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TRB TRANSPORTATION RESEARCH BOARD

TRB Webinar: Accessible Floating Bus Stops

November 28, 2023

2:00 – 3:30 PM

PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

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AICP Credit Information

1.5 American Institute of Certified Planners Certification Maintenance Credits

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Purpose Statement

This webinar will present the experience of Montgomery County, Maryland, with the assistance of Toole Design, in development and evaluation of a prototype accessible floating bus stop. Stakeholders involved throughout the process included people with vision or ambulatory disabilities, local government, and advocacy groups. Challenges remain in design of floating bus stops that are accessible to people with vision disabilities as found in research by the Canadian National Institute for the Blind.

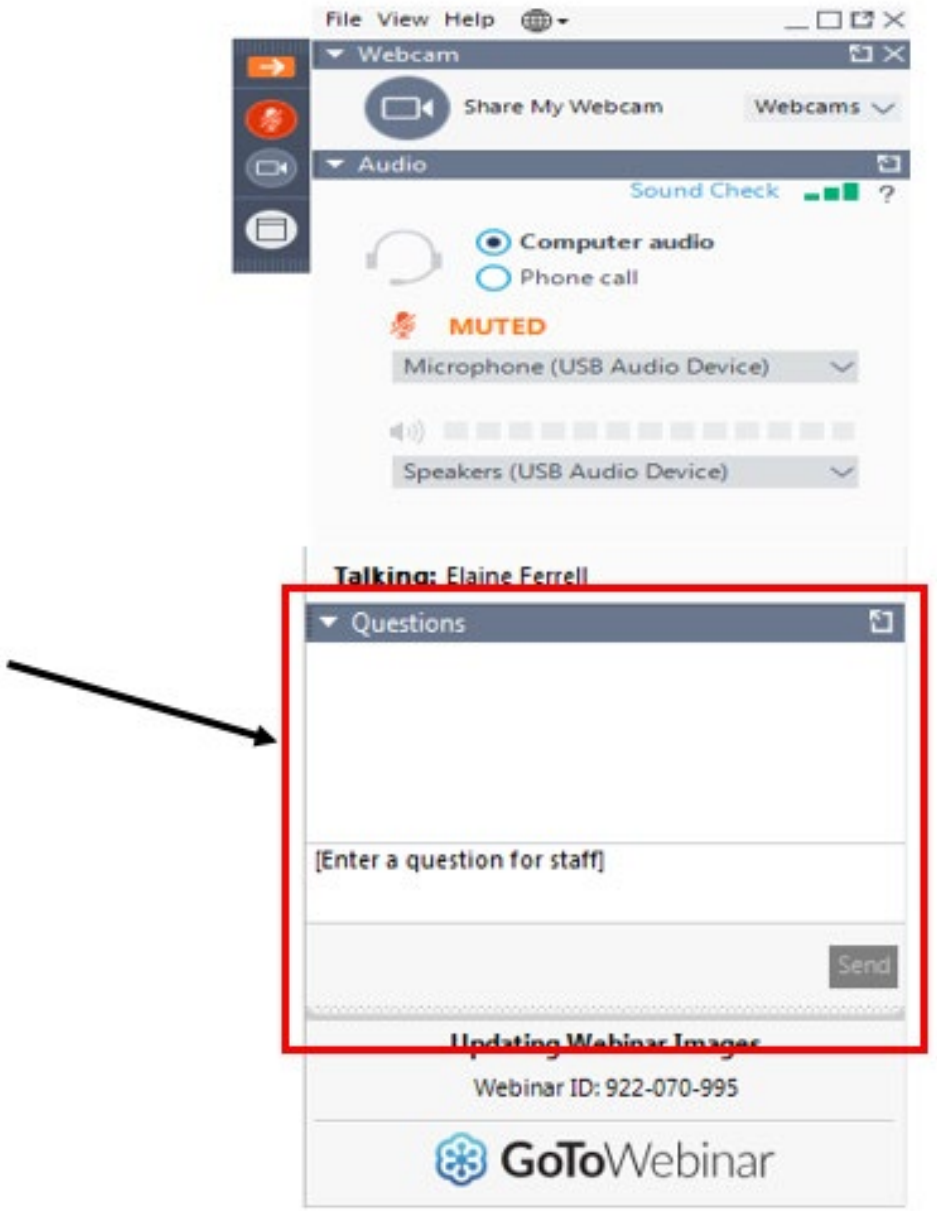
Learning Objectives

At the end of this webinar, you will be able to:

- Make wayfinding information accessible to vision disabled passengers at floating bus stops
- Work effectively with stakeholder groups in the context of making floating bus stops accessible to passengers with vision disabilities
- Recognize the challenges of making bicycle lane crossing safe for people who have vision disabilities

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



Today's presenters

Billie Bentzen
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Accessible Design for the Blind

Jim Elliott
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Toole Design

Matt Johnson
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Montgomery County Department of Transportation

Lui Greco
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December 5, 2023

TRB Webinar: Climate Resilient Design for Culverts and Pavements

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TRB Webinar: Next Stop—Inclusive Virtual Public Involvement

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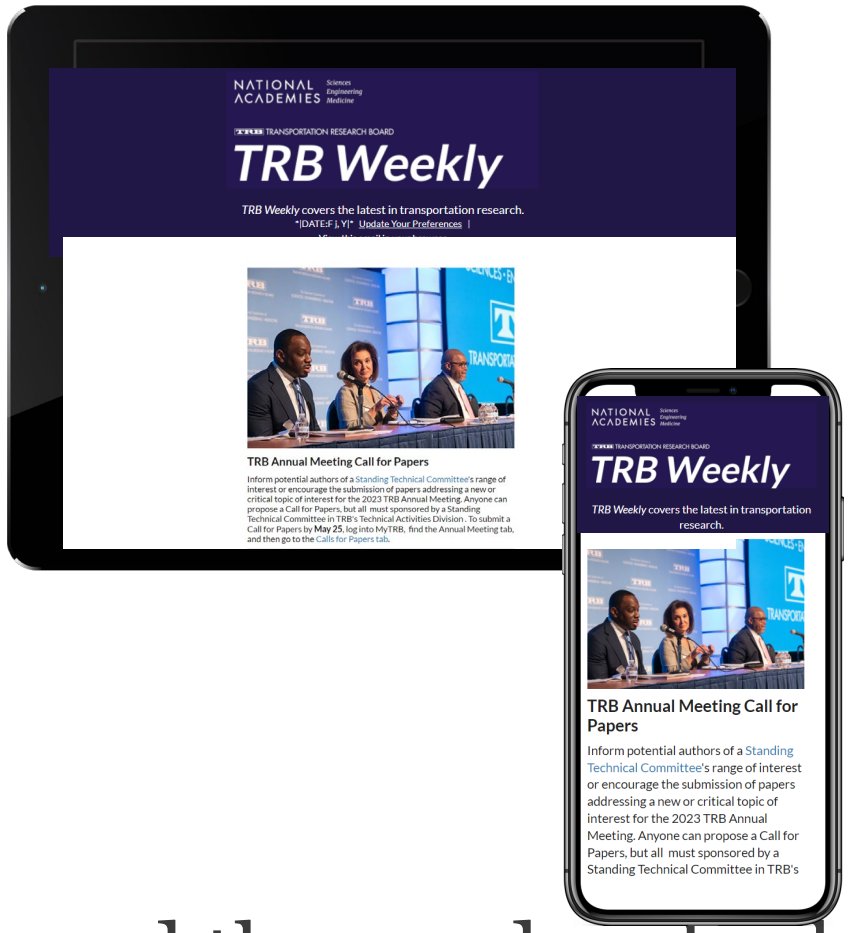

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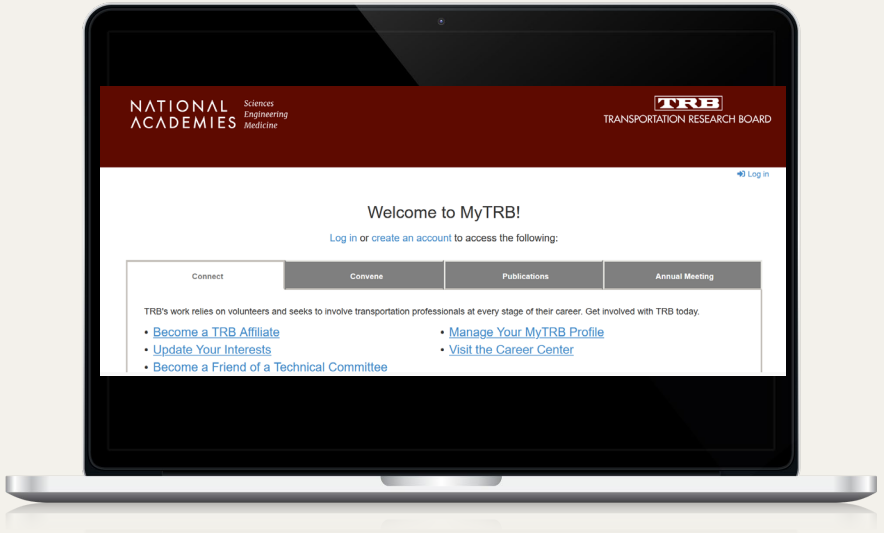

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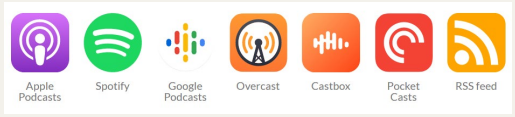

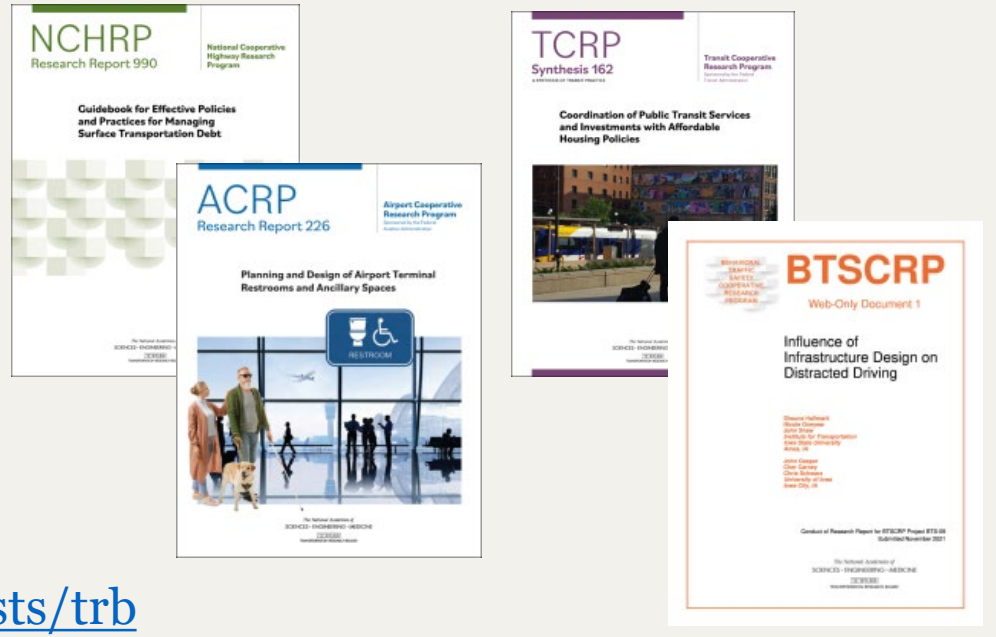

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NATIONAL ACADEMIES Sciences Engineering Medicine

Bus Boarding Islands & Accessibility

Lessons Learned from Montgomery County, Maryland

Matt Johnson, AICP
Capital Project Manager
Montgomery County Department of Transportation

MCDOT
Montgomery County Department of Transportation

What is a bus boarding island?

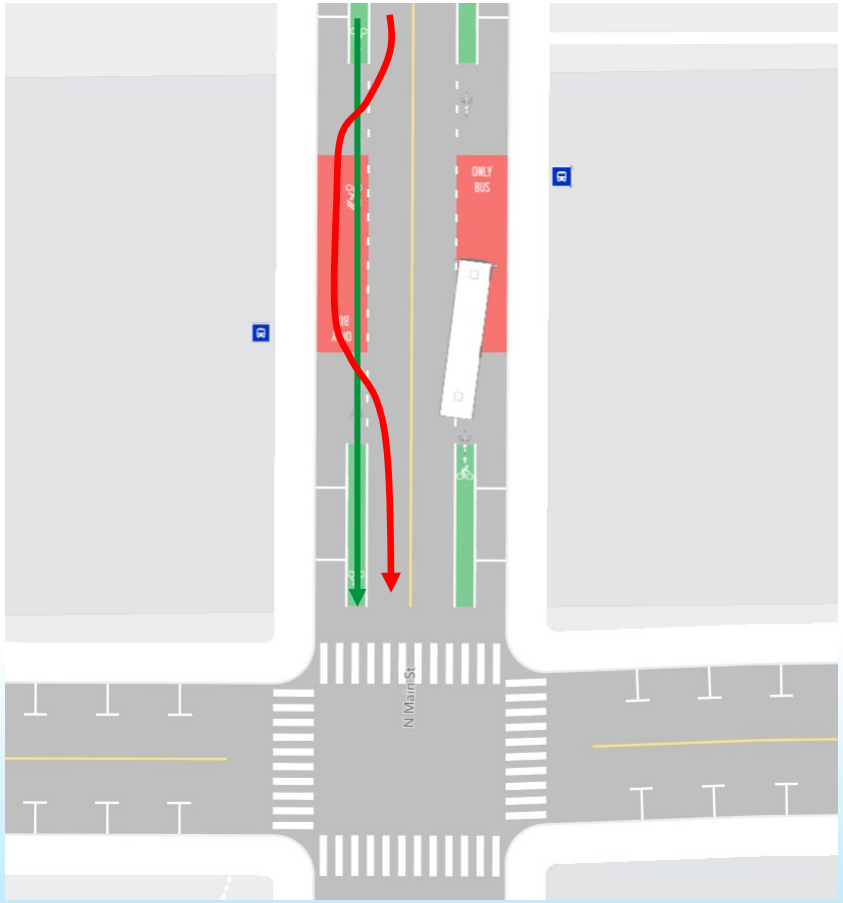
- A bus boarding island is a bus stop that is separated from the sidewalk by a bike lane or some other element.
- Many jurisdictions are building bus boarding islands across North America.

