Designing Pedestrian Facilities for Accessibility

Module 6
Accessible Pedestrian Signals

U.S. Department of Transportation
Federal Highway Administration

Federal Highway Administration
RESOURCE CENTER

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

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

- 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)

Tactile Arrow Examples

WALK Indications

- 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

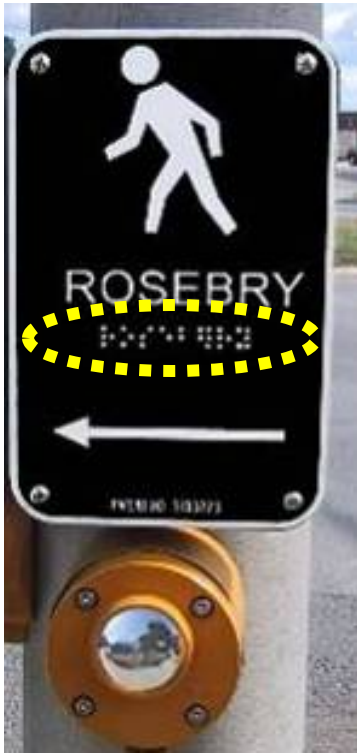
- Pushbutton locator tone, followed by rapid tick WALK indication
  - Hear the locator tone during flashing and steady don't walk
  - Walk indication during WALK

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 beaconing
  - Speech pushbutton information message

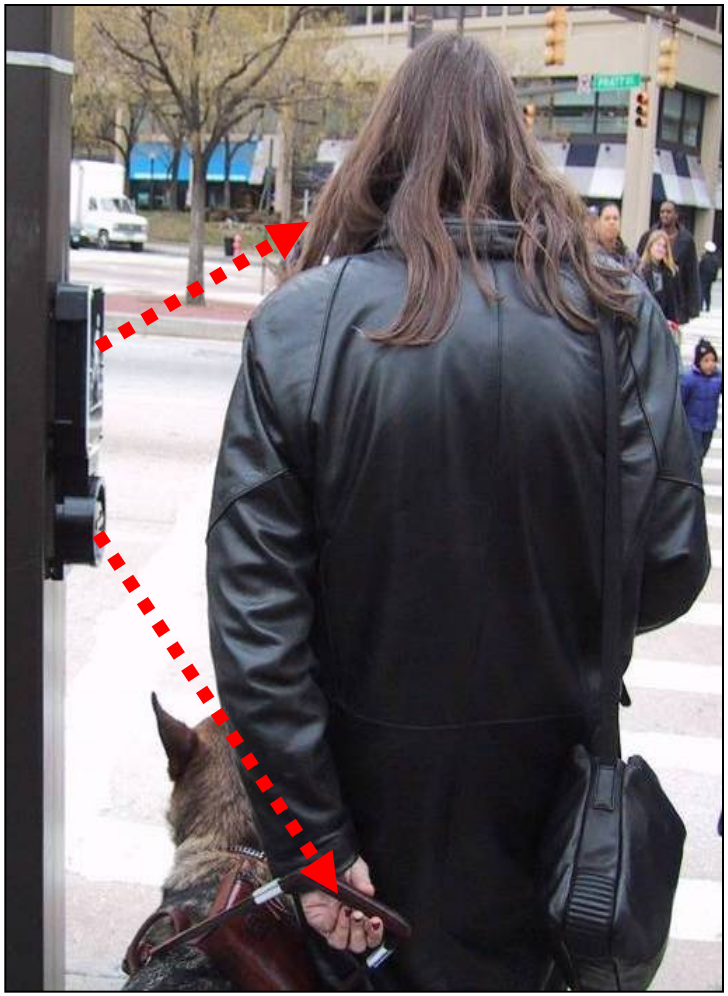


Pushbutton Information Message & Speech WALK Message

Pushbutton – Integrated APS

APS Location is Critical

- Provides information to user at departure point
  - Audible (can be quieter)
  - Vibrotactile within reach
- Imposes less cognitive load on pedestrians
  - Clear
  - Least ambiguous

