

Right Round Round Round

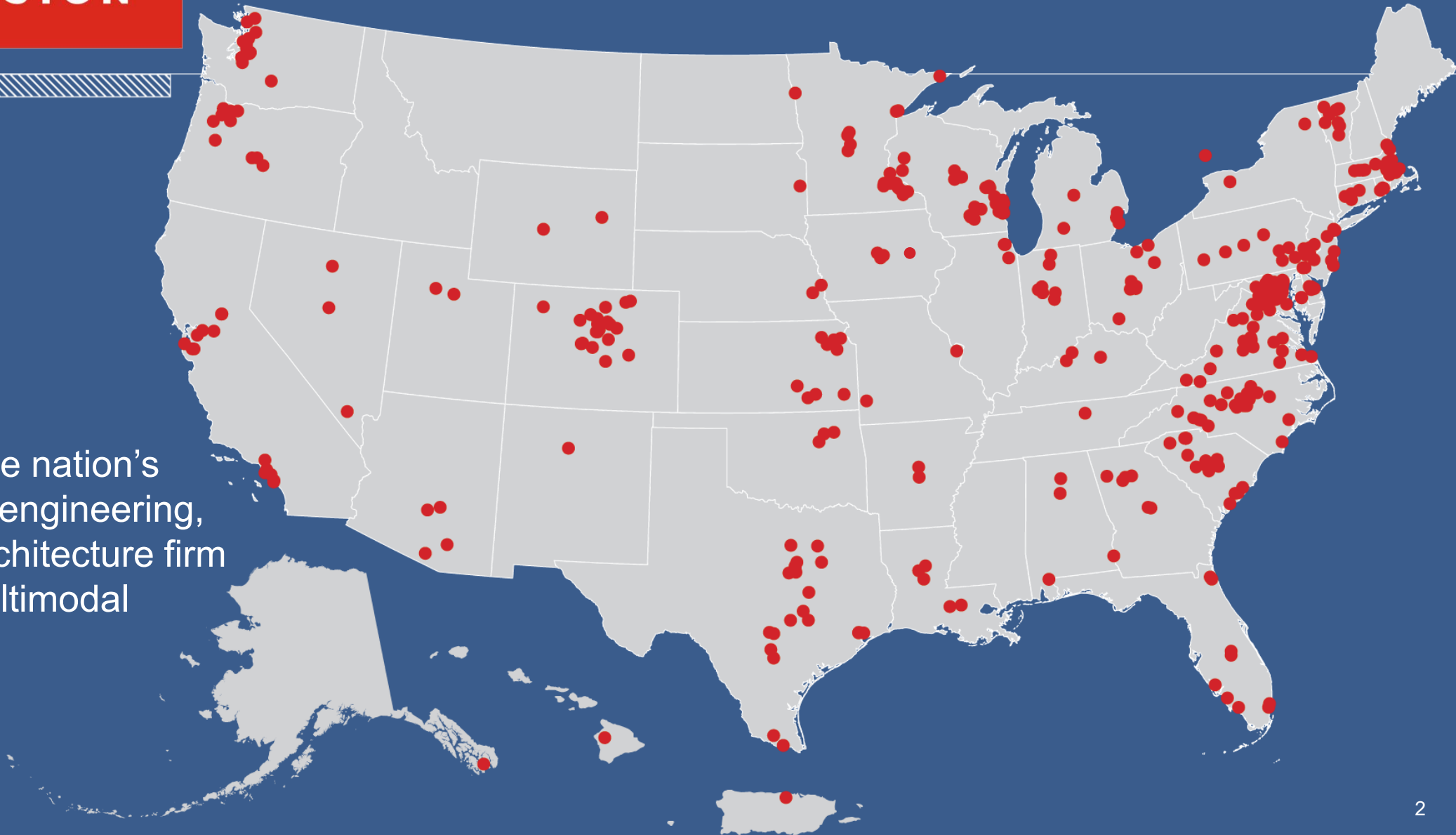
Planning and Designing Roundabouts for Multimodal Safety

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Work Experience Across the Nation

Toole Design is the nation's leading planning, engineering, and landscape architecture firm specializing in multimodal transportation.



TODAY'S TOPICS

- Multimodal considerations during the planning and design of modern roundabouts
- What's new in PROWAG
- What's new in the AASHTO Bike Guide



MODERN ROUNDABOUTS

- Circular intersection with traffic flowing around a raised center island
- **Small radius + deflected approaches = low speed**
- Entering vehicles yield to circulating vehicles
- Can be single lane or multilane
- Multiple legs & odd geometry accommodated
- **Safest Intersection Type**
 - Crashes reduced by 40% to 50%
 - Injury crashes reduced by 60% to 80%
 - Fatal crashes reduced by as much as 90%
- **Pedestrian Accessibility Challenges**



MULTILANE ROUNDABOUTS – MORE LANES, MORE PROBLEMS

- More conflict points
- Higher vehicle volume = greater exposure
- Higher vehicle speeds = shorter gaps
- Uncontrolled, one-way, two-lane crossing = multiple threat scenario



ROUNDAABOUT CAPACITY- SLIP LANES

Slip lanes can accommodate heavy turn volumes while avoiding a full multilane roundabout.

However, allowing motorists to avoid circular roadway also means they may avoid:

- horizontal deflection
- slowing to yield to other vehicles

This can lead to higher speeds at uncontrolled crossings, especially downstream



ROUNDBABOUT CAPACITY- SLIP LANES

Common Exit Ramp Approach Angles

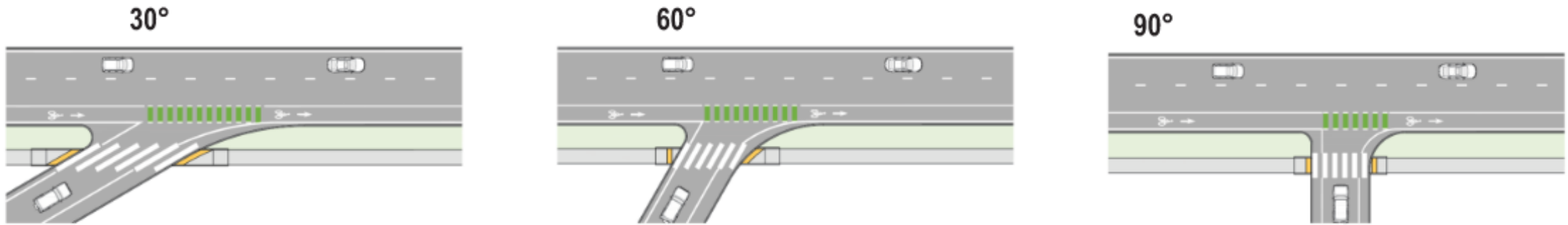


Figure 11-2: Examples of 30-, 60-, and 90-Degree Roadway Intersections

- At skewed approaches of less than 60 degrees, motorists can maintain a faster speed
- A skewed approach greater than 60 degrees can ensure a motorists needs to slow substantially or stop to view conflicting traffic
- A skewed approach of 75 to 90 degrees can assist motorists with restricted range of motion turn their bodies to view conflicting traffic

MULTILANE ROUNDABOUTS



TRUCK APRONS

Mountable truck aprons can accommodate skewed geometry or larger design vehicles more easily

