Section 6

Accessible Pedestrian Signals (APS)

Accessible Pedestrian Signal (APS) Installation

What Will Be Covered

- New types of APS
- MUTCD: Installing APS
- Volume
- Audible tones
- Pushbutton location
- Lessons from installations
- APS problems and solutions exercise

New Types of APS - Summary

- APS available now have different features and functions than those traditionally installed in U.S.:
  - Locator tones
  - Respond to ambient sound
  - Tactile arrows
  - Pushbutton information messages
- Features have made them more useful and less objectionable to communities and to persons who are blind

Two Sections in the MUTCD

- Accessible Pedestrian Signals (4E.06)
- Accessible Pedestrian Signal Detectors (4E.08)
- Understanding the features and functions of the recently available APS is necessary to understand MUTCD sections on APS

Factors in Installing APS

From MUTCD 2000, 4E.06:

"..engineering study, which should consider the following factors:

1. Potential demand for accessible pedestrian signals.
2. A request for accessible pedestrian signals.
3. Traffic volumes during times when pedestrians might be present; including periods of low traffic volumes or high turn-on-red volumes.

(continued)

Factors in Installing APS

From MUTCD 2000, 4E.06:

"..engineering study, which should consider the following factors:

4. The complexity of traffic signal phasing.
5. The complexity of intersection geometry."

Prioritization of APS Installations

- Draft PROW Accessibility Guidelines recommend APS at all renovated and new intersections
- Prioritization rating scales have been developed to score factors mentioned in the MUTCD for retrofits:
  - To decide which requested location should be installed first (if there are too many requests)
  - In doing a city accessibility audit
- Prioritization rating scale being validated by NCHRP 3-62

Prioritization

Based on:

- Intersection signalization and geometry
  - Number of legs
  - Traffic volume and speed
  - Width of crossing
  - Intersection configuration
- Pedestrian use
  - Proximity to facility serving blind people
  - Proximity to transit stops
  - Proximity to commercial facilities
- Other special conditions

Factors in Installing APS

- MUTCD recognizes that confusion has resulted from installation of APS at some types of locations
- Care should be taken to avoid providing misleading or ambiguous information

New Recommendations

- MUTCD language particularly addresses areas that have caused problems in the past and makes new recommendations on:
  - Volume of APS
  - Use of audible beaconing
  - Pushbutton placement

Volume of APS

- MUTCD and draft PROW Accessibility Guidelines both recommend:
  - Signal volume between 2 to 5dB over ambient noise level
  - APS should respond to ambient sound (automatic volume adjustment)
  - Sound should not be loud
  - As previously discussed, audible beaconing should be used only where needed (optional activation)

MUTCD on Volume

- 4E.06 "Guidance:
  - The accessible walk signal tone should be no louder than the locator tone, except when there is optional activation to provide a louder signal tone for a single pedestrian phase."

MUTCD on Volume

- 4E.08 "Guidance:
  - Pushbuttons should be audibly locatable.
  - Pushbutton locator tones should be intensity responsive to ambient sound, and be audible 1.8 to 3.7 m (6 to 12 ft) from the pushbutton, or to the building line, whichever is less.
  - Pushbutton locator tones should be no more than 5 dB louder than ambient sound."

APS Features: Audible Beaconing

- Definition from PROWAAC report:
  - Audible Beacon: a permanently fixed source emitting sound for directional orientation
- Sound from the opposite side of the street is used to provide directional guidance during street crossing; is needed at a minority of crosswalks
- Can be provided for a single cycle when a pedestrian holds the pushbutton in for a longer period of time

Audible Beaconing

- Audible beaconing not needed at all APS locations
- Current recommendations are that audible beaconing should be provided in response to a request
- Request can be placed by holding the pushbutton for several seconds
- Increases sound levels for the following cycle

MUTCD: Choosing Audible Tones

Standard:

When choosing audible tones, possible extraneous sources of sounds (such as wind, rain, vehicle back-up warnings, or birds) shall be considered in order to eliminate potential confusion to pedestrians who have visual disabilities

Bird Sounds

- Chirp type signal has been confused with birds
- Not appropriate in overhead speakers where birds are likely to be present
- No reports of the cuckoo sound being confused with birds in the US

Back-up Warnings

- Some manufacturers sell an audible warning device with tones of the same frequency and duration as vehicle back-up warnings
- Those tones are not appropriate for use as an APS

MUTCD:
Choosing Audible Tones

MUTCD Support:

Technology that provides different sounds for each non-concurrent signal phase has frequently been found to provide ambiguous information

Different Sounds Do Not Solve Ambiguity Problem

- More information may be needed
- Different sounds for different directions (such as cuckoo for North/South crossing and chirp for East/West crossing) require blind pedestrians to know their direction of travel
  - Direction is not always consistent where streets curve or do not run on a N/S grid
  - Difficult for pedestrians to interpret correctly

One Solution for Ambiguity

If the APS is pushbutton integrated:

- Clarifies which sound is for which crosswalk by proximity
- MUTCD 4E.08 states that: "At corners of signalized locations with accessible pedestrian signals where two pedestrian pushbuttons are provided, the pushbuttons should be separated by a distance of at least 3m (10 ft)."

MUTCD 4E.08 on Pushbutton Location

"Pushbuttons for accessible pedestrian signals should be located as follows:

1. Adjacent to a level all-weather surface to provide access from a wheelchair, and where there is an all-weather surface, wheelchair accessible route to the ramp;
2. Within 1.5 m (5 ft) of the crosswalk extended;

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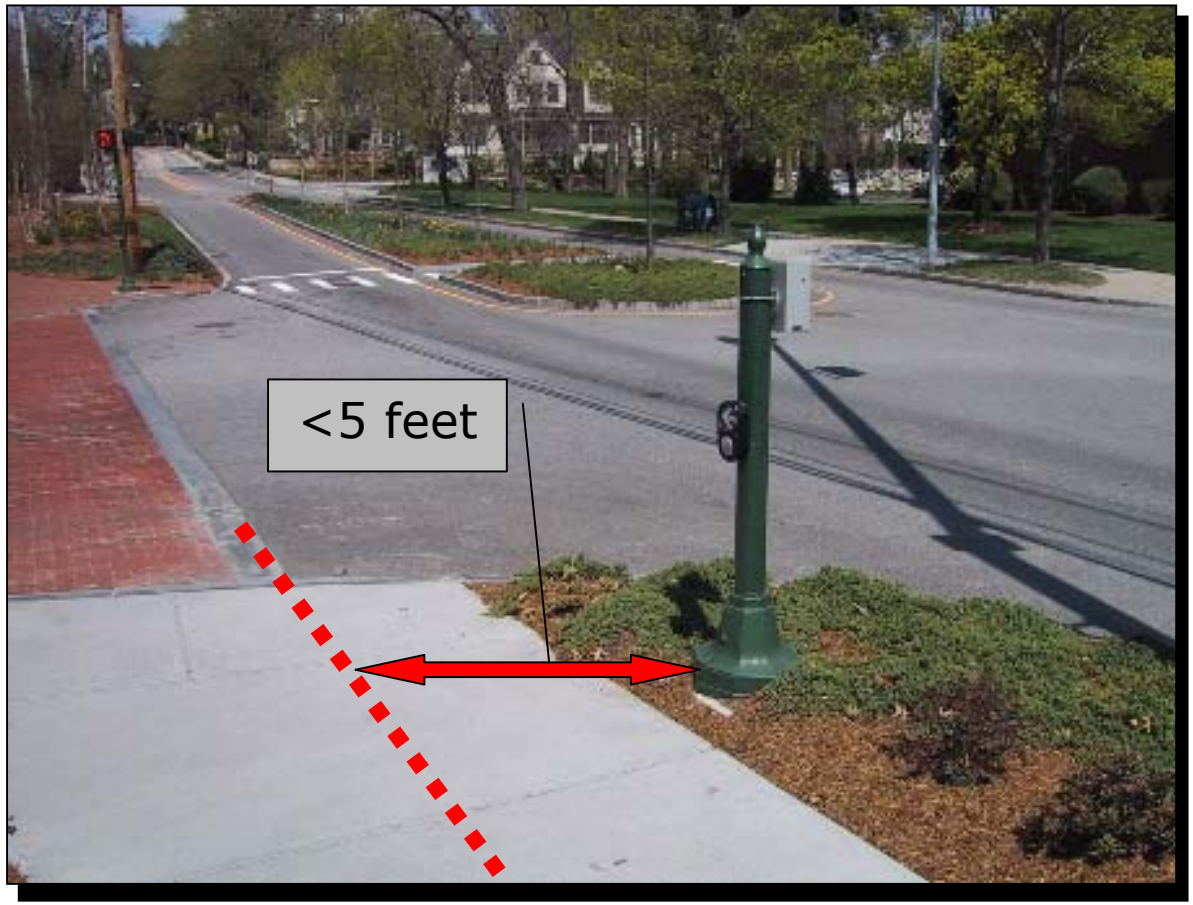
MUTCD 4E.08 on Pushbutton Location

