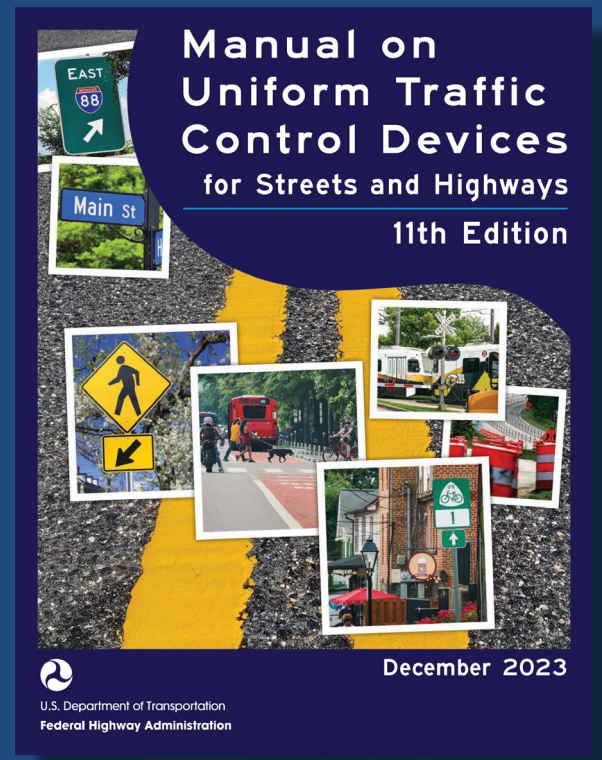
Manual on Uniform Traffic Control Devices for Streets and Highways

An Overview of Changes in the 11th Edition related to Vulnerable Road Users

As published in the December 2023 Notice of Final Rule



U.S. Department of Transportation
Federal Highway Administration

Prepared by the
Federal Highway Administration's
Office of Operations
Traffic Control Devices Program

Disclaimers

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FHWA is the source of all images in this presentation unless otherwise indicated.

Welcome!

Your Presenter

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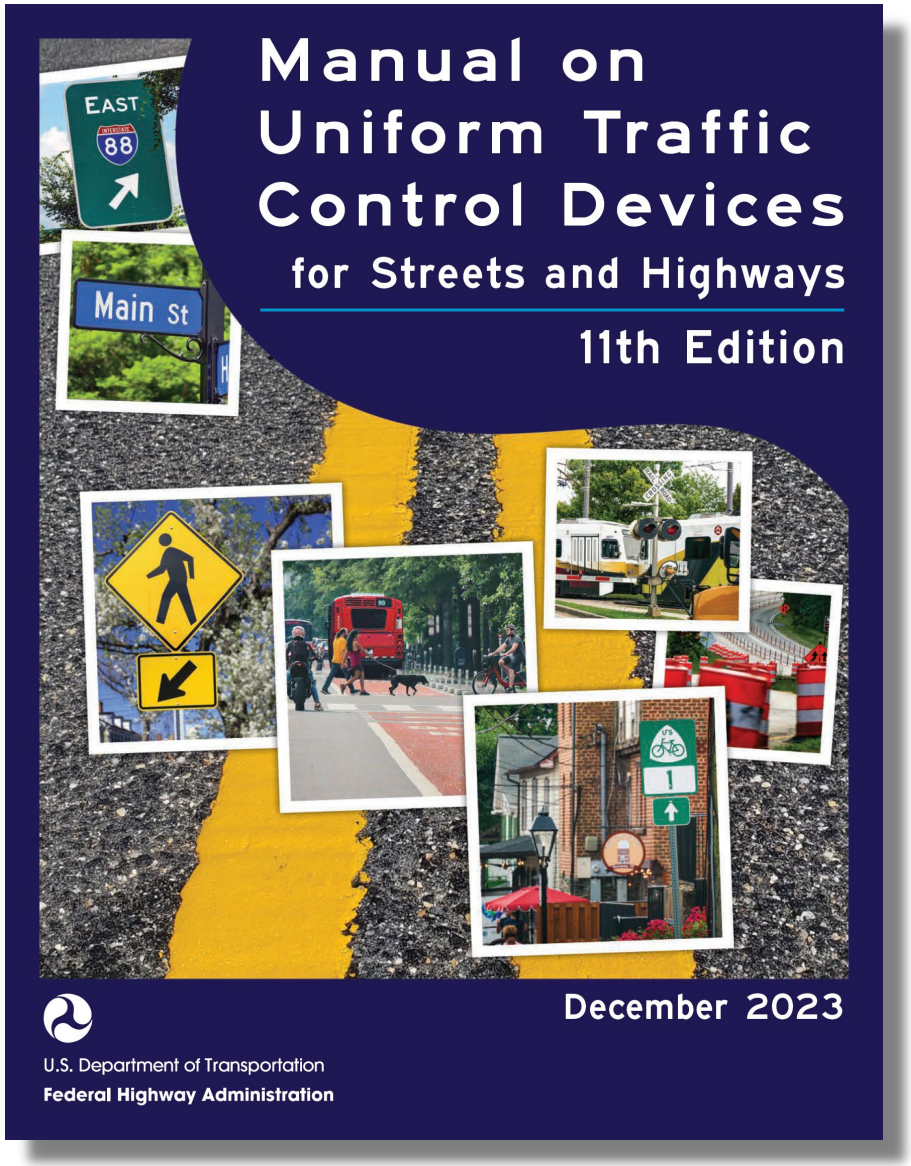

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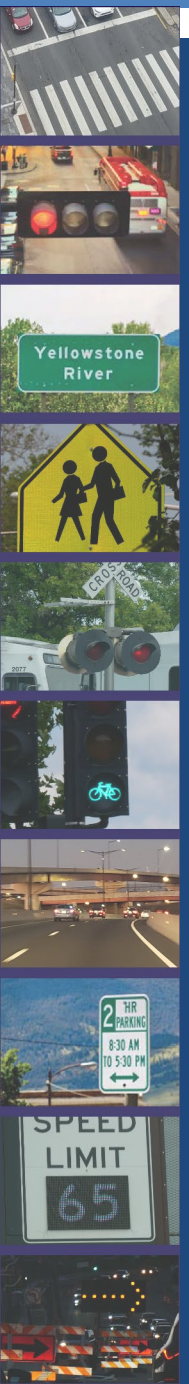
Vulnerable Road Users

- Defined in Title 23, United States Code (U.S.C.) §148(a) as a non-motorist
- Users who have little to no protection from crash forces, including pedestrians and bicyclists
- Safe mobility of vulnerable users is prominent throughout the MUTCD 11th Edition, consistent with section 11135 of the *Infrastructure Investment and Jobs Act* (IIJA, also known as the "Bipartisan Infrastructure Law")[1]

[1] Pub. L. No. 117-58 (November 15, 2021).