- Center
- Outside aprons



TRUCK APRONS – REDUCING LANE WIDTHS



ROUNDAABOUT DESIGN APPROACH

North American Roads Roundabouts



ROUNDAABOUT DESIGN APPROACH

North American Roads Roundabouts



PROWAG – BUFFER SPACE

- Curb ramps shall be provided at both ends of crosswalk
- Where crossing is not intended, the pedestrian circulation path shall be either:
 - Separated from roadway with landscaping or other non-prepared surface or,
 - A detectable edge treatment with bottom edge 15 inches maximum above the pedestrian circulation path



PROWAG

At multi-lane segments of roundabouts and multi-lane channelized turn lanes, PROWAG ***requires*** one or more of the following:



Traffic Signal



Pedestrian Hybrid Beacon



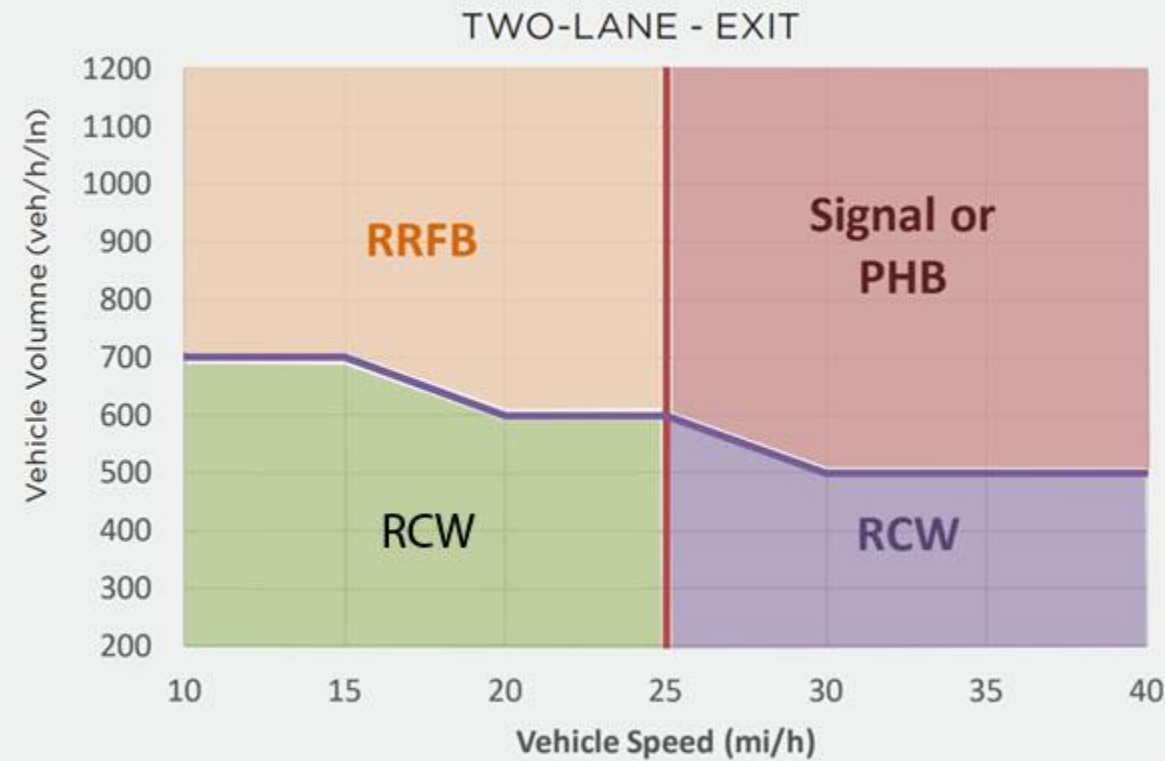
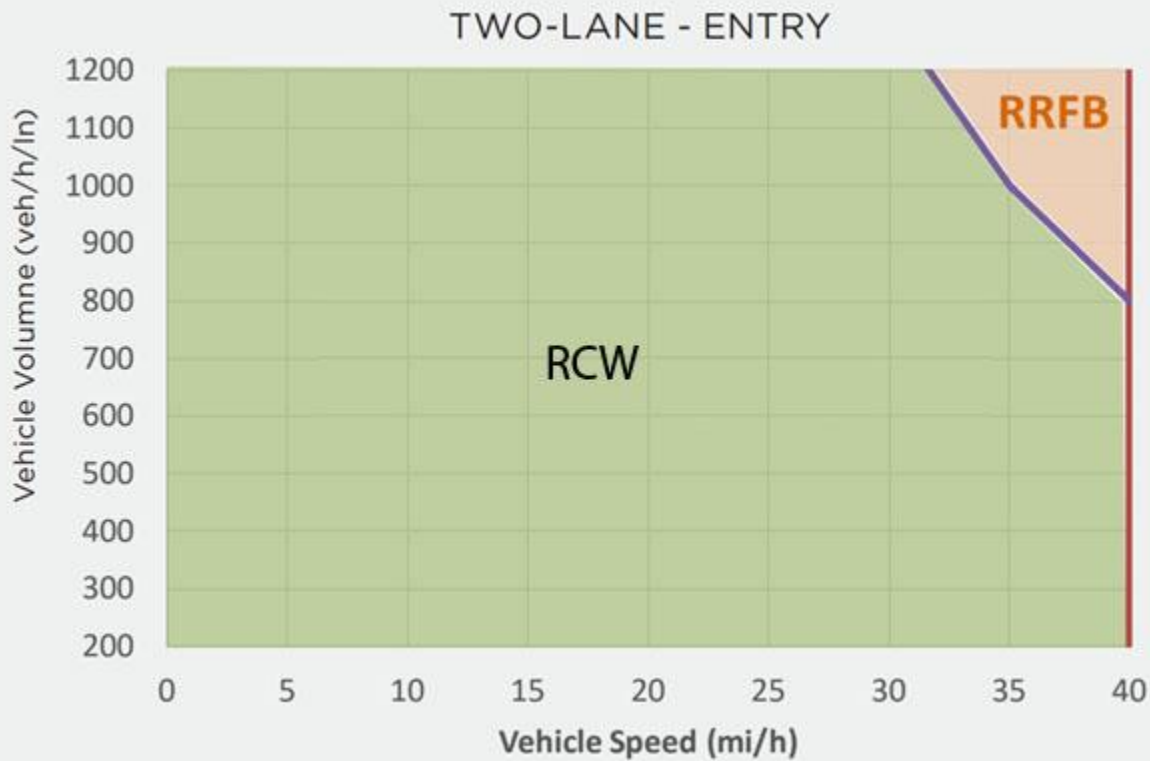
RRFB