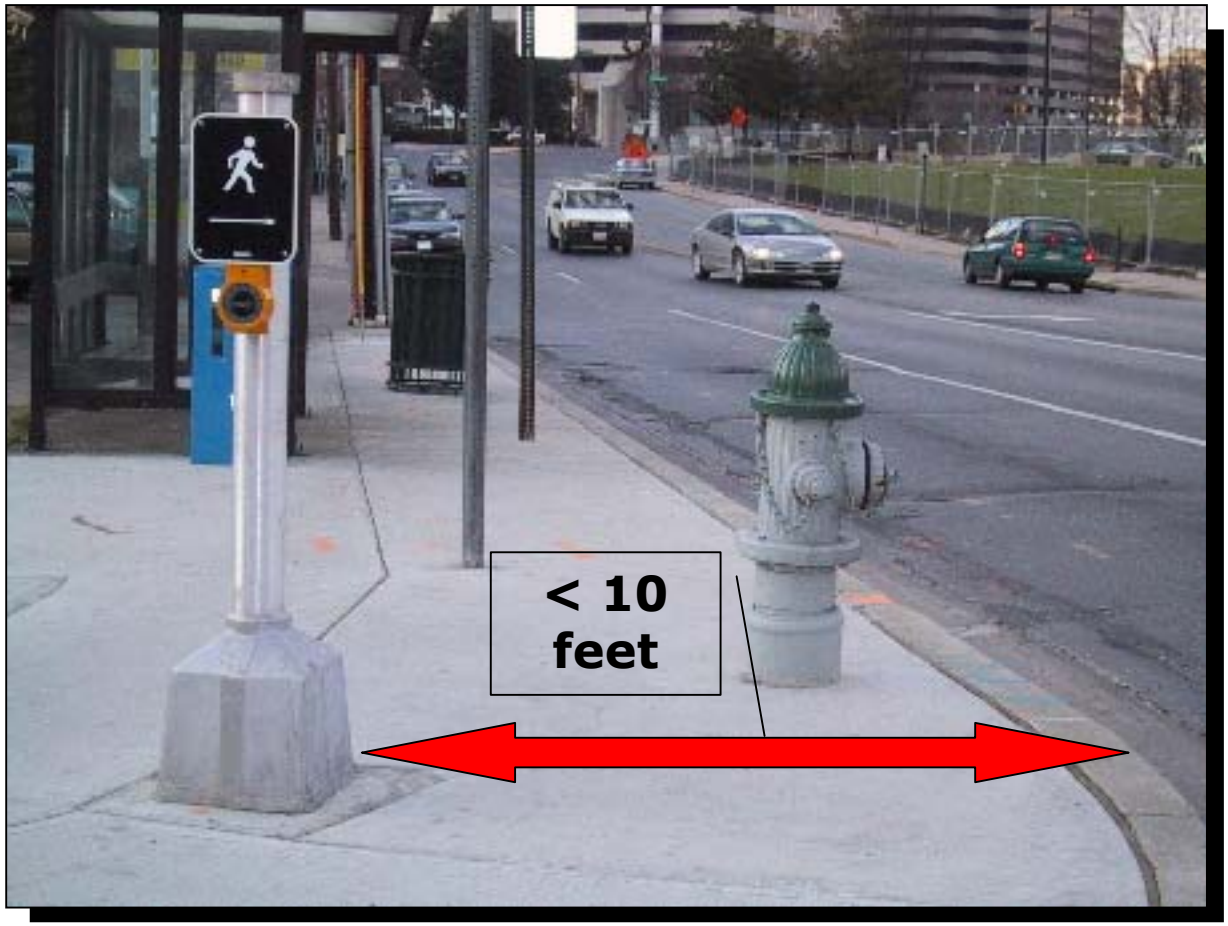
"Pushbuttons for accessible pedestrian signals should be located as follows:

3. Within 3 m (10 ft) of the edge of the curb, shoulder, or pavement; and
4. Parallel to the crosswalk to be used"

Pushbutton within 5 Feet of Crosswalk Line Extended



Pushbutton within 10 Feet of the Curb



Optimal Location: In Line with the Crosswalk Line

- Locate the APS speaker and pushbutton on a pole in line with the crosswalk line that is farthest from the center of the intersection
  - Separation of devices makes different sounds unnecessary
  - Face of APS faces toward intersection
  - Tactile arrow should be aligned indirection of travel on the crosswalk
  - It is relatively easy to discern which crosswalk is being signaled

