

# PBIC Webinar

## Accessible Pedestrian Signals



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**Janet Barlow**, President, Accessible Design for the Blind

**March 11, 2014, 2 pm**



Pedestrian and Bicycle  
Information Center



THE UNIVERSITY OF NORTH CAROLINA  
HIGHWAY SAFETY  
RESEARCH CENTER

# Today's Presentation

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- ⇒ **Questions at the end**



# Designing and Retrofitting Intersections for Accessible Pedestrian Signals

PBIC Webinar, Feb 13, 2014



# Today's Presenters

- **Janet Barlow**, COMS (Accessible Design for the Blind) - Contractor for NCHRP 3-62 and Instructor for the APS Workshop
- **Daniel Carter**, PE (UNC Highway Safety Research Center) - Contractor for NCHRP 3-62 and Instructor for the APS Workshop

Janet Barlow

# BACKGROUND



# Research Project

- NCHRP Project 3-62 “Guidelines on Accessible Pedestrian Signals”
- Research on features and usability of Accessible Pedestrian Signals (APS)
- Guidelines for APS
  - Public Rights-of-Way Accessibility Guidelines
  - Manual on Uniform Traffic Control Devices (MUTCD)
- Training to facilitate implementation of guidelines



Janet Barlow

# **TRAVEL BY PEDESTRIANS WHO ARE BLIND OR WHO HAVE LOW VISION**

# Prevalence of Blindness & Vision Loss



- Some degree of vision impairment affects over 10 million Americans
- 1.3 million are legally blind
- Incidence increases with age



# Visual impairment

- Functional limitation in seeing
- Legal blindness – defined by law to determine eligibility for services
  - Vision of 20/200 or less in the better eye with best possible correction
  - Visual field of 20 degrees or less

# This street crossing



As seen by someone with overall  
reduced acuity



As seen by someone with central  
vision loss



As seen by someone with peripheral  
vision loss



As seen by someone with total  
blindness



# How do people who are blind or who have low vision travel?

- Sighted (human) guide
- White cane
- Dog guide
- Telescope or other low vision aids
- No aid



# Orientation and Mobility Instruction

- Provided by Orientation and Mobility (O&M) Specialist
- Prepares a person to travel in a variety of environments
  - independently assess new intersections
  - plan new routes
- Not all people who need instruction receive it
- Not provided at every intersection a person may need to cross

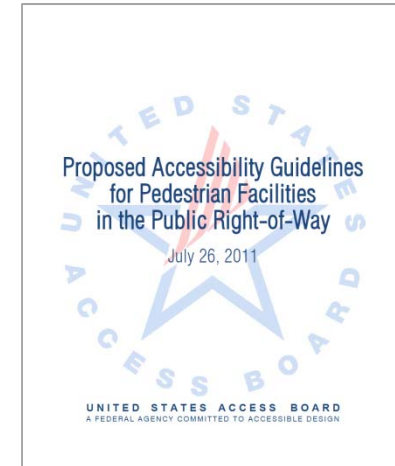
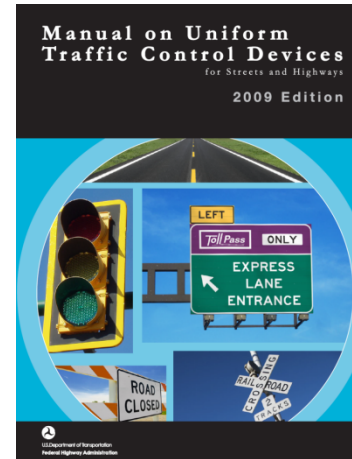


# Tasks for non-visual street crossing

- Locate edge of street and crosswalk
- Determine geometry and proper crossing alignment
- Determine traffic control and appropriate time to cross
- Maintain alignment while crossing

# Summary

- People who are blind or visually impaired cross streets every day
- Street crossing task has become more difficult as geometry and signalization has changed
- Being familiar with intersection and access to more information about the intersection can make the task easier and safer



Janet Barlow

# ADA REGULATIONS AND MUTCD STANDARDS AND GUIDANCE FOR PUSHBUTTON-INTEGRATED APS

# Americans with Disabilities Act (ADA)

- ADA requires that all newly built or altered facilities or programs are “accessible to and usable by” individuals with disabilities
- Public Rights-of-Way Guidelines are still not finalized, however, that doesn’t negate the requirement for all facilities to be accessible

# Proposed PROWAG

- Access Board released proposed *Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way* on July 26, 2011
- Focused on new construction
- Provides direction regarding ADA requirements for public rights-of-way
- Understand and use requirements in proposed PROWAG as goal in any APS installation

# Proposed PROWAG - R209.1 General

- Requires accessible pedestrian signals and pedestrian pushbuttons where ever pedestrian signals are installed
  - APS must comply with Sections 4E.08 through 4E.13 of the MUTCD
  - Also requires that all operable parts shall comply with regulations in Section R403 of proposed PROWAG

