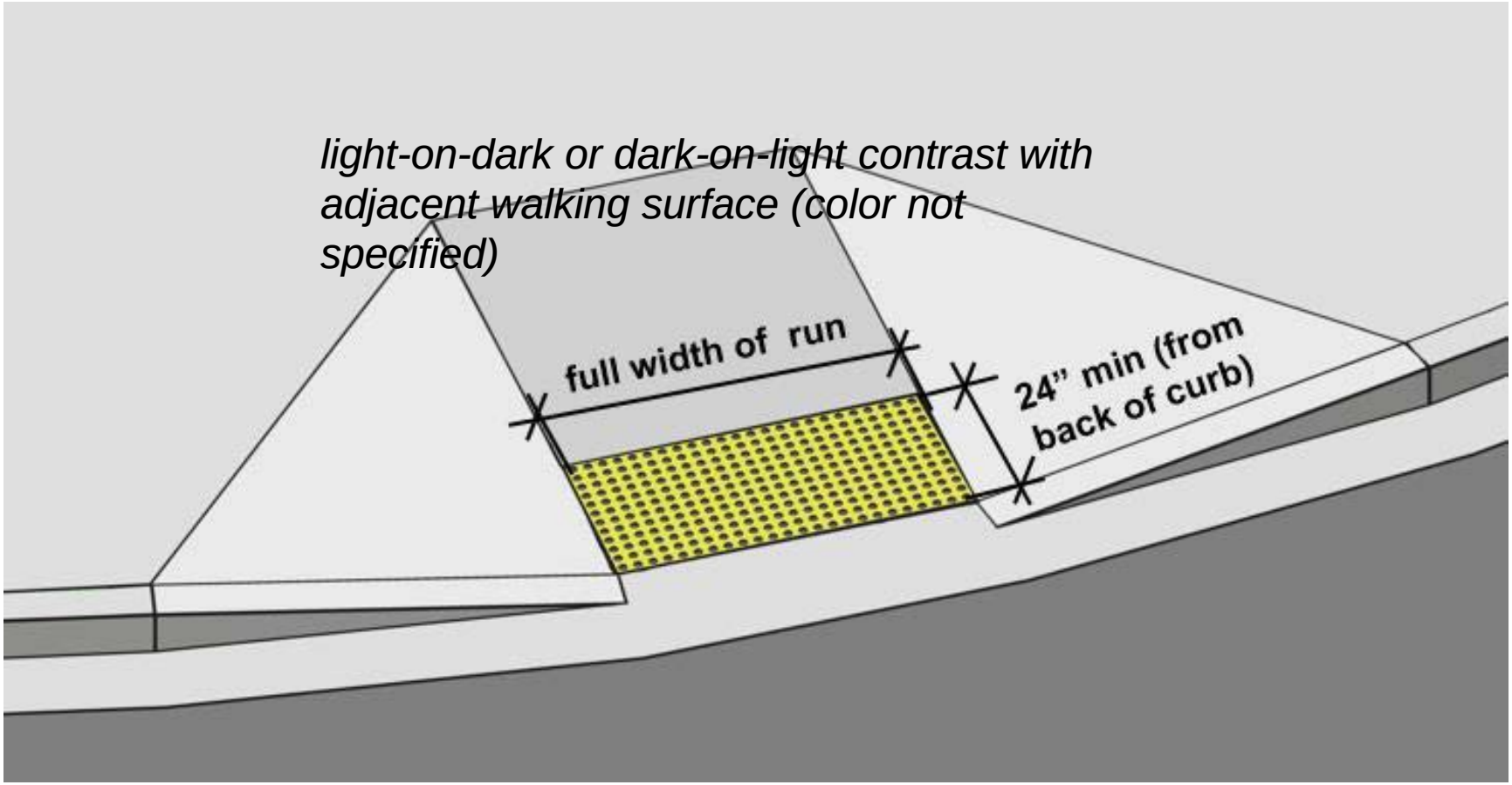
- Must have clear space
- Problematic for low vision and distracted users
- Large radius curves a problem {Why?}
- Users have to turn at transition



[ADAAG Chapter 4 Ramps and Curb Ramps]

Mid-Block

Detectable Warnings



[ADAAG Chapter 4 Ramps and Curb Ramps]

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Lips

Preferred

0” lip

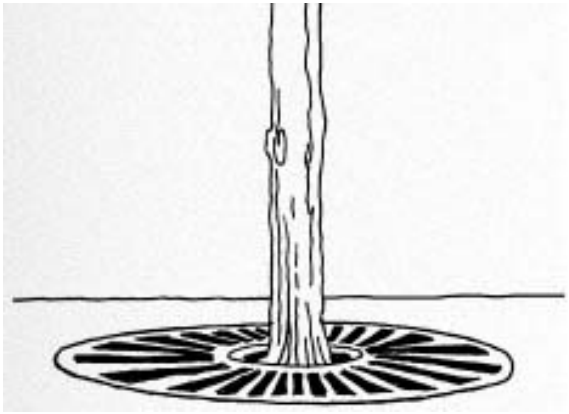
Allowable

1/4” lip

Lips are more critical. They can catch a wheel, cane or walker tip.

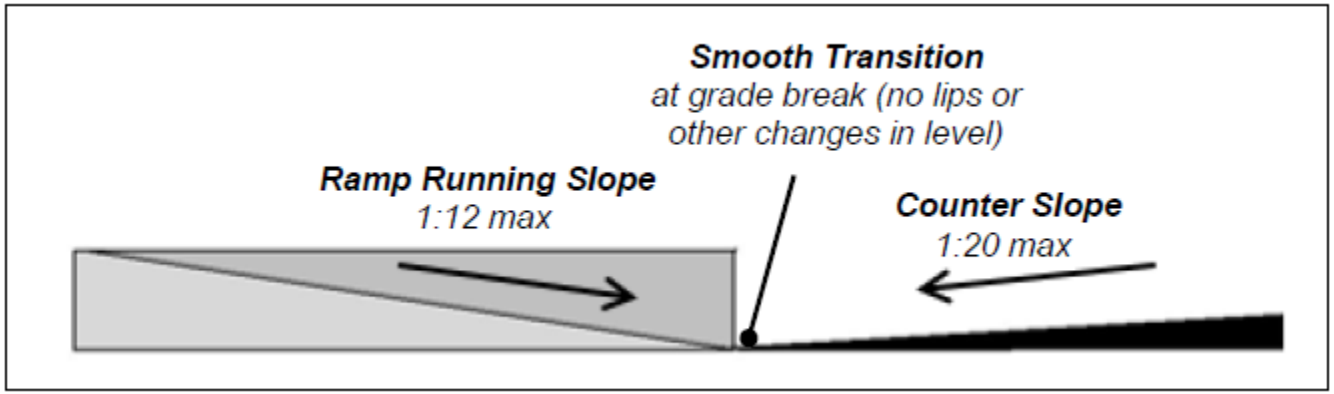
Gaps and Grates

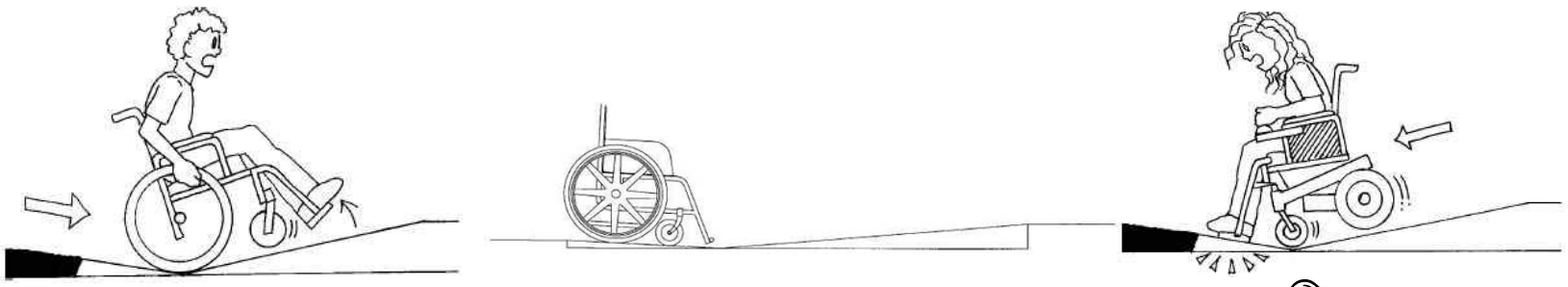
- Openings less than ½ inch sphere
- Long dimension perpendicular or diagonal to travel - may have conflict if in bikeway



Gutters

The gutter slopes counter to the slope of the curb ramp to promote drainage.