- *Note: "bus boarding island" and "floating bus stop" are equivalent terms.*

All photos in this presentation were taken by the presenter or are MCDOT graphics.

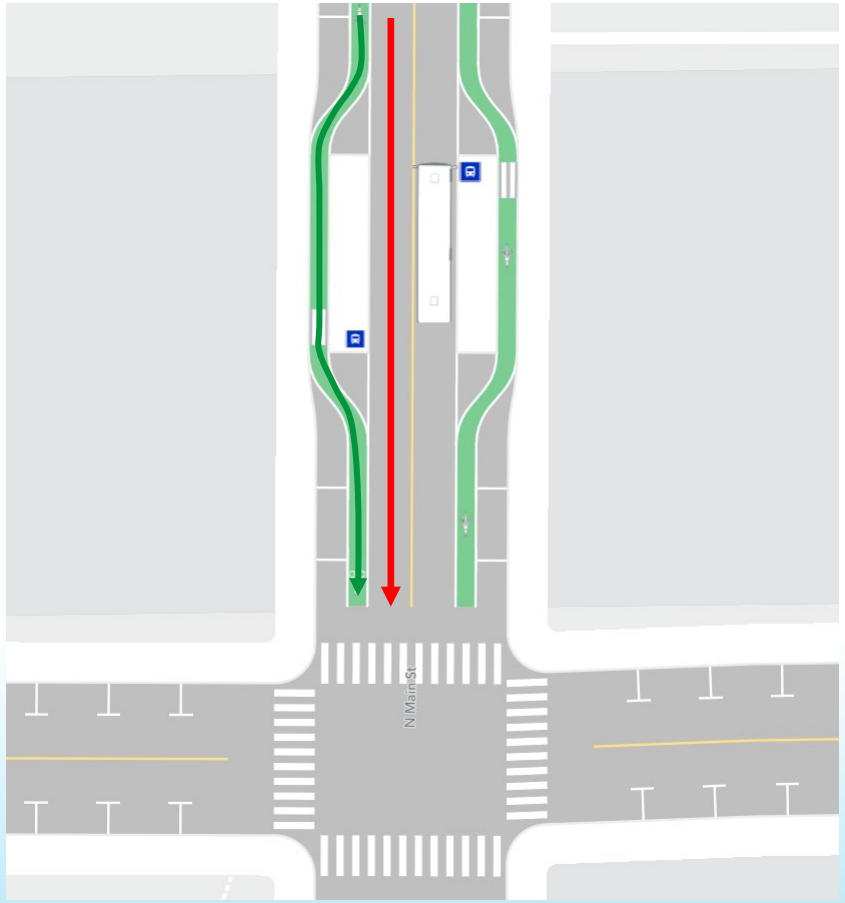
Why build bus boarding islands?

- On a traditional roadway, bike lanes are placed to the right of the travel lanes. This means at bus stops, buses have to enter the bike lane to pick up and discharge passengers.
- This can be dangerous for cyclists and is inconvenient and uncomfortable.



Why build bus boarding islands?

- A bus boarding island allows the bike lane to pass behind the bus boarding area, removing the danger of collision between the bus and the cyclist.
- This introduces a crossing conflict between transit patrons and cyclists.



Advantages of bus boarding islands

- Usually, bus boarding islands provide additional waiting space for transit riders over the previous condition.
- Buses do not have to wait to pull back into traffic.
- The bus stop is less likely to be blocked by standing/illegally parked vehicles than a bus bay.
- Lower stress biking facilities get bikes/scooters off the sidewalk.

Challenges of bus boarding islands

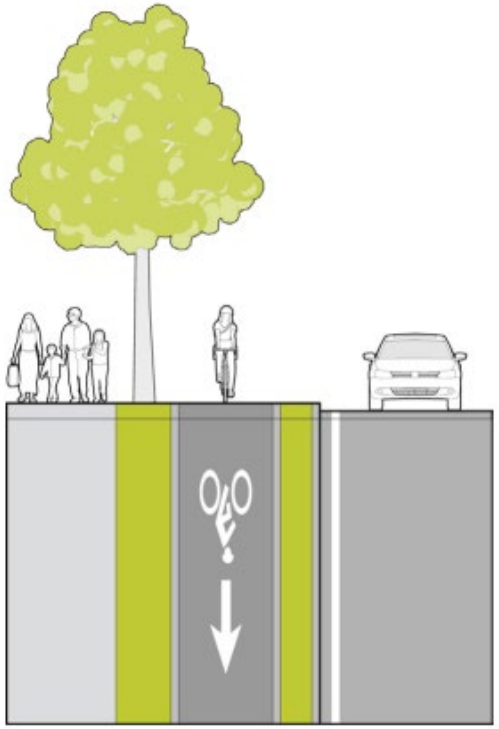
- Pedestrians and cyclists now have a conflicting crossing.
- The bus boarding island may be more challenging for blind users to locate.
- Level bike crossings may add risk that blind users will end up in the bikeway.
- The bus boarding island may introduce navigability challenges to people using wheelchairs or other mobility devices.

Design Challenges

- Separating the sidewalk from the bikeway in a detectable manner.

Design Challenges

- Separating the sidewalk from the bikeway in a detectable manner.



Design Challenges

- Separating the sidewalk from the bikeway in a detectable manner.

Design Challenges

- Crosswalk/crossing designs.
- Bike/ped/bus operator understanding.
  - Behavior of pedestrians with vision disabilities at crosswalks can be misinterpreted.
  - Crosswalk yielding laws.

Bus Boarding Island (1st Generation)

- In 2017, the County built its first floating bus stops, with 4 on Spring/Cedar.
  - Found that the 8’ min platform isn’t wide enough.
  - Channelized bike lanes present navigation challenges for wheelchair users.
  - All 4 are being rebuilt soon to upgrade them to our best-practices.

Bus Boarding Ialand (2nd Generation)

- In 2017, took a group of blind and low-vision pedestrians to visit the bus boarding islands stops along Spring Street.
  - Suggestions were used to improve the next generation.
- In 2019, we built 3 second-generation bus boarding islands.
  - Heard significant concerns on certain design elements.

Access & safety treatments (2nd generation)

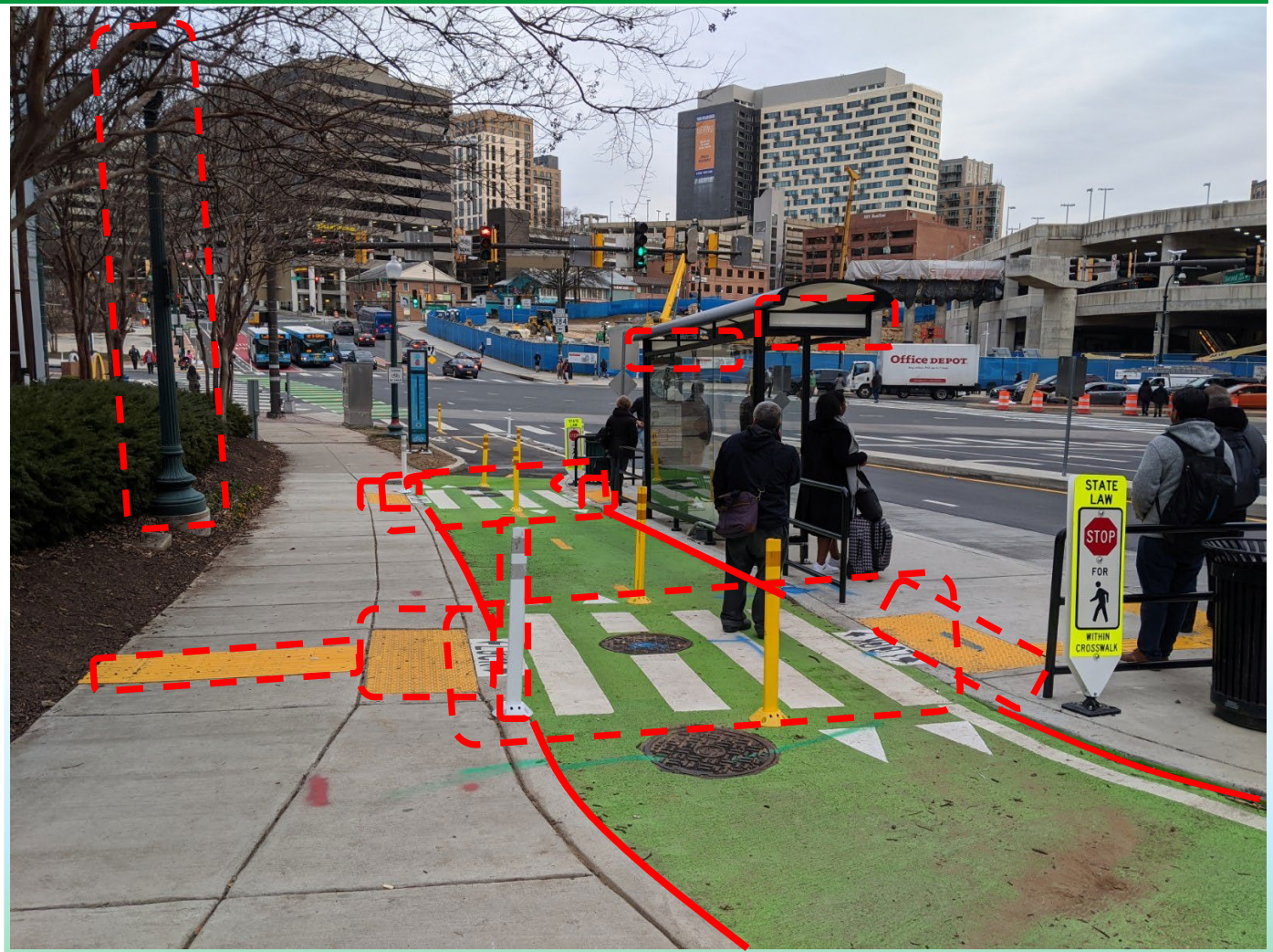
- Bus door detectable surface
- Ramp area
- Level crossing at front door
- Railings

Access & safety treatments (2nd generation)

- Direct roll-off the bus path

Navigation treatments (2nd generation)

- Lighting
- Crosswalks
- Detectable surfaces
- 2" curb reveal
- Longitudinal detectors
- Orientation flexpost

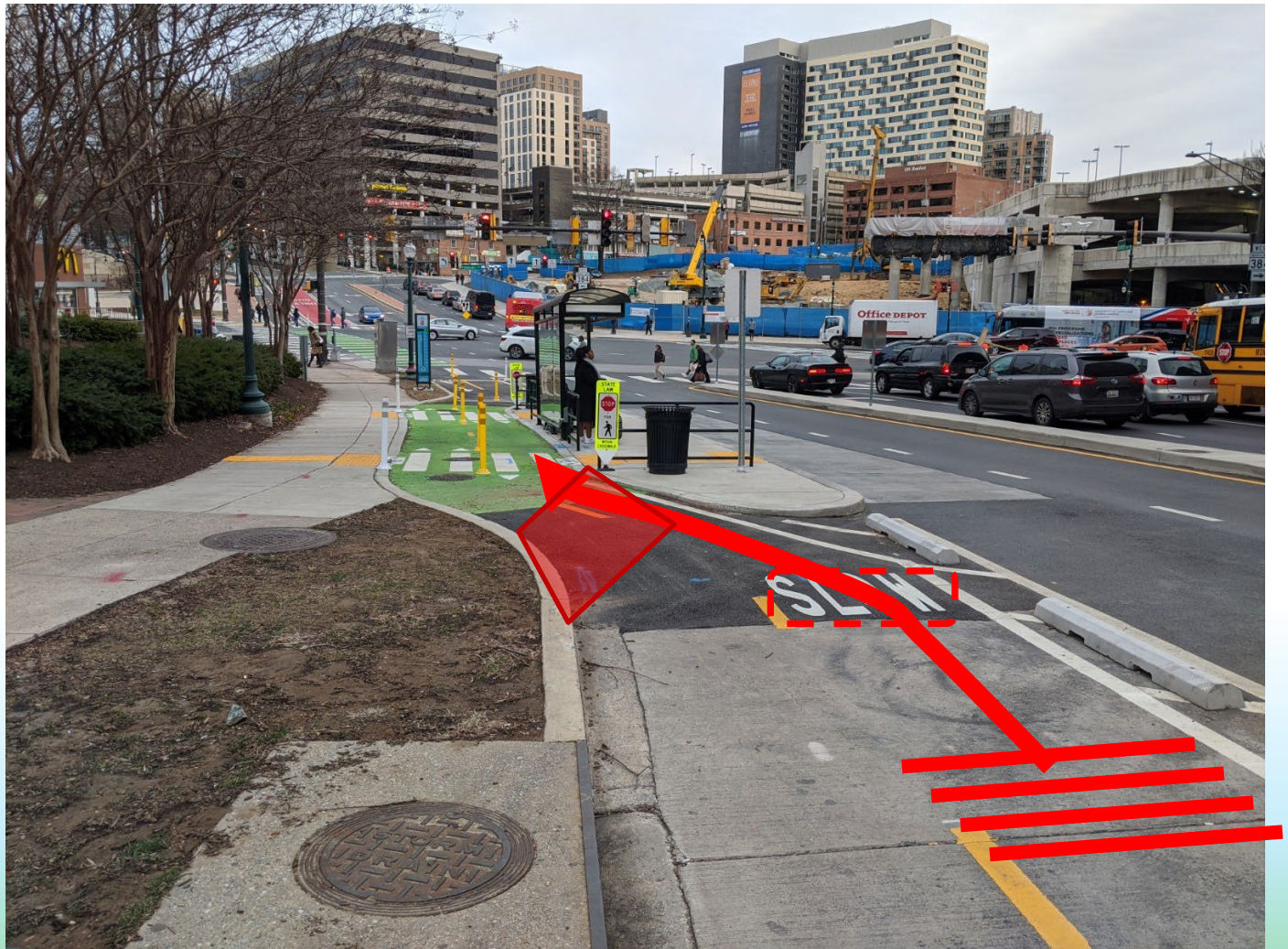


Calming treatments (2nd generation)