# MUTCD 2009

- New version of MUTCD published by FHWA on Dec. 16, 2009
- *Proposed PROWAG* references the *2009 MUTCD*
- Following slides describe the changes

# Pushbutton-integrated APS

- Type specified by 2009 MUTCD
- Other types of APS have been installed in the US, but don't provide benefits of pushbutton-integrated devices
  - Pedhead-mounted (cuckoo/chirps)
  - Vibrotactile-only
  - Receiver-based





# APS Primary Features

- Pushbutton locator tone
- Tactile arrow
- Actuation indicator
- Automatic volume adjustment
- Walk indication
  - Audible tones
  - Vibrotactile indication
  - Audible speech message

# Pushbutton Locator Tone

- Repetitive sound from the pushbutton to provide information about pushbutton presence and location
- 1 tone per second, each tone less than 0.15 seconds in duration
- Different sounds acceptable

# Tactile arrow

- Raised arrow
- May be on the pushbutton, on part of the device
- Aligned with direction of travel on the crosswalk controlled by the pushbutton



# Actuation Indicator



- Indicates to pedestrians that the button has been pressed
  - Light for sighted pedestrians
  - MUTCD specifies audible “Wait” for blind and low vision pedestrians

# Automatic Volume Adjustment

- Quiet signals
- Supposed to be heard 6 to 12 feet from the pushbutton/APS device
- Pedestrians need to hear the traffic as well as signal
- Audible beaconing only if selected

# Automatic Volume Adjustment

- Sounds respond to ambient sound
  - Louder signal produced when intersection noise is high
  - APS monitors volume and responds
- Volume no more than 2 to 5 dB above ambient sound
- Signals pre-set for volume range, may need adjustment when installed

# Vibrotactile WALK indication

- Arrow (or other surface on pushbutton unit) that vibrates during WALK
- Communicates information to pedestrians with both hearing and visual impairments, or can be used to confirm the audible indication
- Must be located close to crosswalk and close to street to be usable

# Audible WALK Indication - Tone or speech message?

- Depends on location of the APS pushbuttons
- Pushbuttons separated by more than 10 feet
  - location clarifies which crosswalk is being signaled
  - tone (rapid tick) walk indication works well
- Two pushbuttons closer than 10 feet to each other
  - cannot distinguish which one is sounding by direction or location
  - specially programmed speech messages *and* additional features are needed



# WALK Indication: Rapid Tick



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

# WALK Indication: Speech Message

- Pushbutton locator tone, followed by speech walk indication
  - Hear the locator tone during flashing and steady don't walk
  - Walk indication during WALK
- Must be accompanied by:
  - tactile arrow
  - pushbutton information message



# WALK indication: Speech message

## Problems

- Seem very user-friendly, but words and meaning must be correctly understood
- Potential for misunderstanding
- May not be understood under all ambient sound conditions
- Users have to know the names of the street
- Slower response from users than to rapid tick

# WALK indication: Speech message

- Need consistent wording:
  - Recommended WALK message: “Howard, Walk sign is on to cross Howard”
  - At location with exclusive pedestrian phasing: “Walk sign is on for all crossings” (or use rapid tick)

## WALK indication: Other features needed with speech message

- Pushbutton information message – provides name of the street that is controlled by the pushbutton, which is the street name used in the speech WALK message
- Tactile arrow – helps distinguish which crossing is being signaled

# Feature Summary

- Pushbutton locator tone
  - Once per second
  - No specific type of sound recommended
- Tactile arrow
  - Raised and on pushbutton
- Automatic volume adjustment
- Actuation indicator – audible and visual

# WALK indication summary

- Quiet, not broadcast across intersection
  - Audible at crosswalk departure point
- Vibrotactile indication (in addition to audible)
- Where APS on corner can be separated
  - Rapid tick
- Where two APS are located on same pole or closer than 10 feet to each other
  - Speech message
    - Needs tactile arrow
    - Needs pushbutton Information message