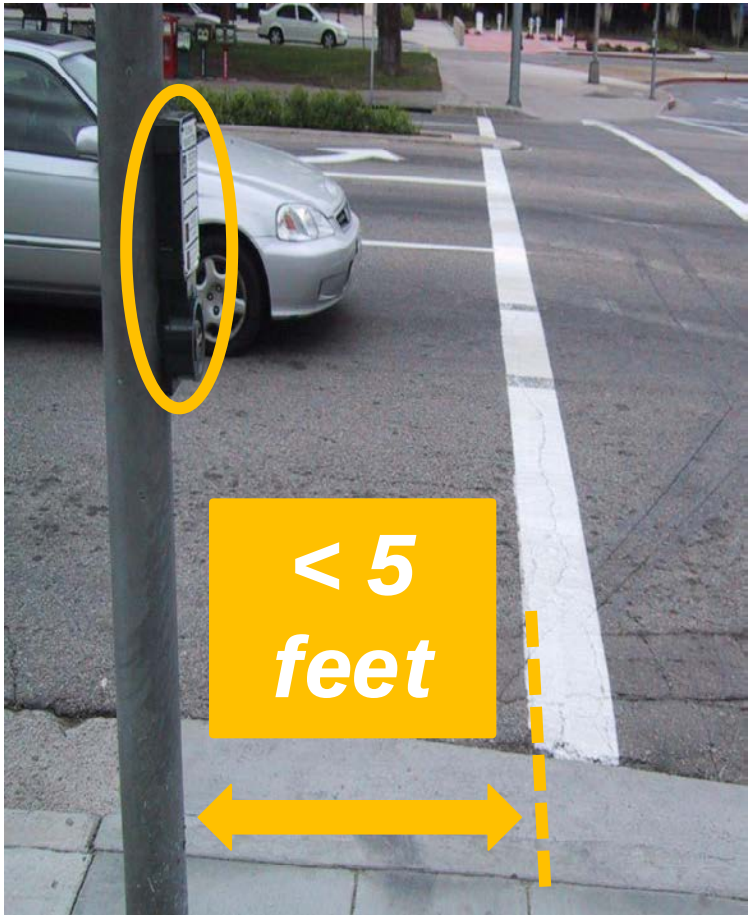


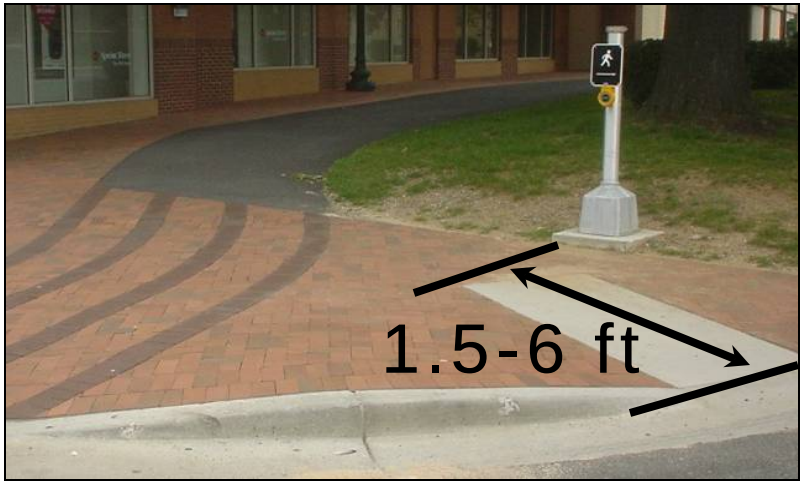
Pushbutton Location (MUTCD 4E.08)