- Sharks' teeth
- Green conflict zone
- Center posts
- Signage

Calming treatments (2nd generation)

- Lateral deflection
- Vertical deflection
- “slow”
- Rumble strips (added since photo was taken)
- RRFB (planned)



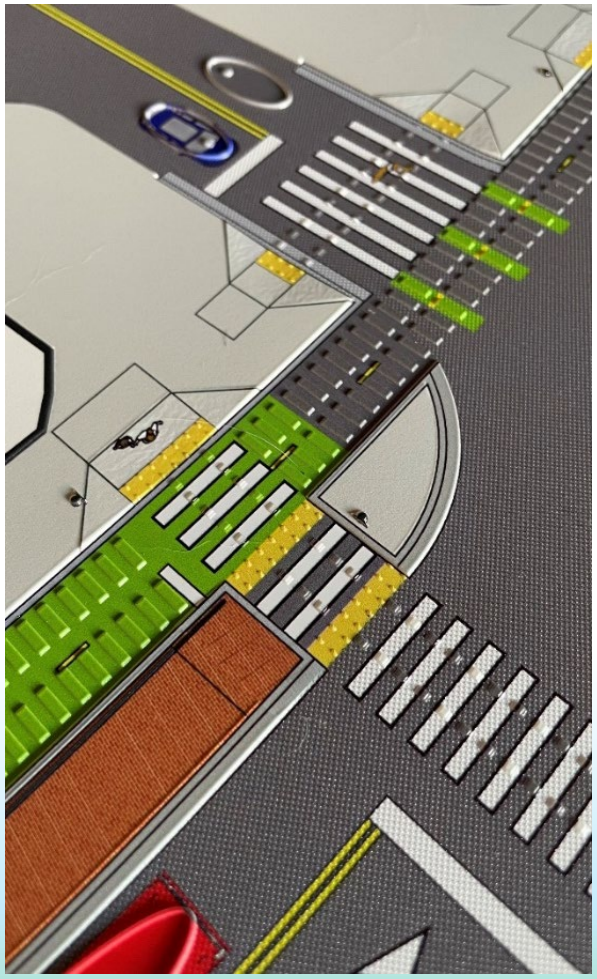
Designing Streets for People with Vision Disabilities

- Based on the feedback from people with vision disabilities, MCDOT applied to MWCOG for a TLC grant to study how to better design streets for people who have a vision disability.
- The study was completed in September 2021, and has been posted to our website.
- Recommendations for sidewalks, crossings, bus stops, lighting, public engagement, and staff training.
- The study also included a pilot design for an intersection in Silver Spring.

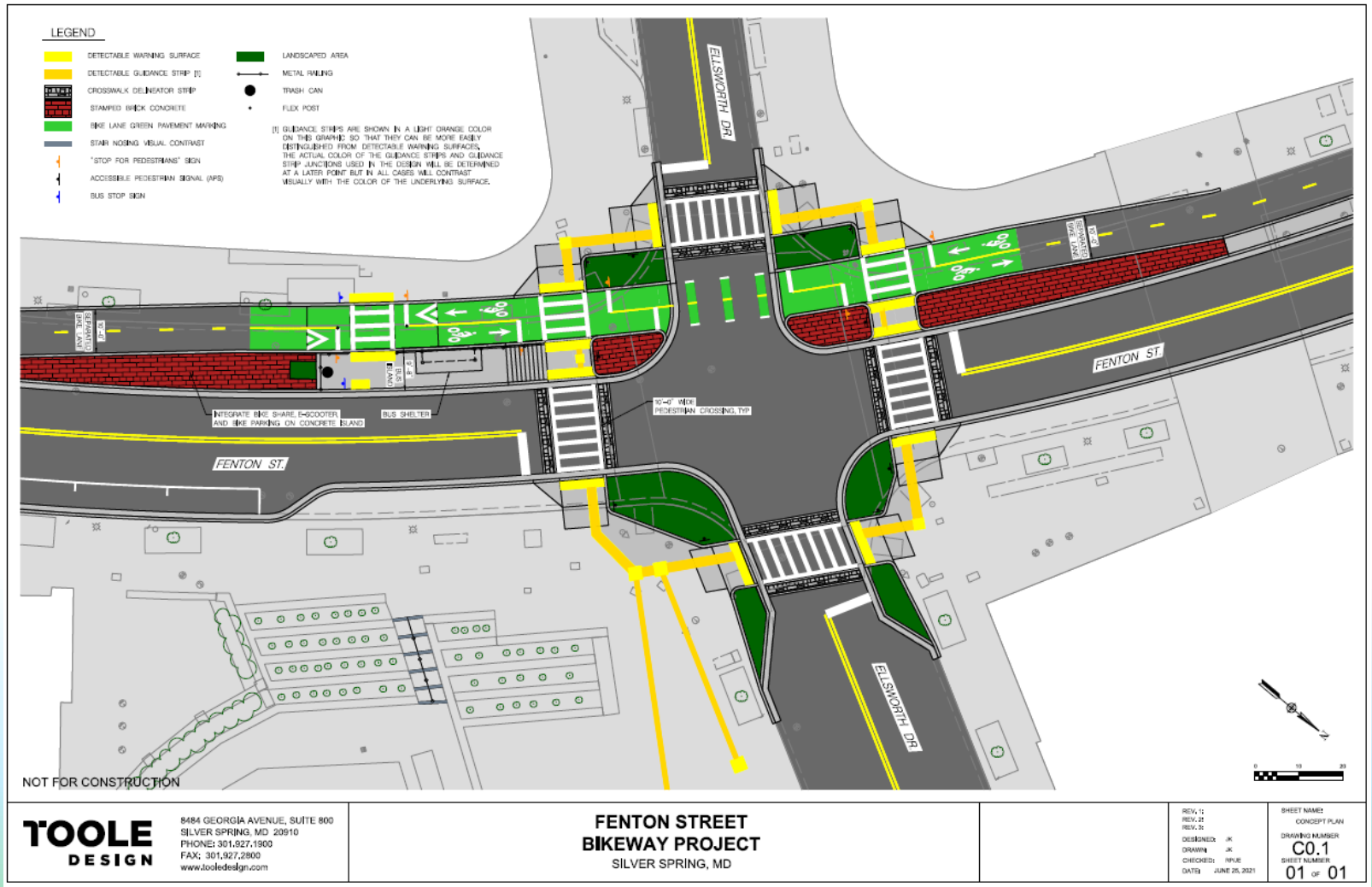
https://www.montgomerycountymd.gov/DOT/Projects/TLCVision/

Designing Streets for People with Vision Disabilities

- Tactile graphics are a critical tool when planning facilities that might have a disproportionate impact on people with vision disabilities.

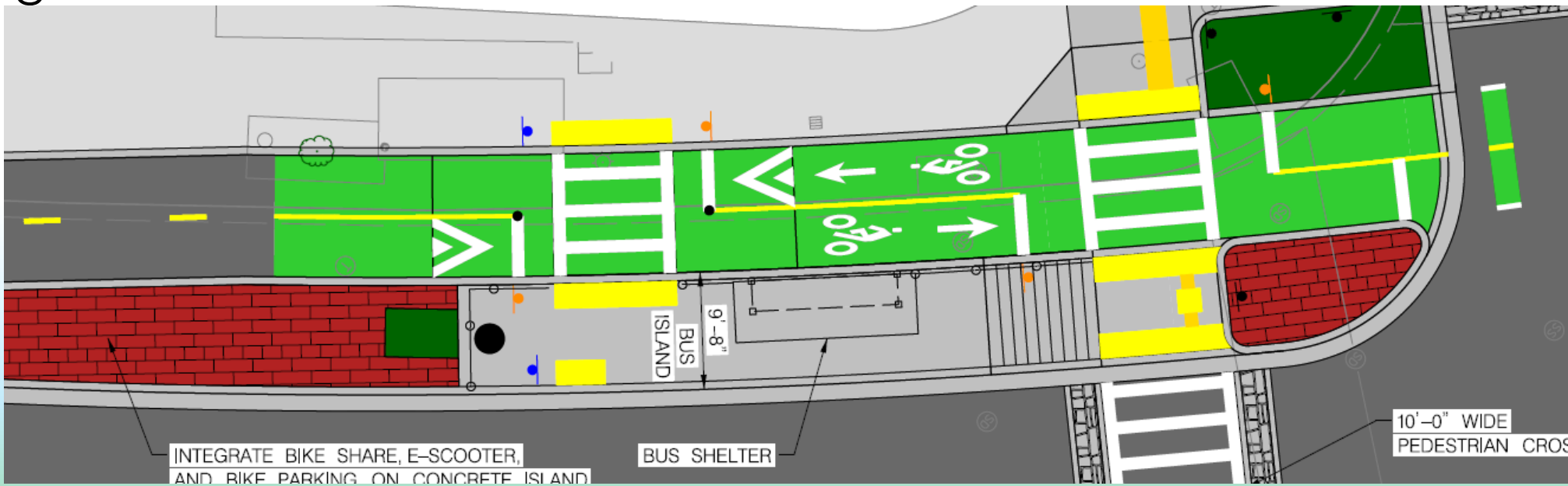


Bus Boarding Island (3rd generation)



Bus Boarding Island (3rd generation)

- Co-locate with signal
- Raised speed table at one end
- Sign on sidewalk in addition to on platform
- Tactile Walking Surface Indicators



Bus Boarding Island Pilot

- In April 2023, MCDOT constructed a temporary pilot third generation bus boarding island in downtown Silver Spring.
- Approximately two dozen people with disabilities were brought to the site to visit the pilot project in person and offer feedback.
- All regional transit operators were invited to observe. Most sent at least one representative.
- The testing of the pilot will allow MCDOT to refine the third generation designs before construction in 2024.

Thank you!

Matt Johnson, AICP
Capital Project Manager
Montgomery County Department of Transportation
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Spring/Ellsworth Pilot

Engaging people with vision disabilities in floating bus stop design

Jim Elliott
Senior Planner
Toole Design
jelliott@tooledesgn.com

TOOLE DESIGN

Agenda

- Pilot goals
- Challenges we tried to address
- Treatments tested
- Limitations
- Stakeholder engagement process
- Takeaways

Pilot Goals

- To receive input from people with disabilities about the accessibility features incorporated into the pilot
- To inform the redesign of four existing floating bus stops in downtown Silver Spring, two of which you visited
- To encourage a conversation among local governments and transit agencies about how to make floating bus stops more accessible and consistent across the region
- To inform the design of other floating bus stops in Montgomery County and across the Metropolitan Washington Region

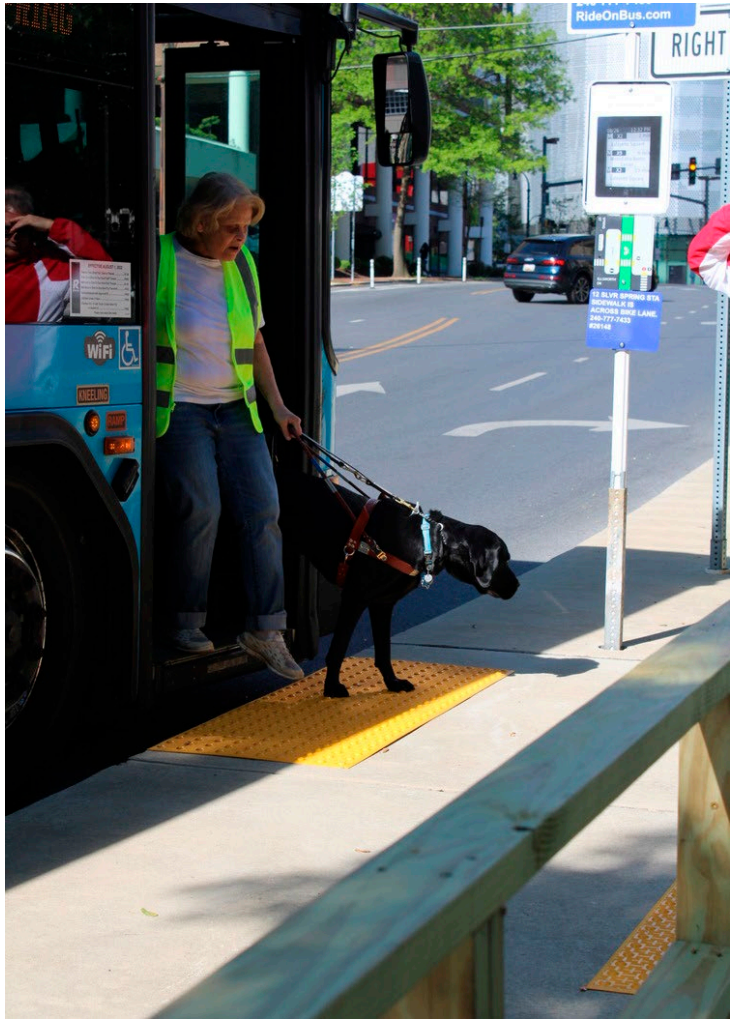
Existing Conditions

Navigation Challenges and Treatments—Bus Stop to Signalized Crosswalk

Navigation Challenge	Treatments Proposed
When you get off the bus, knowing that you're on a bus island	• In-bus audible message • Tactile map of bus layout on secondary bus stop ID pole

"Next stop Ellsworth bus island. Sidewalk across bike lane."

