Accessibility ≠ Safety

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Common Misconception

- If a pedestrian facility is accessible, then it is safe.
- This is simply not true, as these images show.

Relevant Criteria

- Public Rights of Way Accessibility Guidelines (PROWAG)
  -- an accessibility standard intended to provide accessible and usable facilities

- Designers, builders, maintainers of accessible facilities must still use their education, knowledge and experience to provide a safe facility.

- In addition to being knowledgeable about the guidelines, we also need to understand pedestrian behavior both related to vehicle crashes but also to non-motor-vehicle incidents.

Non-Motor-Vehicle-Related Pedestrian Incidents

- Falls are leading cause of nonfatal injuries, exceeding those related to motor vehicles
- Falls account for about one-fifth of treatments in hospital emergency rooms
- Falls are second leading cause of spinal cord and brain injuries
- About two-thirds of “accidental” deaths among older adults are due to falls

Pedestrian Behavior

- When addressing safety issues, it's important to remember:
  - -- Humans are not exclusively logical, rational beings
  - -- People generally don't simply do what they are told to do
  - -- Changing behavior (and changing our designs) requires an understanding of key influencing factors

Expectancy

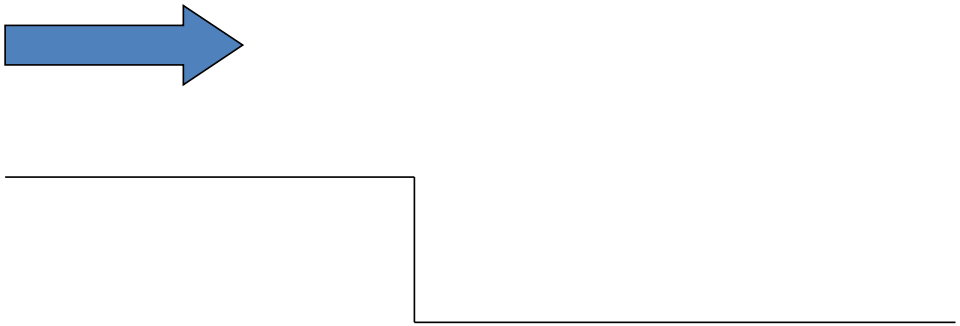
- Pedestrians expect a walkway surface to remain level, have the same traction properties and be free of impediments.

Basic Conditions of Walking Surface Causing Falls

- Unexpected change in traction of walking surface
- Unexpected change in level of walking surface
- Unexpected impediment in walking surface

Unexpected Change in Traction

Unexpected Change in Level—the Single Step



Unexpected Impediments

Pedestrian Line of Sight -- 15° Below Horizontal

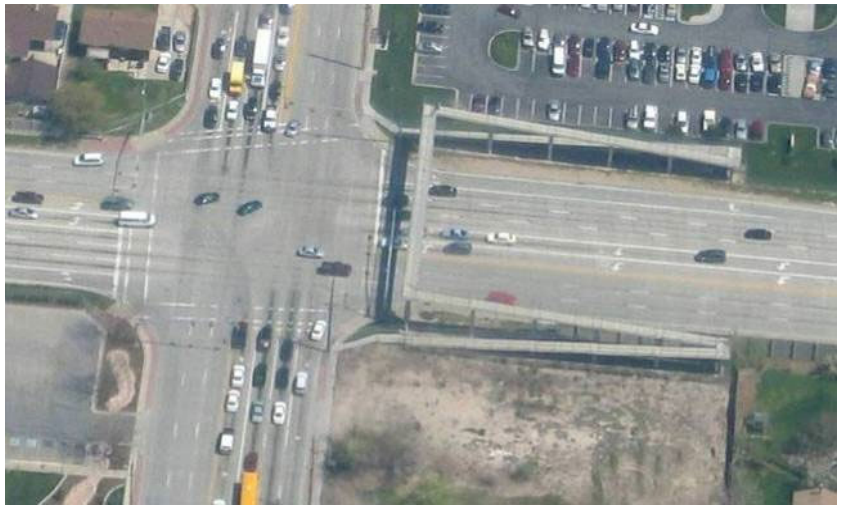
Level Sidewalk

1.5-inch Elevation Difference

Pedestrian Walking Speeds

- College students: 4 ft/sec
- Avg pedestrian: 3 to 3.5 ft/sec
- Pedestrian using a walker: around 1.8 ft/sec

Pedestrians Always Take the Least Energy Route



What Can We Do?