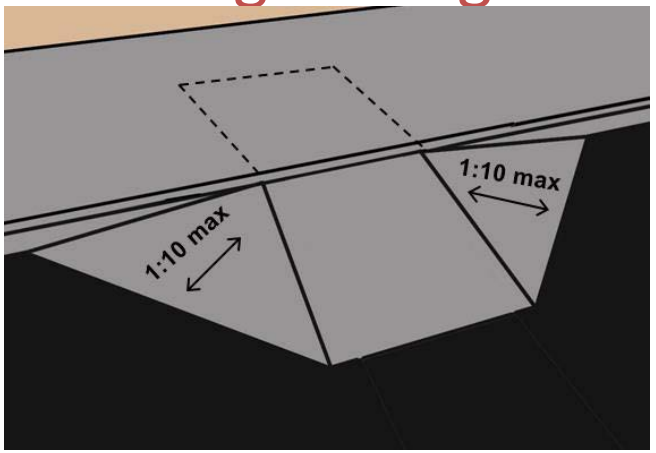


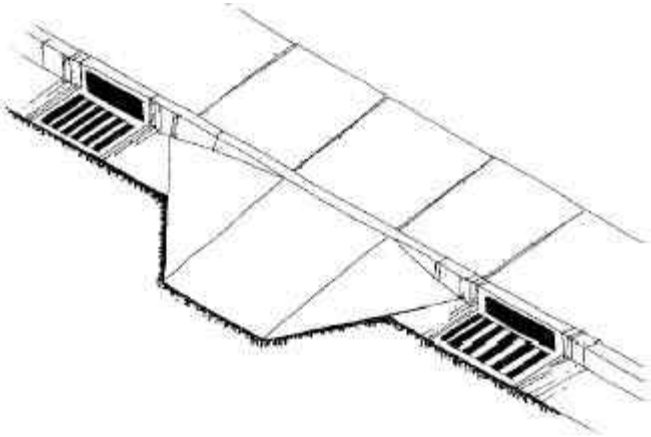


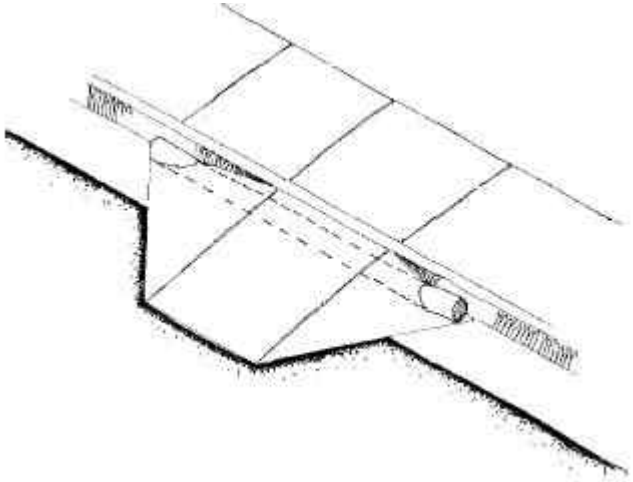
Built Up Curb Ramps

- Perpendicular
- Narrow Sidewalks
- Low vision user challenges
- Cannot extend into vehicle or bike lanes
- Drains

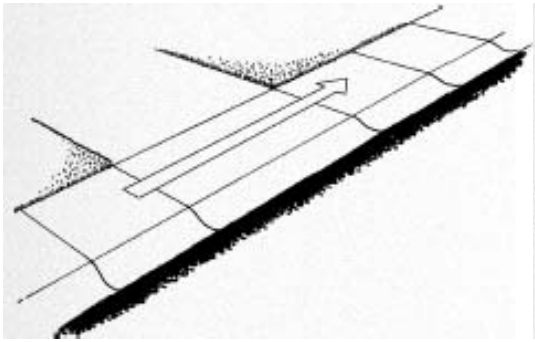
Where does detectable warning belong?

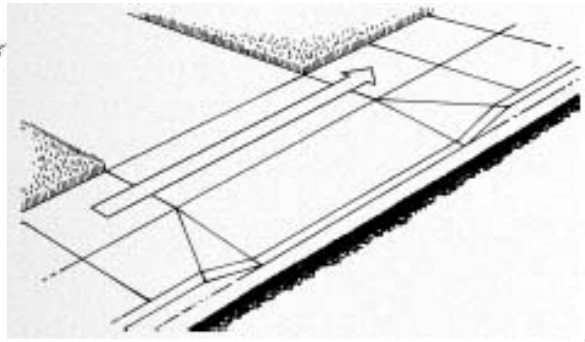


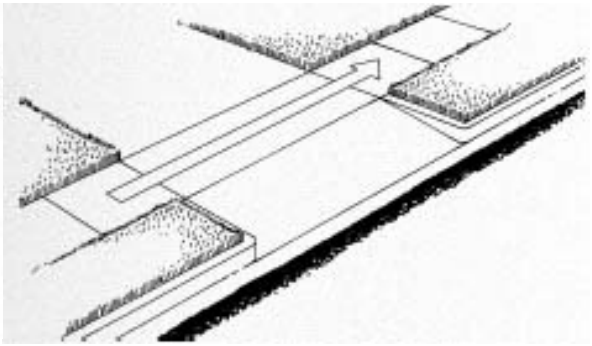


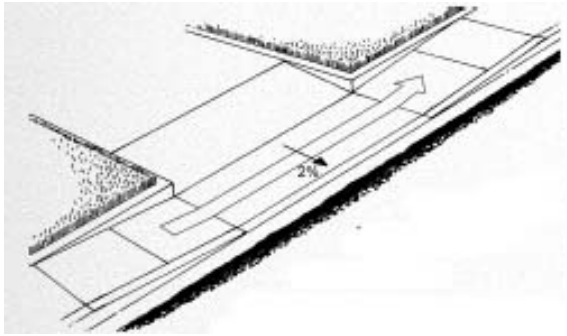


DRIVEWAYS









What are the challenges with these designs? Which is the better? And why?

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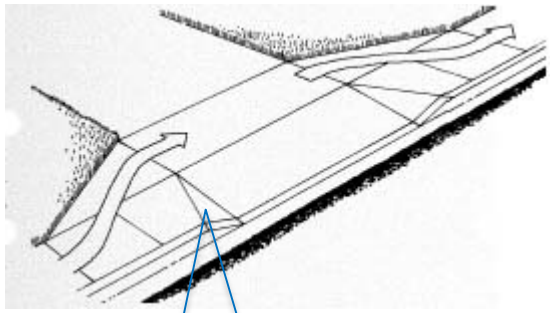
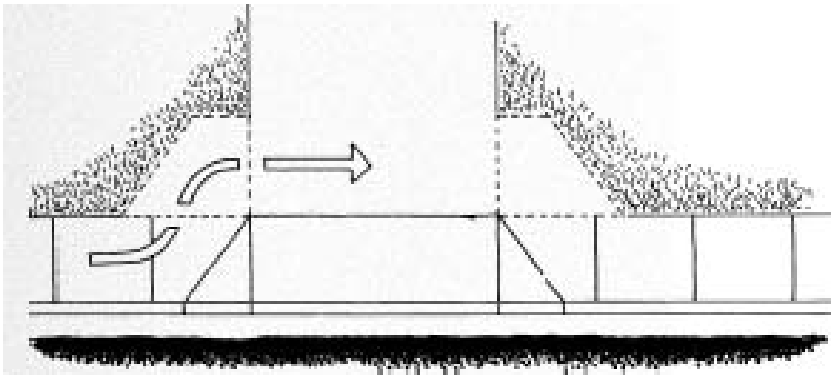
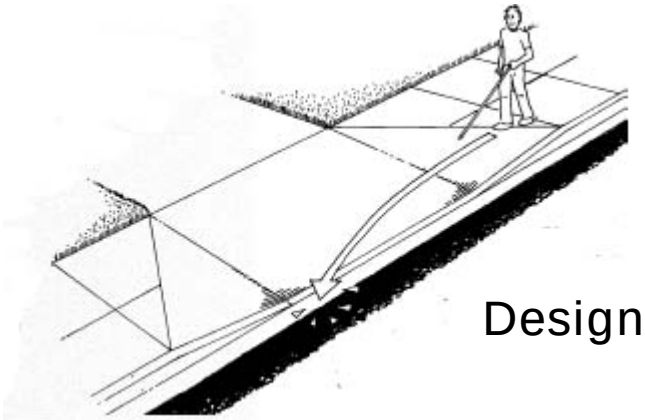
Driveway Challenges



I am blind! cues and clues?