--In-bus audible speech message

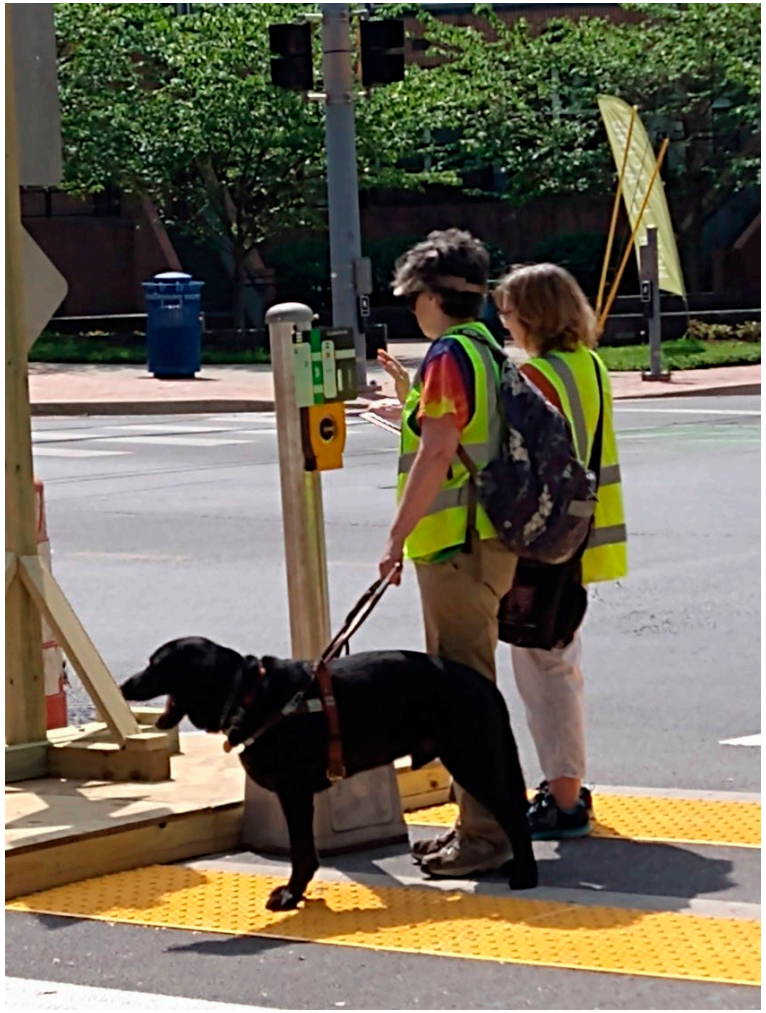


Navigation Challenges and Treatments—Bus Stop to Signalized Crosswalk

Navigation Challenge	Treatments Proposed
When you get off the bus, knowing that you're on a bus island	• In-bus audible message • Tactile map of bus layout on secondary bus stop ID pole
Navigating to the signalized crosswalk	• **Tactile map of bus stop layout** • **Fencing**

Navigation Challenges and Treatments—Bus Stop to Signalized Crosswalk

Navigation Challenge	Treatments Proposed
When you get off the bus, knowing that you're on a bus island	• In-bus audible message • Tactile map of bus layout on secondary bus stop ID pole
Navigating to the signalized crosswalk	• Tactile map of bus stop layout • Fencing • Detectable warning surfaces
Determining when it is safe to cross and that you can cross either bike lane or the street	• **APS with audible speech message on bus island** • **Tactile map of bus stop layout**



Navigation Challenges and Treatments—Sidewalk to Bus Stop via Signalized Crosswalk

Navigation Challenge	Treatments Proposed
Understanding that the signalized crosswalk includes a floating bus stop	• APS with audible speech message • Tactile map of bus stop layout
Determining when it is safe to cross	• APS
Bicyclists yielding to pedestrians in the crosswalk	• Integration with signalized crossing

"Wait to cross bike lane, bus boarding island, and Spring St. at Ellsworth. Map above pushbutton."

--APS audible speech message

Navigation Challenges and Treatments—Sidewalk to Bus Stop via Signalized Crosswalk

Navigation Challenge	Treatments Proposed
Understanding that the signalized crosswalk includes a floating bus stop	• APS with audible speech message • Tactile map of bus stop layout
Determining when it is safe to cross	• APS
Bicyclists yielding to pedestrians in the crosswalk	• Integration with signalized crossing
Locating the bus boarding area	• **Primary bus ID pole with distinctive octagonal shape** • **Detectable warning surface**
Understanding when the next bus is due to arrive	• **Real-time bus information sign with pushbutton-activated audible speech message**

Navigation Challenges and Treatments—Sidewalk to Bus Stop via Mid-Block Crosswalk

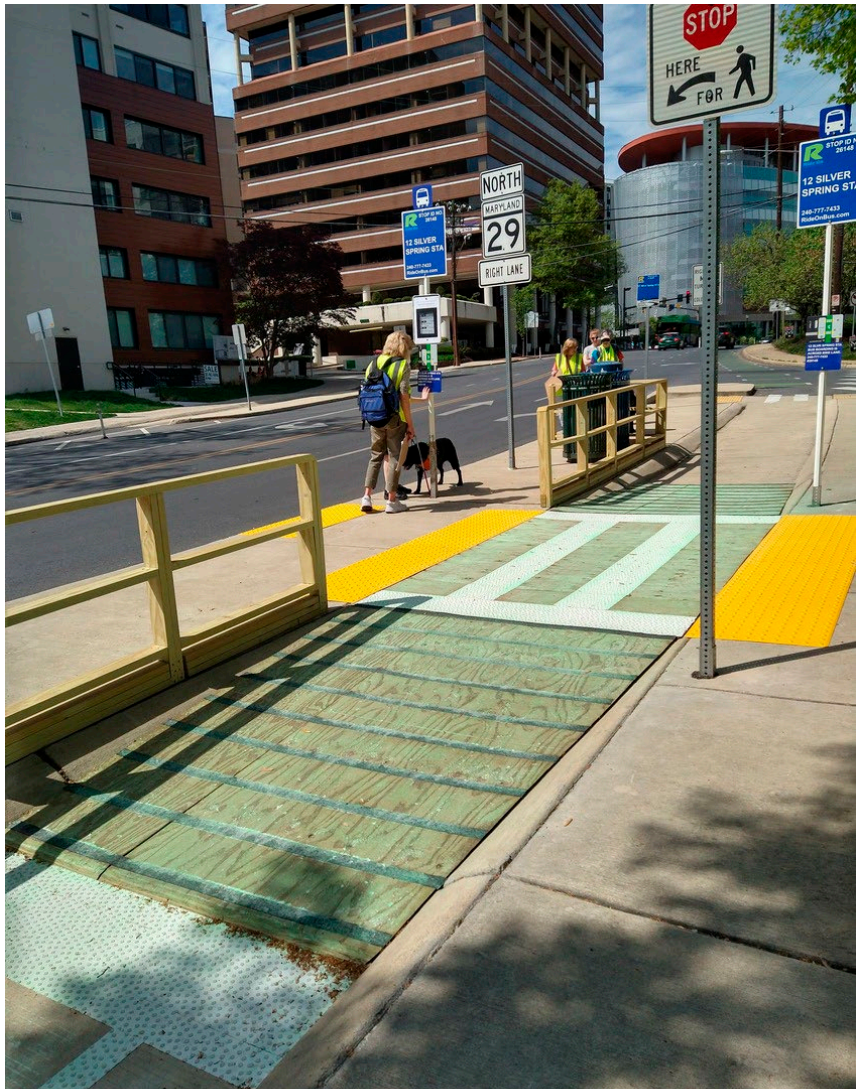
Navigation Challenge	Treatments Proposed
Finding the mid-block crosswalk	• Secondary bus ID pole with distinctive octagonal shape • Detectable warning surfaces on both sides of crossing • High-visibility marked crosswalk

Navigation Challenges and Treatments—Sidewalk to Bus Stop via Mid-Block Crosswalk

Navigation Challenge	Treatments Proposed
Finding the mid-block crosswalk	• Secondary bus ID pole with distinctive octagonal shape • Detectable warning surfaces on both sides of crossing • High-visibility marked crosswalk
Determining what bus(es) serve a bus island without having to cross the bike lane	• **Tactile braille and raised letter sign with bus information**

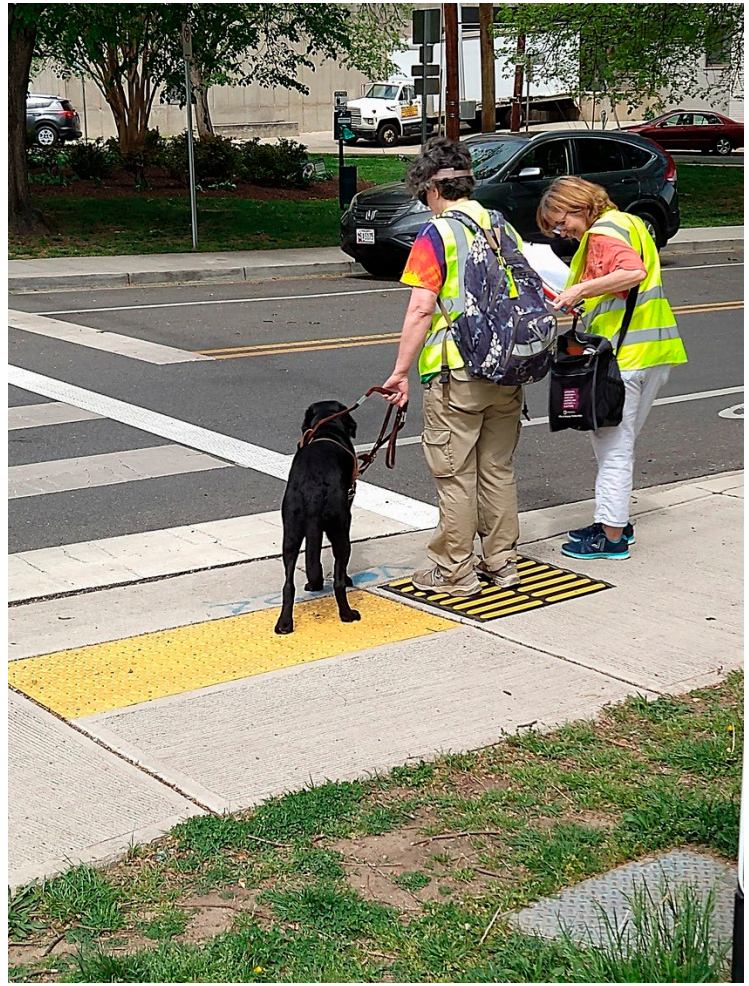
Navigation Challenges and Treatments—Sidewalk to Bus Stop via Mid-Block Crosswalk

Navigation Challenge	Treatments Proposed
Finding the mid-block crosswalk	• Secondary bus ID pole with distinctive octagonal shape • Detectable warning surfaces on both sides of crossing • High-visibility marked crosswalk
Determining what bus(es) serve a bus island without having to cross the bike lane	• Tactile braille and raised letter sign with bus information
Distinguishing the bike lane	• **Green color** • **Bike lane markings**
Determining when it is safe to cross	• **None**
Bicyclists yielding to pedestrians in the crosswalk	• **Raised pedestrian crossing** • **Stop bar** • **Stop here for pedestrians sign**