Provide a More Direct Path

Place Barriers at Ground Level

But Not This!

What Were They Thinking?

Pedestrian Waiting Times

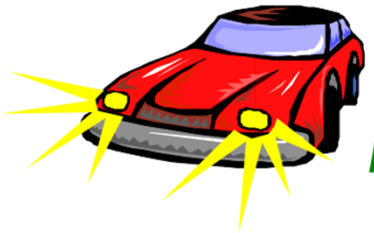
- Some studies have found that more than 30 seconds is too long.
- Pedestrians who must wait an excessive amount of time to cross a street may walk against a signal or cross at another location.

Pedestrians Overestimate Drivers' Ability to See Them, Particularly at Night

- Visibility of pedestrians in traffic depends on:

Pedestrian's Attire +

Vehicle



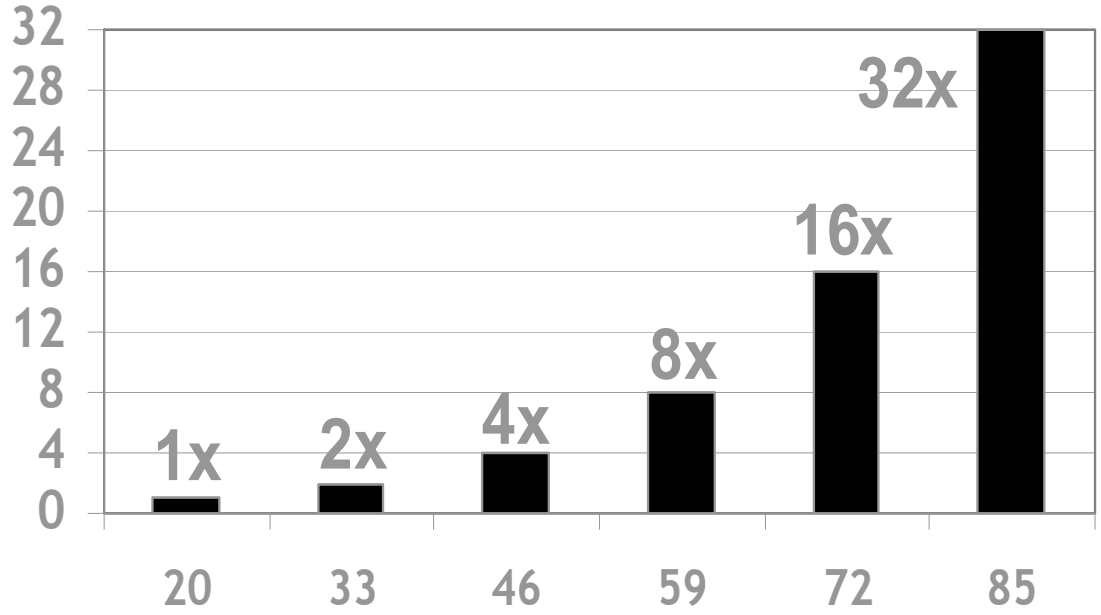
Headlamps

Driver

key factor is *degree of contrast* between pedestrian and the environment.

Older Road User Vision

- As we age, most visual functions decline.
- Starting at age 20, the amount of light needed to see doubles every 13 years.



