Designing Pedestrian Facilities for Accessibility

Module 2
Pedestrian Access Route (PAR)
Public Right-of-Way Accessibility Guidelines (PROWAG)

- Chapter R1 - Application and Administration
- Chapter R2 - Scoping Requirements
- Chapter R3 - Technical Requirements
- Chapter R4 - Supplementary Technical Requirements

- Focus will be on Chapter 3 Section R302 (R301)
- **R302 Pedestrian Access Route (R301)**
  - R302.2 Components (R301.2)
  - R302.3 Continuous Width (R301.3)
  - R302.4 Passing Spaces (R301.3.2)
  - R302.5 Grade (R301.4.2)
  - R302.6 Cross Slope (R301.4.1)
  - R302.7 Surfaces (R301.5)
R302.2 Components (R301.2)

- Pedestrian access routes (PAR) components:
  - Walkways
  - Ramps
  - Curb ramps (excluding flared sides) & landings
  - Blended transitions
  - Crosswalks
  - Pedestrian overpasses & underpasses
  - Elevators and platform lifts
• Stairways and escalators shall not be part of a pedestrian access route.
Design Issues for Pedestrians with Ambulatory Impairments

US Access Board Video
Ambulatory Impairments (8 mins)
R302.3 Continuous Width (R301.3.1)

- The MINIMUM continuous and unobstructed clear width of a pedestrian access route shall be 4.0 ft, exclusive of the width of the curb.
3 feet for one wheelchair user
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3.5 feet for a person using crutches
4 ft. for user with guide dog, sighted guide, or one person assisting another
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5 ft. for a wheelchair user and walking companion; 6 ft for two wheelchair users
5 ft. for a turning wheelchair
5 feet provides for two people to walk comfortably side by side (or to pass each other)
Other Guideline minimums:

- 4 feet - “A Policy on Geometric Design of Highways and Streets” (Green Book), AASHTO, 2011
- 4 feet - AASHTO Pedestrian Guide, 2004
- 5 feet - “Designing Sidewalks and Trails for Access”, FHWA, 2002
Sidewalk Zone System (Pedestrian Circulation Path)

- Curb Zone (back of curb to roadway)
- Furniture Zone
- Pedestrian Zone
- Frontage Zone
Curb Zone

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Furniture Zone

- Keeps pedestrian zone free of obstacles
  - Space for street furniture (signs, benches, trees, fire hydrants)
- Buffers pedestrians
- Easier to provide accessible ramps and driveways
- No protruding objects (R402)
Pedestrian Zone

- Area reserved for pedestrian travel includes “pedestrian access route”
- Must be free of obstacles, protruding objects
- PROWAG - 4 ft min
R302.4 Passing Spaces (R301.3.2)

- Walkways in pedestrian access routes that are less than 5.0 ft in clear width shall provide passing spaces at intervals of 200 ft maximum. Pedestrian access routes at passing spaces shall be 5.0 ft wide for a distance of 5.0 ft.
Sidewalk widened around pole

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Sidewalk wraps around large tree
Note that a longer taper would be easier to use.
Frontage Zone

- Room for doors, planter boxes, signs on buildings, etc.
- Must be free of overhanging and protruding obstacles
Zone System Summary: residential
Zone System Summary: commercial

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R302.5/R302.6 Walkway Grade & Cross Slope (R301.4)

R302.6 Cross Slope (R310.4.1)

- The cross slope of the walkway of a pedestrian access route shall be 2 percent maximum.
Cross Slopes Challenges

- Steep Cross Slopes
- Pedestrians must work against gravity
  - Crutch, walker, and prosthesis users may be forced to walk sideways
- Wheelchair users must make significant efforts just to travel straight
Sometimes building elevations make it difficult to create a proper cross slope.
Create a level area of preferably 6 feet (4 feet min.)
Acceptable solution:

- Raise the curb but remember curbs higher than 8” create parking concerns
- Parallel parking - doors cannot be opened
- Diagonal Parking - overhang is impossible

![Diagram of a wheelchair user with a raised curb to demonstrate accessibility considerations.](image)
Here the curb is stepped to allow diagonal on-street parking & sidewalks with good cross slope
Grade

