

# Evaluating Accessibility for People with Vision Disabilities

NCDOT R&D Lunch & Learn  
September 26, 2024



Photo: Lee Rodegerdts



## Objectives

- **Introduce accessibility concepts for people who are blind or have low vision**
- **Discuss framework for evaluating accessibility at intersections (thinking beyond the checkbox)**
- **Prepare for field activity in February 2025**

## Travel by pedestrians who are blind (1 of 2)

- **Limitations in vision can affect**
  - Ability to judge traffic approach speed and distance
  - Understanding drivers' intentions
  - Ability to recognize crosswalk location
  - Detection of curbs or islands, or curb ramps



Photo: Bastian Schroeder

## Travel by pedestrians who are blind (2 of 2)

- **Pedestrians who are blind DO travel to new unfamiliar intersections and cross**
  - Pedestrians who are blind do not receive ongoing training
  - Do not receive training or orientation to every location where they may cross the street
  - Most individuals who are blind do not use dog guides, and dog guides do not decide when to cross



Photo: Janet Barlow



## Growing elderly population with low vision

- Vision can vary with different lighting conditions
- May have reduced contrast sensitivity
- May react more slowly and move more slowly

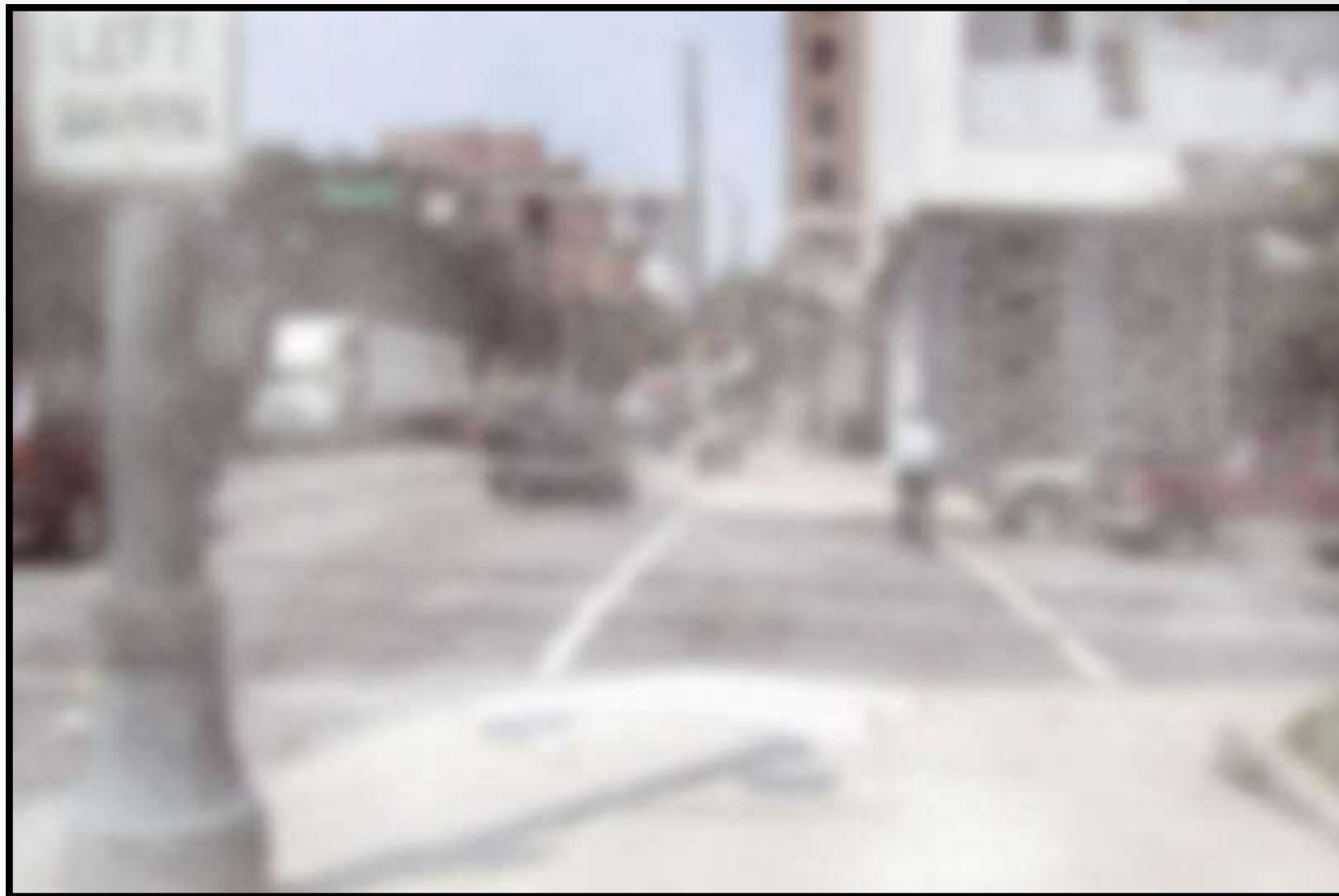


Photo: Janet Barlow

## Intersection as seen by someone with “normal” vision



## Overall acuity loss





## Central vision loss





## Peripheral Vision Loss



## Totally blind



# Framework for Evaluating Accessibility (NCHRP Report 834)

- **Wayfinding tasks**
