Designing Pedestrian Facilities for Accessibility

Module 6
Accessible Pedestrian Signals
Design Issues for Pedestrians with low vision and who are blind

US Access Board Video
Persons Who Are Blind (12 mins)
Applicable Regulations

- Title II, 35.130 prohibits discrimination
- Title II, 35.151 New Construction and Alterations
  - New facilities must be accessible to and usable by persons with disabilities
  - Altered facilities must be accessible to and usable by persons with disabilities to the maximum extent feasible
- Title II, 35.160, Subpart E Communications:
  - Communications with public with disabilities must be as effective as with others
Effective Communication

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Accessible Pedestrian Signals (APS)

- Provide pedestrian signal information in usable formats, both audible and vibrotactile
- Information in redundant format benefits all pedestrians
- Increase the efficiency of pedestrian timing (research shows reduction in vehicle delay)
R209 Pedestrian Signals

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- Where pedestrian signals are provided, they shall include accessible pedestrian signals and pedestrian pushbuttons complying with MUTCD 4E.08-4E.13
  - Audible and vibrotactile indications of the WALK interval.
  - Pushbutton integrated into the accessible pedestrian signal
  - Location & reach specifications
Pushbutton-Integrated APS

- Specified by PROWAG; specific language contained in the 2009 MUTCD Section 4E (when APS used)
  - Speakers at the pushbutton
  - Pushbutton locator tone
  - Tactile arrow
  - Audible and vibrotactile walk indications
  - Automatic volume adjustment

- No longer recommended
  - Pedhead-mounted (cuckoo/chirps)
  - Vibrotactile-only
  - Receiver-based
Speakers at the pushbutton
Pushbutton Locator Tone

- Repeating sound that informs approaching pedestrians that there is a pushbutton and enables pedestrians to locate the pushbutton
- MUTCD 4E.12 specifies locator tone must have a repetition rate of one tone per second.
- MUTCD 4E.12 requires that all new pushbuttons have integrated locator tones
- Intensity responsive to ambient sound & audible 6-12’ from the pushbutton, or to the building line, whichever is less.
Tactile/Vibrotactile Arrow

- MUTCD 4E.12 states that tactile arrows shall:
  - Be located on the pushbutton
  - Have high visual contrast
  - Be aligned parallel to the direction of travel on the associated crosswalk

- Tactile arrow shall vibrate during the walk interval (MUTCD 4E.11)
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Tactile Arrow Examples
• MUTCD 4E.11 requires audible and vibrotactile WALK indications
  - Audible WALK indication:
    • Percussive tone if buttons separated by ≥10’
    • Speech walk message if buttons separated by <10’
  - Vibrotactile WALK indication: tactile arrow on pushbutton unit that vibrates during WALK
    • Provides signal information to persons with hearing impairment
    • Must be located close to crosswalk
• R306.2.3 contains similar language
Rapid Tick WALK Indication

- Pushbutton locator tone, followed by rapid tick WALK indication
  - Hear the locator tone during flashing and steady don’t walk
  - Walk indication during WALK
Speech WALK Indication

- Use only where technically infeasible to separate pushbuttons by ≥10’
- Pushbutton locator tone, followed by speech WALK indication
  - Hear the locator tone during flashing & steady don’t walk
  - Walk indication during WALK
- May use ‘wait’ outside the WALK interval
- Automatic Volume Adjustment
Optional Features (MUTCD 4E.09 & 4E.13)

- Street names may be provided in:
  - Braille
  - Raised print
- Tactile crosswalk maps may be provided
- Extended button press (4E.13)
  - Increased crossing time (sign required)
  - Audible beaconsting
  - Speech pushbutton information message
Pushbutton Information Message & Speech WALK Message

**Pushbutton message:** “Wait to cross Grand at Howard, Wait.
**Speech walk message:** Grand, WALK sign is on to cross Grand.