Design Flaw

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Intersection Questions

- Is my destination curb straight in front of me, or must I angle to the left or right to reach it?
- How many streets intersect here?
- How wide is this street?
- Should I expect to encounter any islands or medians as I cross this street?
- Am I standing within the crosswalk?
- Is there a pedestrian push button?
  - ➢ Can I find it?
  - ➢ Can I reach it?

Intersections and the Vision Impaired

- **Use good geometry, so they can track their way across approaches & through intersections**
- **Place crosswalks where they are expected - in line with curb cuts and sidewalks**
- **Avoid locations where the crossing points may not be readily apparent to motorists, especially at corners with a large radius**
- **Provide audible pedestrian signals**
- **Use special surface texture at curb-cuts to identify crosswalk**

Possible Solutions

- Clearly detectable crossings
- Delineated paths of travel
- Clear indication of useable gaps in traffic
  - Enforcing vehicles to stop for pedestrians
  - Traffic calming, flashing beacons
- Relocation of crossings
- Future challenges of electric vehicles

Geometric Design Impacts on Accessible Pedestrian Signals (APS)

- Large curb radii- reduced space for APS
  - Higher operating speeds
  - Longer crossing distances
  - Lack of Pedestrian visibility
- Right Turn on Red
  - Confusing cues for Pedestrians with low vision

Tighten Curb Radii

Traffic Calming

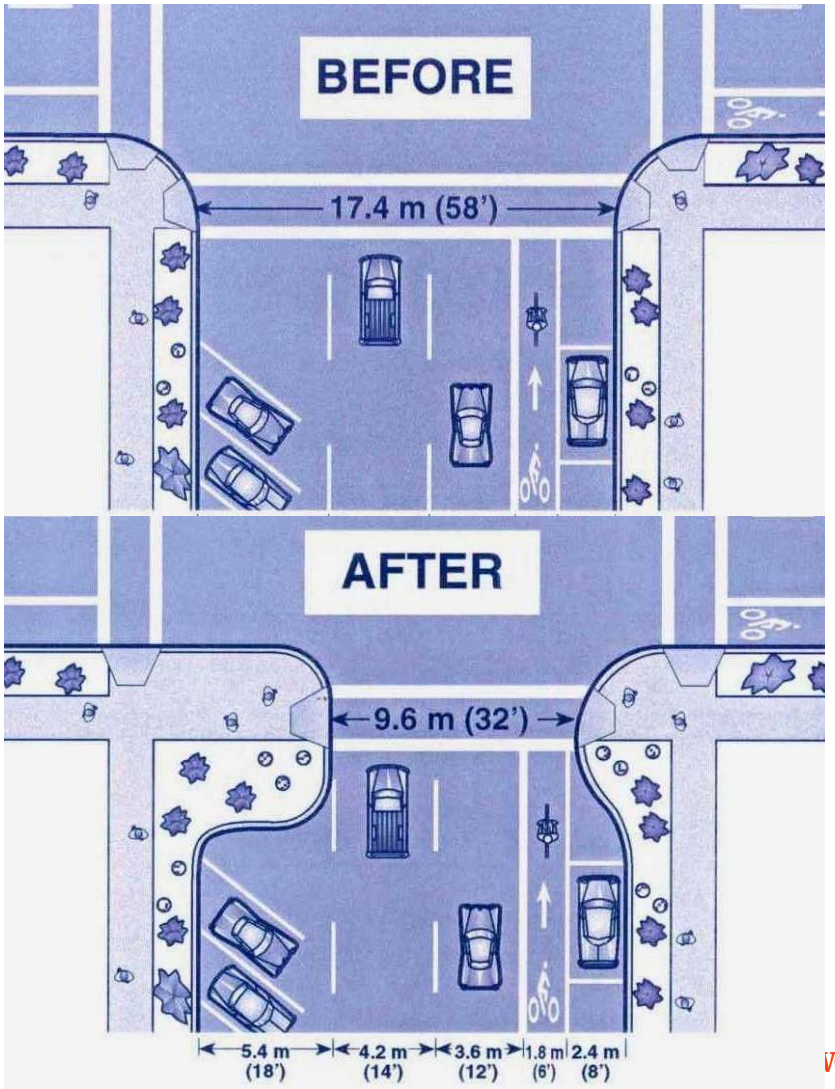
- Slower turning speed
- Increase space for pedestrians to wait
- Shortens street crossing distance and time
- More audible cues

Characteristics of a Good Intersection

- Tight
- Simple
- Slow speed
- Good visibility
- Easy to understand
- If complex, break it up
- NO FREE-FLOW MOVES!

Curb Extensions

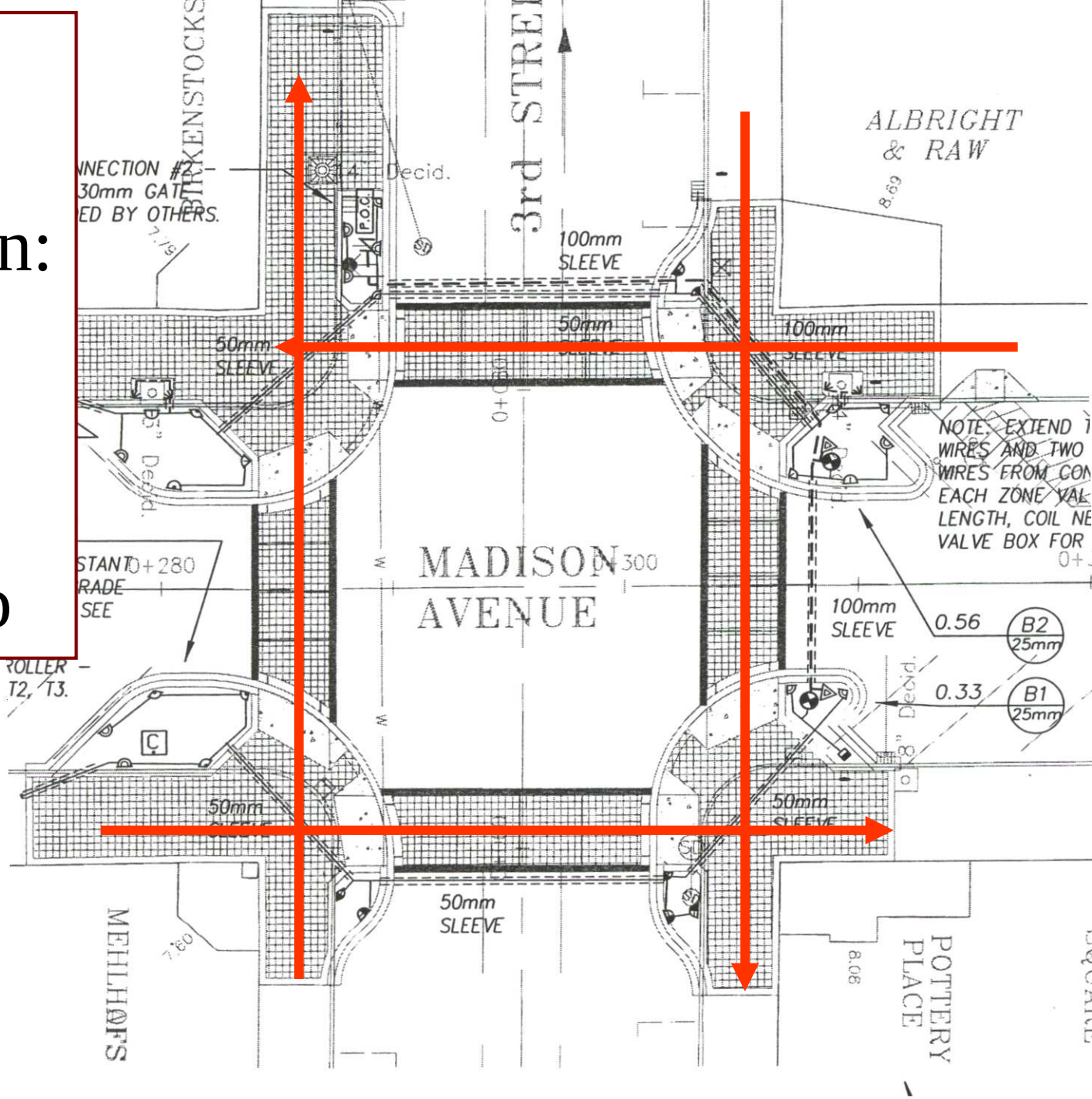
- Most focus has been on reducing crossing distance
- Other advantages
- Better visibility (both ways)
- Traffic calming
- Room for street furniture
- Additional on-street parking (huh?)