Raised Crossing

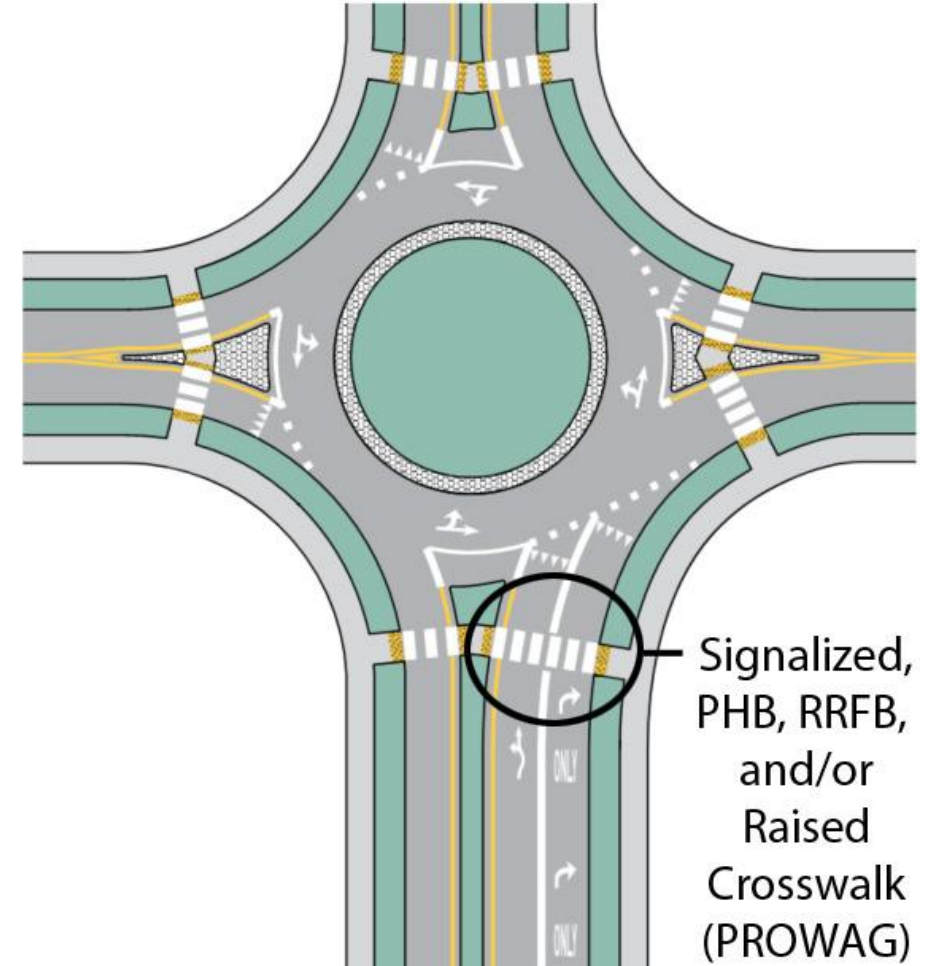
STATE GUIDANCE

FIGURE 5-15: CROSSWALK TREATMENT RECOMMENDATIONS FOR TWO-LANE ROUNDABOUTS IN LOW NOISE ENVIRONMENTS

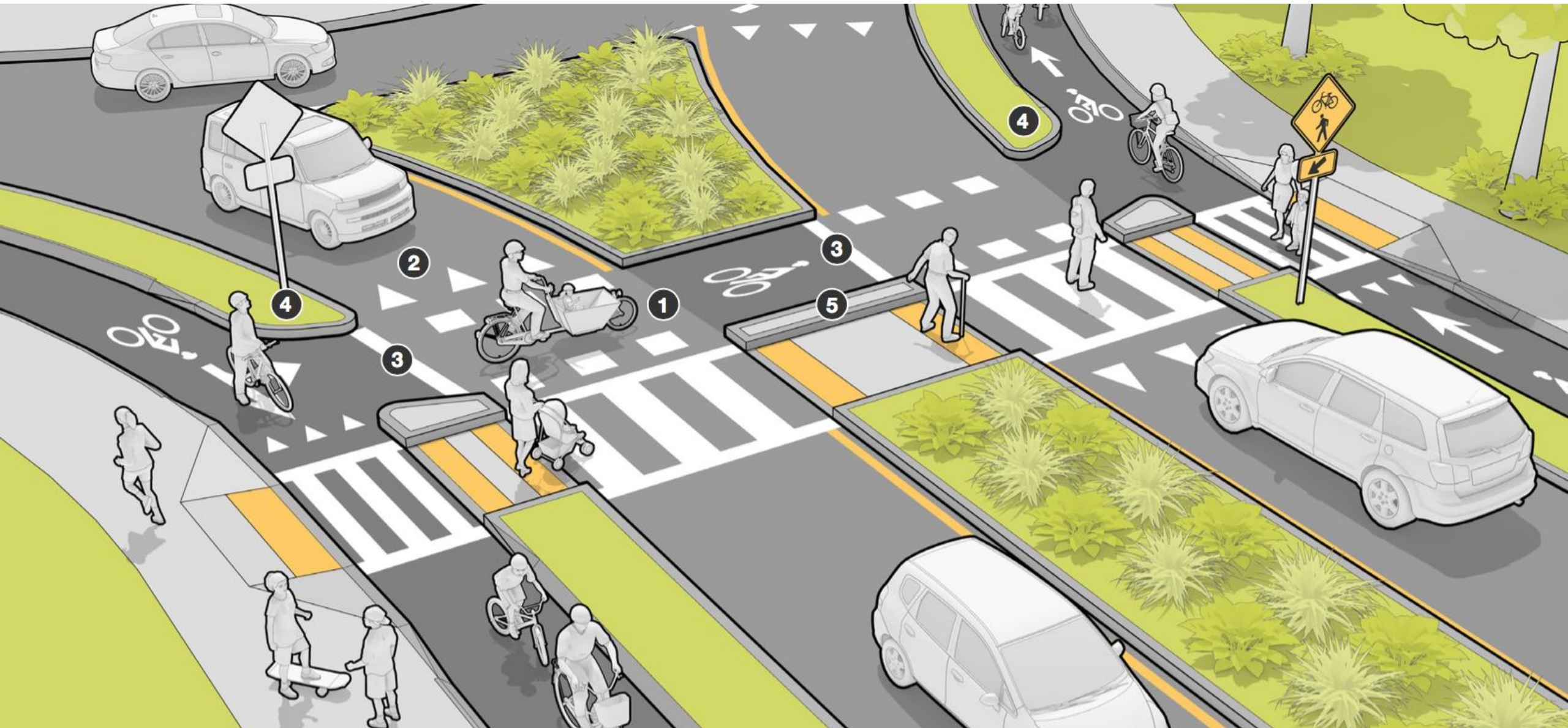


MUTCD

- The MUTCD illustrates multilane roundabouts with crosswalks, but does not address crossing guidance or requirements
- The MUTCD prohibits conventional bike lanes in a roundabout – on street bike facilities must transition to shared lane conditions, or exit the roadway to a shared use path