- 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

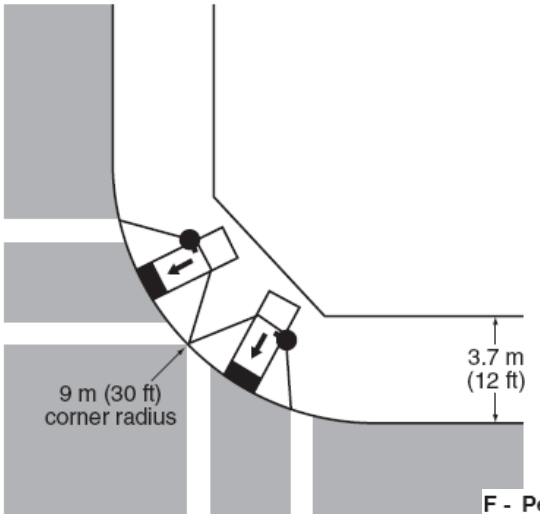
APS Location Examples



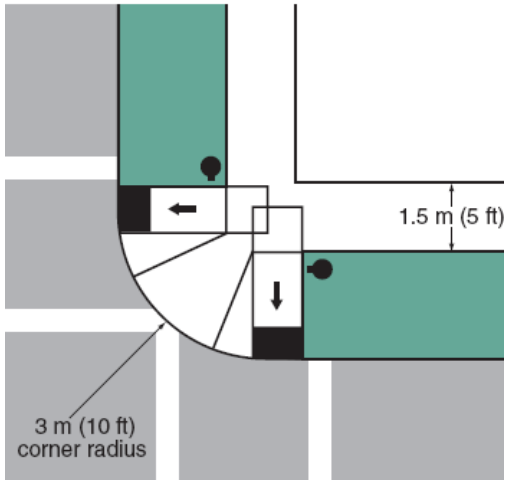


Pushbutton Location Examples – 2009 MUTCD

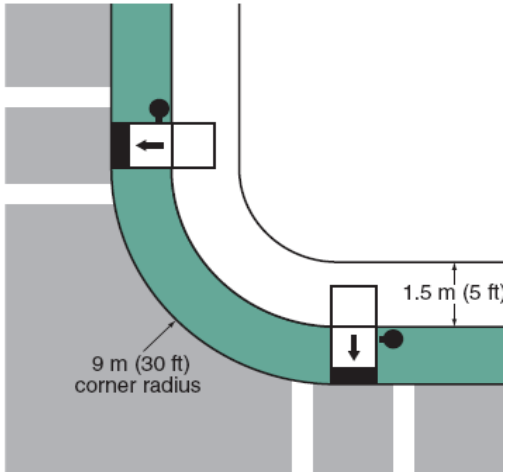
E - Perpendicular ramps with crosswalks close together



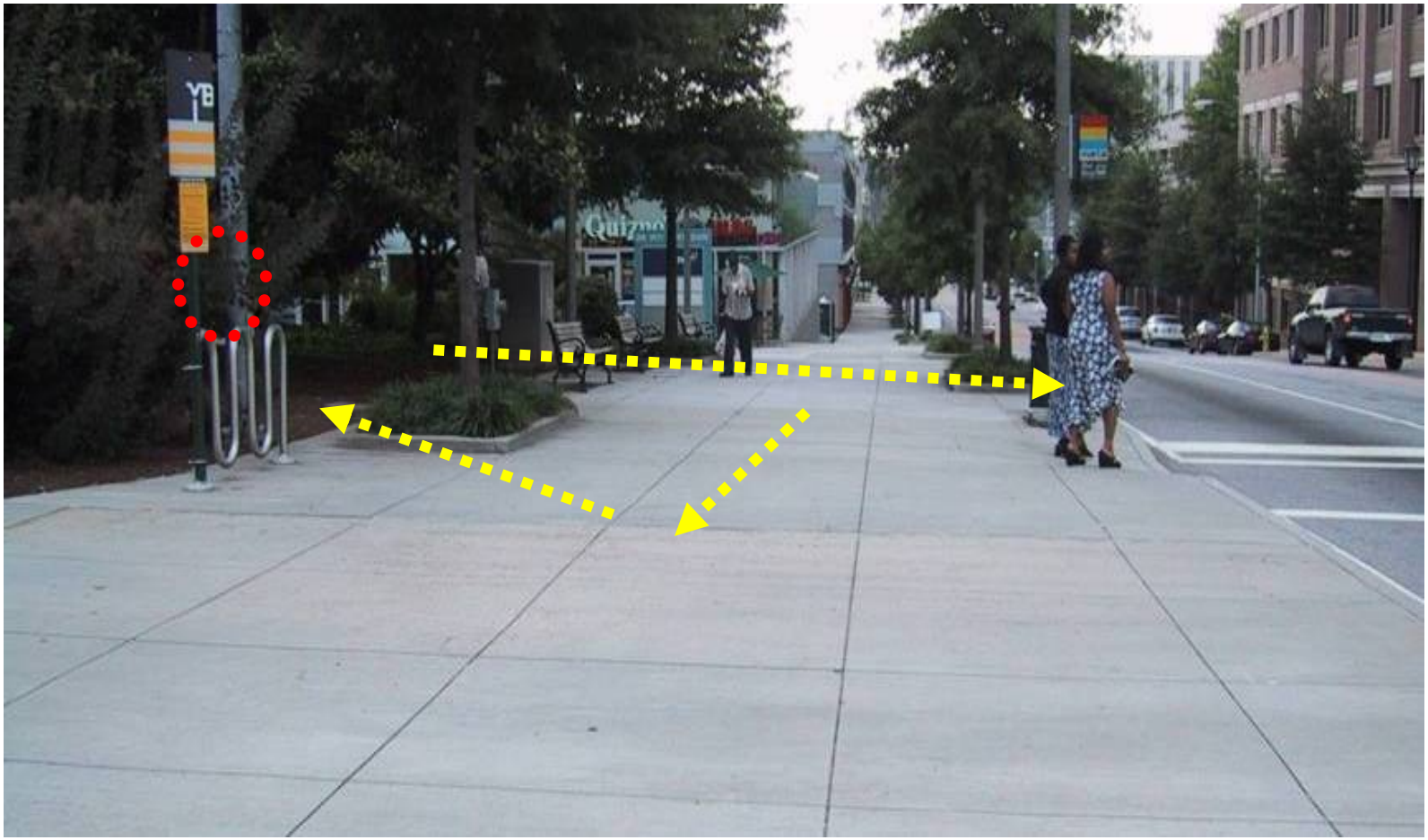
H - Perpendicular ramps with sidewalk set back from road with continuous sidewalk between ramps