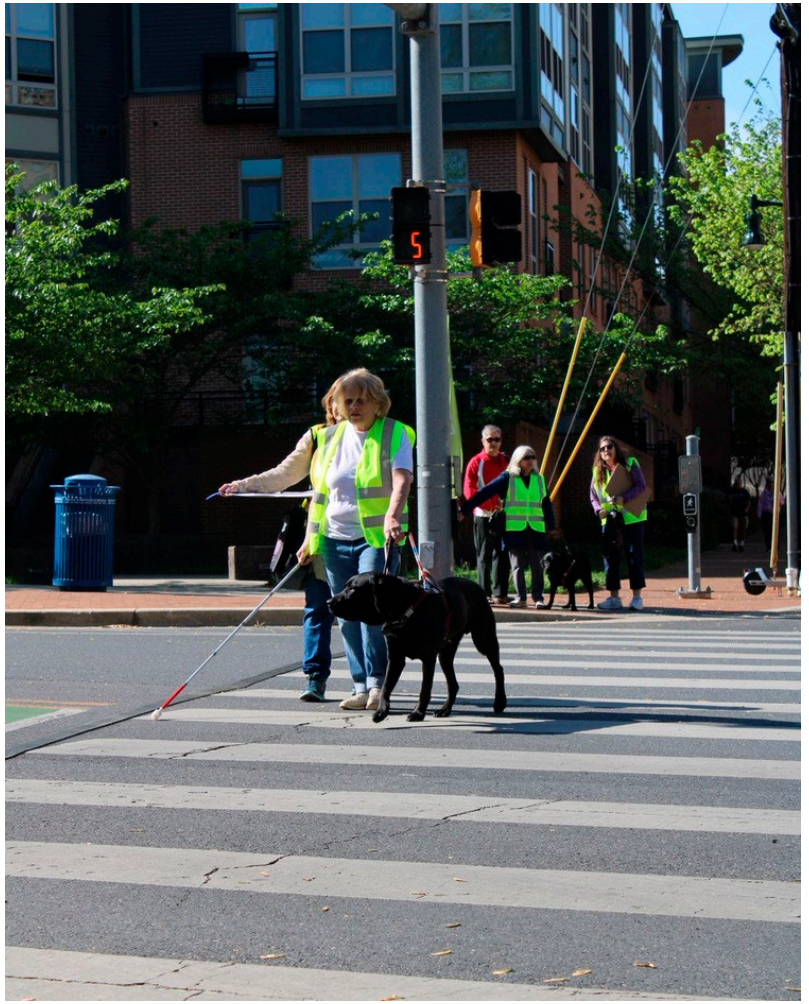
Navigation Challenges and Treatments—Navigating the Intersection

Navigation Challenge	Treatments Proposed
Aligning properly at the crosswalk intersection and maintaining the correct heading across the crosswalk	• APS with raised arrow in direction of travel across the crosswalk • Alignment bars

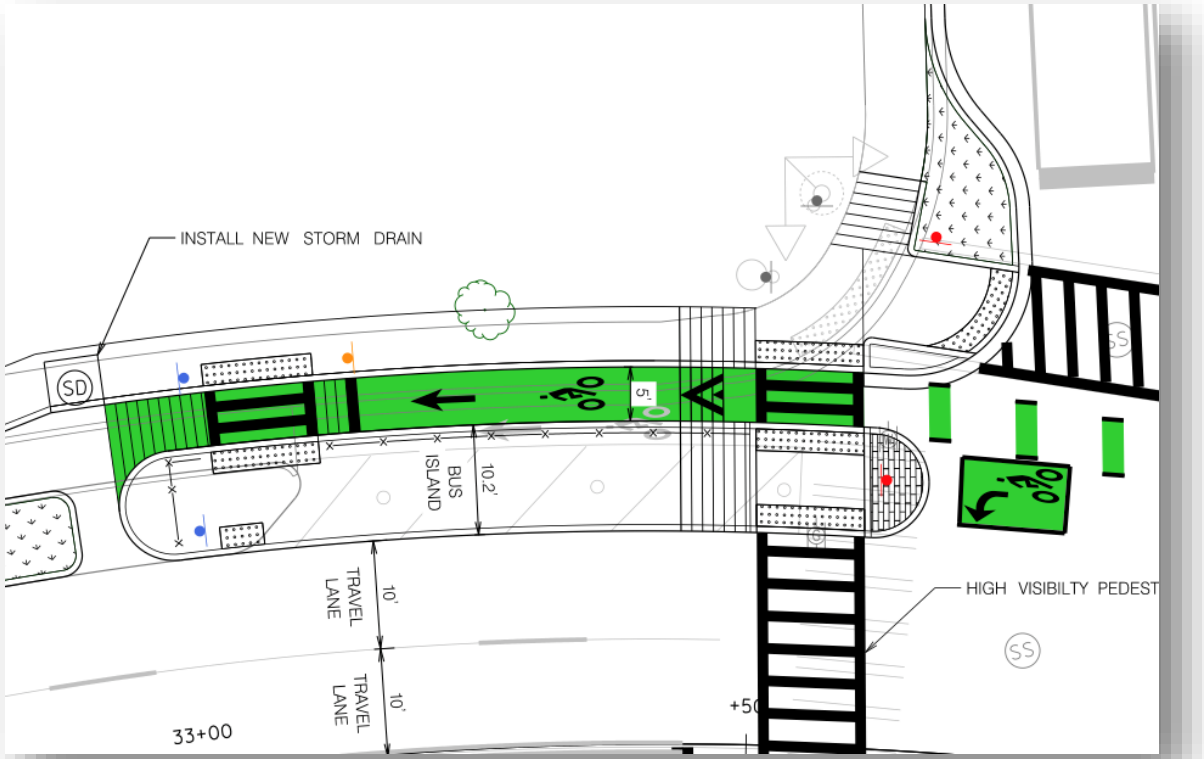


Navigation Challenges and Treatments—Navigating the intersection

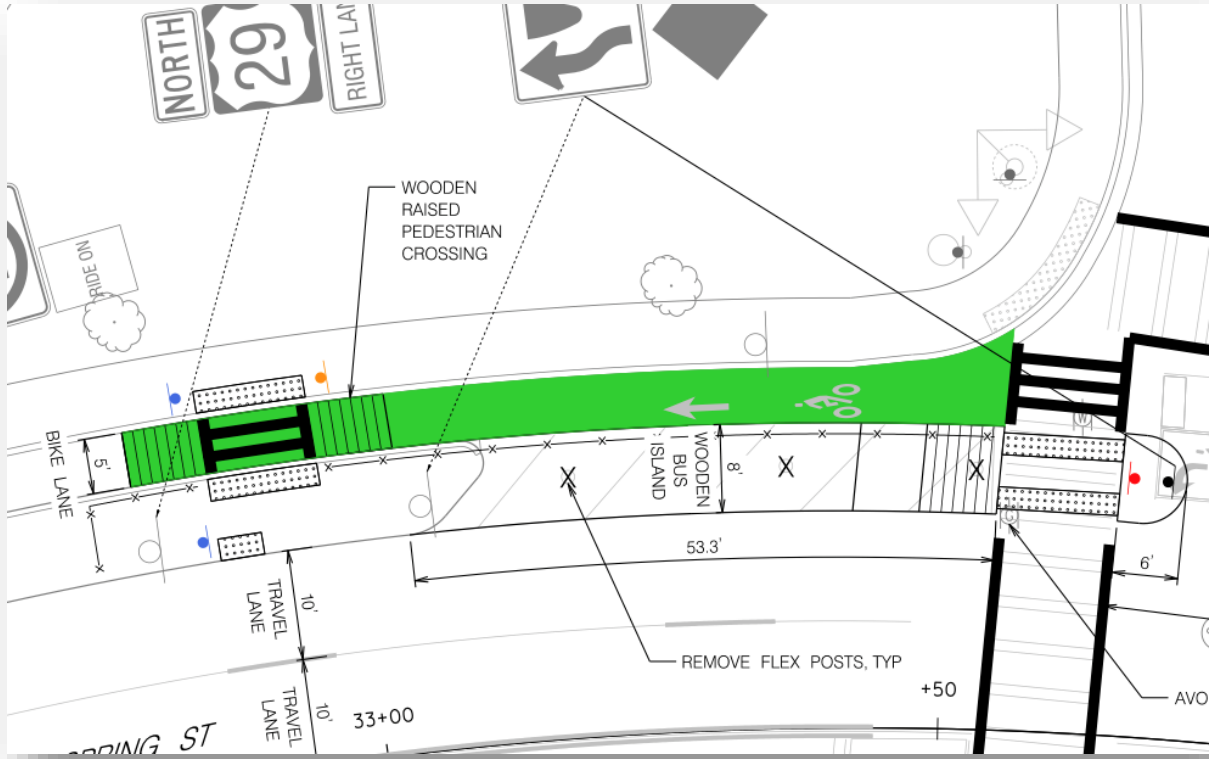
Navigation Challenge	Treatments Proposed
Aligning properly at the crosswalk intersection and maintaining the correct heading across the crosswalk	• APS with raised arrow in direction of travel across the crosswalk • Alignment bars
Maintaining the proper heading in the crosswalk	• **High-visibility crosswalk** • **Crosswalk guide strip** • **Beaconing APS**



Proposed Design & Pilot Design



Proposed Design



Pilot Design

Stakeholder Engagement Process

Who was engaged?

- 19 participants with a range of vision disabilities and navigation aids
- 2 participants with ambulatory disabilities
- 6 Orientation and Mobility Specialists
- Observers from US Access Board, Federal Highways Administration, WMATA, DDOT, and Arlington County DES
- Advocacy groups, including Montgomery County Action Committee for Transit, WMATA Accessibility Advisory Committee, Greater Greater Washington, WABA, and others

Who was engaged—People with Vision Disabilities

What kind of aid do you use when you travel?

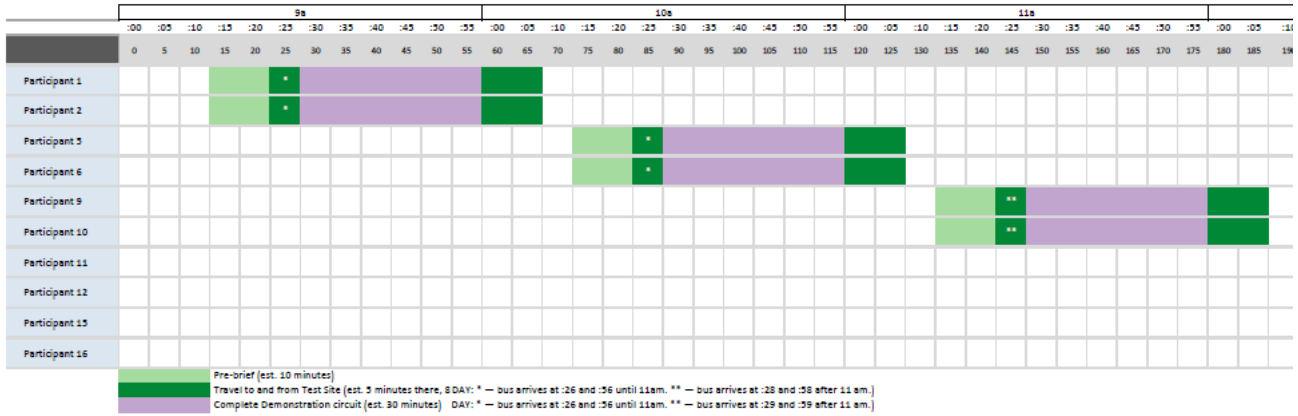
Value	Percent	Responses
Cane	63.2%	12
Dog	36.8%	7
Low vision	10.5%	2

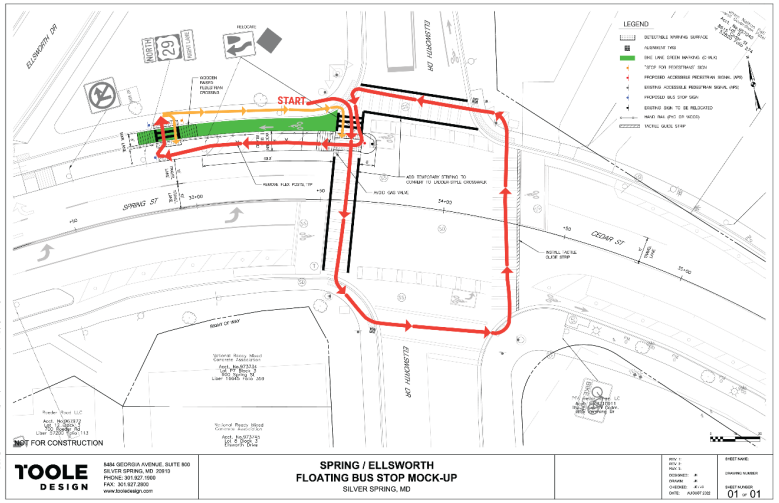
How would you describe your vision?

Value	Percent	Responses
Totally blind	42.1%	8
Can see light	26.3%	5
Can see where light is coming from	36.8%	7
Can see buses	42.1%	8
Can usually see poles and signs	15.8%	3
Can read signs visually if the print is large enough and they are well lighted	15.8%	3
Read braille	52.6%	10
Read raised letters and numbers	57.9%	11

How were they engaged?—People with Vision Disabilities

- Pre-brief
- Pilot tour
- Evaluation form
- Post-pilot debrief meeting





How were they engaged?—Other Participants

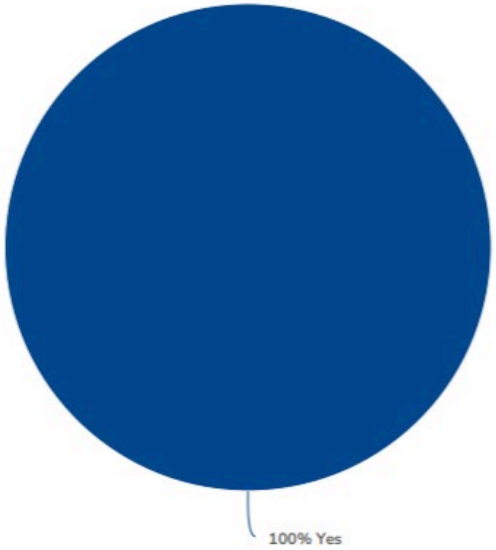
Participant Type	How engaged?
Participants with Ambulatory Disabilities	• Pilot tour
Orientation and Mobility Specialists	• Pilot guides • Pilot tours
Local Government and Transit Stakeholders	• Pilot tour • Invited to observe testing
Advocacy Groups	• Pilot tour

Results

Results—In-Bus Speech Message

19. "Was the in-bus message about where I would be when I exited helpful?"