BACKGROUND

The MUTCD

U.S. Department of Transportation

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What is the MUTCD? (1/3)

- **The MUTCD is the national standard** for traffic control devices (TCDs)—those signs, signals, and pavement markings we see on all streets, highways, and bikeways open to public travel, regardless of funding source or jurisdiction in accordance with Federal regulations.[1]

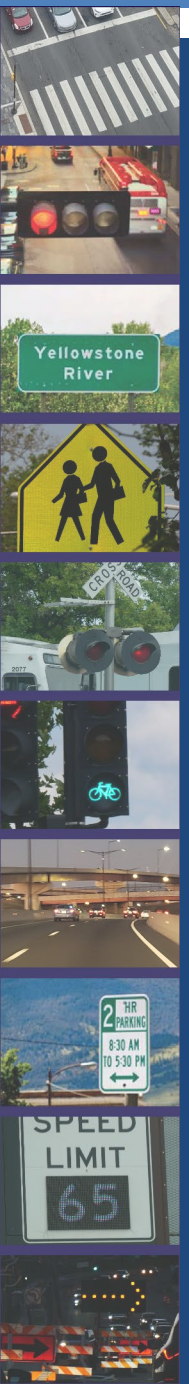
[1] 23 Code of Federal Regulations (CFR) Part 655.603.

What is the MUTCD? (2/3)

- **Not a roadway design manual:**
  - Does not dictate many policy and planning decisions made at local level:
    - Land use, zoning
    - Type and character of facility; prioritization of travel modes
- **Local agencies decide design features:**
  - Number of lanes
  - Bike or other special-use lanes
  - Access control

What is the MUTCD? (3/3)

- **The MUTCD is the standard for the devices that communicate the result of all these decisions to road users.**



ACCESSIBILITY

U.S. Department of Transportation

Federal Highway Administration

Public Right-of-Way Accessibility Guidelines (PROWAG) (1/3)

- PROWAG and the MUTCD:
  - U .S. Access Board issued PROWAG Final Rule [1]
  - PROWAG and MUTCD 11th Edition rulemakings were done concurrently:
    - Timing precluded inclusion of final PROWAG provisions in the new MUTCD
  - PROWAG provides guidelines, not enforceable Federal standards:
    - Not enforceable under the Americans with Disabilities Act (ADA) [2] until the U.S. Department of Justice (USDOJ) and the U.S. Department of Transportation (USDOT) adopt standards consistent with PROWAG through separate rulemaking processes

[1] 88 FR 53604 (August 8, 2023)
[2] Pub. L. No. 101-336 (July 26, 1990)

Public Right-of-Way Accessibility Guidelines (PROWAG) (2/3)

- PROWAG and the MUTCD:
  - MUTCD does not establish accessibility standards but addresses accessibility in certain instances
  - After the USDOJ adoption of ADA standards consistent with PROWAG, FHWA will commence rulemaking to revise the MUTCD to reflect DOJ's standards
  - Until PROWAG related standards are adopted by USDOJ and USDOT, State and local agencies have some flexibility in determining how to comply with the general obligation under Title Ⅱ of the ADA to ensure that their facilities are "accessible to and usable by" individuals with disabilities

Public Right-of-Way Accessibility Guidelines (PROWAG) (3/3)

- PROWAG and the MUTCD:
  - Agencies that already have (or plan to) adopt PROWAG prior to USDOJ and USDOT adoption are expected to adhere to those provisions
  - Accessibility standards adopted by USDOJ and USDOT cannot provide less accessibility than PROWAG and must be “consistent” with PROWAG
  - Agencies should anticipate that a future edition of the MUTCD will closely reflect the minimum accessibility guidelines established in PROWAG

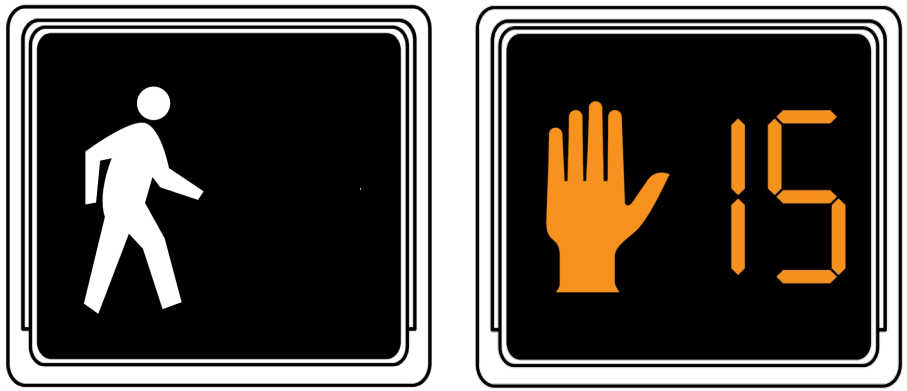
Accessibility for Pedestrians With Ambulatory Disabilities