Daniel Carter

# **INSTALLATION AND DESIGN GUIDANCE**



# APS Location is critical

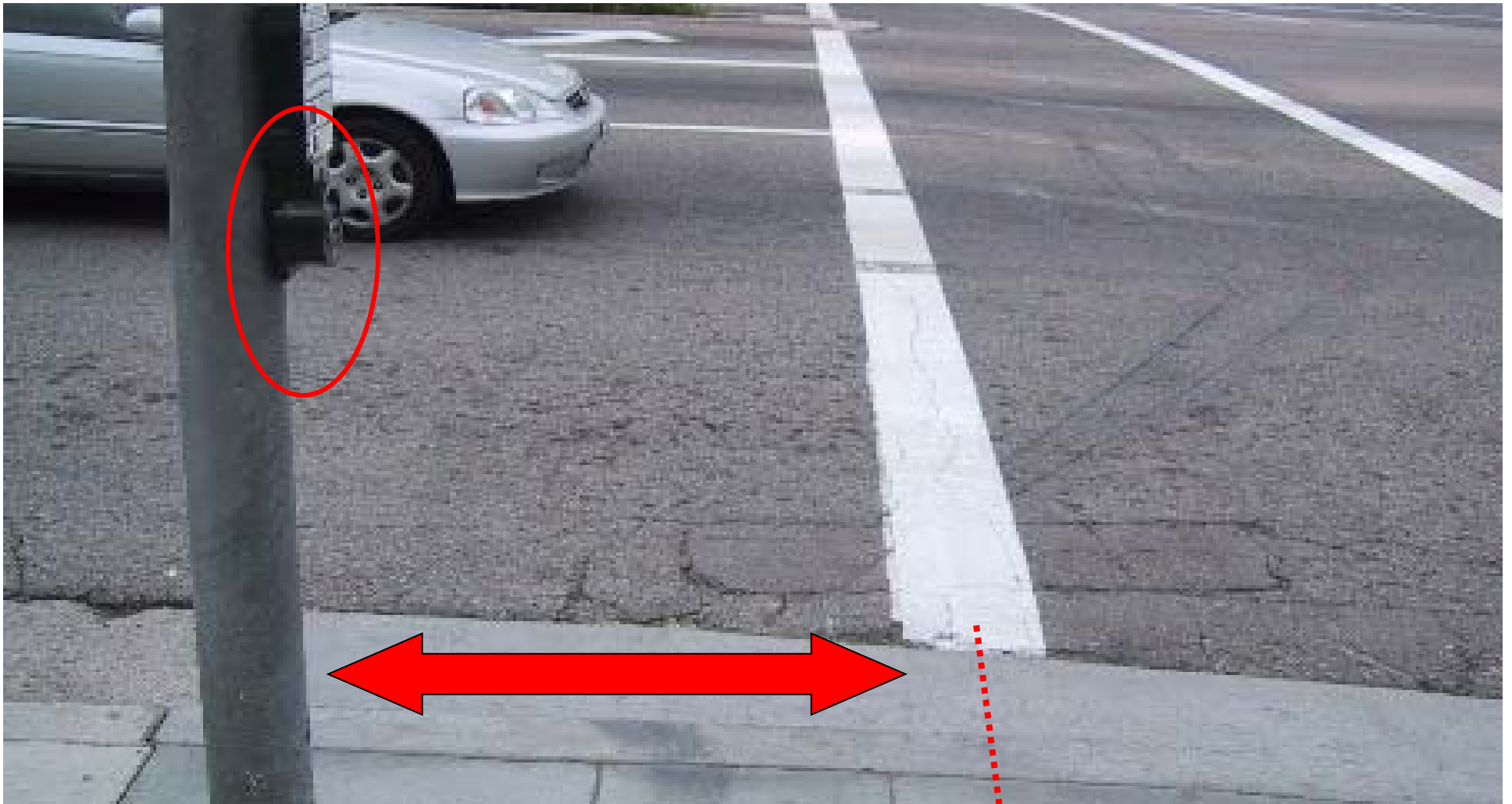
- Newer types provide information to the user through proximity to the departure point
- Impose less of a cognitive load on pedestrians who are visually impaired
  - ‘I have pushed the button on my right’
  - ‘The WALK indication is coming from my right’
  - ‘That sound is for my crosswalk’
- Signal can be quieter due to proximity

# MUTCD 2009

- Changes specifications for location of all pedestrian detectors (pushbuttons) in 4E.08
- APS detectors (4E.10) should be as close as possible to the curb ramp, and as close as possible to the crosswalk line furthest from the center of the intersection