Overestimate Ability of Drivers to See Them at Night

- Ped in black clothing will first become visible about 50 feet in front of the car for average driver under low-beam headlamps.
- Any vehicle traveling more than about 18 mph will not be able to stop in time.

Remember—Key Factor is Contrast

Contrast Sensitivity—Important Both Night and Day

- Visibility refers to the sensing of contrast, which is largely limited by physical conditions.
- Contrast sensitivity is the cornerstone of spatial vision.
- Contrast sensitivity is better predictor of road user behavior than acuity which can be measured quickly and easily.
- Contrast sensitivity better reflects the tasks that viewers actually perform, i.e., detecting the contrast of larger objects against a background.

Relative Lack of Contrast

Pedestrian’s View from Other Direction

Characteristics of Pedestrians with Disabilities

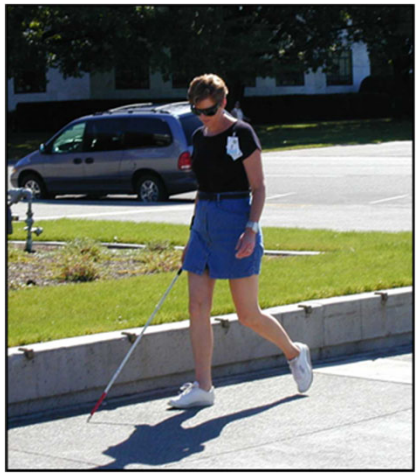
- Mobility disabilities
- Sensory disabilities
- Cognitive disabilities

Pedestrians with Mobility Disabilities

- People may have limited agility, speed, endurance.
- They benefit from
  - Firm level surfaces
  - Adequate clear width
  - Curb ramps
  - Limited cross slope

Pedestrians with Vision Disabilities

- People get information from sounds, textures and contrast.
- They benefit from information in non-visual formats:
  - Audible/vibrotactile crossing information
  - Tactile indication of boundary between ped and vehicular way
  - Clearly defined pathways
  - High color contrasts

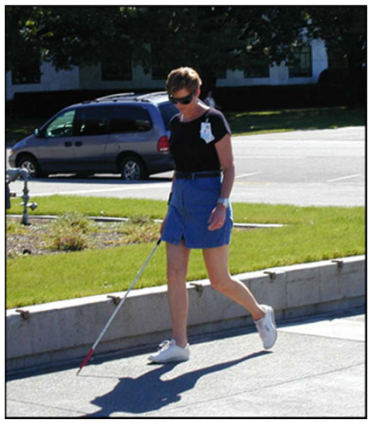


Pedestrians with Cognitive Disabilities

- Individuals have different information processing and decision-making skills
- Examples include traumatic brain injuries and autism
- They benefit from :
  - Straightforward, direct environments
  - Uncomplicated street crossings
  - Easy to understand symbols

Accessibility

- Since 1990, ADA has required pedestrian facilities in the public right-of-way to be accessible.
- 2011 Proposed PROWAG Guidelines central to providing, maintaining and connecting to pedestrian access routes. Key provisions follow.