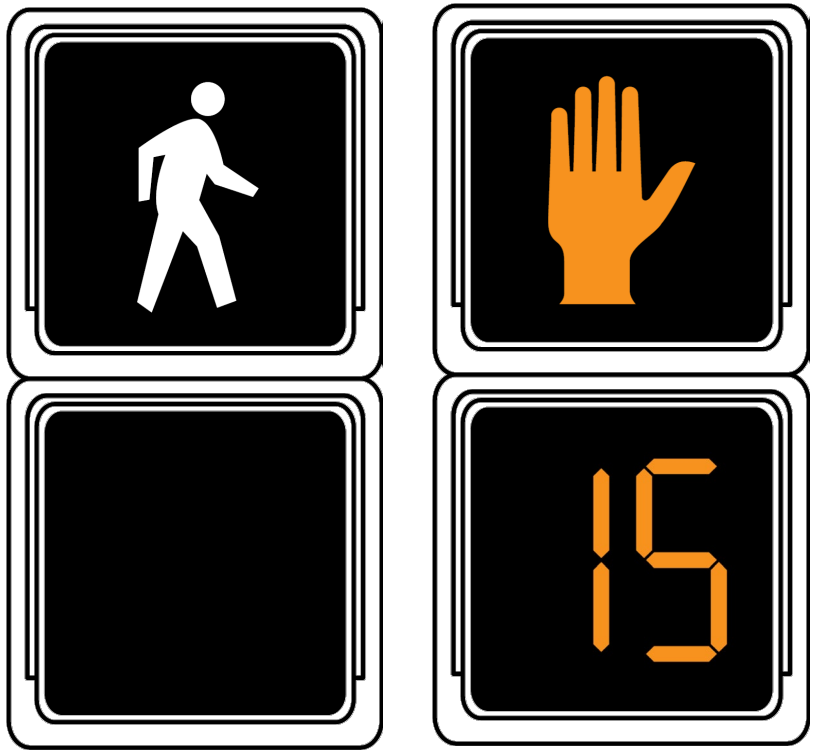
- Improves guidance on pedestrian push button proximity to sidewalk curb ramps
- Clarifies "easy activation" of pedestrian push buttons as no more than 5 pounds of force to activate
- Provides expanded guidance on push button location at intersections in section 4I.05 and figures 4I-2 and 4I-3


Photo: U.S. Access Board

Pedestrian Signal Heads

- Required in four specific cases (section 4D.02)
- Recommended at all traffic control signals with marked crosswalks:
  - Previously, decision was based on engineering judgment





Accessibility for Pedestrians With Vision Disabilities (1/2)

- Decision on when to use accessible pedestrian signals (APS) is subject to requirements of the ADA and section 504 of the Rehabilitation Act of 1973[1]
- Recommends audible information device (AID) at rectangular rapid-flashing beacons, pedestrian-actuated warning beacons, and in-roadway warning lights at crosswalks

Photo by Elizabeth Hilton


Photo by Elizabeth Hilton

[1] Pub. L. No. 93-112 (September 26, 1973)

Accessibility for Pedestrians With Vision Disabilities (2/2)

- New Chapter 4K: APS and detectors
  - Clarifies that percussive tones indicating the walk interval are required when push buttons are separated by 10 feet or more on an individual corner of an intersection
  - Specifies that speech messages indicating the walk interval are only permitted when push buttons on an individual corner of an intersection are separated by less than 10 feet
  - No implied intent to use speech messages for all corners of an intersection if 10 feet or more separation can be achieved on other corners at the same intersection

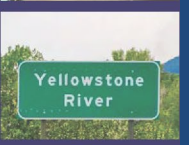
Accessibility in Work Zones (1/2)

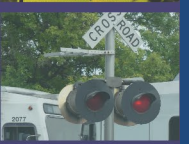
- Revised text that addresses sidewalk closure, alternate routes during construction and accessible pedestrian access
- Eliminated text that refers to a level of usage by pedestrians with disabilities as a basis for taking certain accessibility-related actions
- Eliminated text suggesting accommodation of pedestrians with disabilities is sometimes unnecessary

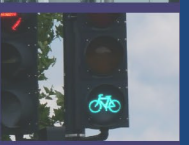
Accessibility in Work Zones (2/2)

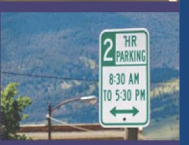
- For blocked routes and alternate crossings:
  - Recommends audible information to match signing messages provided for sighted pedestrians
  - Audible messages can be activated by passive detection (preferred), push button detection, or continuously played
  - Recommends a locator tone if a push button is used

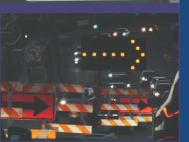










TRAFFIC SIGNALS AND PEDESTRIAN HYBRID BEACONS

Warrants

Research Needs

U.S. Department of Transportation

Federal Highway Administration

Traffic Signal Warrants

- Traffic signal warrants changed from standard to guidance
- Reinforces that other factors, beyond the warrants, be considered as part of the engineering study to justify installation of traffic control signals
- Agencies have more flexibility to consider other relevant factors in addition to reliance on the numerical warrant analysis alone

Warrants for Pedestrian Hybrid Beacons (PHBs)

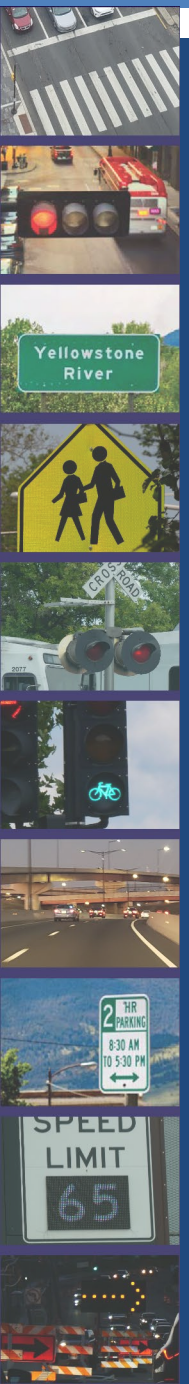
- New provisions to support expanded use:
  - Option to reduce vehicle and pedestrian thresholds by up to 50% based on usage by slower walking pedestrians
  - Agencies have flexibility to consider other relevant factors in addition to reliance on the volume thresholds alone

Ongoing Research on Pedestrian Needs

- National Cooperative Highway Research Program (NCHRP)

  Project 03-143 – *Framework and Toolkit for Selecting Pedestrian Crossing Treatments:*

  - Examines updates to the vehicular and pedestrian volume thresholds for traffic control signals, pedestrian hybrid beacons, and other pedestrian-actuated warning devices.
  - Examines latent pedestrian demand, land use, and context to develop additional tools to assist in selecting the appropriate traffic control device to improve safety for pedestrians.