Spring/Ellsworth Pilot Feedback Form

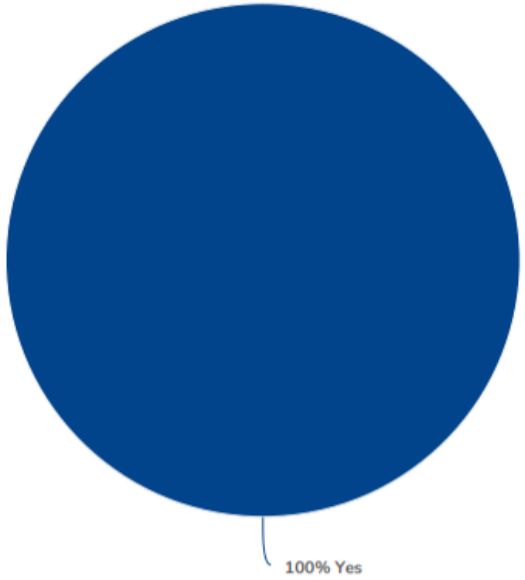


Value	Percent	Responses
Yes	100.0%	18

Totals: 18

21. "Did you understand that you would be exiting onto an island?"

Spring/Ellsworth Pilot Feedback Form



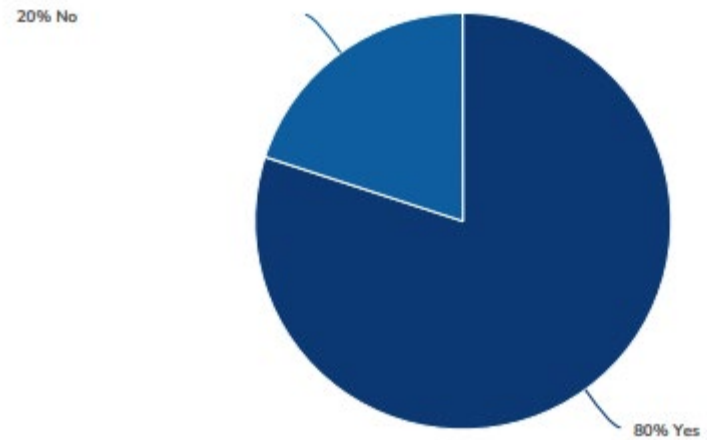
Value	Percent	Responses
Yes	100.0%	19

Totals: 19

Results—Tactile Map of Bus Stop Layout

9. Could point to closest bike lane crosswalk (mid-block)

Spring/Ellsworth Pilot Feedback Form

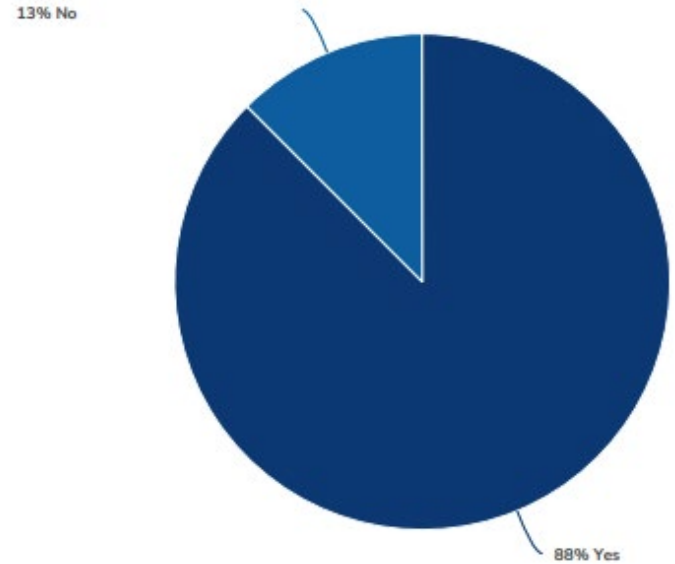


Value	Percent	Responses
Yes	80.0%	12
No	20.0%	3

Totals: 15

11. Could point to intersection bike lane crosswalk

Spring/Ellsworth Pilot Feedback Form



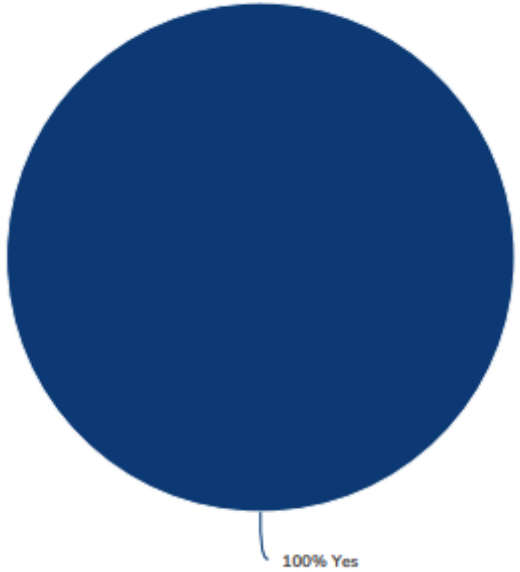
Value	Percent	Responses
Yes	87.5%	14
No	12.5%	2

Totals: 16

Results—Finding Signalized Crosswalk & APS

13. Found crosswalk across Spring Street independently

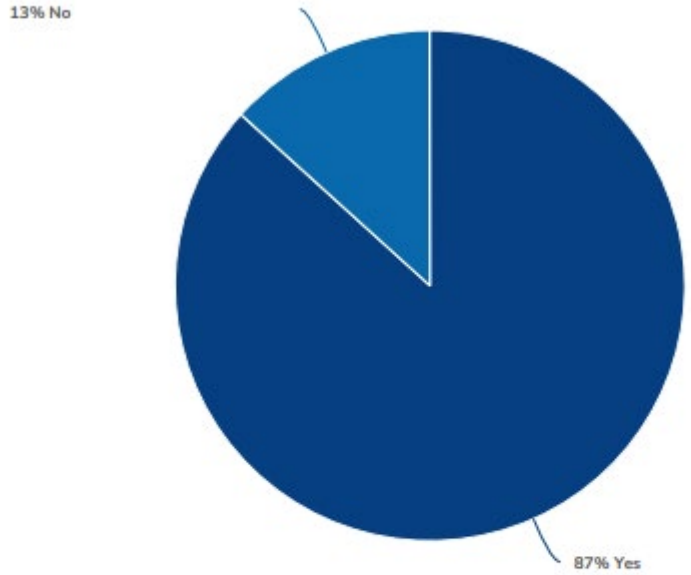
Spring/Ellsworth Pilot Feedback Form



Value	Percent	Responses
Yes	100.0%	15
	Totals: 15	

15. Found APS independently

Spring/Ellsworth Pilot Feedback Form

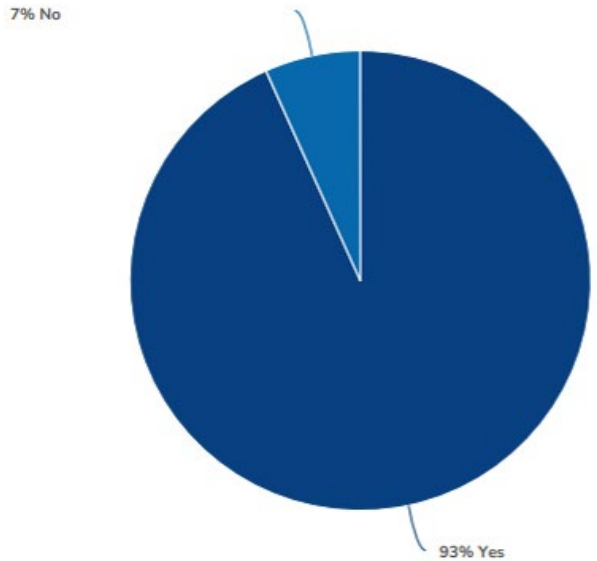


Value	Percent	Responses
Yes	86.7%	13
No	13.3%	2
	Totals: 15	

Results—Understanding Need to Cross Bike Lane to Get to Corner

27. "Did you understand that you would need to cross a bike lane to get to the corner?"

Spring/Ellsworth Pilot Feedback Form



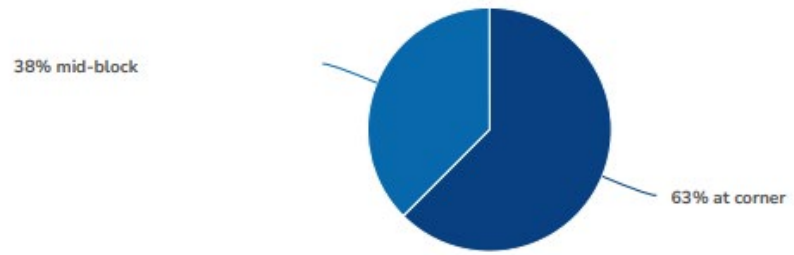
Value	Percent	Responses
Yes	93.3%	14
No	6.7%	1

Totals: 15

Results—Determining When it is Safe to Cross

83. Chose to cross bike lane...

Spring/Ellsworth Pilot Feedback Form



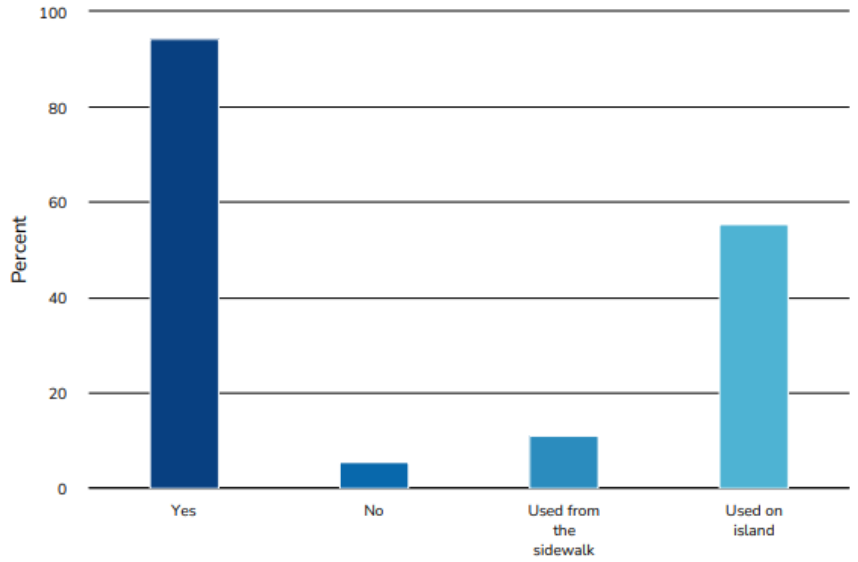
Value	Percent	Responses
at corner	62.5%	10
mid-block	37.5%	6

Totals: 16

Results—Secondary Bus ID Pole

23. “Was the pole shape helpful in identifying the bus stop?”

Spring/Ellsworth Pilot Feedback Form

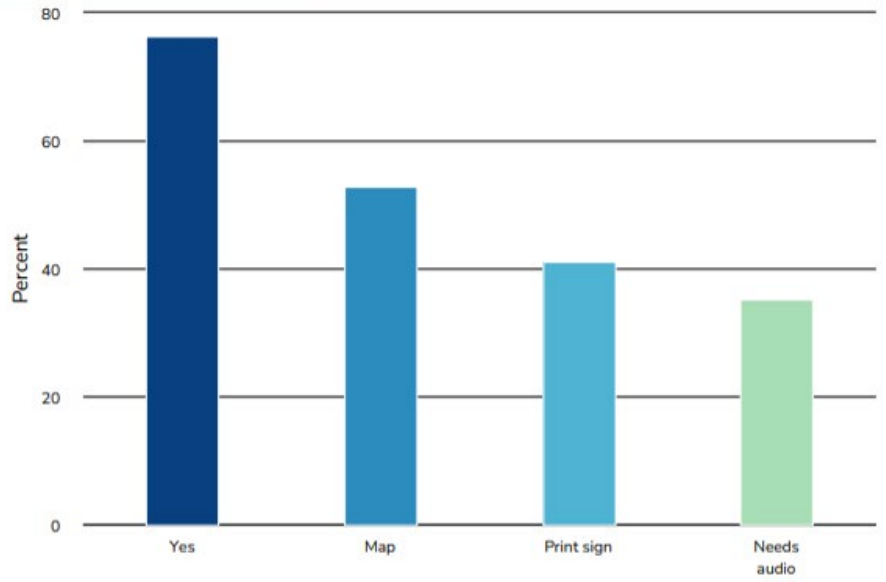


Value	Percent	Responses
Yes	94.4%	17
No	5.6%	1
Used from the sidewalk	11.1%	2
Used on island	55.6%	10

Results—Tactile Braille and Raised Letter Sign

25. “Was the bus stop signage helpful in identifying bus info?”