PROWAG R302--Pedestrian Access Route

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

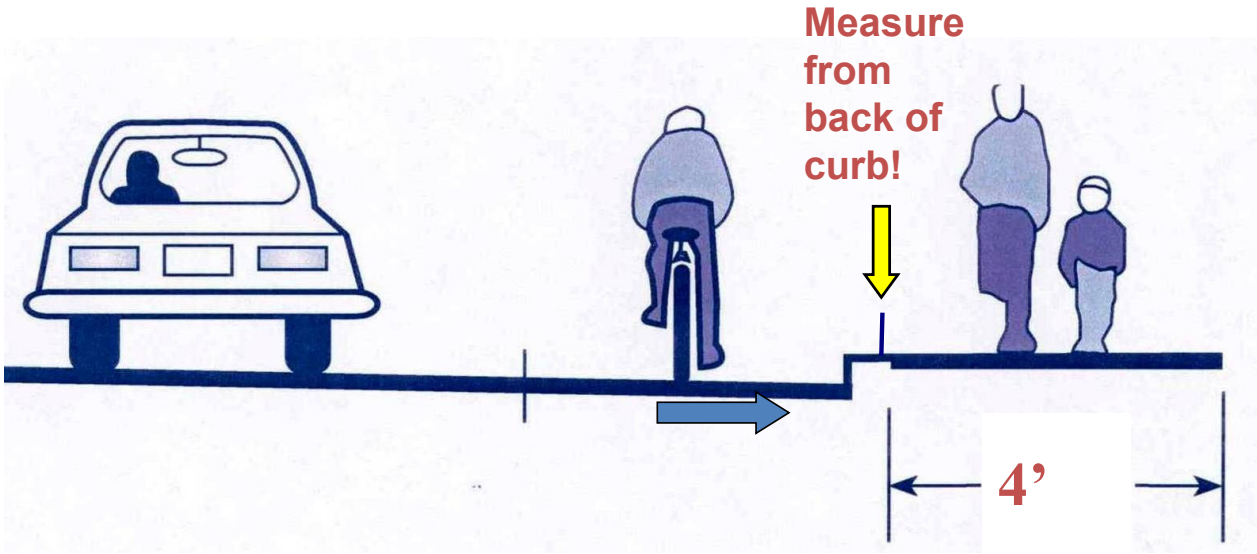
- R302.2 Components
- R302.3 Continuous Width
- R302.4 Passing Spaces
- R302.5 Grade
- R302.6 Cross Slope
- R302.7 Surfaces
- R402 Protruding Objects

Components of Pedestrian Access Route (R302.2)

- Walkways
- Ramps
- Curb ramps (excluding flared sides) & landings
- Blended transitions
- Crosswalks
- Pedestrian overpasses & underpasses

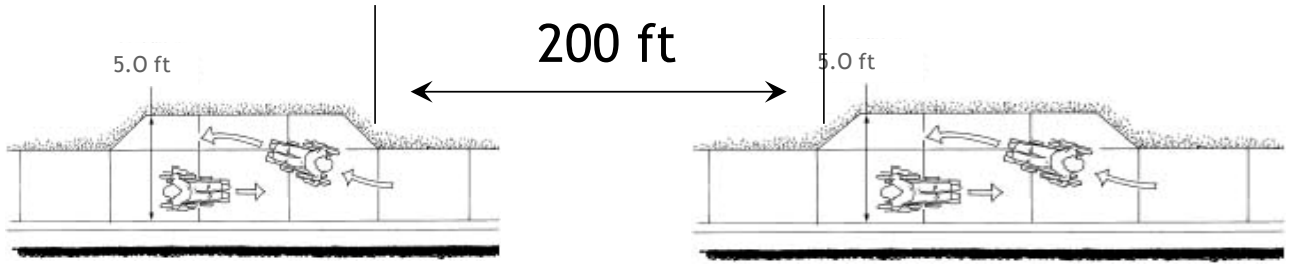
Width (R302.3)

- The MINIMUM continuous and unobstructed clear width of a pedestrian access route shall be 4.0 ft, exclusive of the width of the curb.



Width—Passing Spaces (R302.4)

- Walkways in pedestrian access routes that are less than 5.0 ft in clear width shall provide passing spaces (5.0 ft wide for a distance of 5.0 ft) at intervals of 200 ft maximum.