MARKED CROSSWALKS

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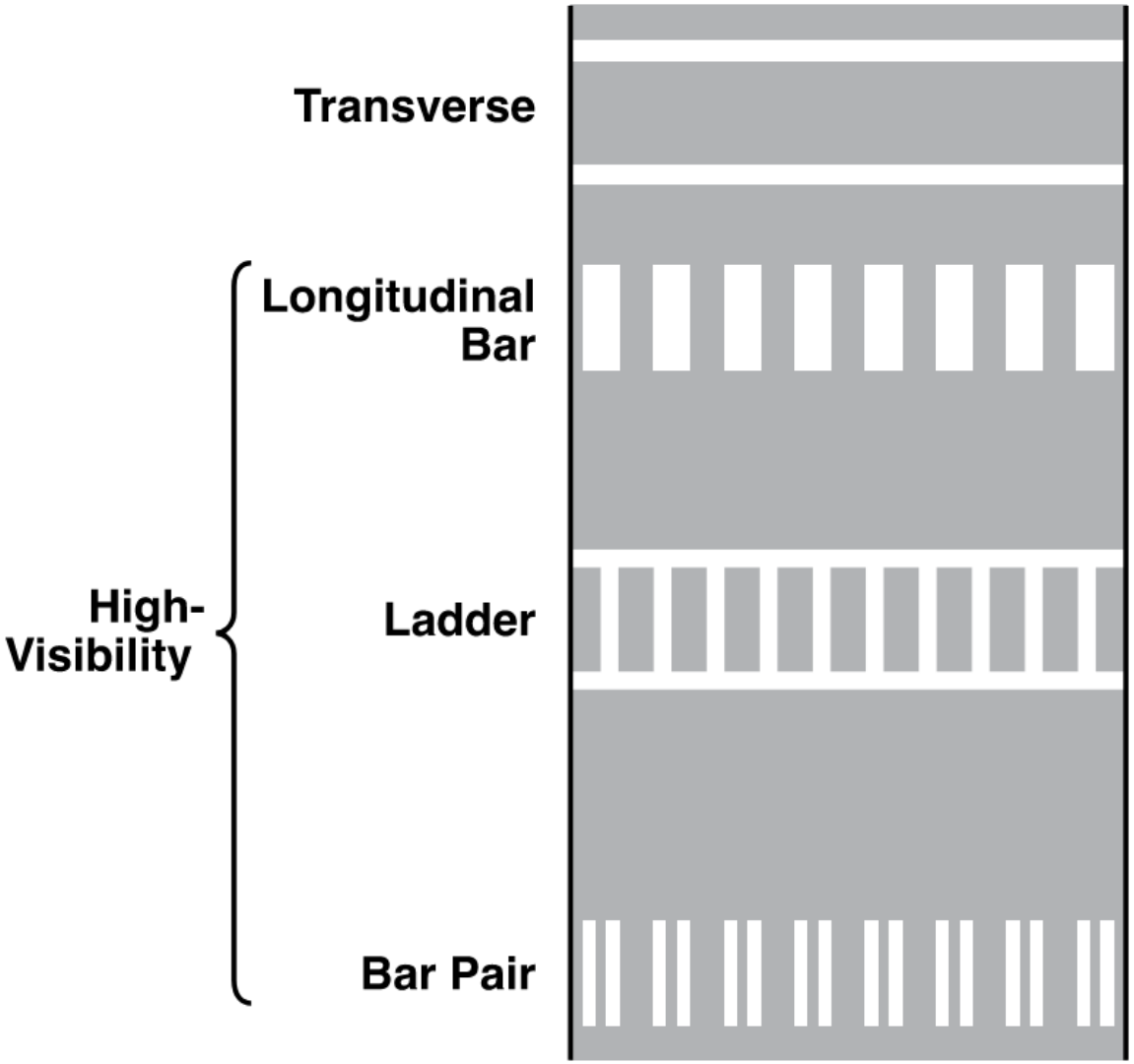
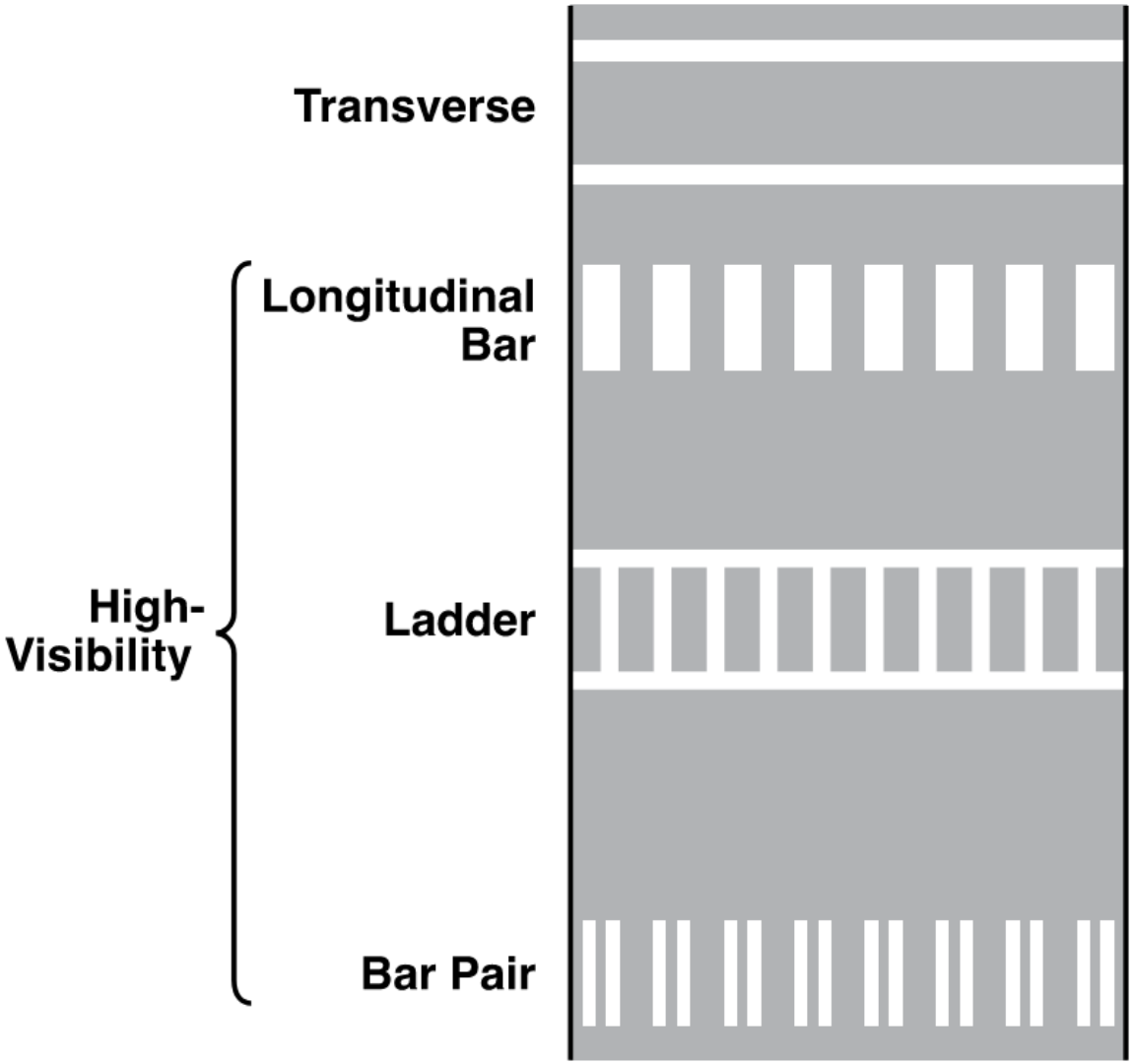
Marked Crosswalks (1/2)