  - Determining the appropriate crossing location
  - Aligning to cross (establishing a correct heading)
  - Maintaining the correct heading while crossing (staying in the crosswalk)
- **Crossing tasks**
  - Determining when to initiate crossing (accepting an appropriate gap or yield crossing opportunity)



Photo: Bastian Schroeder

# Determining the appropriate crossing location

- **Typical techniques**
  - Stop when contact curb or edge of street in front of them
  - Some people may search for a curb ramp and/or detectable warning surface to confirm crossing location
  - Follow along landscape strip looking for any opening toward street



Photo: Janet Barlow



## Landscaping or fencing may provide guidance to crosswalk location



Photo: Janet Barlow

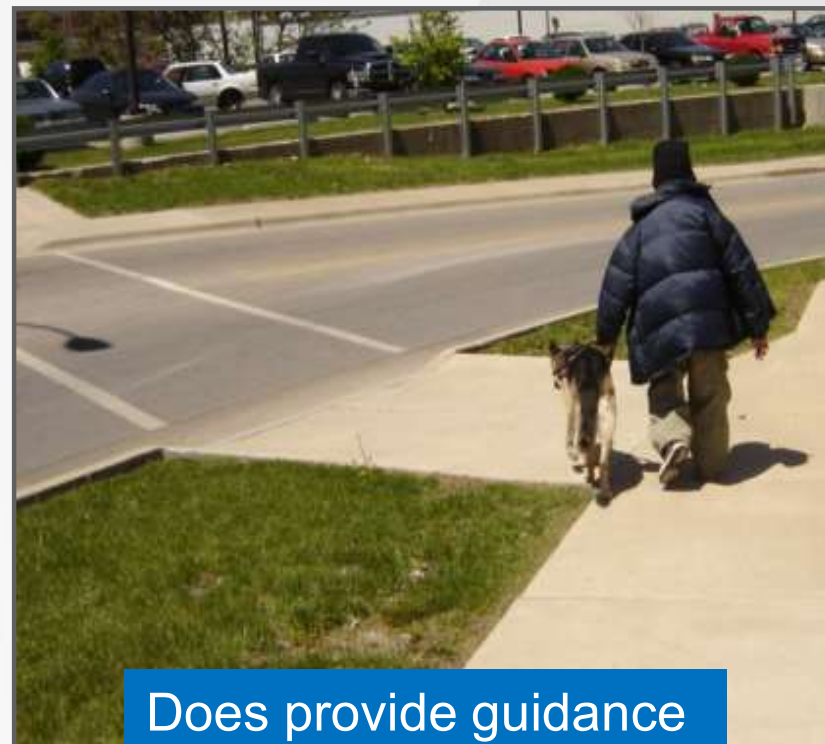


Photo: Lukas Franck

## Guidance needed to crossing location on islands too



Photo: Janet Barlow

- Island may be cut-through or ramped
- Detectable warnings to indicate location of street at edge of street at cut-through paths or at base of ramp
- Gravel or grass outside of walking area to indicate area is not the walking path

## Aligning to cross (establishing a correct heading)

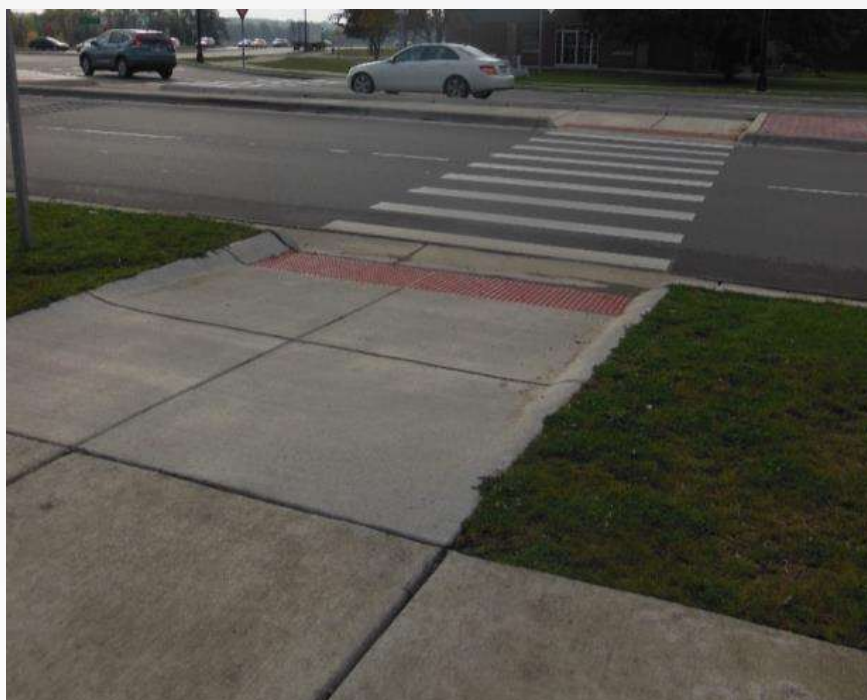
- **Typical techniques**
  - Maintain approach alignment
  - Align with parallel traffic (traffic on the street beside them)
  - Align with perpendicular (traffic on the street they are crossing)
  - May try to use slope of ramp, alignment of curb or gutter, or detectable warning surface (truncated domes)