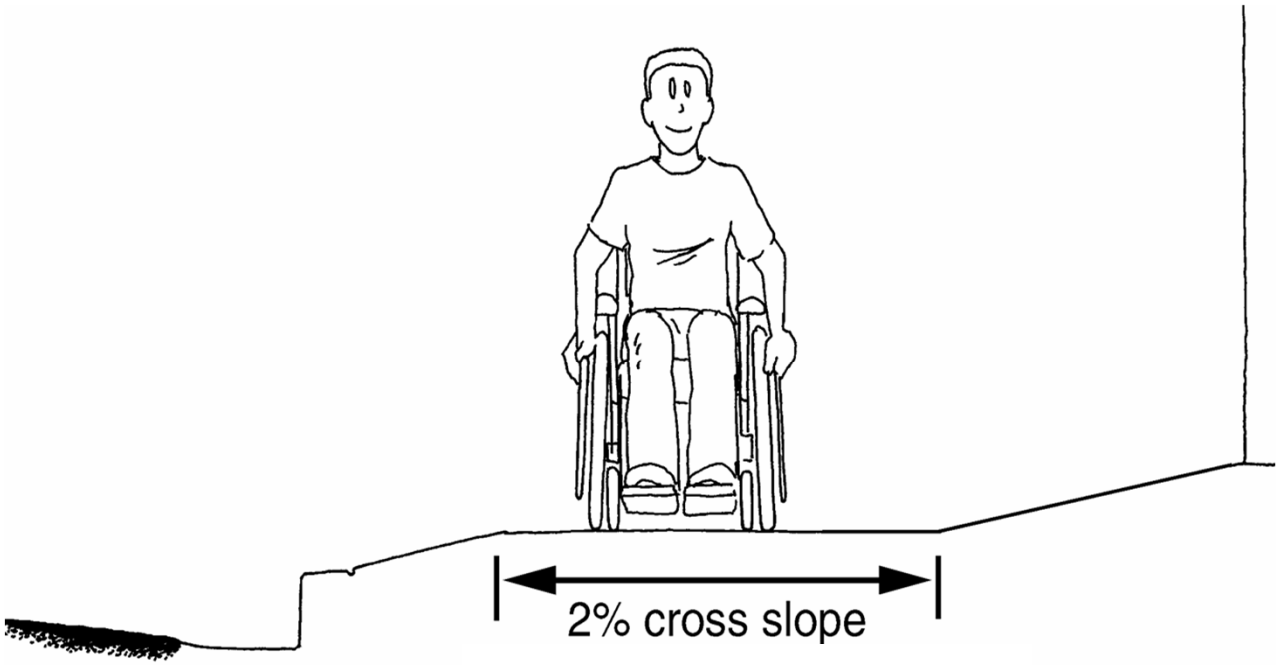


Walkway Cross Slope (R302.6)

The cross slope of the walkway of a pedestrian access route shall be 2 percent <u>maximum</u>

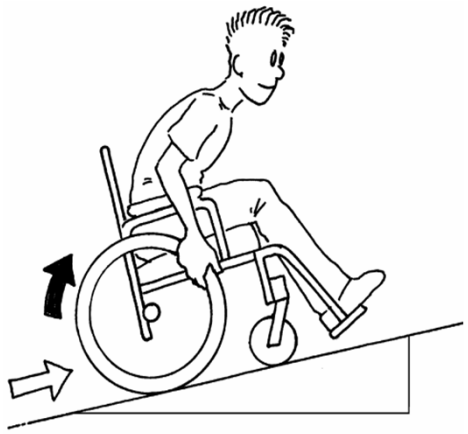
Cross Slope Solutions

Create a level area of preferably 6 ft (4 ft min.)



Walkway Grade (R302.5)

- If sidewalk in ROW and along road or bridge: follow general parallel roadway grade
- Otherwise, max grade is 5%
- Crosswalk grade (street crown): 5% maximum



Sidewalk Not Serving Street—Max g = 5%

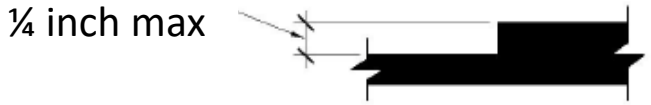
Surfaces (R302.7)

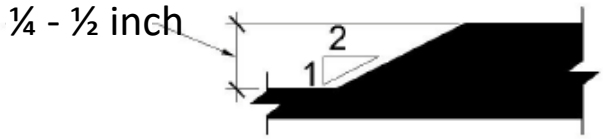
Surfaces must be firm, stable, and slip resistant.