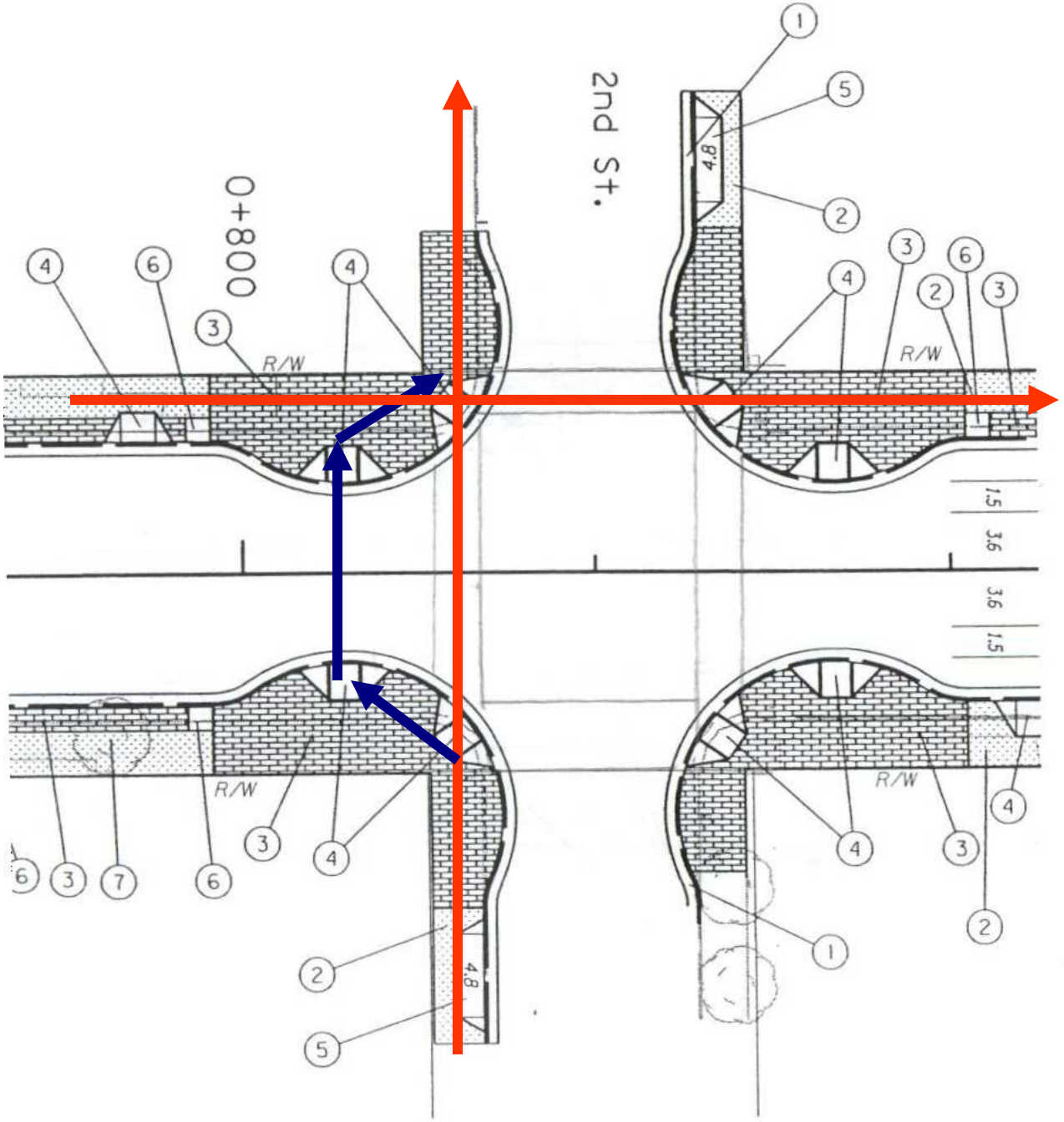


Curb ext + tightened radius slow cars

Somehow, trucks make it…

Important design consideration: crosswalks, ramps & sidewalks **must** line up





(4) Const. Sidewalk
Option A
(For Details, Se

(5) Const. P.C. Conc
Option F (Mod
(For Details, Se

(6) Const. Tree Wel
(For Details, Se

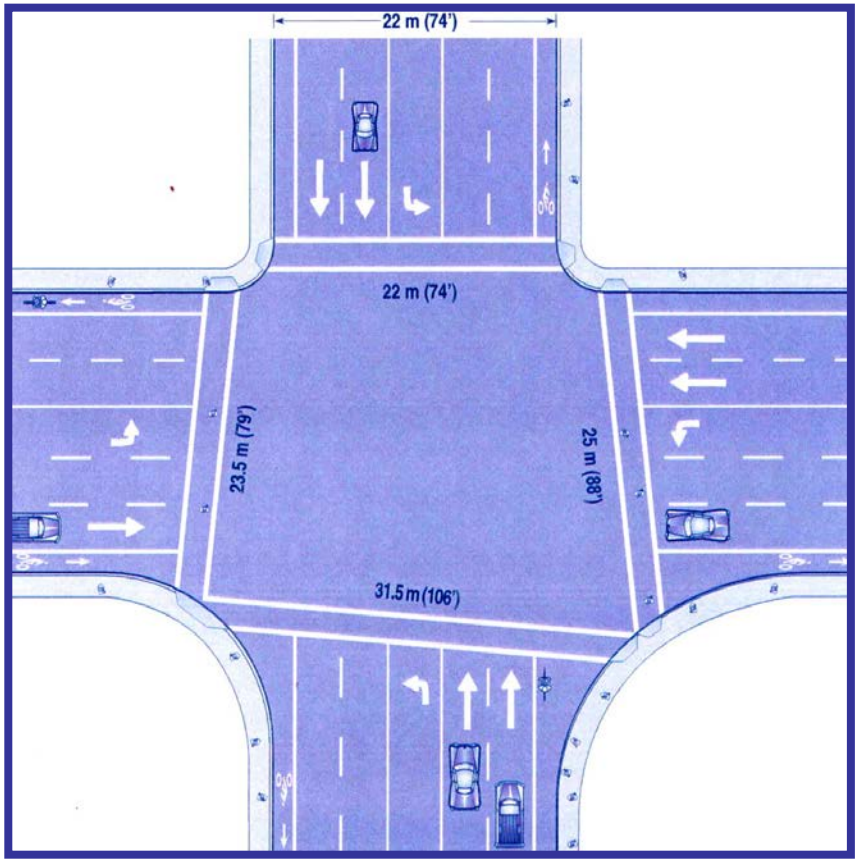
(7) Remove Extg. T
(By Others)

HOW DO YOU FIX THIS?