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



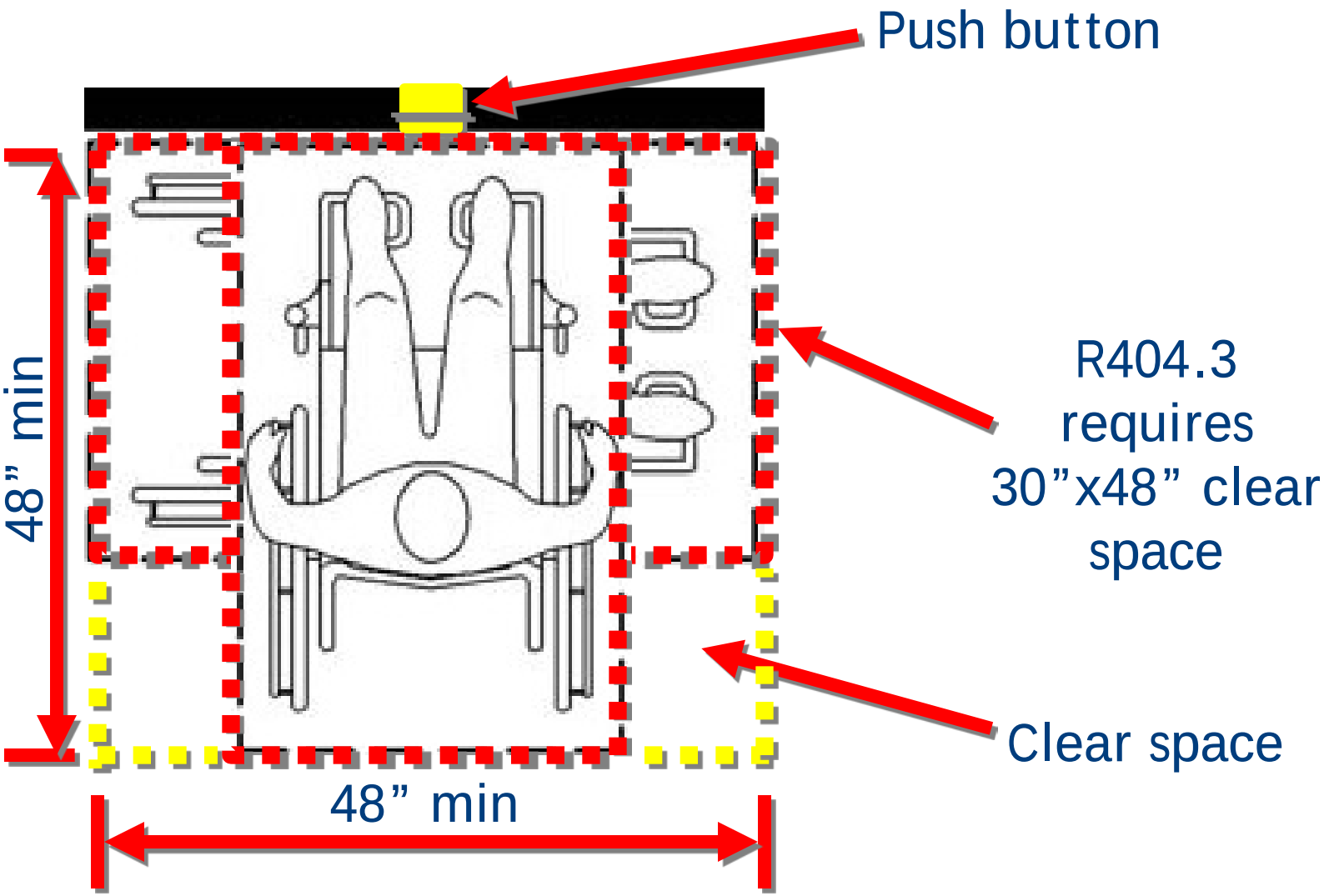
Find the pushbutton



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)