- **Recommended** at locations controlled by traffic control signals
- Uncontrolled crosswalks:
  - **Revised criteria** for engineering study



Marked Crosswalks (2/2)

- **Types** of crosswalk markings:
  - Transverse line:
    - **Recommended** to extend the full width of the pavement or edge of intersecting crosswalk
  - High visibility:
    - **Recommended** at non-intersection locations

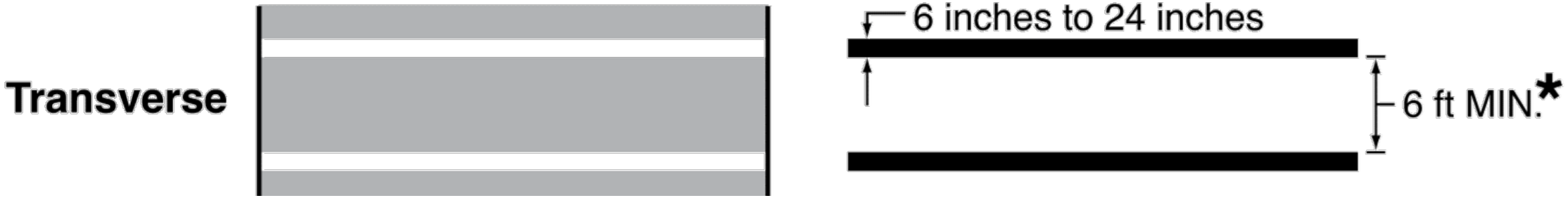


Crosswalk Markings at Non-intersection Crossings

- Crosswalk markings at non-intersection locations with legally established crosswalks
- Recommends other traffic control devices in addition to crosswalk markings at locations:
  - Posted speed limits of 40 mph or greater
  - Locations where there is a crash threat due to multiple lane crossings or limited sight distance
  - When adequate visibility cannot be provided by parking prohibitions

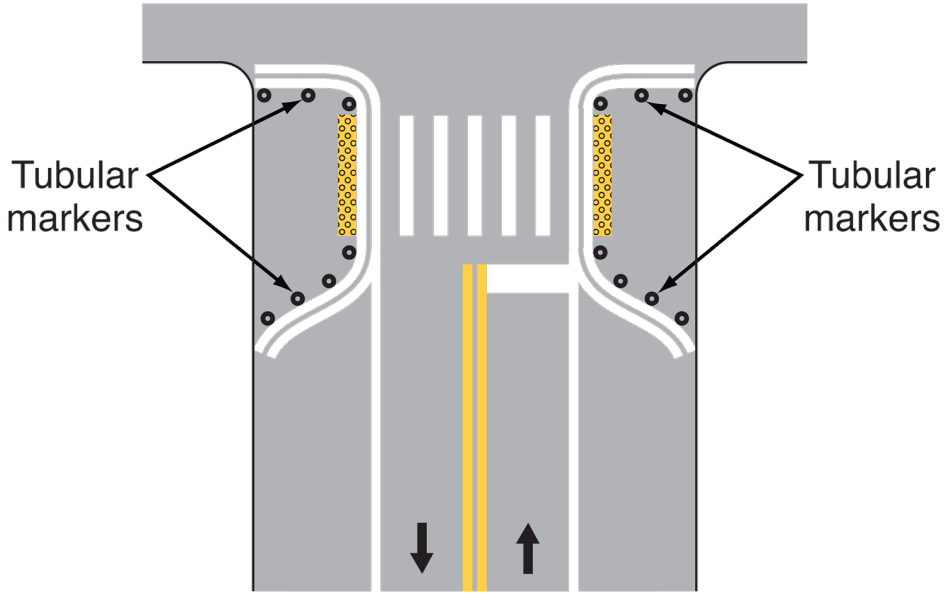
Design of Crosswalk Markings

- Paving materials used as transverse lines **required** to be retroreflective
- New marked crosswalk Standards
  - 6 ft minimum width
  - 8 ft minimum for crosswalks at non-intersections where the posted speed limit is 40 mph or greater
  - Where curb ramps provided, they are contained within the extension of the crosswalk markings