Photo: Janet Barlow



## Alignment cues



Using returned curb, DWS, and gutter on ramp may help with alignment



Using returned curb, DWS, and gutter will result in poor alignment for this crossing



## Maintaining the correct heading while crossing (staying in the crosswalk)



Photo: Beezy Bentzen

- Typical techniques
  - Travel parallel to straight-ahead traffic on the street beside them as they cross
- **Not possible at roundabouts or CTLs since no traffic traveling parallel to crosswalk**
  - Somewhat mitigated by shorter crossings, if the starting heading is correct

## Determine when to cross

- Detect a gap in traffic
- Detect that vehicle has yielded
- Use an audible device



Photo: Janet Barlow

## Plan for February 2025 Field Activity

- Conduct “Accessibility Audit” of nearby intersection
- Discuss wayfinding and crossing tasks and challenges on-site
- Discuss potential solutions and treatments
- Simulate vision and/or mobility impairments for those interested



## Questions and Discussion



Photo: Bastian Schroeder

RRFB in Olympia, WA



## Timeline of Accessibility Legislation

**1990**

**Americans with Disabilities Act (ADA) signed into law (July 26)**

**1999**

**Public Rights-of-Way Accessibility Advisory Committee (PROWAAC) convened (October 20)**

**2001**

**PROWAAC submits final report to U.S. Access Board (January 10)**

**2002**

**Draft guidelines released for public comment (June 17)**

**2005**

**Revised draft guidelines released for gathering info for cost analysis (November 23)**

**2011**

**Proposed Rule on Shared Use Path Accessibility Guidelines (December 5)**

**2011**

**Reopened Proposed Rule for public comment (March 28)**

**2013**

**Proposed PROWAG Rule released; Supplemental Notice for Shared-Use Paths released for public comment (February 13)**

**2023**

**Final Rule on PROWAG Published (August 8)**

**2024**

**Adoption by US DOT and DOJ anticipated**

## Americans with Disabilities Act (1990)

- Civil rights law
- Applies to all programs and activities regardless of funding source
- Key provisions:
  - New and altered facilities must be accessible to and usable by individuals with disabilities to the maximum extent feasible
  - Equivalent facilitation allows use of alternatives to those prescribed, provided they result in substantially equivalent or greater accessibility and usability

Adapted from [www.apsguide.org](http://www.apsguide.org), Module A, Slide 20;  
<https://www.ada.gov/pubs/adastatute08.htm>

## What's in the Final PROWAG?

- Pedestrian Access Routes
- Alternate Pedestrian Access Routes
- Crosswalks
- Accessible Pedestrian Signals
- Transit Stops
- On-Street Parking



Source: Lee Rodegerdts

## Multilane crossings (PROWAG 2023)

- Each multilane segment with a crossing shall have one or more of the following treatments:
  - Traffic control signal with pedestrian signal head
  - Pedestrian hybrid beacon (PHB)
  - Pedestrian-actuated rectangular rapid flashing beacon (RRFB)
  - Raised crossing
- No guidance in PROWAG on how to select which treatment to use, but NCHRP 834 can help