SEPARATED BIKE LANES AT ROUNDABOUTS



SEPARATED BIKE LANES AND SHARED USE PATHS

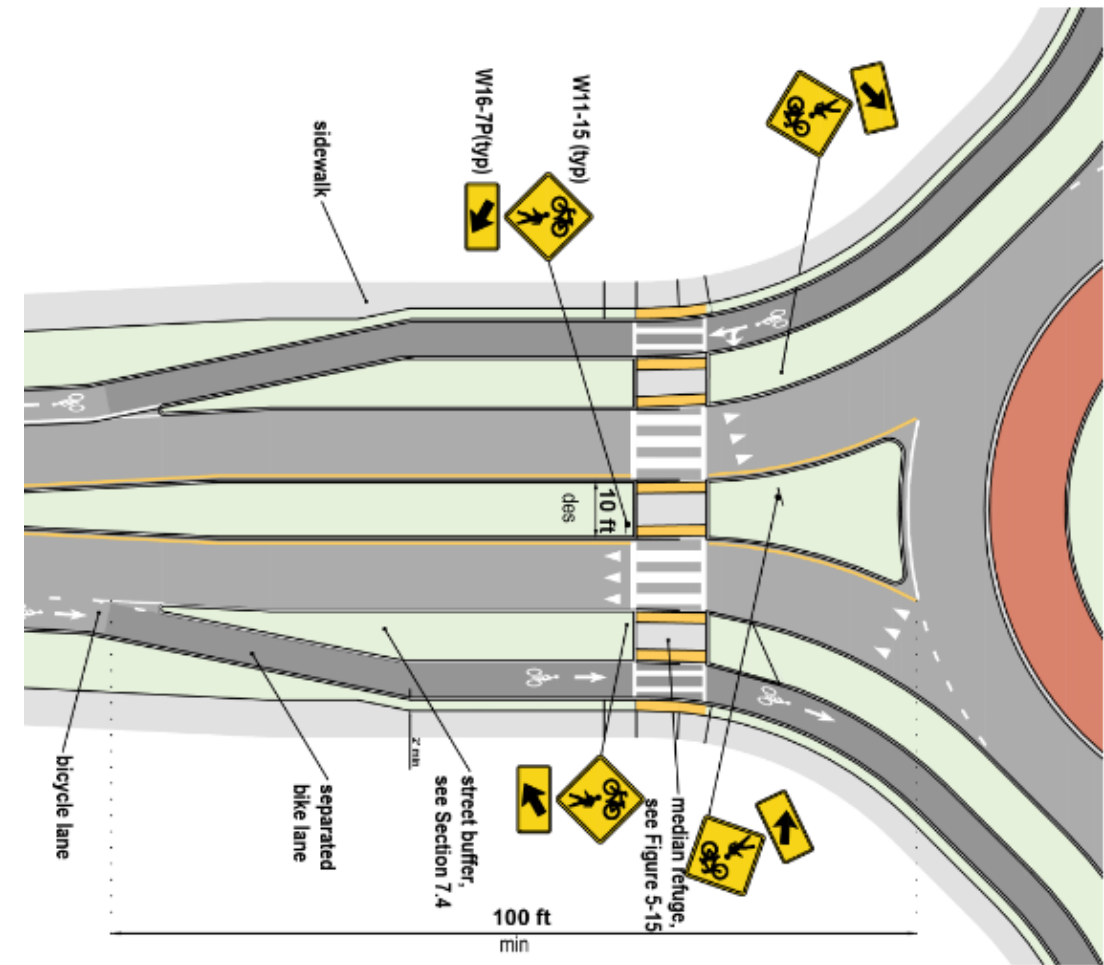


Figure 11-17: Typical Layout of Separated Bike Lanes at Roundabout

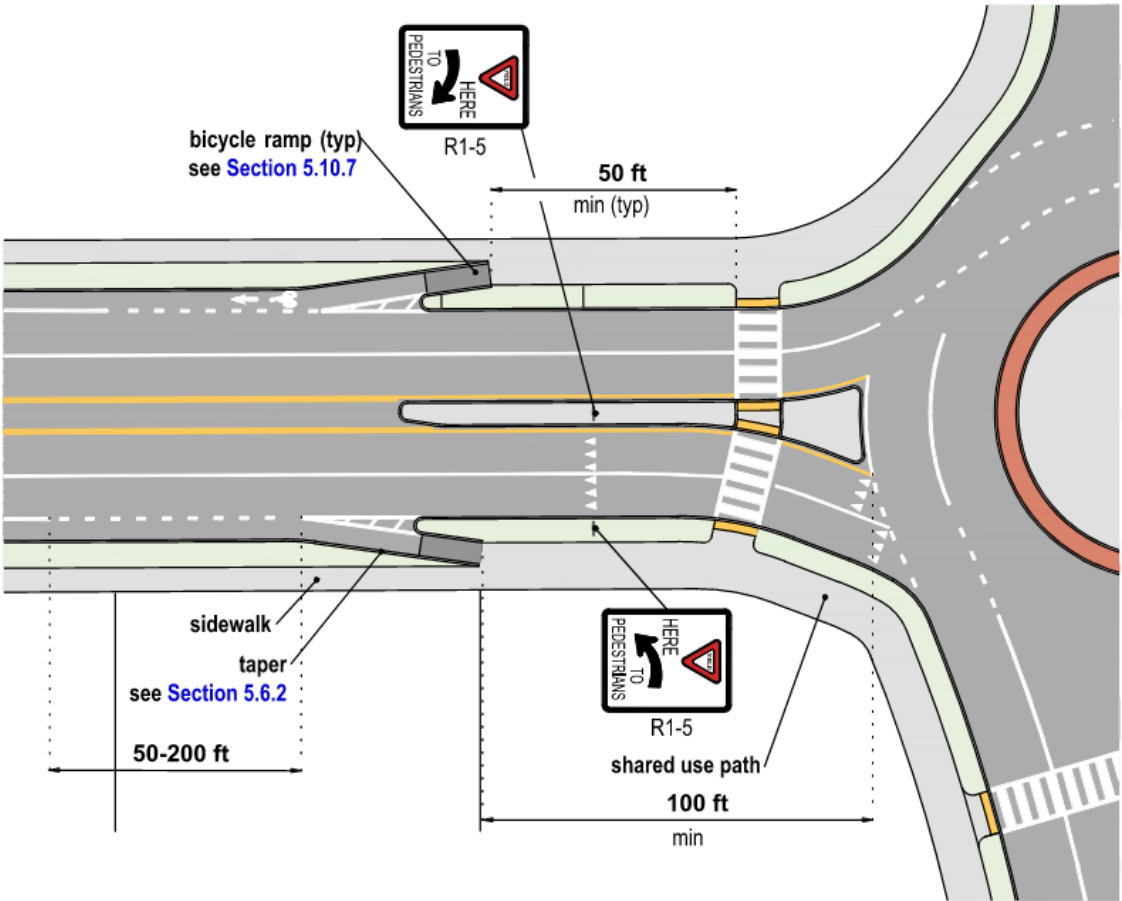
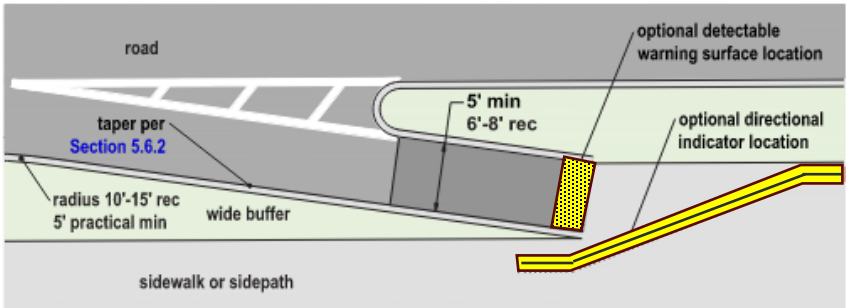
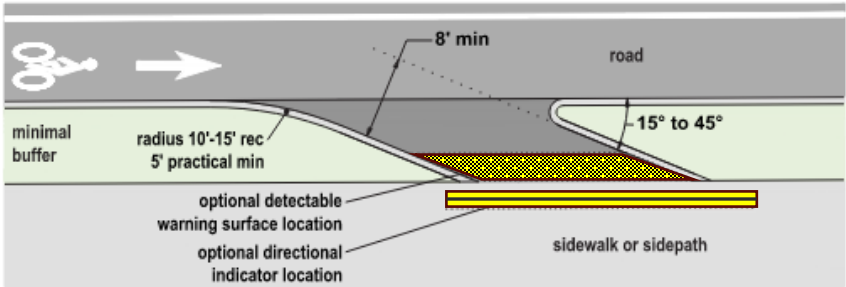