PLEASE
DON'T
LITTER

Effect of radius on intersection geometry

It's more than crossing distance – crosswalk & ramp placement are also affected



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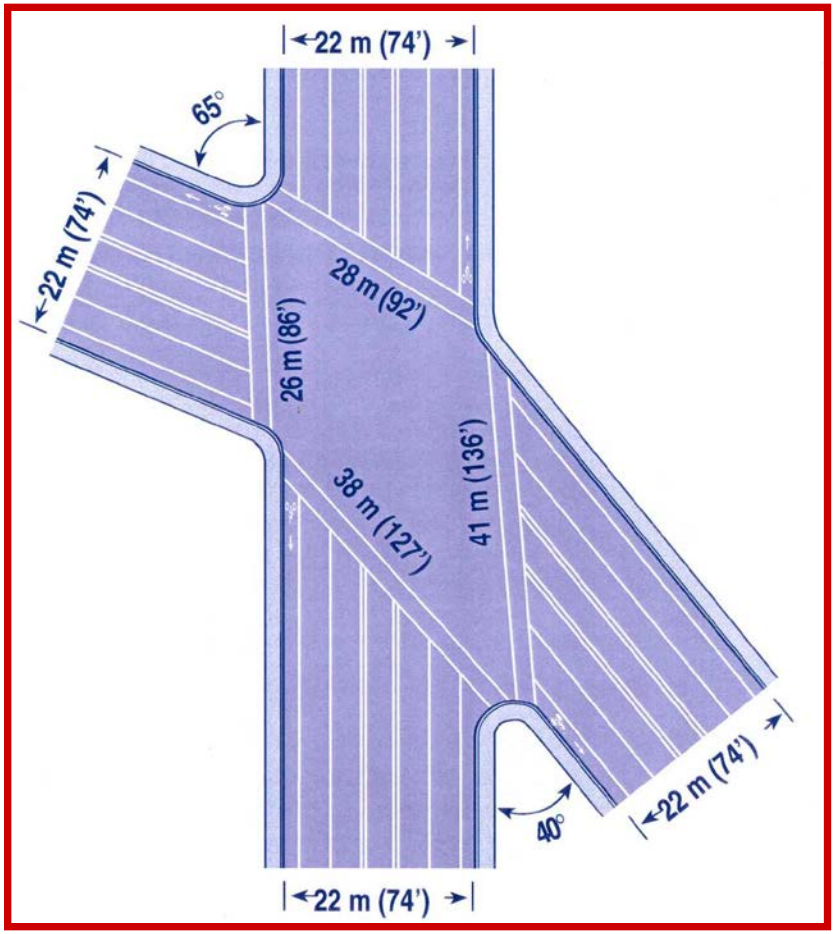
Skewed Intersections

Skews increase crossing distance & time to cross intersection

How long to travel 136 feet at 3.5 ft/sec?

39 seconds!



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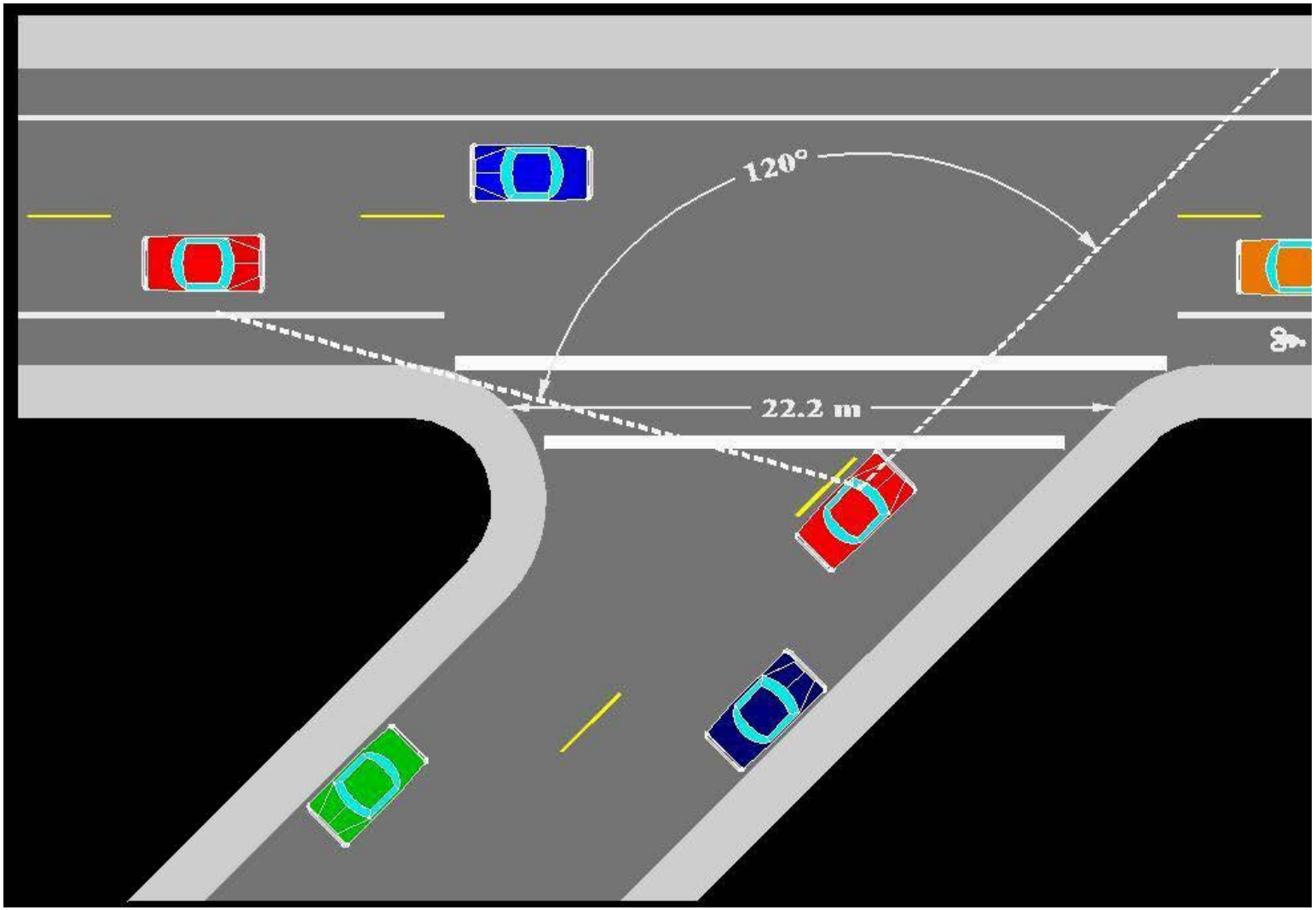
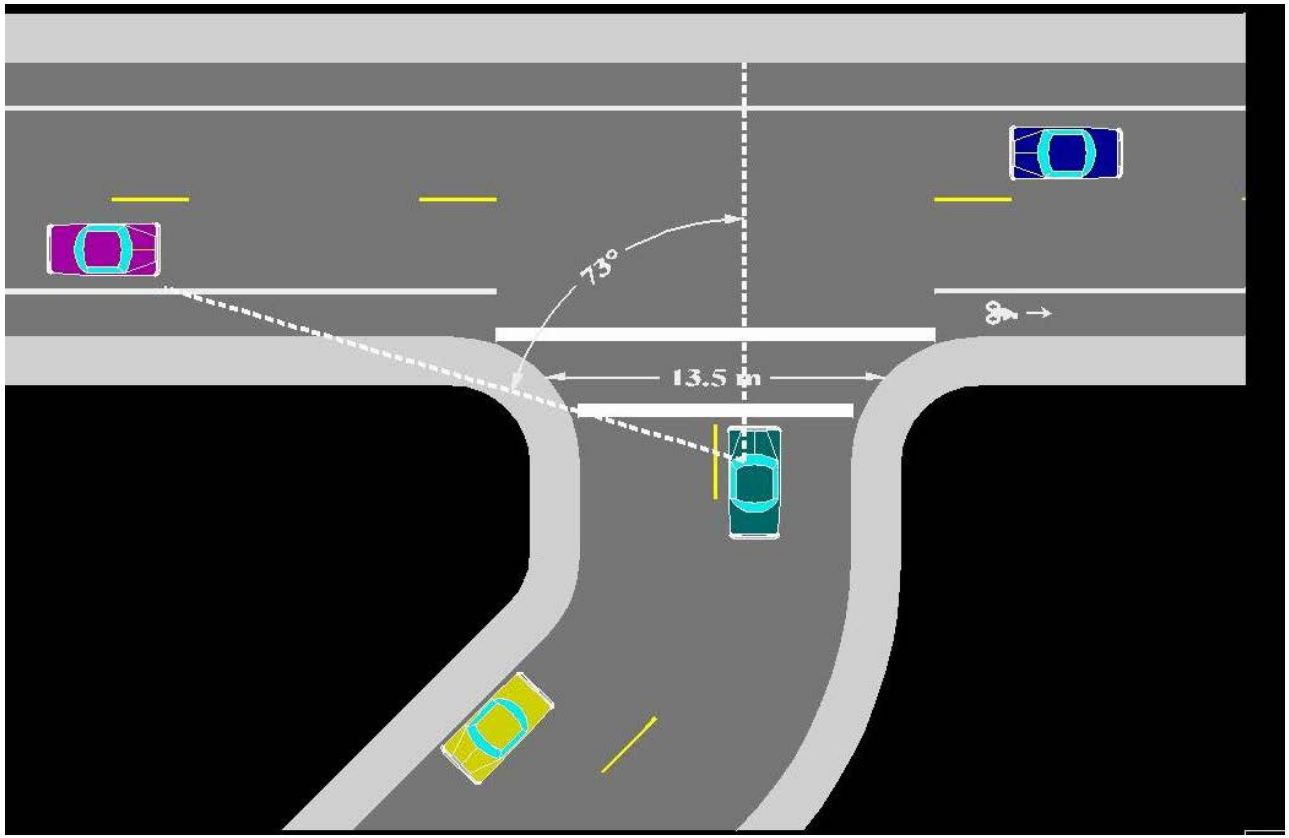
Skewed Intersection