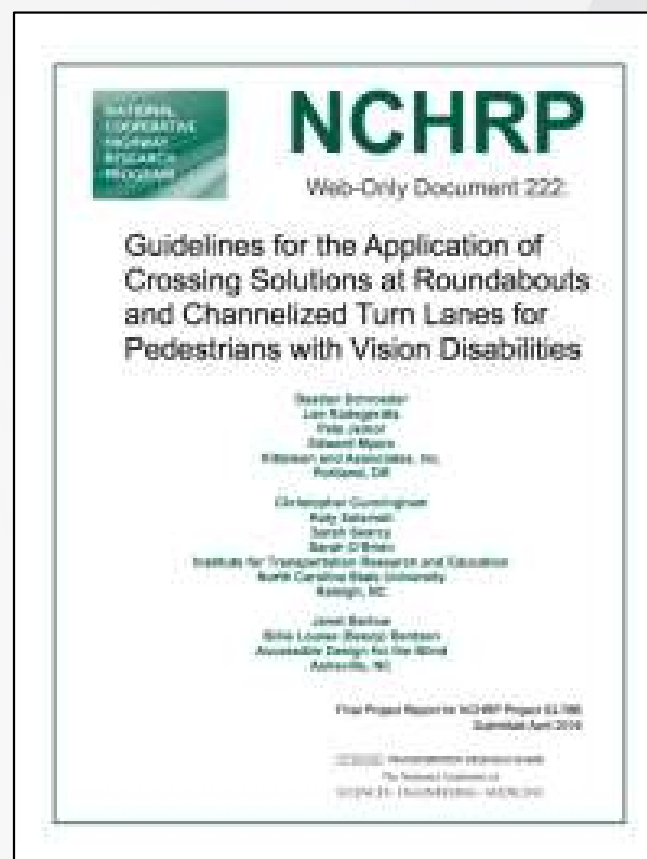


PHB in Oakland County Michigan



# NCHRP Report 834 and Web-Only Document 222

## (Published Jan 2017)



# NCHRP Report 834

## - Goals and Objectives

- Provide useful and implementable guidance
- Define feasible range of geometric and traffic operational conditions
- Target planning and preliminary design stage
- Supported by empirical data and modeling – 4,400+ street crossings with blind participants studied since 2004
- Decision-support tool for practicing engineers
- Focus on roundabouts and channelized turn lanes, but principles apply more broadly

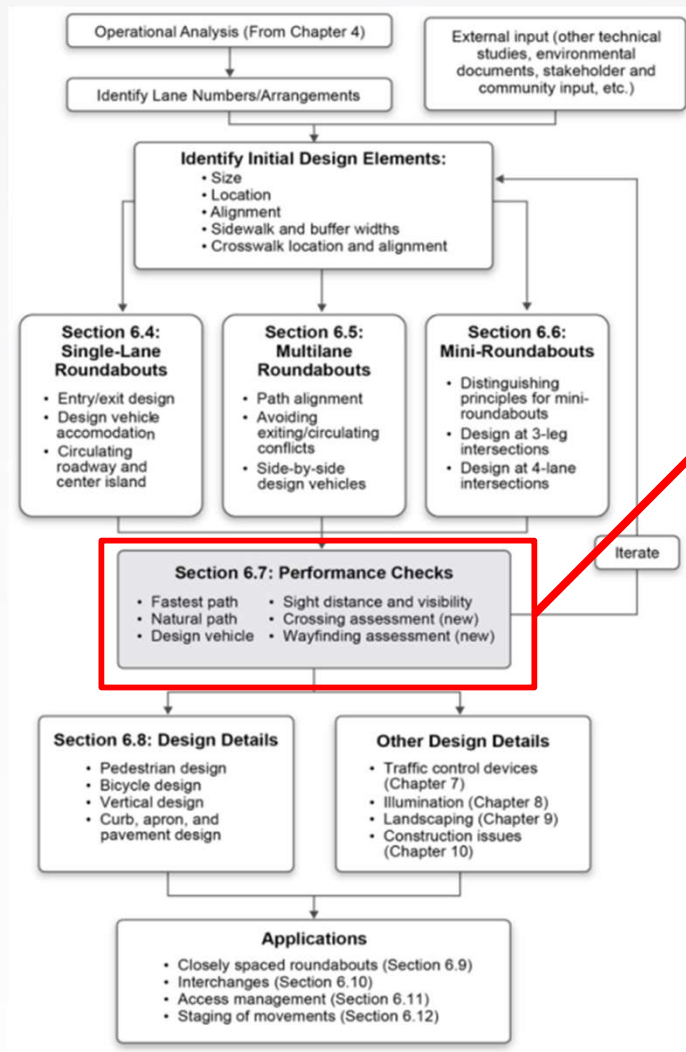


PHB in Oakland County, MI



Speed Hump in Kissimmee, FL

# Tying into Design Process (NCHRP Report 672 – FHWA Roundabout Guide)



## Section 6.7: Performance Checks

- Fastest path
- Natural path
- Design vehicle
- Sight distance and visibility
- Crossing assessment (new)
- Wayfinding assessment (new)

## ■ New Performance Checks

- Wayfinding Assessment
- Crossing Assessment
  - Crossing Sight Distance
  - Pedestrian Delay
  - Level of Risk

## Questions and Discussion



Photo: Bastian Schroeder

RRFB in Olympia, WA