Figure 11-16: Typical Layout of Bike Lane Transitions to Shared Use Path at Multilane Roundabout with Bike Ramps

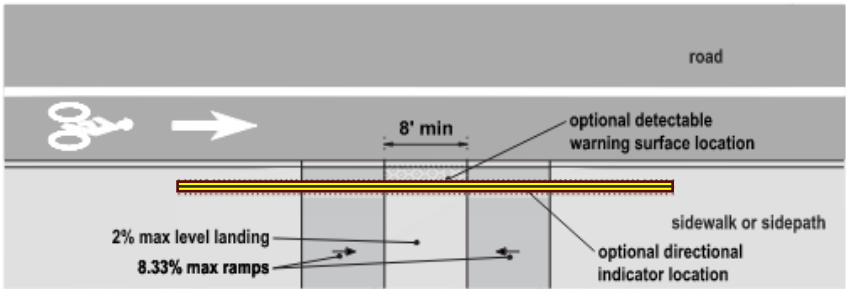
BIKE RAMP



Detail 1—Preferred bicycle ramp alignment with wide sidewalk buffer



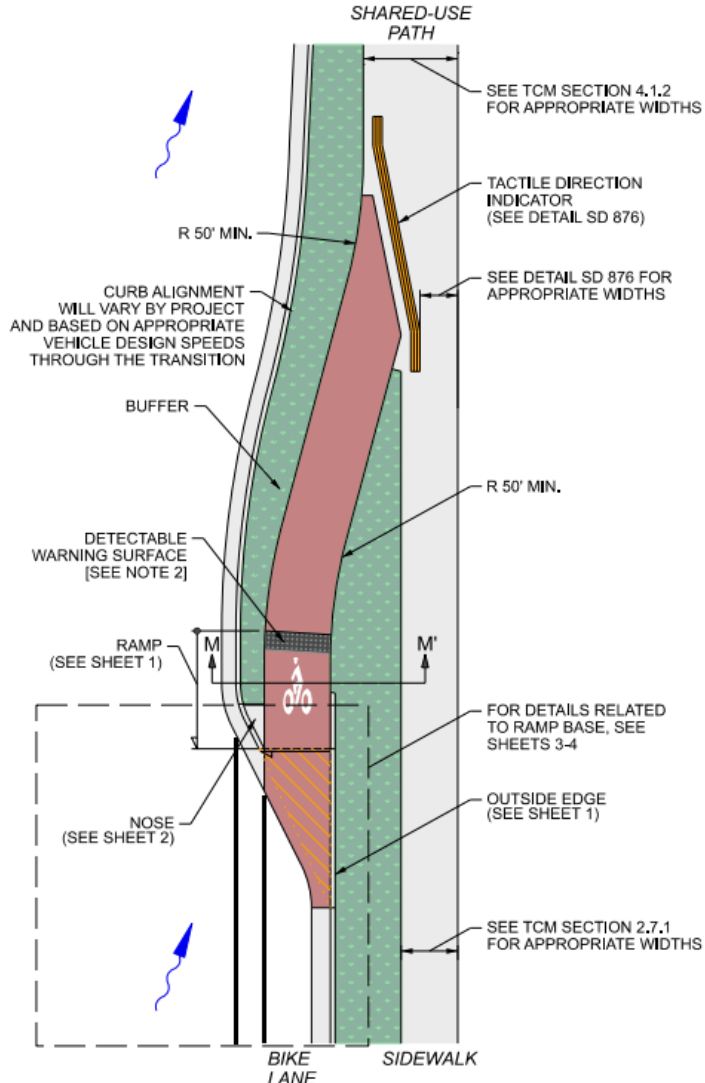
Detail 2—Lateral shift bicycle ramp alignment with minimal width sidewalk buffer



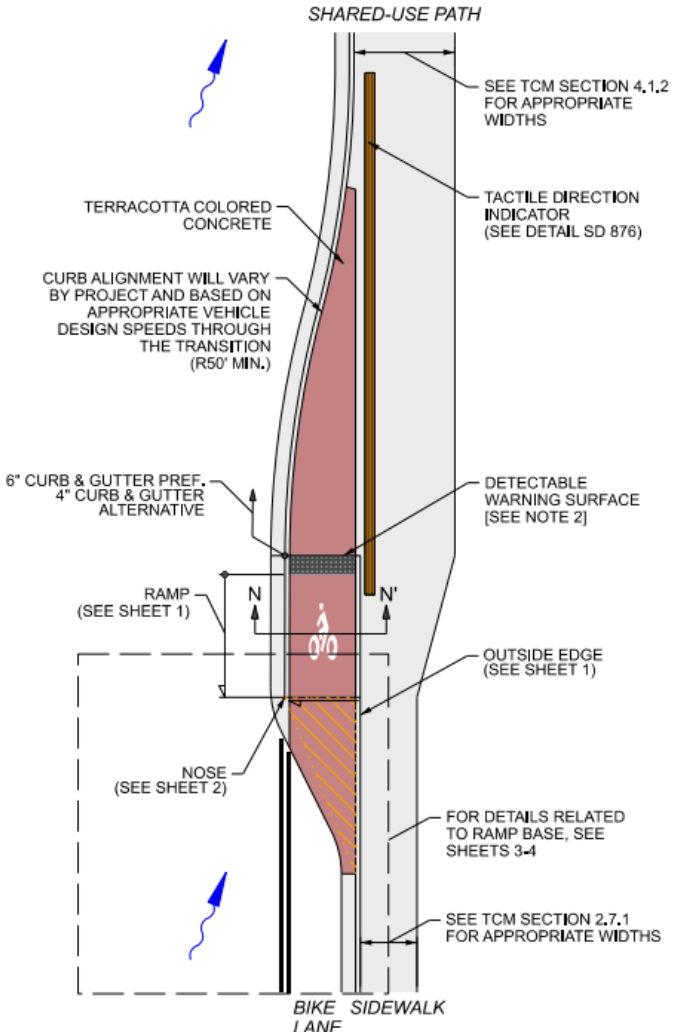
Detail 3—Parallel bicycle ramp with no sidewalk buffer

Note: Directional indicators are an emerging treatment. See Section 5.10.8 for recommendations for implementation.