Right angle decreases crosswalk length, increases visibility



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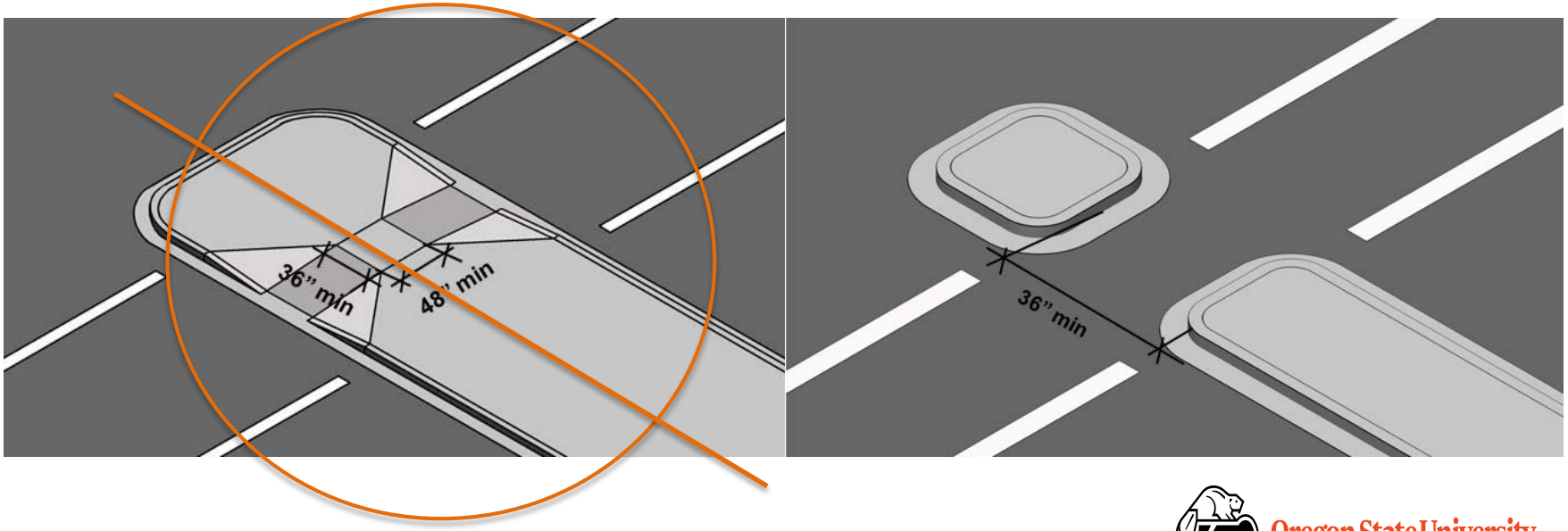
Not everywhere is flat

West Blankenship Road in West Linn

Islands and Medians



[ADAAG Chapter 4 Ramps and Curb Ramps]

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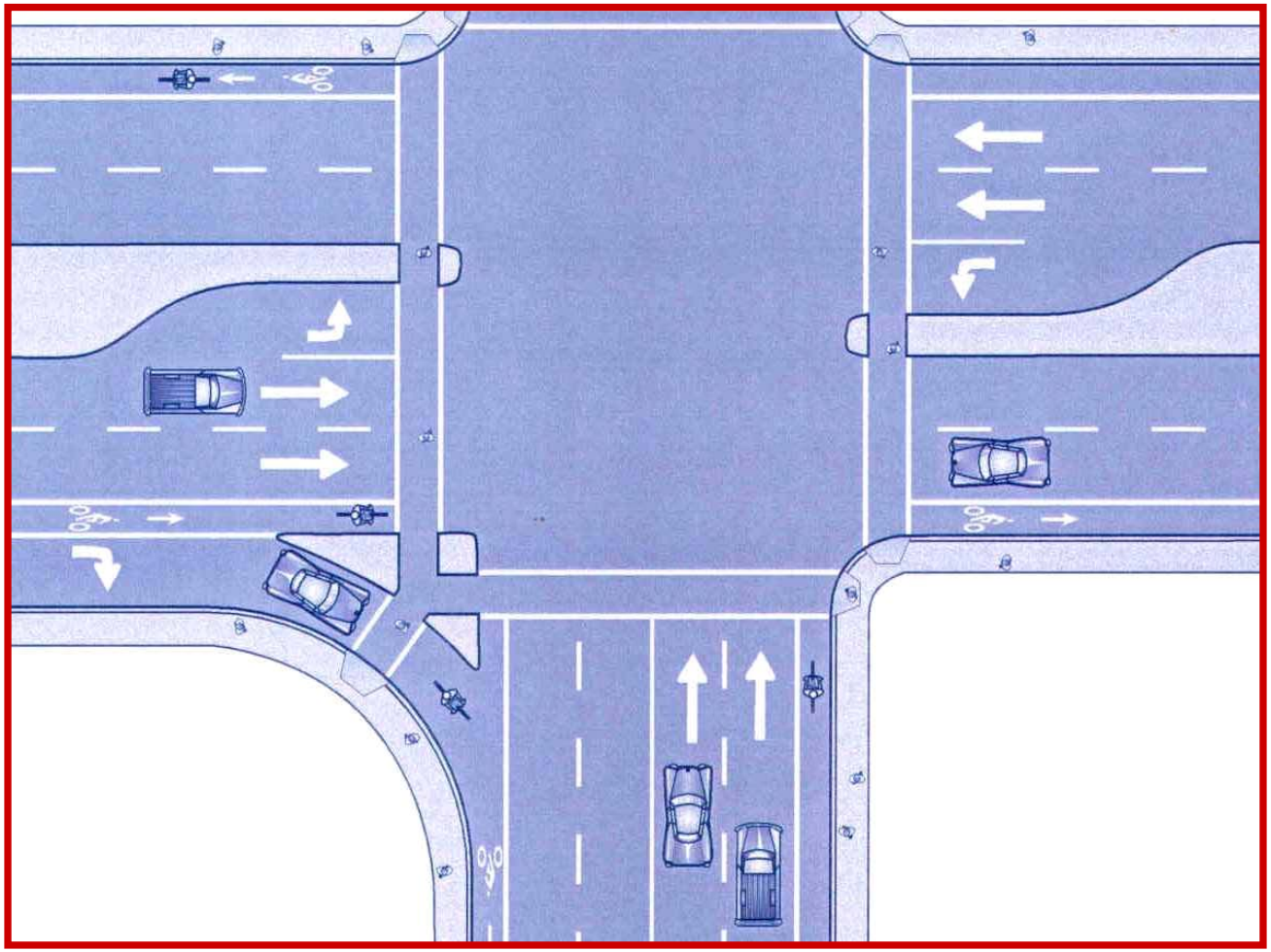
Islands