Location in Line with the Crosswalk Line

Location in Line with the Crosswalk Line

Other Solutions to Ambiguity

- Location and aiming of pedhead mounted APS speaker
- Speech messages for pushbutton orientation message and for walk indication when location is not optimal

Location and Aiming of Overhead Speakers

- Pedhead mounted speakers should be mounted over the beginning of the crosswalk
- Aimed at crosswalk departure location rather than across the street (audible beaconing is not needed in a majority of locations)
- Volume should be carefully adjusted

Speaker Aimed at Waiting Location

Speaker Mounted on Mast Arm

Could be aimed down at crosswalk waiting location

Speech Messages

- If APS cannot be separated by at least 10 feet and must be located on the same pole:
  - Speech messages, if properly worded, including street names, may provide more appropriate information than different tones
  - Street names must be provided in a pushbutton information message to clarify the speech walk message

Messages Must Be Carefully Chosen If Pushbuttons Are Located on the Same Pole

Wording of Speech Messages

- Typical WALK message:

  "Howard Street, Walk sign is on to cross Howard"

- At location with exclusive pedestrian phasing:

  "Walk sign is on for all crossings"

Speech Walk Messages Combined with Pushbutton Messages

- Need to use a pushbutton information message that tells the pedestrian the street name controlled by the pushbutton
- Sample pushbutton message: "Wait to cross Howard at Grand"
  - Provides name of street to be crossed
  - In conjunction with tactile arrow, clarifies the speech walk message
  - Can provide name of other street at intersection

MUTCD on Choosing Audible Tones

"Carefully selected …when the following conditions exist:

1. Where there is an island that allows unsignalized right turns across a crosswalk…
2. Where multi-leg approaches or complex signal phasing require more than two pedestrian phases…"

MUTCD on Choosing Audible Tones

"Carefully selected …when the following conditions exist:

- At intersections where a diagonal pedestrian crossing is allowed, or where one street receives a WALK signal indication simultaneously with another street"

Concerns about These Locations

- If APS is loud enough to hear before crossing to the island, pedestrian may assume that the unsignalized lane is signalized
- In a location with split phasing, APS for one crosswalk may sound at the same time that the vehicles are crossing the parallel crosswalk

Concerns about These Locations

- APS sounds are not very directional and it can be hard to determine which leg is signalized and being indicated

Problems with Exclusive Pedestrian Phases

- Blind pedestrians cannot determine the time to cross from the movement of cars
- Confusing to blind pedestrians because no cars are moving to confirm alignment or if RTOR allowed, no real break to cross
- Providing two sounds at the same time does not clarify the signalization (Should not have cuckoo and chirp at the same time!)

Solutions

- Different tones do not solve the problems
  - Speaker placement and alignment should be planned and evaluated after installation, so sound is only heard at the crosswalk being signaled
  - Volume must be carefully adjusted and evaluated
  - Most intersections do NOT need audible beaconing. Audible beaconing can be provided 'on demand'

APS Features: Pushbutton Activation of Options

As discussed earlier, a 3-second hold of pushbutton may be used to activate:

- Pushbutton information message
- Audible beaconing feature
- Audible walk signal
- Longer crossing time

Lessons from Installations

Bad installations:

- "Bad" installations may not be very usable due to lack of understanding of how a pedestrian who is blind would use the facility
- May be usable to someone who is familiar with the installation

Problem Location

- APS not in line with crosswalk
- Control face not facing the crosswalk waiting area

Good Location

- Pushbuttons within 5 feet of crosswalk lines extended and within 10 feet of curb
- Control face facing intersection

Problem Example

- Two pushbuttons on same pole
- Pushbutton message: “Harford & Taylor”
- Speech WALK message is “Walk sign is on to cross Harford” (doesn’t clarify which one is sounding if you don’t know which street is Harford)

Audible Pedestrian Signals

Problems and Design Solutions Exercise

Accessible Pedestrian Signals Problems

- Identify the problems on the following photographs.
- Specify exactly how they may pose accessibility difficulties to pedestrians who are blind or visually impaired.

Problem #1

Solution #1

Problem #2

Solution #2

- Rotate the pedestrian signal head, rewire it, and turn it toward the crossing over which it is positioned
  - That will correct the position of the audible signal speaker
  - Will put the speaker and pedhead over pushbutton on that pole controls