BUFFERS ON BOTH SIDES



CONSTRAINED EXAMPLE WITH NO BUFFERS



CITY OF AUSTIN TRANSPORTATION PUBLIC WORKS		BIKE RAMPS SHARED-USE PATH TRANSITIONS	
		THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR APPROPRIATE USE OF THIS STANDARD.	STANDARD NO. SD 440-2 5 OF 7

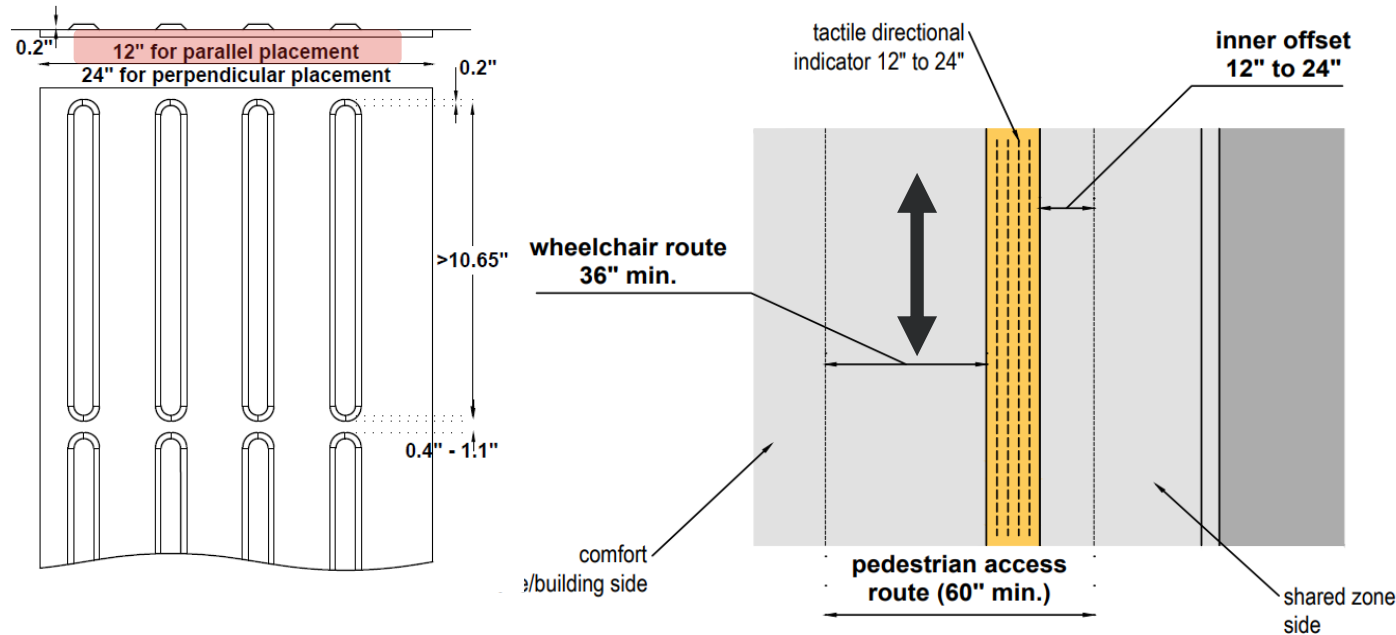
TACTILE WALKING SURFACE INDICATORS

Tactile Walking Surface Indicators (TWSI) include:

- ***Detectable Warning Surfaces (DWS)*** to warn users of a change from pedestrian circulation route to vehicle travel lane.
- ***Tactile Direction Indicators (TDIs)*** to guide users along a pedestrian circulation route
- ***Sidewalk Alert TDIs*** to alert users of a non-standard crossing, such as a midblock crossing

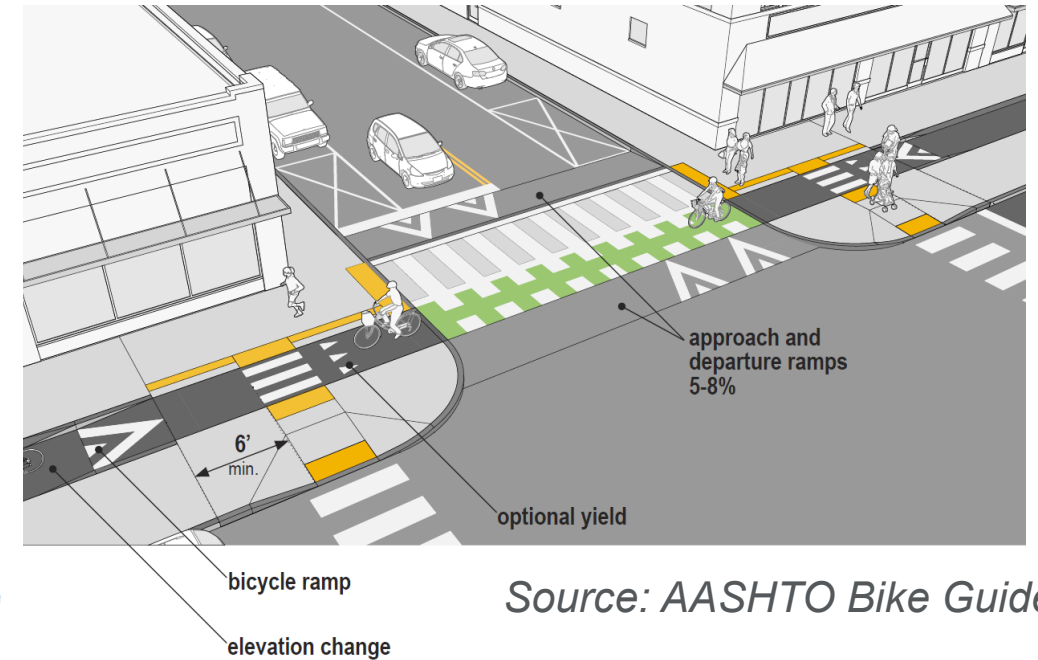
TACTILE DIRECTION INDICATORS

- Bars oriented parallel to pedestrian path
- Guide users along pedestrian path



Plan View of Direction Indicators

Source: Montgomery County Accessibility Guide

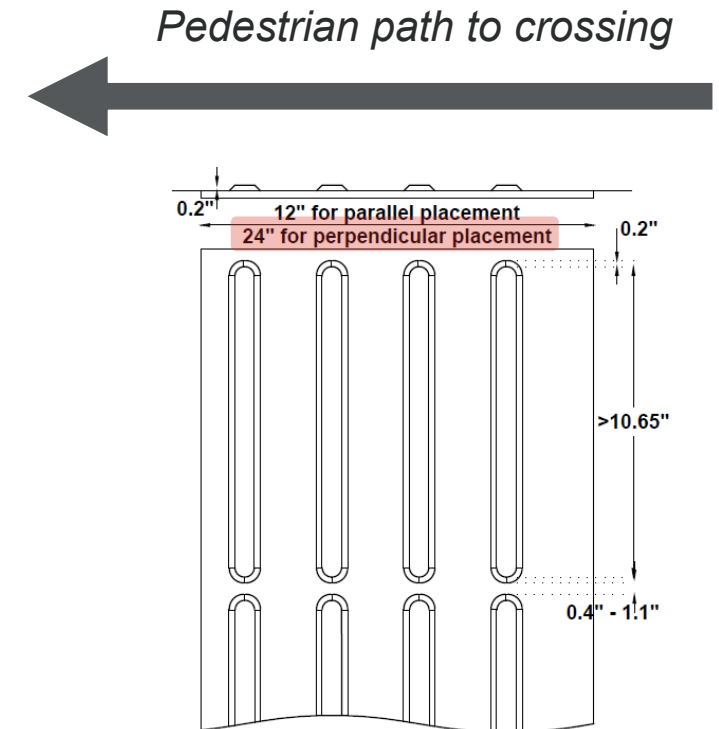


Source: AASHTO Bike Guide

SIDEWALK ALERT TDIS

- Bars oriented perpendicular to pedestrian path
- Guide users to non-intersection crossing or transit stop