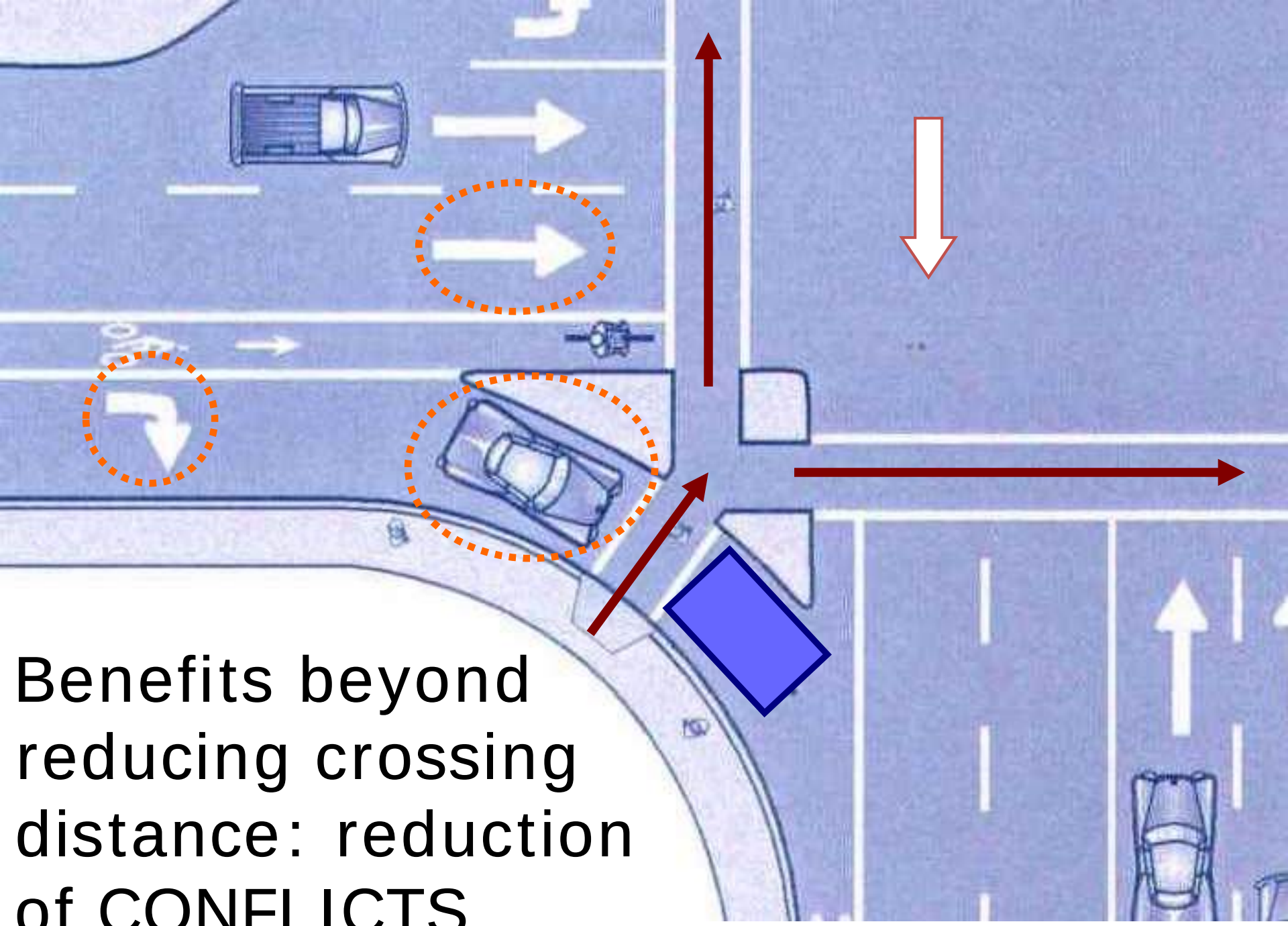
Raised Islands should be cut through

- Max crowning 1:20
- Provide sufficient protection/storage
  - 1.22 m-1.525 m (4 – 5 feet) length
  - May limit number of wheelchair crossings per phase
- Need Accessible Pedestrian Signal at median/island it 2 cycles required to cross street

Islands at intersection

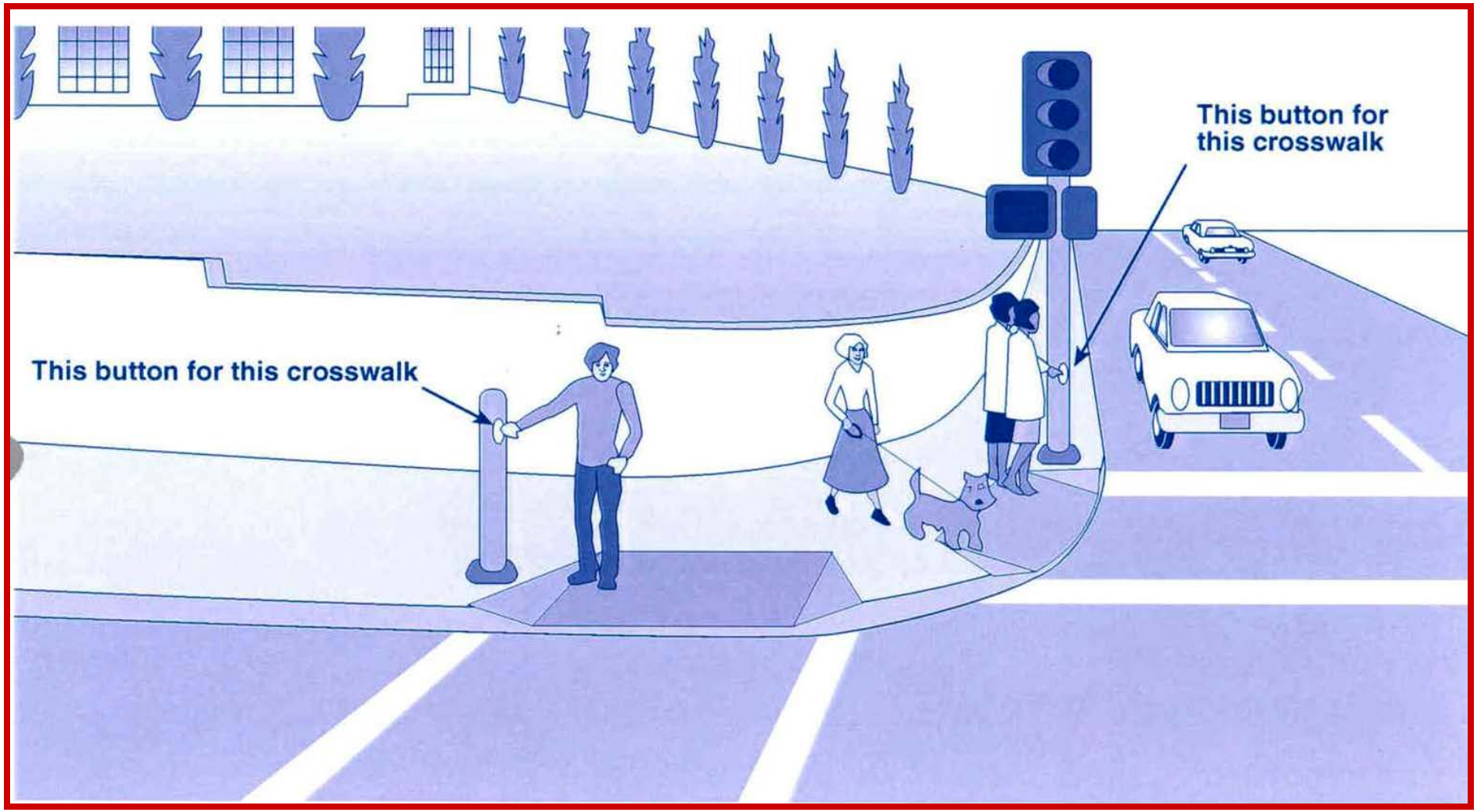
- Islands reduce crossing distance and separate conflicts