**Pushbutton message:** 
“Wait to cross Howard at Grand, Wait.”
**Speech walk message:** 
Howard, WALK sign is on to cross Howard.
APS Location is Critical

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- Provides information to user at departure point
  - Audible (can be quieter)
  - Vibrotactile within reach
- Imposes less cognitive load on pedestrians
  - Clear
  - Least ambiguous
• Pedestrian pushbuttons should be located to meet the following criteria:
  - Unobstructed & adjacent to level all-weather surface
  - Accessible route from pushbutton to curb ramp
  - Between edge of outer crosswalk line & side of curb ramp (no more than 5 feet from X-walk)
  - Between 1.5 and 6 feet from edge of curb, shoulder, pavement
  - Face of pushbutton parallel to crosswalk to be used
  - Mounting height approx. 3.5’, but no more than 4’ above the sidewalk
APS Location Example

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APS Location Examples

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< 5 feet

1.5-6 ft
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Pushbutton Location Examples - 2009 MUTCD

E - Perpendicular ramps with crosswalks close together

9 m (30 ft) corner radius
3.7 m (12 ft)

F - Perpendicular ramps with sidewalk set back from road with crosswalks far apart

15 m (5 ft)
9 m (30 ft) corner radius

4 - Perpendicular ramps with sidewalk set back from road with continuous sidewalk between ramps

1.5 m (5 ft)
3 m (10 ft) corner radius

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Previous    Next
Find the pushbutton

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APS Pushbutton Location - Mounting Height (R406)

- Vertical reach
  - 48 inches maximum
  - 15 inches minimum
- Horizontal reach
  - 10 inches maximum side reach over obstruction
- Be mindful of obstructions
- MUTCD recommends 42” mounting height
Clear Space (R403.2 & R404)

R404.3 requires 30”x48” clear space

Push button

Clear space

48” min
Pushbutton Operation (R403)

- Operable with one hand without tight grasping, pinching, or twisting wrist
- Actuation force: no more than 5 pounds
Signal height needs to be between 7-10 feet
Visual Signal Head Placement

Oops! Pushbutton placement is not right!
Good Pushbutton & Pedestrian Signal Head Placement

- **Good:**
  - Pushbutton separation
  - Mounting height
  - Horizontal reach (right)
  - Visual display location

- **Pretty Good:**
  - Horizontal reach (left)
• PROWAG (new construction/reconstruction)
  - When pedestrian signals are newly installed, and when controller is altered or signal head is replaced
• MUTCD 2009
  - Engineering study considers needs of pedestrians with visual disabilities
• FHWA Guidance
  - Jurisdictions must have a reasonable & consistent policy to provide accessibility
  - Policy should include:
    • APS as individual accommodation
    • APS in existing locations (transition plan)
    • APS in new construction/alterations
• Complaint against the Maryland State Highway Administration
  - Alleged that blind pedestrians were not able to access pedestrian signal information and APS were not installed in response to requests
  - FHWA found ADA violation regarding APS; in response, Maryland SHA agreed to develop APS policy
• New construction/alterations
  - All new pedestrian signals will include APS
  - Projects to add pedestrian signals to existing signals will include APS
  - Projects that significantly modify pedestrian signals will include APS
  - Signal inventory will be performed and APS installed on priority ranking basis (transition plan)
• Minimize crossing distance
• Factors affecting crossing distance:
  - Number of lanes
  - Lane width
  - Curb radii
  - Medians/islands
  - Curb extensions
  - Parking lanes
  - Bike lanes
  - Transit lanes
2009 MUTCD (guidance):  
- Ped clearance time based on 3.5 ft/sec max.  
- Steady Walk interval at least 7 seconds (4 seconds if warranted)  
- Consider a walking speed less than 3.5 ft/sec. (if warranted)  
- 2nd check to ensure WALK interval + ped clearance time allows crossing at 3.0 ft/sec. when starting 6’ behind curb or edge of pavement. Add any additional time to WALK interval.
Sample Calculation of 60’ Curb to Curb Crosswalk

Ped clearance phase calculated at 3.5’/sec curb-to-curb.
- 60’ crosswalk requires 17 sec
- 7(min) + 17 = 24 sec total

Time from push button (or 6’ feet back from top of ramp to curb at the other side) to equal 3’/sec including steady walk phase
- 60’ crosswalk + 6’ ramp = 66’
- 66’ requires 22 sec

24 sec > 22 sec; passes test.
Use 7 sec (or longer) WALK and 17 sec PED CLEARANCE