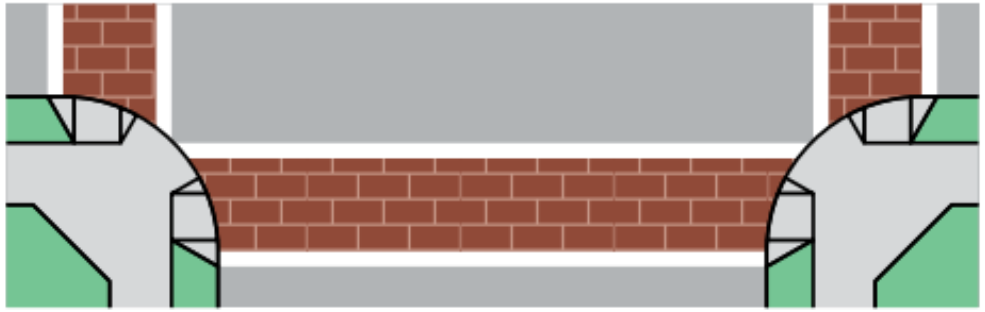
Sidewalk Extensions

- New provisions address sidewalk extensions designated by pavement markings (not physical construction)
  - Recommends that channelizing devices be used to provide enhanced conspicuity
  - Can be used to:
    - Extend the sidewalk or other pedestrian space
    - Reduce pedestrian crossing distance
    - Alter roadway geometry for speed management
    - Improve pedestrian safety

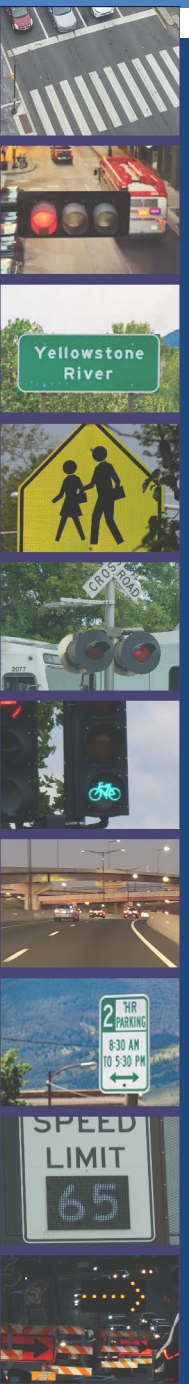


Aesthetic Surface Treatments

- Differ from colored pavement:
  - Aesthetic treatments serve no traffic control purpose and are not traffic control devices
  - Colored pavement serves a traffic control purpose (as specified in the MUTCD)



- MUTCD does not prohibit aesthetic surface treatments but does limit how they interact with official traffic control devices:
  - Cannot mimic, obscure, or otherwise adversely impact the effectiveness of traffic control devices



BICYCLE FACILITIES

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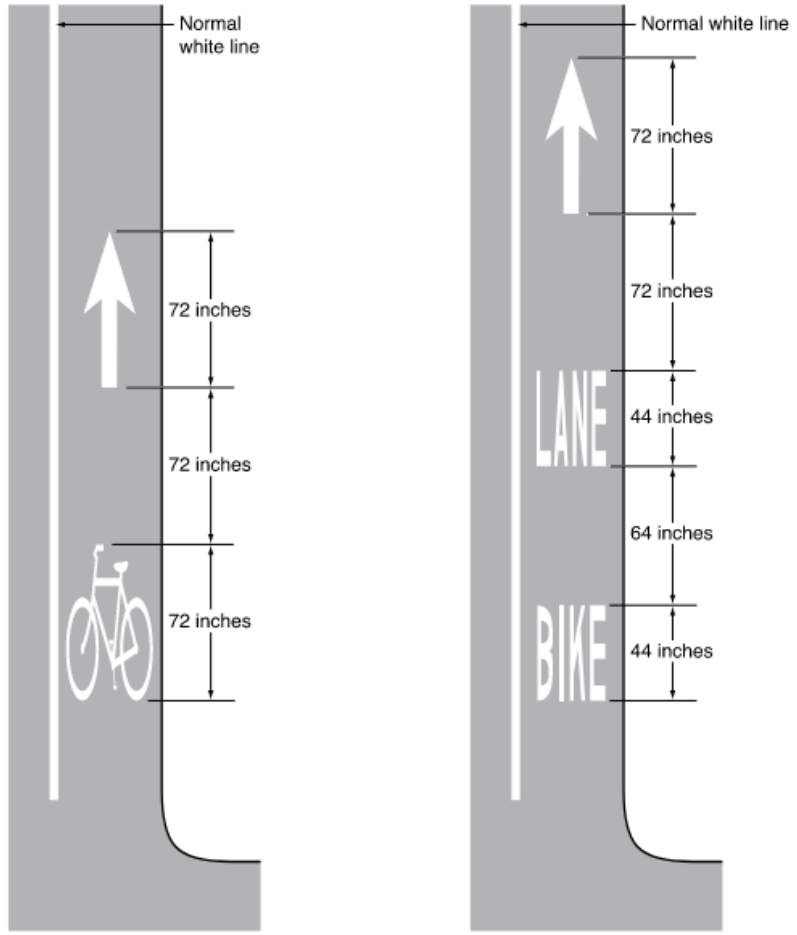
Bicycle Lanes