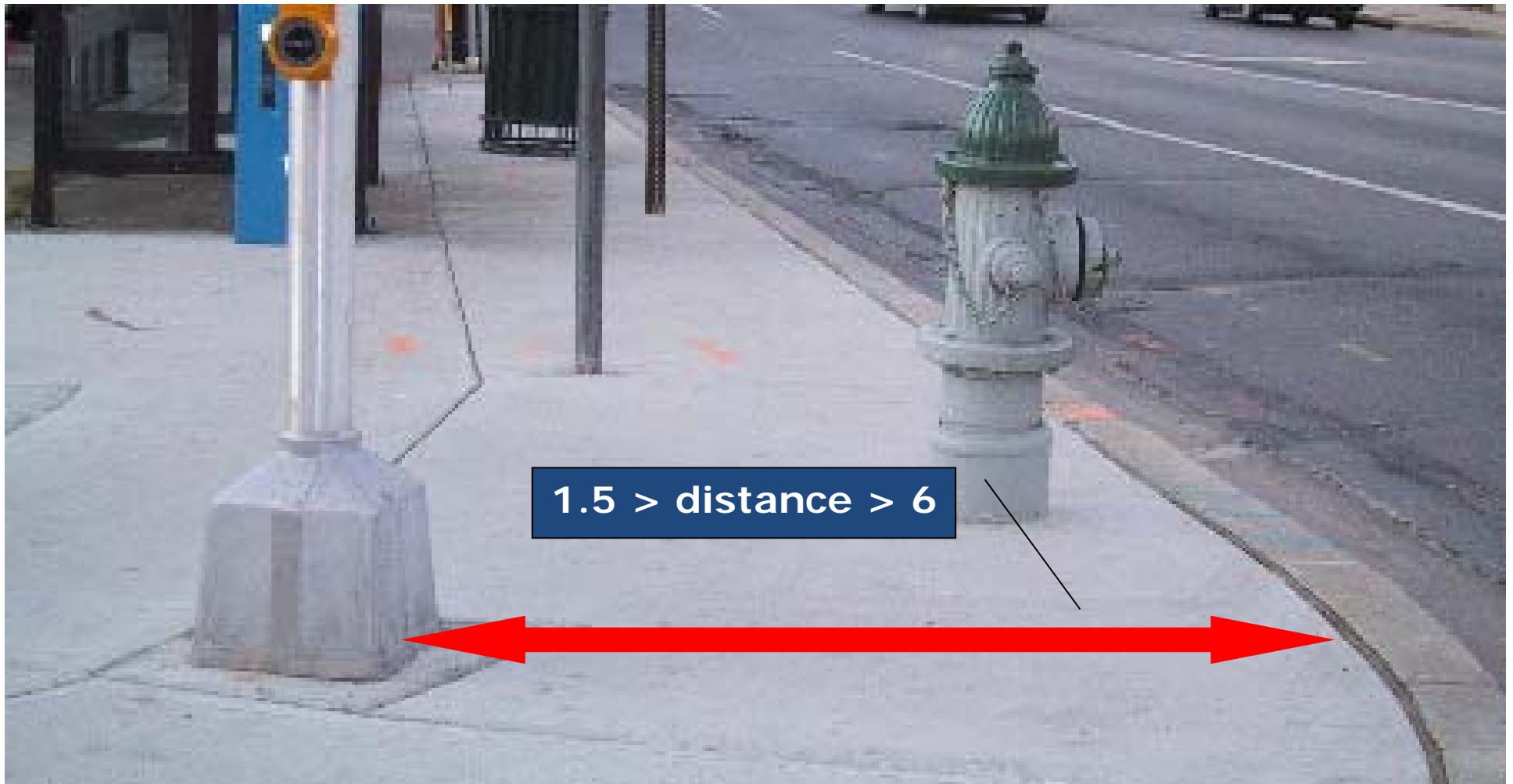
# *MUTCD*: APS Location

- Within 5 feet of crosswalk line extended

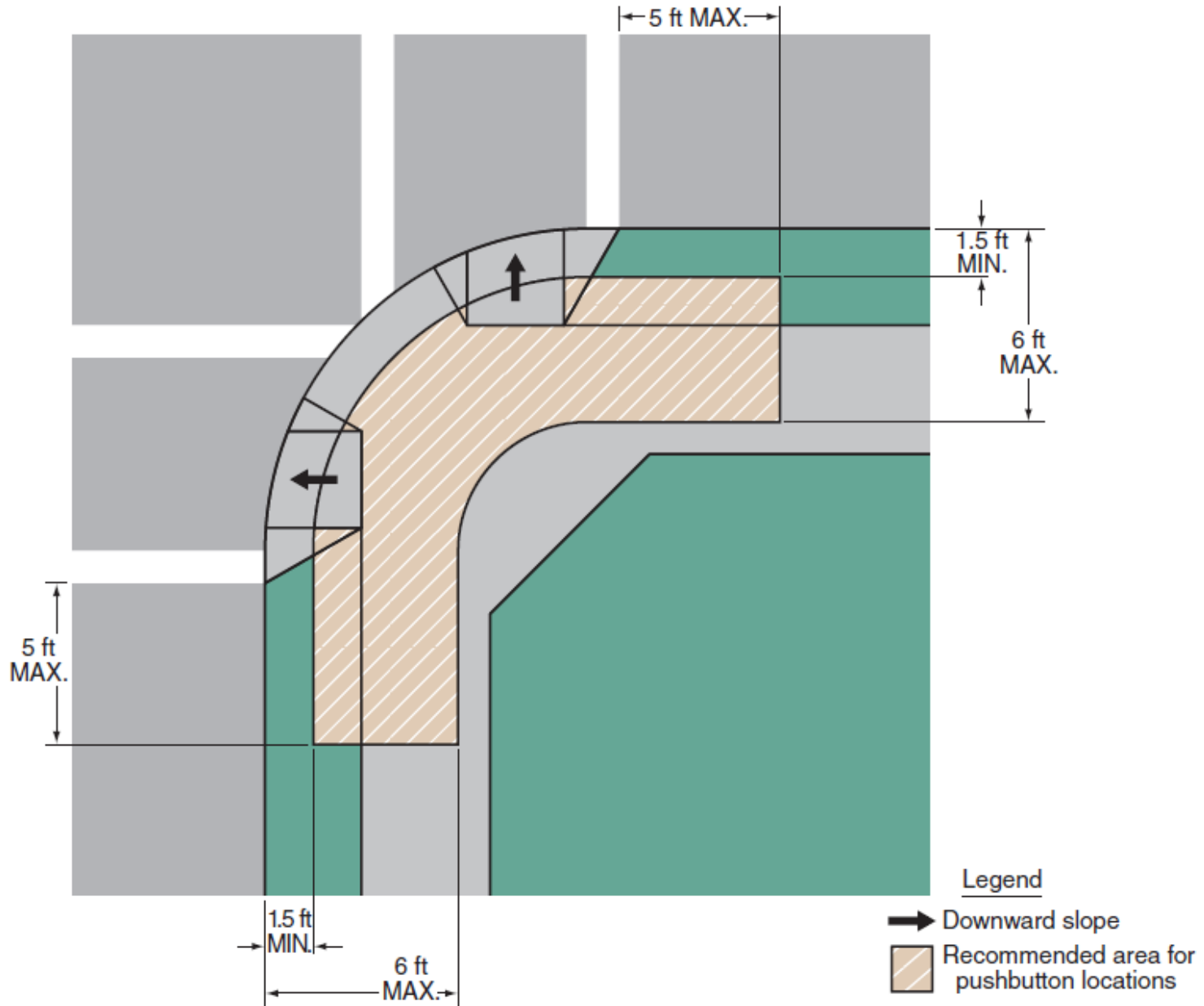


# *MUTCD*: APS Location

- From 1.5 to 6 feet of the curb



# MUTCD Pushbutton Locations



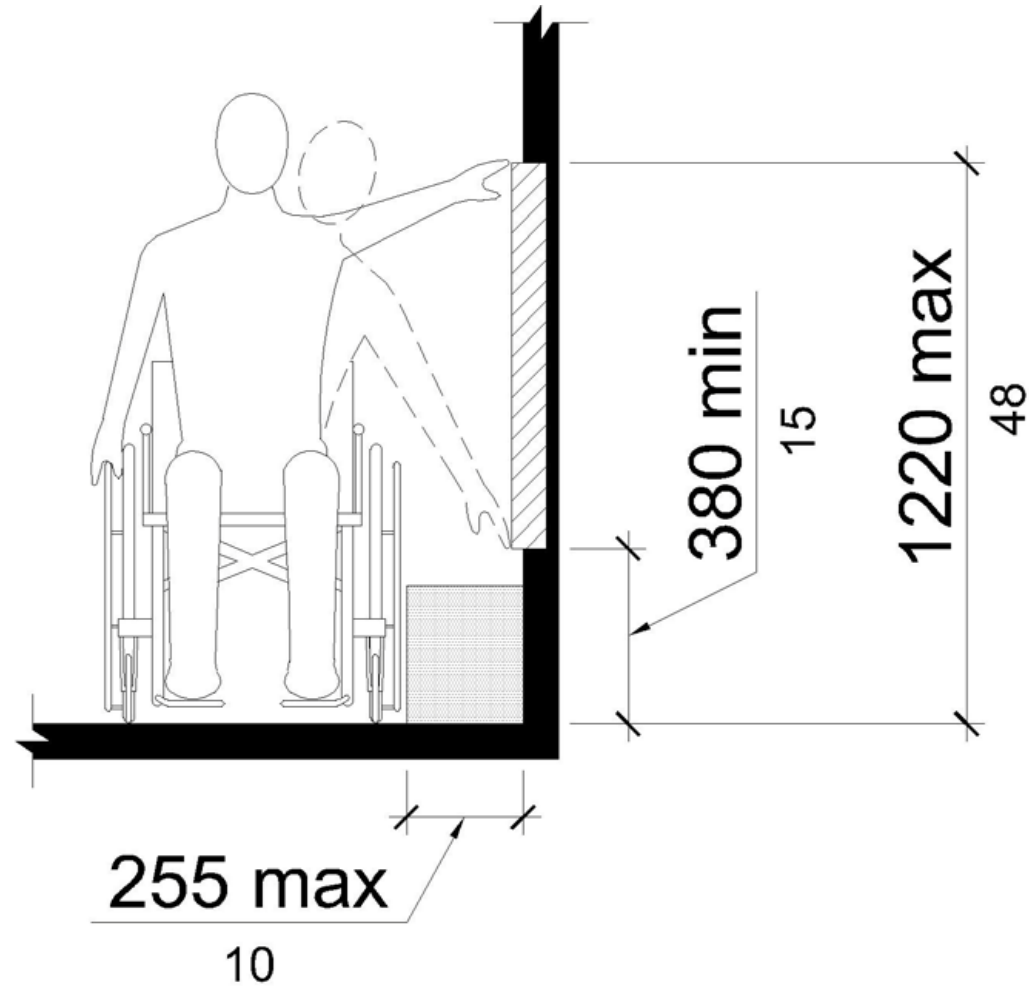
# *MUTCD*: APS Location

- Parallel to the crosswalk to be used



# Proposed PROWAG R406

## Reach Ranges - side reach



Not in reach range - inaccessible





# Within reach range



# *MUTCD: APS Location*

- Separated by 10 feet



# *MUTCD*: APS Location

- Separated by 10 feet



Separated poles not possible?