Spring/Ellsworth Pilot Feedback Form

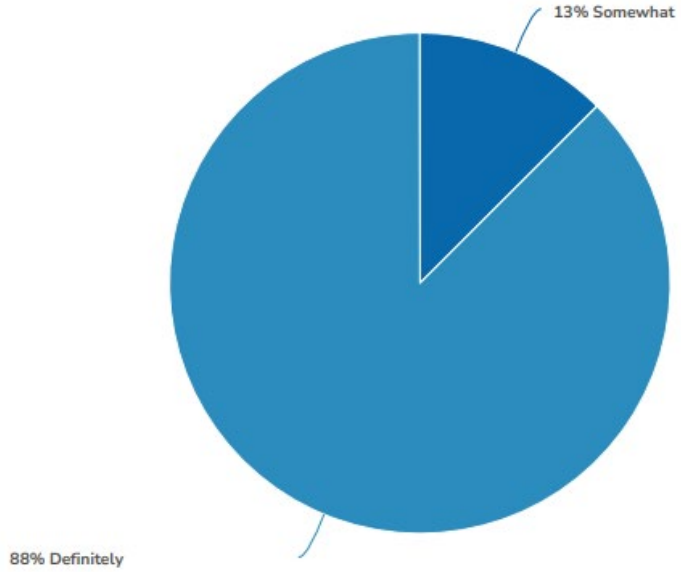


Value	Percent	Responses
Yes	76.5%	13
Map	52.9%	9
Print sign	41.2%	7
Needs audio	35.3%	6

Results—Detectable Warning Surface at Midblock Crosswalk

95. "Did the truncated domes helped you know where to cross?"

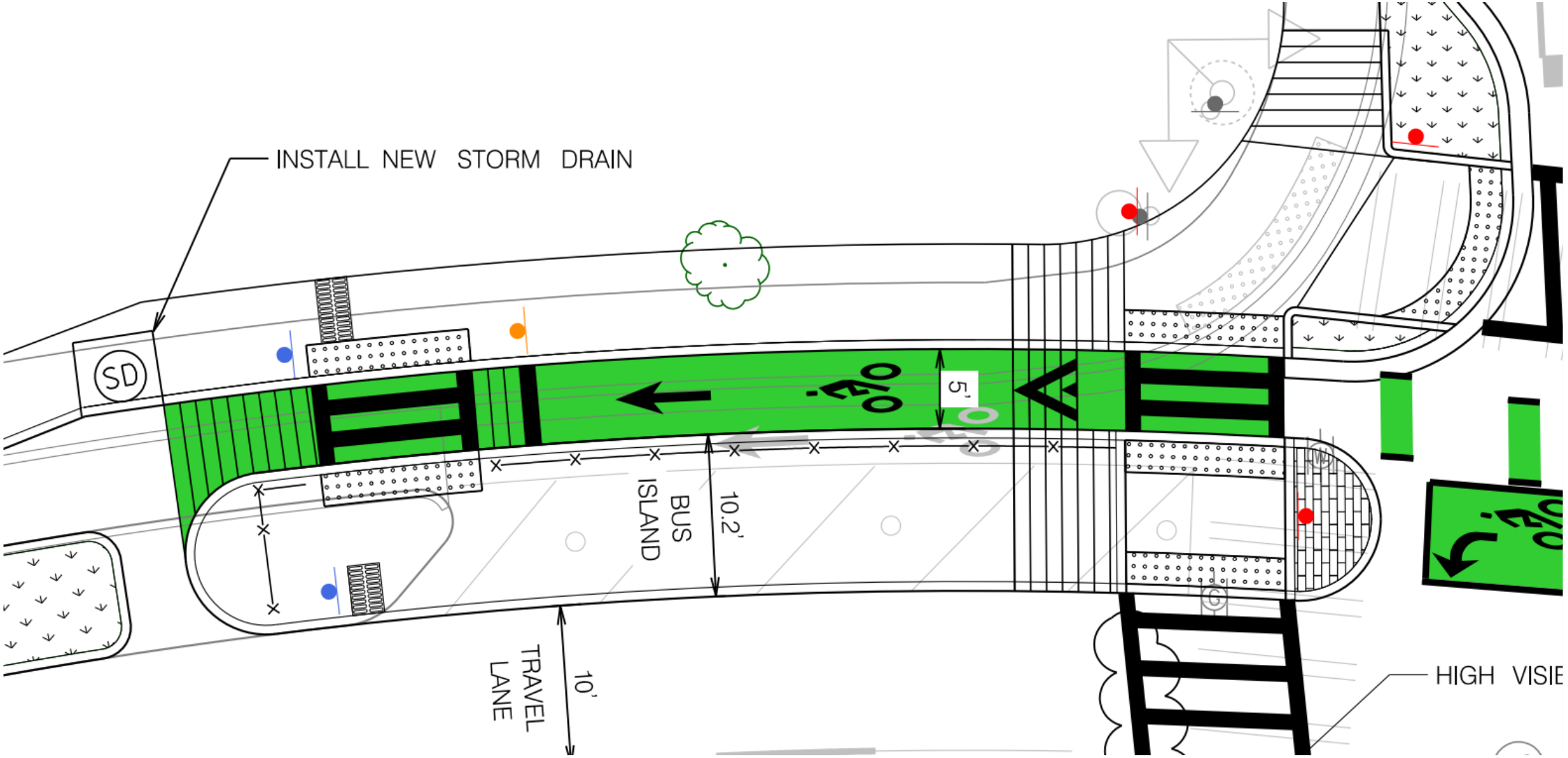
Spring/Ellsworth Pilot Feedback Form



Value	Percent	Responses
Somewhat	12.5%	2
Definitely	87.5%	14

Totals: 16

Updated Design



Remaining Questions

- How to best address navigational challenges in constrained locations?
- How to best address navigational challenges at mid-block locations?
  - Determining when it is safe to cross
  - Clarifying intent to cross to bicyclists

Thank You!

Jim Elliott
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Accessible Bus Stops

Lui Greco

Lead - Information Technology and Accessibility CNIB

cnib.ca

About CNIB

The **Canadian National Institute for the Blind or CNIB Foundation** is a non-profit organization driven to change what it is to be blind today. CNIB delivers innovative programs and powerful advocacy that empower people impacted by blindness to live their dreams and tear down barriers to inclusion. CNIB's work as a blind foundation is powered by a network of volunteers, donors and partners from across Canada.

What is sight loss?

- Fact: Most people who identify as living with sight loss have some residual/useable sight
  - Less than 10% are completely blind
- “Legal blindness” in most jurisdictions means somewhere in the range of less than 10% of “normal vision”

Sight loss in Canada

- Canadian Population is 40.5 million and over 5.5 million have vision threatening eye conditions.
- The prevalence of vision loss is expected to increase by nearly 30% in the next decade.
- Chronic diseases along with an ageing population, increases the likelihood of vision loss.
- Over a quarter of the population is over 60 years and one in eight Canadians will have diabetes by 2025.

The four leading causes of sight loss in Canada (2017) are:

1. Cataracts: 3,541,000 people
2. Age-related macular degeneration: 1,574,000 people
3. Glaucoma: 294,000 people
4. Diabetic retinopathy: 749,800 people

Sight Loss and Transit Accessibility

- Public Transit is the preferred mode of transport for people who are blind or low vision, be it a public bus or train system which has numerous accessibility barriers.

In 2022, CNIB received funding through the Government of Canada to try and understand the barriers facing Canadians living with sight loss when navigating island/platform bus stops.

Island Platform Bus Stops

How do the various design features of island platform transit stops affect the safety and security of transit passengers living with sight loss?

Focus of Study

- **Specific to “island platform bus stops”**
- **Specific to impacts on people living with sight loss**

Study Design and Method

- A review of academic literature and existing design guidance
- Established an advisory committee consisting of 8 Canadian municipalities and a representative from Vision Ireland
- Developed a structured research methodology to solicit research participants perceptions of safety/comfort at island platform bus stops
- Recruited 26 participants living with sight loss who are regular users of public transit

➢ Mainly tested through coordinated multiple field testing across Canada
➢ Engagement was mainly through accessibility committees' meetings
➢ Parallel TransLink Study

Results findings were compiled into a series of guidelines targeted at transportation design

Project Scope

1. **Literature Review**
2. **Research Methodology**
3. **Field Testing**
4. **Testing Results**
5. **Recommendations and Guidelines**

Literature Review

Island Platform Bus Stop

What empirical studies have been completed on island platform transit stops?

London, UK (2018)

- Published Project Report PPR853: Accompanied visits of people with disabilities to Bus Stop Bypasses
- Published Project Report PPR854: Analysis of Pedestrian and Cyclist Behaviour via Video
- Published Project Report PPR855: Surveys of Pedestrians and Cyclists

Nanjing, China (2019, 2022)

- Analysis of the Characteristics and Number of Bicycle–Passenger Conflicts at Bus Stops for Improving Safety (Published in MDPI Sustainability journal, 2019)
- Observational study on multi-type conflicts between passengers and cyclists at the bus stop – A case study in Nanjing (Published in Travel Behaviour and Society journal, 2022)

Island Platform Bus Stop

- The "island platform transit stop" design provides a separated cycling facility that routes cyclists between a bus stop and the pedestrian sidewalk
  - inclusion in the Transportation Association of Canada (TAC) Geometric Design Guide
  - implementation has begun at numerous municipalities nationwide
  - for cyclists, this design offers enhanced safety by removing interactions with transit vehicles.

Two Island Platform Bus Stop designs are pictured on the right.

Island Platform Bus Stop –”CONCERNS”

As a result of a Human Rights Tribunal decision, in British Columbia, Canada, the City of Victoria was directed to install pedestrian activated flashing beacons as an interim solution.
An absence of design guidance was sited by the adjudicator in his recommendations.

There is a need for consistent and uniform standards that can be incorporated into the planning and design processes of such infrastructure!

Literature Review – Key Questions

1. What types of challenges are being experienced by people with vision loss?
2. What design guidance is currently available?
3. What consistencies, discrepancies, and gaps exist in the current design guidance?
4. What empirical studies have been completed on island platform transit stops?
5. What is currently known about the behaviour of cyclists and pedestrians at island platform transit stops, and the factors that influence this?

What types of challenges are being experienced by people with vision loss?

Based on BC Human Rights Tribunal and academic research from London, UK:

- Detecting cyclists approaching (ambient noise, quiet bikes)
- Confirming whether an approaching cyclist has stopped or intends to yield
- Orienting themselves to the stop layout
- Navigating to and from the raised platform (especially with guide dog)

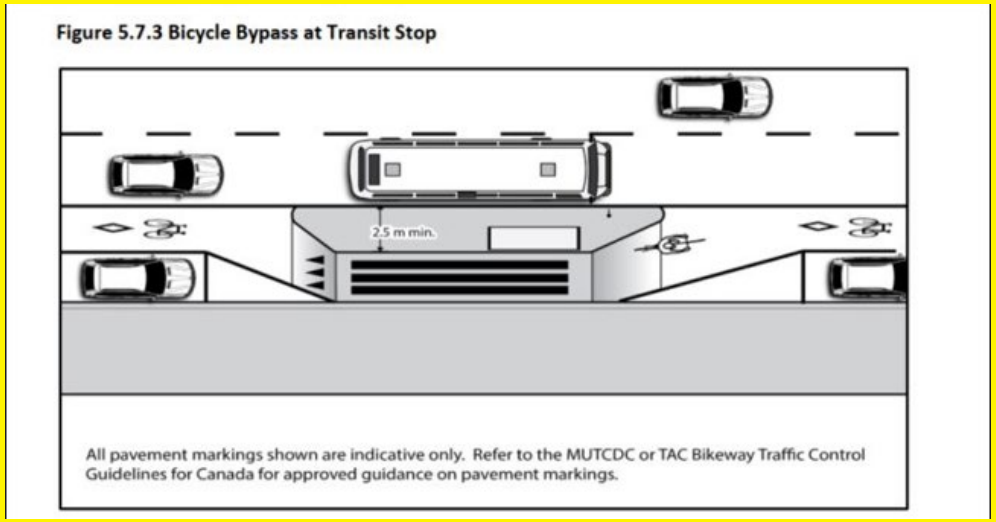
Findings – literature review

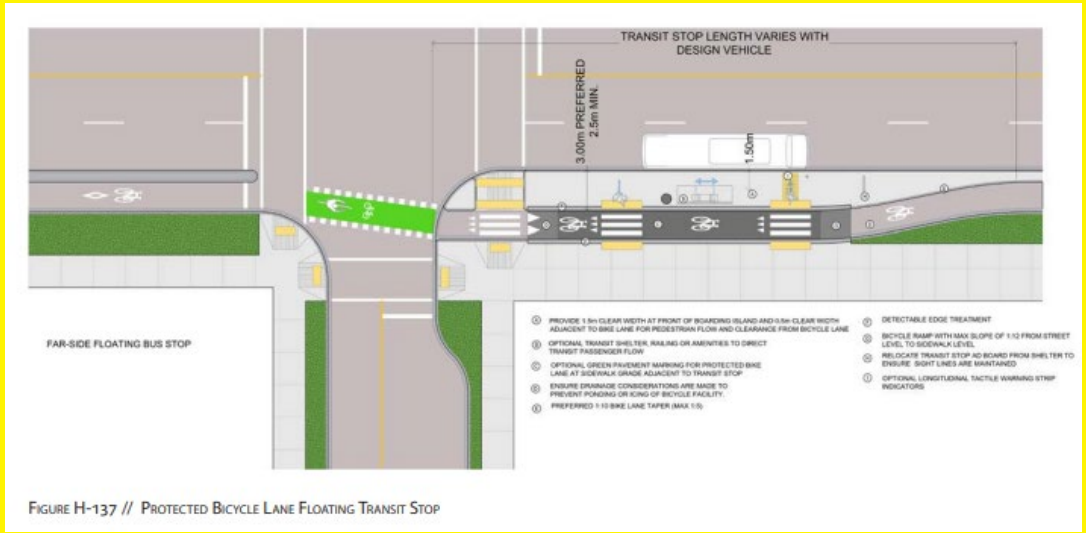
People who are blind or partially sighted were the **most impacted group** by the design and had difficulties with understanding the layout, not being able to instruct their guide dog, and having trouble detecting oncoming cyclists.