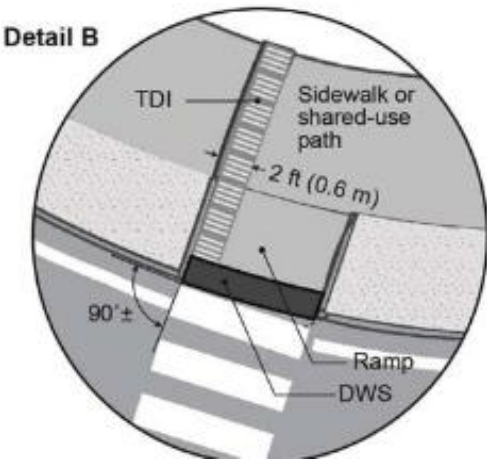
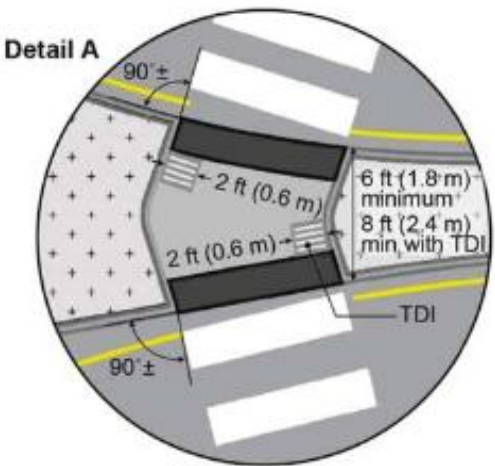
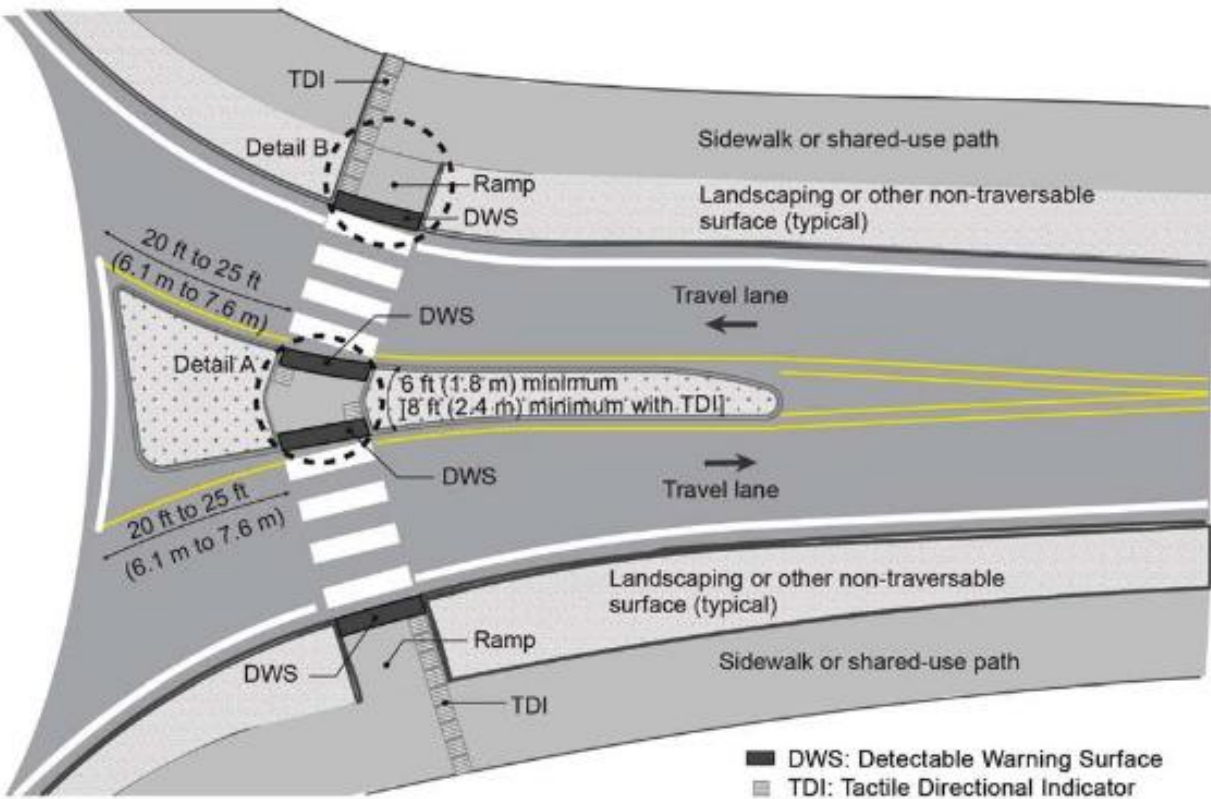
Figure 13: Example of sidewalk alert TDI
(Source: Jennifer Graham, Accessible Design for the Blind)



SIDEWALK ALERT TACTILE DIRECTION INDICATORS



Exhibit 10.27. Typical features and dimensions of angled crossing.