# Separated poles not possible?

## Standard:

If two accessible pedestrian pushbuttons are placed less than 10 feet apart or on the same pole, each accessible pedestrian pushbutton shall be provided with the following features (see Sections 4E.11 through 4E.13):

- A. A pushbutton locator tone,
- B. A tactile arrow,
- C. A speech walk message for the WALKING PERSON (symbolizing WALK) indication, and
- D. A speech pushbutton information message

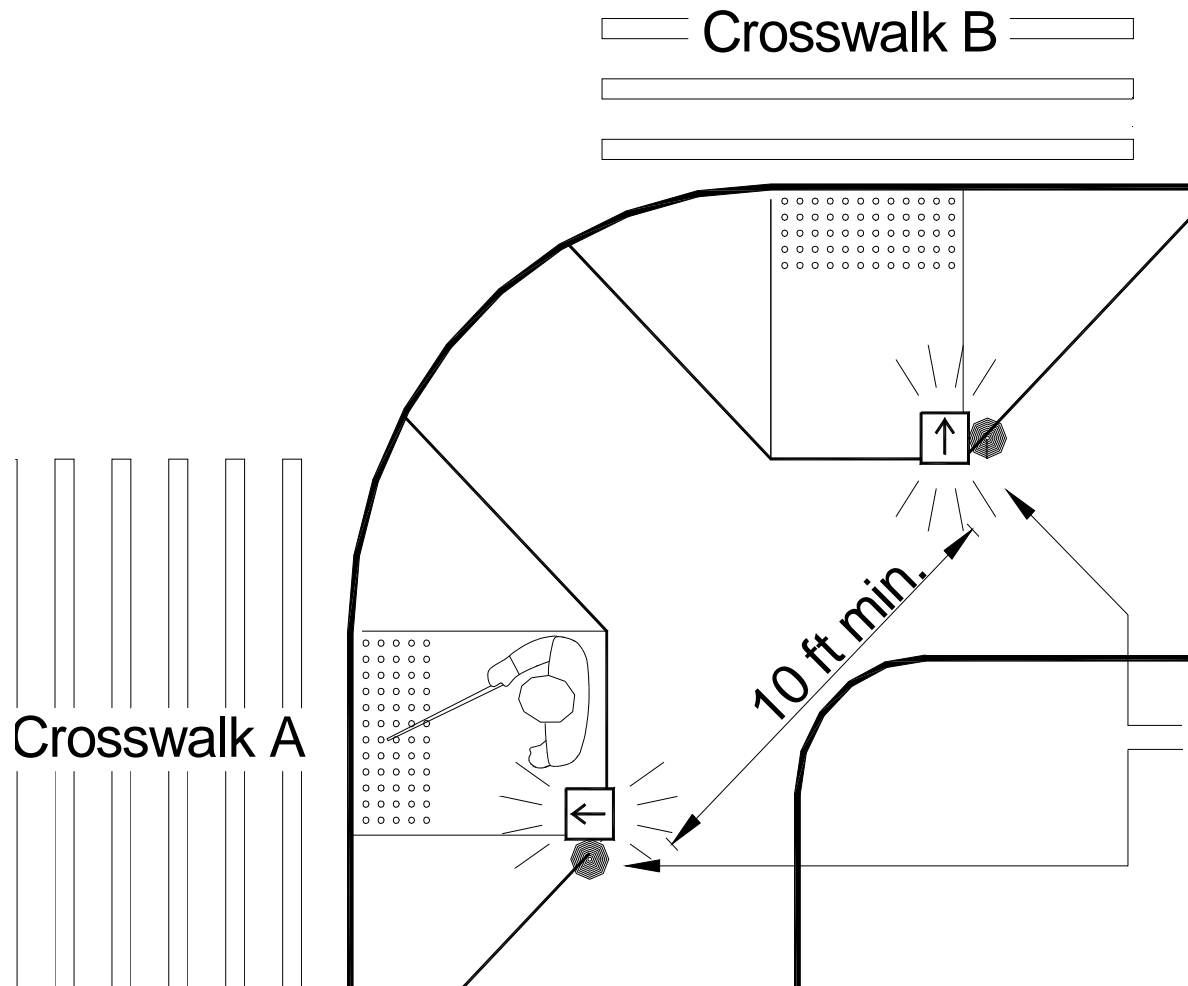
# Pushbutton information message and speech walk message



# Summary of Ideal Installation

- Adjacent to a level landing
- Face of APS oriented parallel to crosswalk
- No more than 6 feet back from curb
- No more than 5 feet out of line with crosswalk, between curb ramp and the crosswalk line furthest from the intersection
- No less than 10 feet between APS on same corner