Should be smooth.

Vertical Surface Discontinuities (R302.7.2)

- Vertical surface discontinuities shall not exceed ¼ inch maximum
- Those between ¼ and ½ inch shall be beveled with a slope not steeper than 50% (bevel across the entire vertical surface discontinuity)





Vertical Surface Discontinuities (2)

- Changes in level greater than ½-inch shall be transitioned by means of a ramp.

Accessible? Safe?

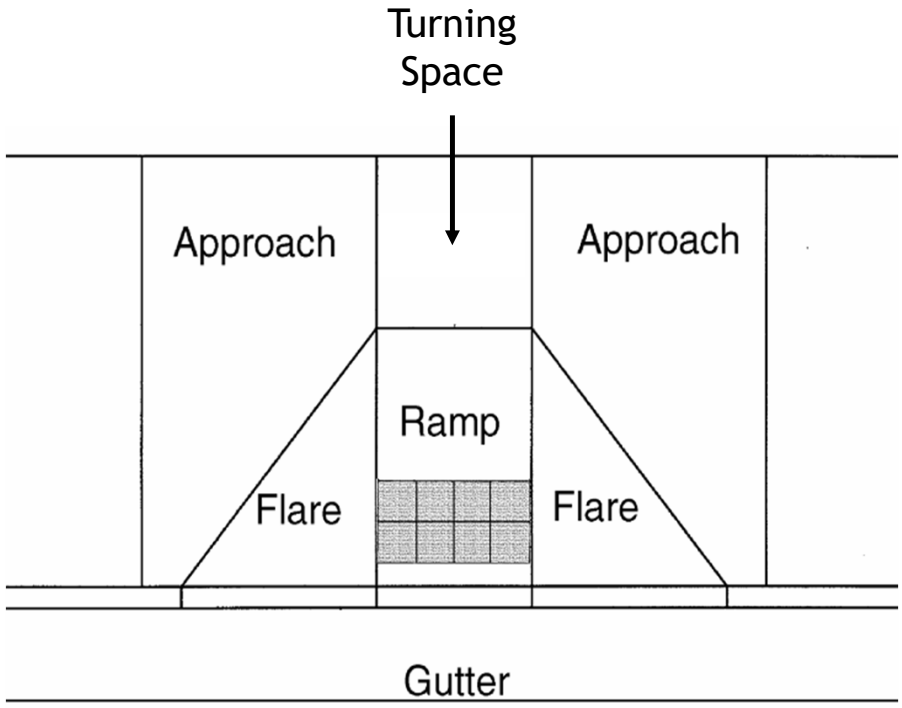
Vertical Surface Discontinuities (3)

How About This?

Horizontal Openings (R302.7.3)

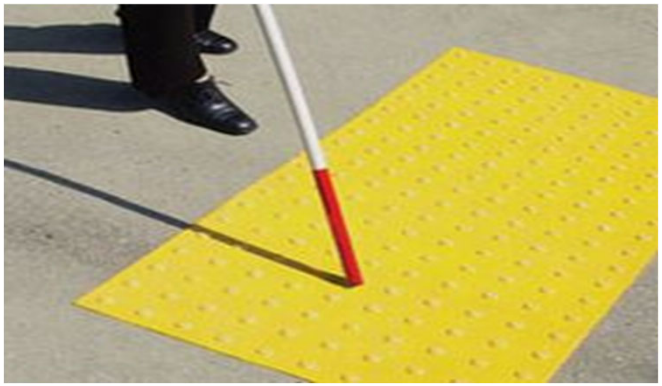
Walkway Joints & Gratings - Openings shall not permit passage of a sphere more than 0.5 inch in diameter.