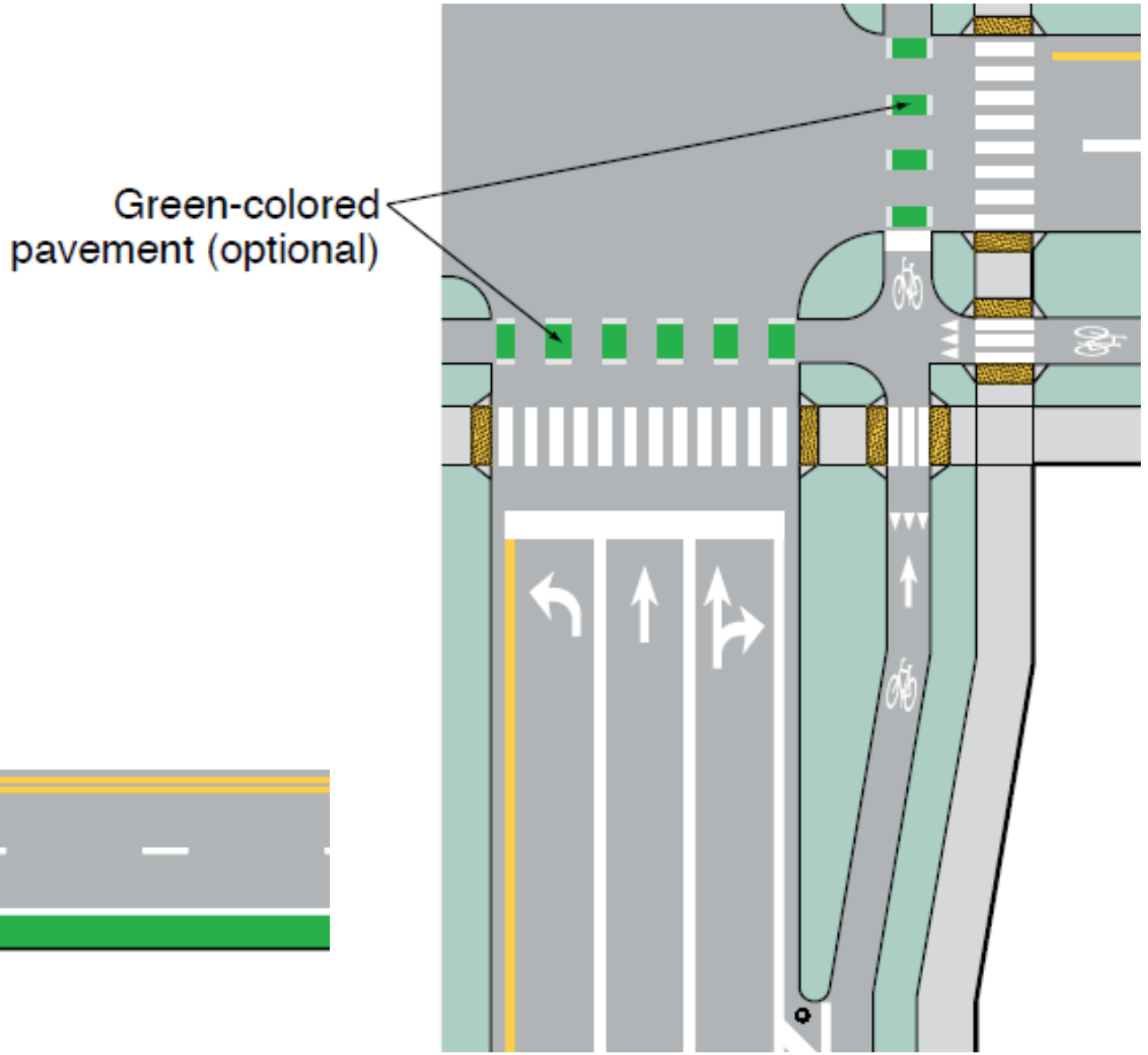
- Pavement markings on bicycle facilities shall be retroreflective unless the pavement markings are visible under provided lighting
- Longitudinal pavement markings AND bicycle lane symbol or word markings shall be used to define bicycle lanes
- Portion of the travel way cannot be both a shoulder and a bicycle lane