# Summary of Ideal Installation





Daniel Carter and Janet Barlow

# DESIGN EXERCISES



# East & Dilworth “Before”



# East & Dilworth “After”



# East & Dilworth “Before”



# East & Dilworth “After”



# East & Euclid “Before”



# East & Euclid “After”



# Two on one pole







 **START CROSSING**  
Watch For  
Vehicles

 **DON'T START**  
Finish Crossing  
If Started

 **DON'T CROSS**

**TO CROSS**  
←  
**PUSH BUTTON**

 **DON'T CROSS**  
If Started

 **DON'T CROSS**

 **DON'T CROSS**

**TO CROSS**  
→  
**PUSH BUTTON**

# Hillsborough and Enterprise (before)



# Hillsborough and Enterprise (after)







# Hillsborough and Gardner (before)



# Hillsborough and Gardner (after)



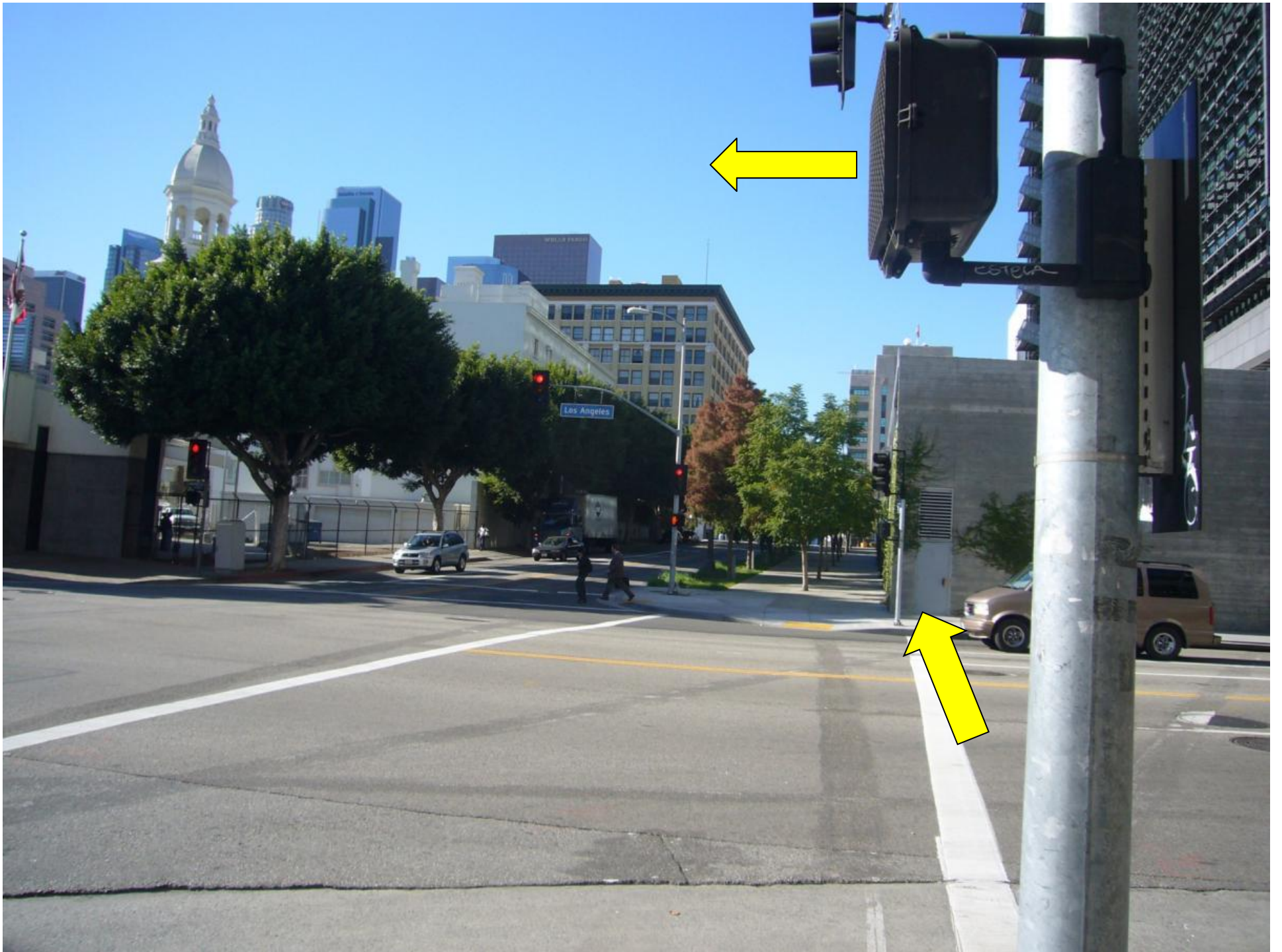
# How about this? OK?





And this one?