Curb Ramp Components (R304)



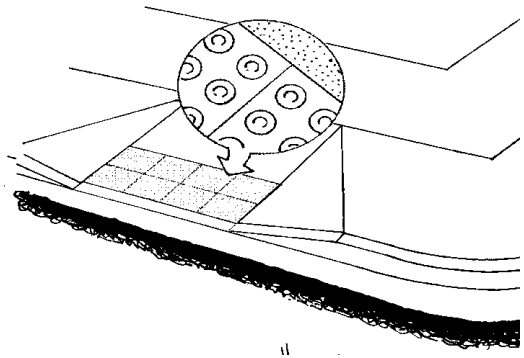
Curb Ramp Components—Visual and Tactile Contrast

- Detectable warnings (truncated domes)
  - Visual (provide high color contrast)
  - Tactile (detectable by cane and under foot)



Detectable Warnings

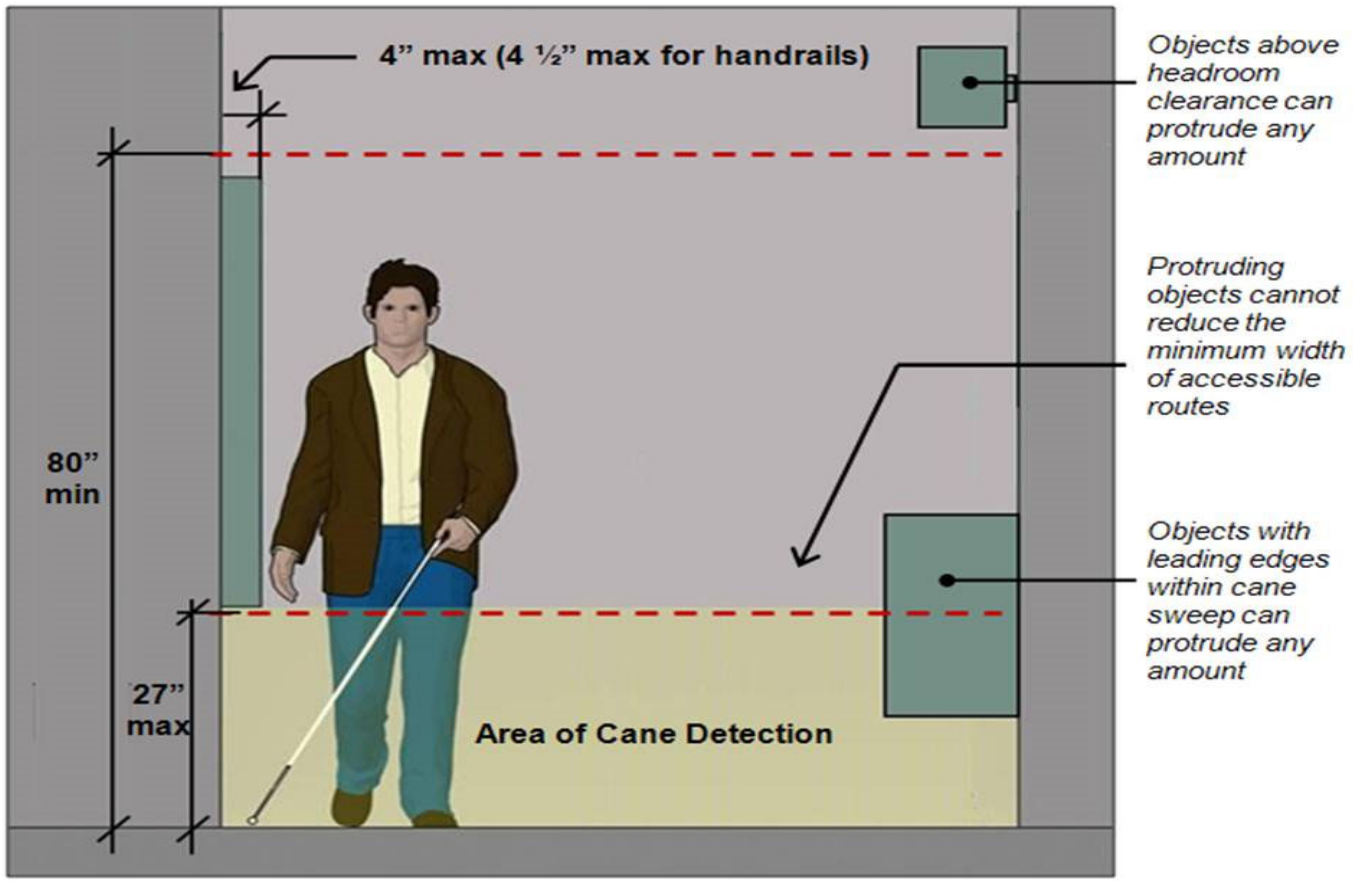
- Alert pedestrians with visual impairments about the sidewalk to street transition
- Use everywhere the curb is missing at a street crossing