"it is clear from comments that many disabled people have a poor perception of cyclist behaviour which would limit their feelings of safety (and by extension may reduce their propensity to travel). Separate work might be undertaken to improve this". – London, UK study

What design guidance is currently available?

- Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (2017), Section 5.7.4 Bikeway Facilities at Transit Stops
- Ontario Traffic Manual (OTM) Book 18 (2021): Cycling Facilities, Section 7.1.1 Island Boarding Transit Stop
- British Columbia Active Transportation Design Guide (2019): Section H.1 Multi-Modal Integration
- Alameda and Contra Costa (AC) Transit Multimodal Corridor Guidelines (2018)





What consistencies, discrepancies, and gaps exist in the current design guidance?

- Naming convention for “island platform bus stop”: e.g., Bicycle bypass at transit stop (TAC), Island boarding transit stop (OTM), Floating transit stop (BC),
- The number and placement of pedestrian crossings, and the design of signage instructing cyclists to yield to pedestrians at these crossings
- Guidance on measures to reduce bicycle travel speeds at the yield area
- Design measures to improve orientation and wayfinding for people with sight loss

What is currently known about the behaviour of cyclists and pedestrians at island platform transit stops, and the factors that influence this?

- When interactions between pedestrians and cyclists occur, cyclists yield about 50% of the time
- When conflicts occur, “pedestrian inattentiveness” is a common cited factor
- Number of conflicts increases with bicycle volume, bus passenger volume, and frequency of bus service
- Sightline obstructions have significant influence on conflicts, and clear, channelized crossings can improve conflicts

Key Conclusions

- Existing design guidance is inconsistent on key details for people with sight loss
- Established behaviour of pedestrians using eye contact and negotiating right-of-way with cyclists
- Rigid, compliance-based approach to pedestrian-bicycle crossings will likely not be effective
- Functionality is improved with marked crosswalks, tactile wayfinding, channelization of crossings, and removal of sightline obstructions
- Stops with high volumes of cyclists, passengers, and/or buses stopping should be treated with special concern

Recommendations based on field study

Challenge	Synthesis of findings from field testing
Finding the bus stop	12 of the 26 participants required assistance in identifying the general location of the stop adjacent to the sidewalk. Only the Winnipeg location had a 100% success rate in participants finding the stop the first time. People who are completely blind used echolocation to identify the presence of the shelter and therefore the stop. People who are partially sighted located shelters visually. Shelter and furniture were key landmarks for finding the stop. When these were absent or placed off of the platform, users were sometimes misled. When a shelter on a platform was far from an approaching user on the sidewalk, it was more difficult to detect using echolocation. Many users detected the bus stop by the presence of a diverging path from the sidewalk. These were detected by changes in the surface between the sidewalk and bike path (i.e., termination of grass buffer), and the presence of attention TWSI and directional TWSI across the sidewalk. When the approaching sidewalk is wide or significantly setback from the platform, participants had more difficulty in locating the shelter using echolocation. 67% of the participants who couldn't locate the bus stop found the sidewalk to be too wide.
Orienting and navigating to and from the island platform	The shelter was a key landmark for orienting to the stop and provided a signal for where passengers should wait for the bus. When the shelter was at the back of the sidewalk (i.e., not on platform), participants were confused about the layout. Sidewalk edges were used for shorelining. When a grass buffer was interrupted by a diverging sidewalk, users recognized it as a diverging path to the platform. Once people were aware of a diverging path to reach the platform, the directional TWSI helped people orient themselves to the correct path. This was also helpful when alighting to reach the sidewalk from the platform. Participants looked for bus stop pole to know where to wait for the bus and confirm they were at the bus stop. When the poles were not located on the platform, participants were confused. Sometimes poles were mistaken for signposts due to their odd size. The presence of clutter (poles, furniture, waste bins, benches) caused some to struggle when navigating platforms. Multiple crosswalks and very long platforms caused confusion. Attention TWSI's generally worked as intended and provided key information about crossings, when detected. 40% of participants found it easier to cross back to the sidewalk than to cross to the platform due to increased familiarity with the layout the second time. Participants shared than they felt more comfortable once with have experience with design. It was suggested by some that consistent design and training are key to the success of this design. When alighting, participants worried that narrower platforms would force them into conflict with cyclists when higher volumes of passengers were present. Channelization was particularly useful for directing alighting passengers to cross the bicycle path at the designated crossings.
Interactions with Cyclists: Detecting approaching cyclists	Across all sites and participants, everyone mentioned the need to make approaching cyclists more audible/detectable. Cyclists make little noise when travelling and bus stops often have significant background noise from traffic. The signalized crossing improved perceived safety but users still lacked reassurance that an approaching cyclist had stopped. At the London and Calgary sites, the shelter design obstructed cyclists' sightlines of passengers waiting to cross.
Interactions with Cyclists: Negotiating right of way with approaching cyclists	People using guide dogs were very conspicuous to cyclists, and cyclists were observed to give right of way. Signalized crossing removed need to negotiate right of way as users became reliant on the signal to manage right of way. There was a concern that with stops on the near side of a signalized intersection, cyclists were less likely to yield when they are approaching a green light.
Boarding and alighting	Some of the participants who rely on some visual cues had a hard time identifying the edge of the bus from the edge of the platform when alighting.

Site Selection

Screening criteria:

1. Sites that fall within the municipalities represented on the Advisory Committee
2. Sites identified as problematic by members of the CNIB
3. Sites in or near communities with both a WSP and CNIB office
4. Bus stops that receive moderate or high levels of bike, foot, and bus traffic
5. Ensuring the selected sites cover a broad geographic area representing a range of climates and jurisdictions
6. Sites cover a wide range of design elements and levels of protection at the crossing.

London, Ontario, Canada

Winnipeg, Manitoba, Canada

Montreal, Quebec, Canada

Vancouver, British Columbia, Canada

Calgary, Alberta, Canada

CNIB FOUNDATION

Thank You!

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Lead - Information Technology and Accessibility CNIB

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The full report can be found at:

Cycling Infrastructure and People with Sight Loss – Design Challenges and Opportunities at Transit Stops Across Canada Final Report and Recommendations September 2023

https://clearingourpath.ca/wp-content/uploads/2023/11/CNIB-Bus-Stops-Final-Report_english.docx

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December 5, 2023

TRB Webinar: Climate Resilient Design for Culverts and Pavements

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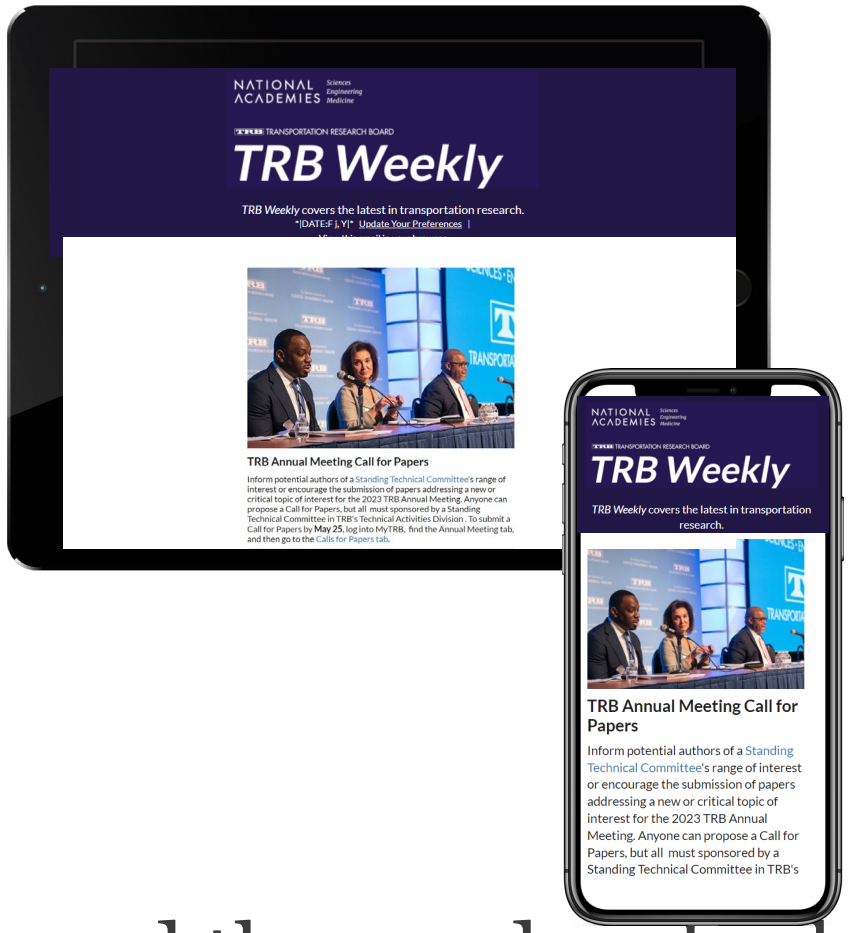

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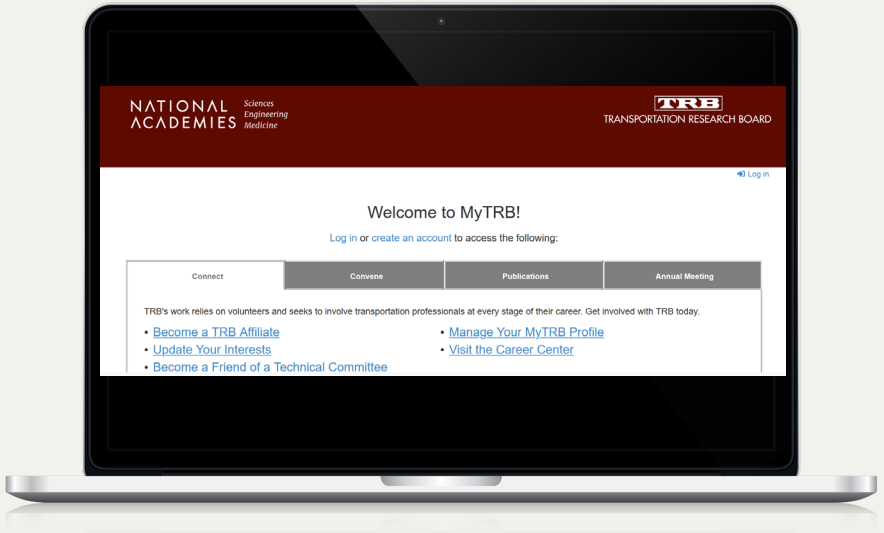

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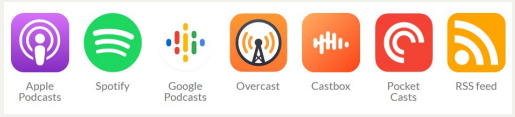

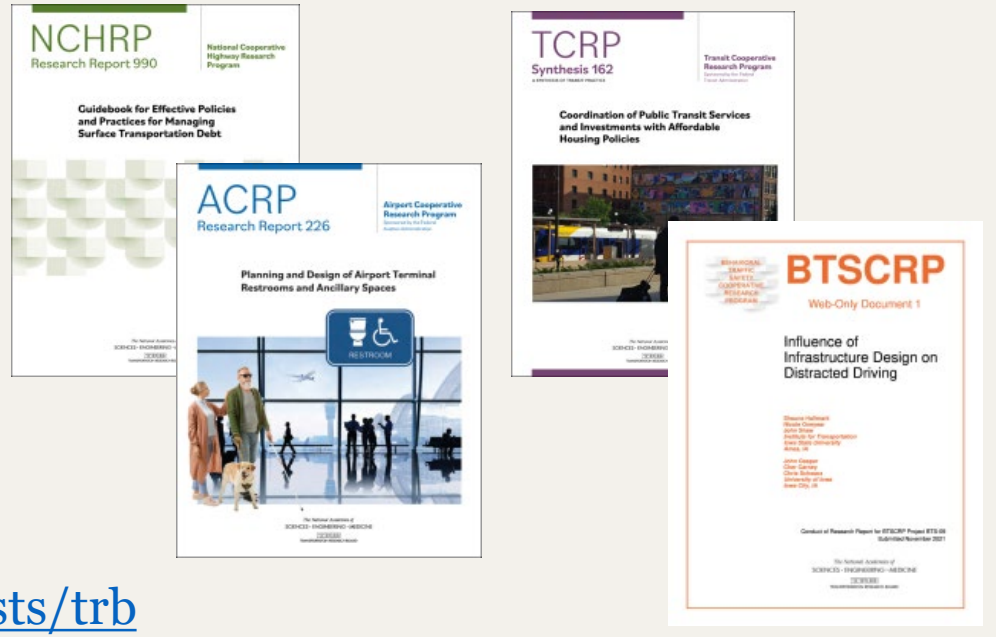

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