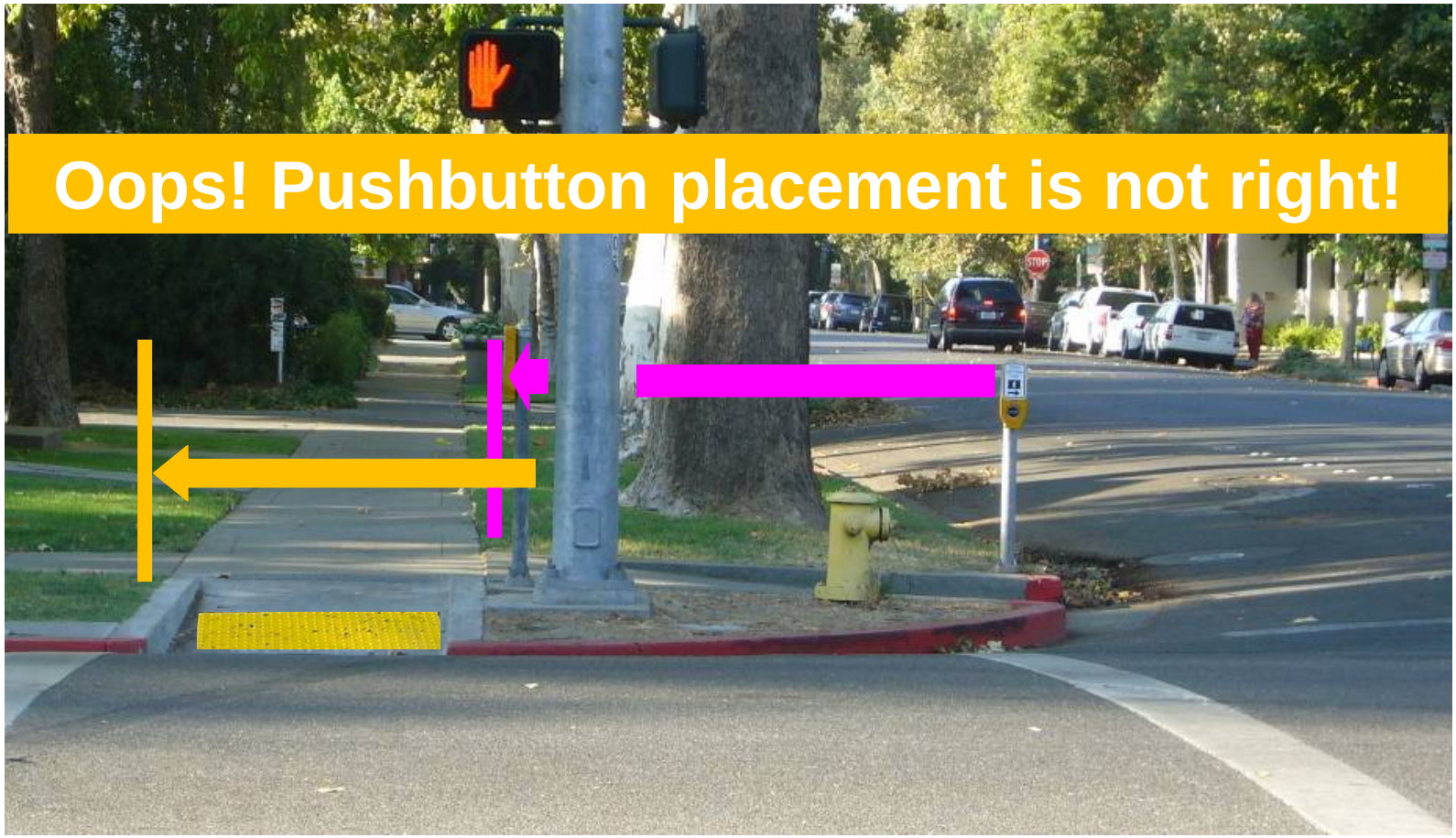


Pushbutton Operation (R403)

- Operable with one hand without tight grasping, pinching, or twisting wrist
- Actuation force: no more than 5 pounds

Visual Signal Head Placement

Visual Signal Head Placement



Good Pushbutton & Pedestrian Signal Head Placement

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

APS Installation

- 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

Reasonable & Consistent Policy

- 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

Texas DOT APS Policy (January 2011)

- 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)

Crossing Distance

- Minimize crossing distance
- Factors affecting crossing distance:
  - Number of lanes
  - Lane width
  - Curb radii
  - Medians/islands
  - Curb extensions
  - Parking lanes
  - Bike lanes
  - Transit lanes

Pedestrian Crossing Time

- 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

Calculations Based on 2009 MUTCD

- 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

Questions