PROWAG R402—Protruding Objects

- Objects with leading edges more than 27 inches and not more than 80 inches above the finish surface shall protrude 4 inches max. horizontally into pedestrian circulation paths.

Protruding Objects in PAR



Protruding Objects

- Protruding objects can be hazardous for all peds, especially peds who are blind or have low vision.
- **Requirements in R402 apply across the entire width of the pedestrian circulation path**, not just the PAR.

More Protruding Objects

ADAAG vs. PROWAG

- 2010 ADA Design Standards (ADAAG)
  - -- current law with respect to ADA
  - -- for buildings and on-site facilities
- PROWAG
  - -- intended for the PROW
  - -- 2011 NPRM (still a draft)
  - -- agencies should be using in PROW

Some Important Differences

- Design User
  - -- ADAAG: person in wheelchair, 3 feet width
  - -- PROWAG: person on crutches, 4 feet width
- Max. Grade
  - -- ADAAG: 5%
  - -- PROWAG: can follow street grade
- Detectable Warning Surfaces
  - -- ADAAG: optional
  - -- PROWAG: required in PROW

Sometimes the Biggest Challenges are at the Interface of the PROW and Private Property!

Coordination and Communication are Critical

Let’s Assess Some Pedestrian Facilities

Accessible? Safe?

Accessible? Safe?

Accessible? Safe?

Accessible? Safe?

Accessible? Safe?

But Not Accessible Now

East End of Block

West End of Block

Accessible? Safe?

Accessible? Safe?

Accessible? Safe?

Accessible? Safe?

Accessible? Safe?

An Example--What Do You Think?

Claimed Unsafe Placement of Barricade

- Trip/fall incident in crosswalk on rainy night.
- Woman walking, with a colleague, in direction shown, tripped on angle-iron feet of Type 3 barricade sustaining severe and permanent arm injury.
- Filed tort claims against municipality, general contractor and traffic control device subcontractor alleging negligent placement of the Type 3 barricades which created a hazard for pedestrians.

Tort Claim (2)

- Defendants argued that more than 3 feet of width was available to pedestrians so walkway complied with ADA criteria.
- Also argued that if a walkway is accessible (complies with ADA criteria), it is also safe.
- Confidential out-of-court settlement reached just before trial.

Possible Solutions

- Move barricades back, so out of crosswalk
- Use different type of support, maybe . . .

Lessons Learned

- Follow accepted safety principles, e.g., avoid obstructions in marked walkway.
- Don’t ignore human behavior/characteristics.
- Plans need to be detailed enough to show locations of devices.
- Maintenance is also important.

Wrap-Up

- Understand the criteria
- Understand pedestrian behavior and take it into account
- Don’t forget general safety principles
- Details! Details! Details!
- Accessibility ≠ Safety

Thank You!

Questions?

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