# What's wrong?



# What's good? What's bad?

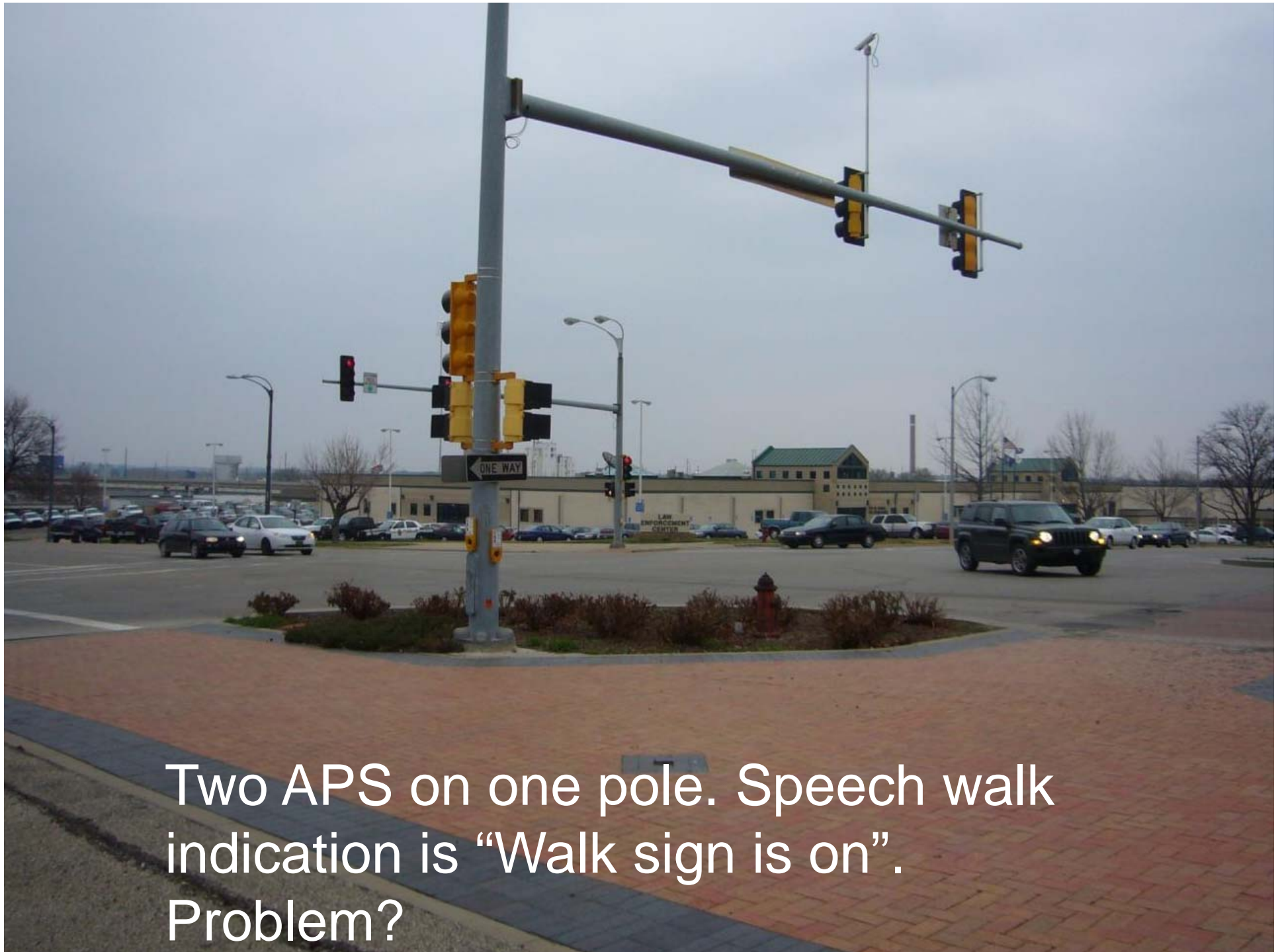




Good?

# Issues here?





Two APS on one pole. Speech walk indication is "Walk sign is on". Problem?

Daniel Carter

# **APS WORKSHOP**



# Workshop General Info

- One full day in length (typically 8:30 AM – 4:00 PM)
- Taught by:
  - Janet Barlow, Researcher and Certified Orientation and Mobility Specialist
  - Daniel Carter, Researcher and Registered Professional Engineer



# More information on APS available at [www.apsguide.org](http://www.apsguide.org)

Skip Navigation

Accessible Pedestrian Signals | A Guide to Best Practices

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Accessible pedestrian signals are devices that communicate information about the WALK and DON'T WALK intervals at signalized intersections in non-visual formats to pedestrians who are blind or who have low vision.

This website provides a comprehensive source of information on APS, including how APS are used, what features are recommended or required, and how to design intersection corners to accommodate APS appropriately.

## Guide

View the online version of the APS Guide to Best Practices.

Or, download the full guidance document in printable PDF form.

## Online Workshop

View a walkthrough of APS installation based on adapted versions of the Powerpoint slides used in the one-day in-person workshop.

## Resources

Find information regarding common installation problems, informative webinars, and so much more!

# Thank You!

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## ⇒ Archive at [pedbikeinfo.org/webinars](http://pedbikeinfo.org/webinars)

- Downloadable and streaming recording, transcript, presentation slides

## ⇒ Questions?

- **Daniel Carter**  
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- **Janet Barlow**  
[jmbarlow@accessforblind.org](mailto:jmbarlow@accessforblind.org)