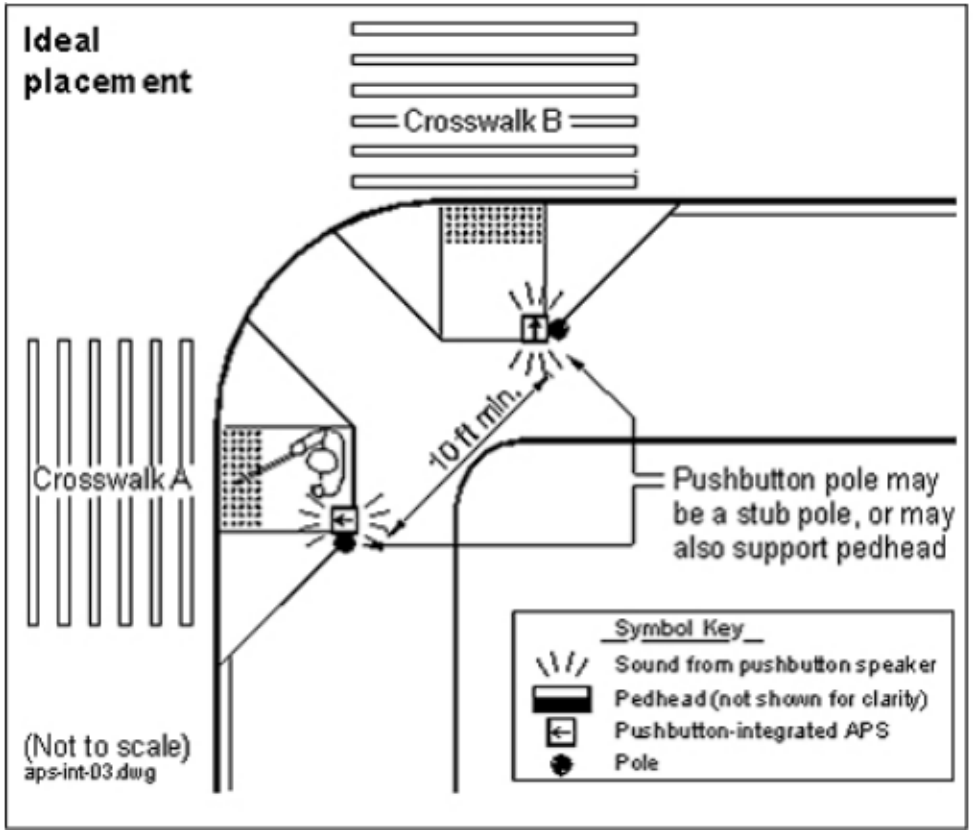
Benefits beyond reducing crossing distance: reduction of CONFLICTS

Proper placement of ped push buttons



Ideal Placement

- Place 10 ft apart
- Rapid tick WALK indication
- Rapid Tick is 8-10 repetitons per second



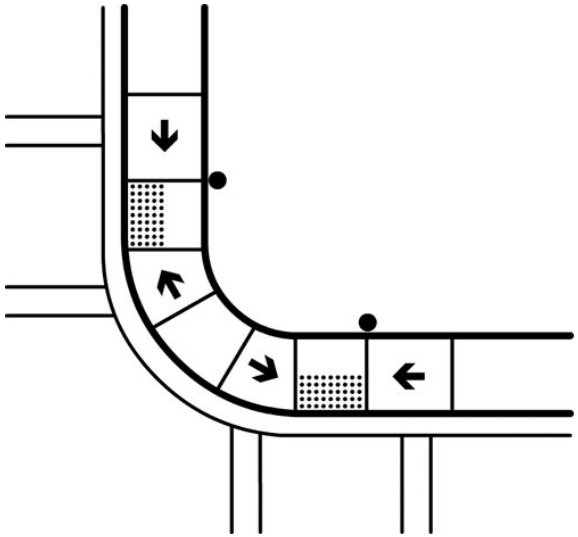
Level space

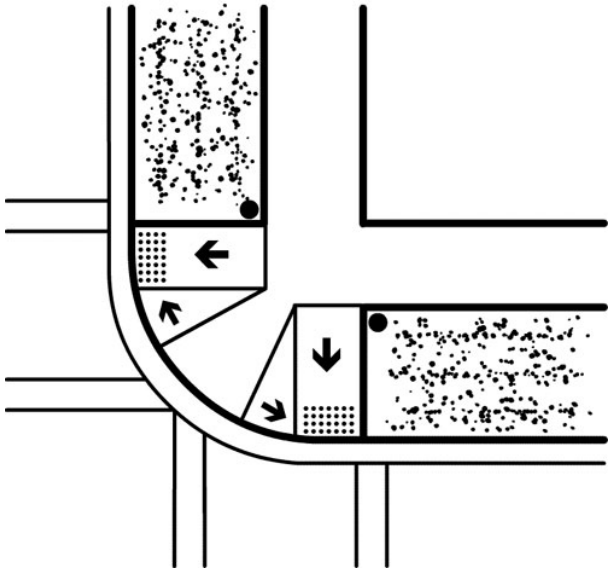
APS pole

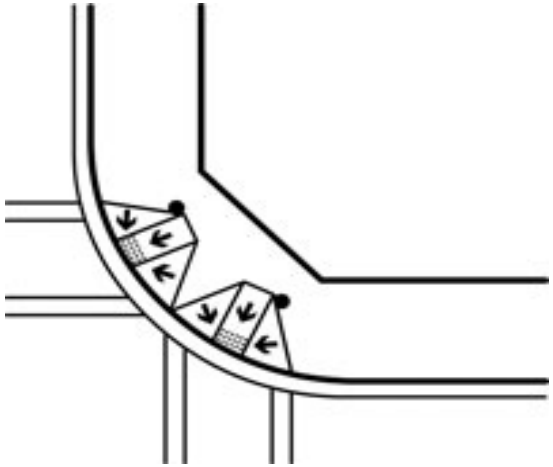
Detectable warning

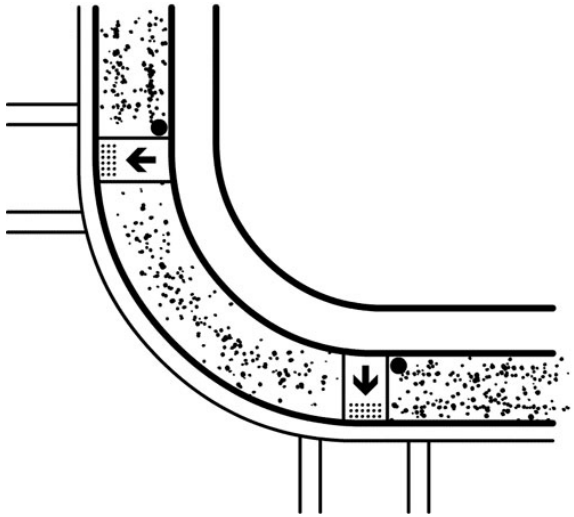
Parkway

Ramp indication



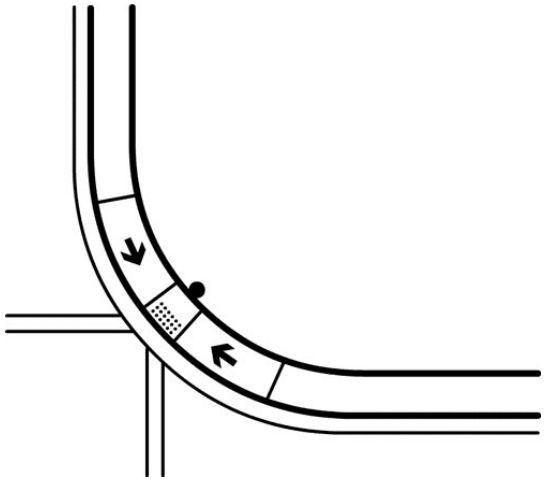






Single Installation

- Use when two cannot be used
- Speech WALK must include “[“[street name], walk sign is on to cross [street name]”



- a pushbutton information message:
  - needed on the device to provide street name information
  - provides the name of the street controlled by the pushbutton, when the button is pushed and held for more than one second during the flashing or steady don’t walk interval

What is good? What is not so well thought out?

What are the oops?

What is missing?

Better but who is impacted here? Why?

How about here?

Crosswalk Placement: observe pedestrians

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People instinctively know where to cross

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Crosswalk Placement: observe pedestrians!

Are there any other problems with this crossing?

Accessible Bus Stops

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Not this (sources intentionally omitted)

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Or This (sources intentionally omitted)

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What about Protected Intersections ?

- Bi directional, separated and protected bike lane

[Davidsuzuki.org, Toronto, ON, Canada]

- http://www.streetsblog.org/2014/09/25/hobokens-main-drag-will-set-a-new-standard-for-complete-streets/
- http://www.hobokennj.org/washingtonstreet/

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Dutch Intersection-
[something to consider for Bike and Pedestrian Facilities]

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LESSONS LEARNED Evolution of the Protected Intersection December 2015

- https://altaplanning.com/wp-content/uploads/Evolution-of-the-Protected-Intersection_ALTA-2015.pdf
- PREPARED BY: Alta Planning + Design 711 SE Grand Ave Portland, OR 97214

Salt Lake City: Alta Planning and Design

Resources

- US Access Board https://www.access-board.gov/
- FHWA Office of Civil Rights https://www.fhwa.dot.gov/civilrights/programs/ada.cfm
- Oregon DOT http://www.oregon.gov/ODOT/Engineering/Pages/Accessibility.aspx

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Discussion