- In ROW and along road or bridge: follow general parallel roadway grade
- Crosswalk grade (street crown): 5% maximum (R302.5.1)
- In ROW and not along road (i.e. pedestrian over/underpasses): Provide ramp, lift or elevator per R407 (R204.4)

R301.4.2 & R305.5
- In ROW and along road: follow general parallel roadway grade
- Where supported by a structure (i.e., bridge), should not exceed 5%
Running Slope Challenges

- **Uphill:** requires people with mobility impairments to exert more energy
- **Downhill:** difficult for users of walkers, canes, crutches, prostheses
Best Practice: Reducing Impact of Steep or Long Grades

On steep or long grades, provide rest areas at reasonable intervals
Best Practice: Reducing Impact of Steep or Long Grades

• Provide signs that indicate:
  - grade and length
  - alternative routes with lesser grades

• Provide handrails where warranted
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If driveways are not done right, sidewalks won’t be used (most common reason given by wheelchair users using the street)
At noncompliant driveways, sidewalk users encounter:

- Steep Cross slopes
- Rapid grade change at driveway flare
Cross-slope on an old-style sloped driveway is often 5 or 6 times higher than the 2% maximum.
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Design Solutions for Sidewalks at Driveways

- Accessible driveway requires level pedestrian access route:
  - Cross slope: 2% maximum
  - Width: 4’ minimum (PROWAG)

- Factors to consider when choosing accessible driveway option:
  - Sidewalk width
  - Planter strip width
  - Curb height
  - Available right-of-way
Best Solution - Planter strip allows for flat uninterrupted sidewalk.

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Inaccessible design - Constant steep slope across planter strip and sidewalk
Good Solution - Level accessible route at back of wide sidewalk

PROWAG specifies 4 ft. min. level area
Good Solution - Level Sidewalk within Driveway
Acceptable Variation - Driveway with mountable curb

Revert to vertical curbs before and after the driveway to discourage cars parking on sidewalk
Good solution for narrow sidewalks

- Width of level area
  - 4 ft PROWAG min.
  - Best to use full sidewalk width
- Longer tapers are easier to use
• Nicely landscaped areas add curb appeal and direct pedestrians away from driveway apron.
• Note that a longer taper would be easier to use
Acceptable solution for narrow sidewalks
Fully lowered sidewalk

- **Possible problems:**
  - Drainage
  - Users must negotiate two ramps
  - Peds who are blind may veer into street
  - Allows drivers to turn at higher speeds
• R302.7 Surfaces (R301.5)

• R302.7.1 Vertical Alignment (R301.5.1)

• R302.7.2 Vertical Surface Discontinuities (R301.5.2)
• Surfaces must be firm, stable, & slip resistant
R302.7.1 Vertical Alignment (R301.5.1)

- Generally planar within pedestrian access routes (including curb ramp runs, blended transitions, turning spaces, & gutter areas)
- Grade breaks shall be flush
Vertical Alignment

- If changes not addressed, can be tripping hazards
- Can be inaccessible to wheelchair users
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Vertical Alignment

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R302.7.2 Vertical Surface Discontinuities (R301.5.2)

- Vertical surface discontinuities shall not exceed ½ 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).
Tree Roots

Before

![Before image](image1)

After

![After image](image2)

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Example of where rubberized sidewalk panels were used to address a tree root problem.
Temporary repairs often don’t meet standards but is better than leaving it as is
Utility Covers

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Not Acceptable

Acceptable
Rough surfaces can cause:

- Tripping hazards
- Confusion to people who are blind in detecting tactile cues
- Painful to people with spinal cord injuries due to vibrations
- Maintenance difficulties
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Best Practice: Concrete in the pedestrian zone, textured surface in furniture zone
Best Practice: Visual Contrast of Surfaces

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Walkway Joints & Gratings - Openings shall not permit passage of a sphere more than 0.5 inch in diameter. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel.
Use of Wire Mesh Screen

Use of Straps Welded to Existing Grate
• Tree grates should be placed in the furniture zone, outside the pedestrian zone

• Tree grates expand the pedestrian zone for some users
Quality Control of Grades, Cross Slopes and Widths

- Reliance on contractors & inspectors
- Tight construction tolerances are needed
- Inspections: actual measuring (not visual)
- Train carpenters, concrete finishers, and inspectors - some jurisdictions have certifications.
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Example #1

Existing Condition

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Possible Solution

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Questions