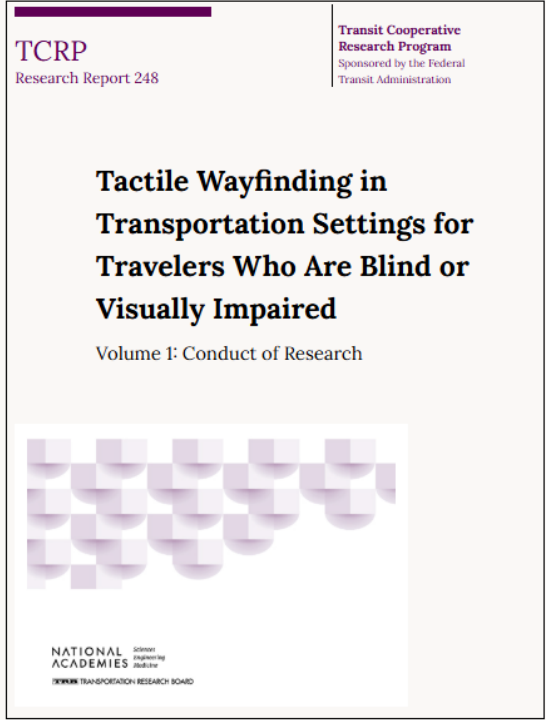
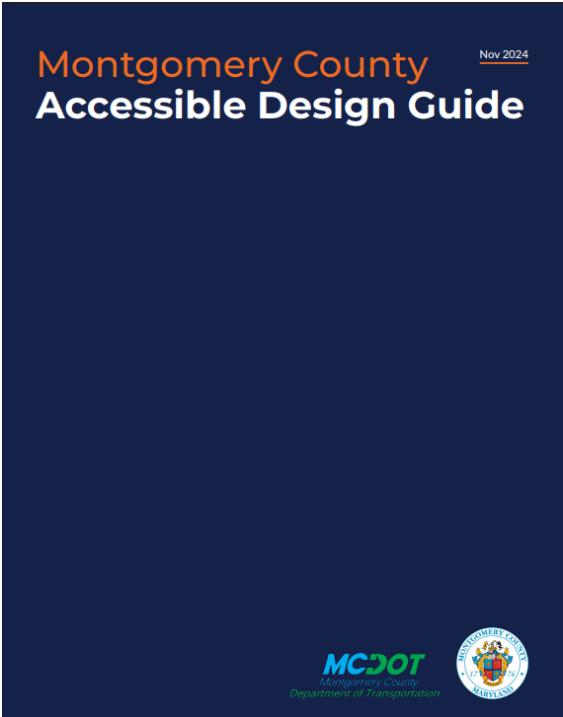
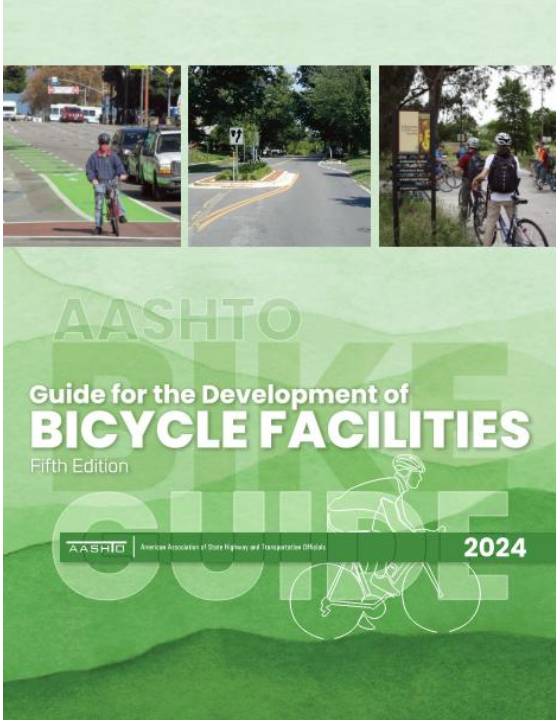
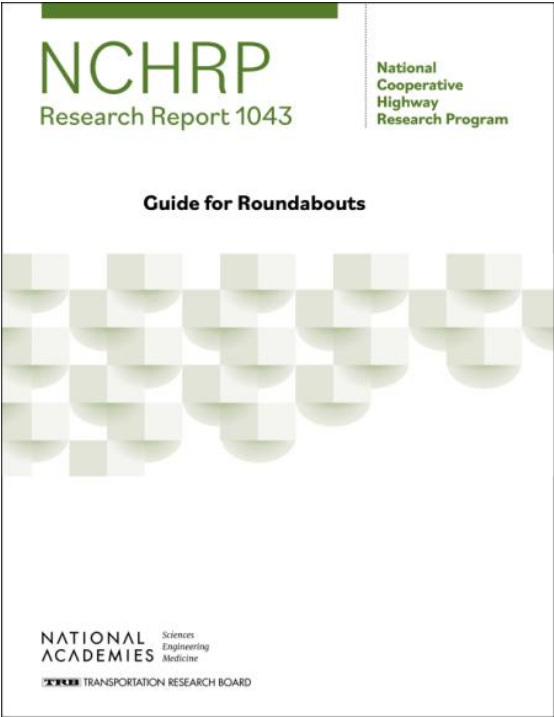
DIRECTIONAL INDICATORS – AASHTO BIKE GUIDE

Common Mistakes:

- Used as an edge treatment
- Too narrow
- Direct people into obstructions



DIRECTIONAL INDICATORS – RESOURCES



COMPACT ROUNDABOUT EXAMPLES



[Vienna, Virginia](#)

COMPACT ROUNDABOUT EXAMPLES



[Bel Air, Maryland](#)



COMPACT ROUNDABOUT EXAMPLES



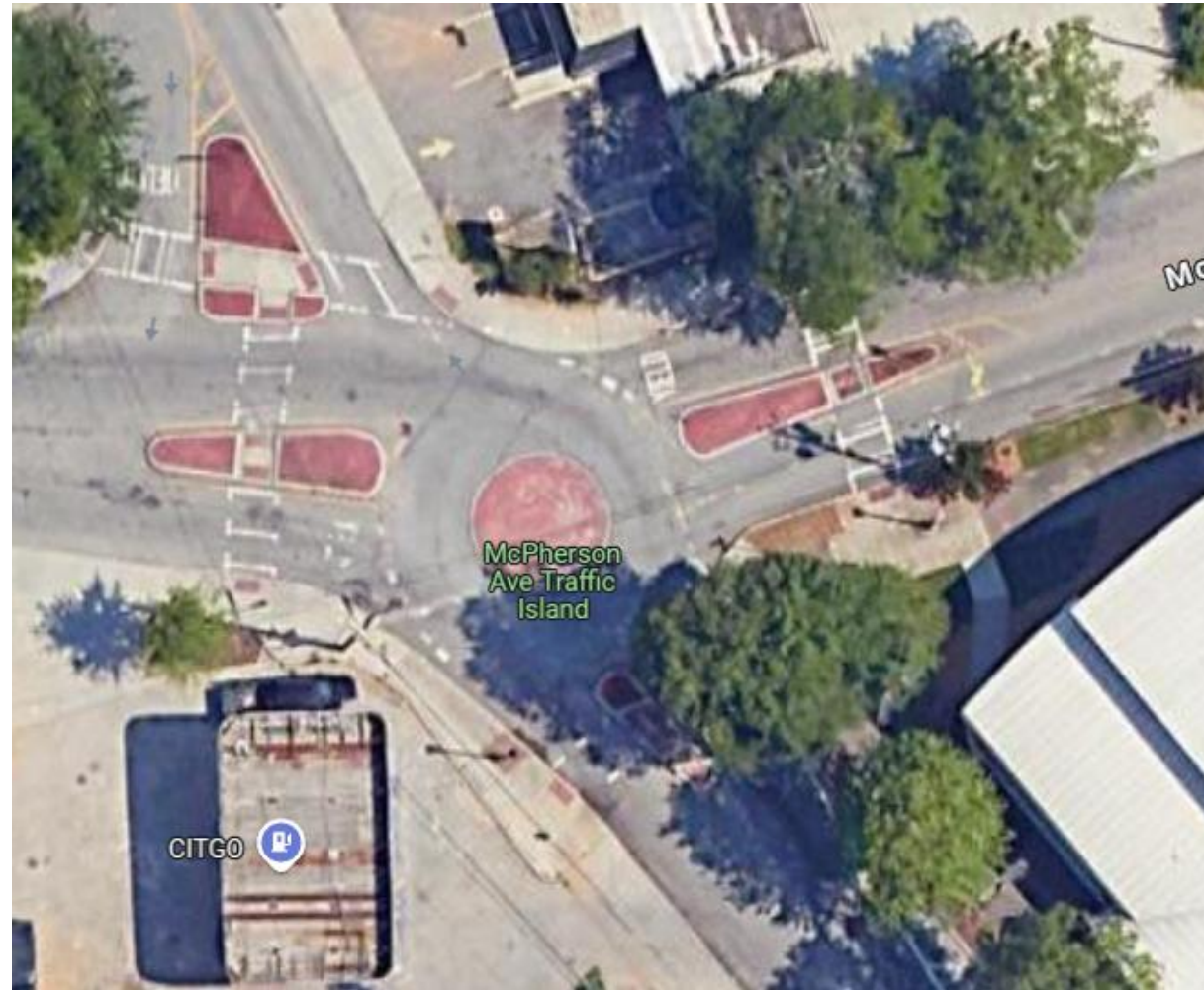
[Newark, Ohio](#)

COMPACT ROUNDABOUT EXAMPLES



[Philadelphia, PA](#)

COMPACT ROUNDABOUT EXAMPLES



[Atlanta, Georgia](#)

Questions? Discussion!

Thank you!

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