Figure 9E-1. Word, Symbol, and Arrow Pavement Markings for Bicycle Lanes



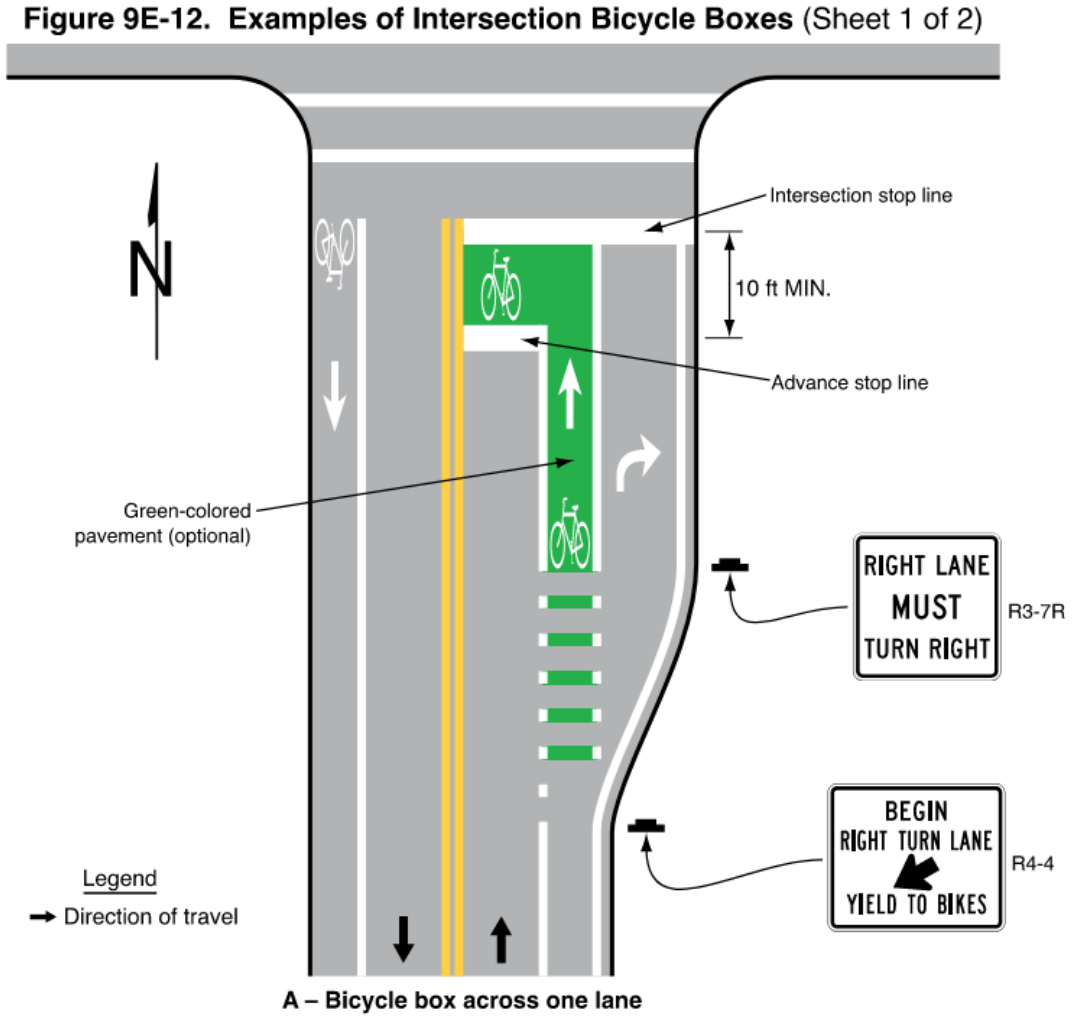
Green-Colored Pavement

- **Green-colored pavement** enhances conspicuity of bicycle lanes and bike lane extensions and can enhance conspicuity of certain bicycle lane symbols and arrows.



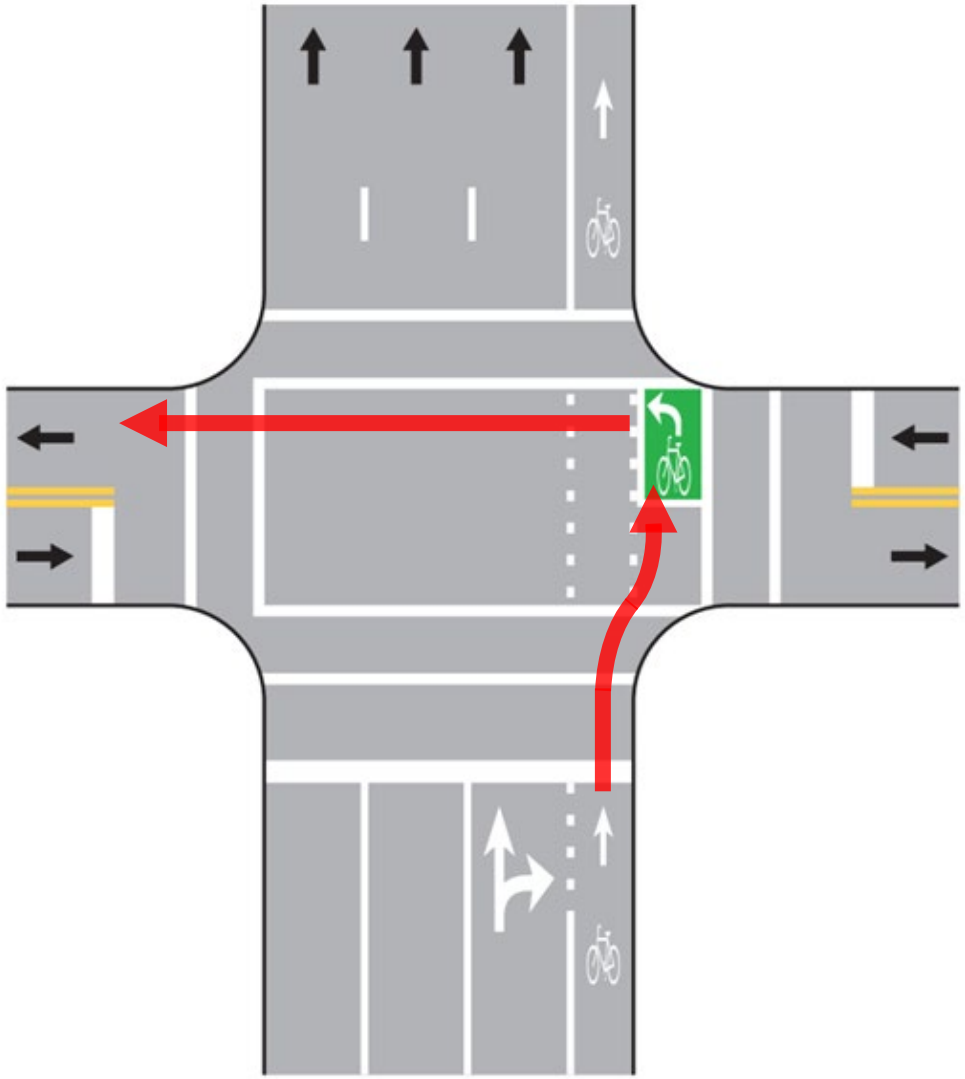
Bicycle Box

- New section and new figure
- Locations, markings, signal yellow change and red clearance intervals, and countdown pedestrian signals required when the bicycle box extends across more than one approach lane of motor vehicles
- Right-on-red is prohibited when box present



Two-Stage Bicycle Turn Box

- Allows bicyclists to make easier left turns in urban areas
- Bicyclists cross intersection to the designated area, then complete their turn when cross traffic gets green signal (two stages)
- Can be made mandatory for bicycle turns (regulatory signs) or optional for bicycle turns (guide signs)



New Bicycle Facilities Signs

R4-19

R10-40

R10-40a

R10-41

R10-41a

R10-41b

R10-41c

W16-21P

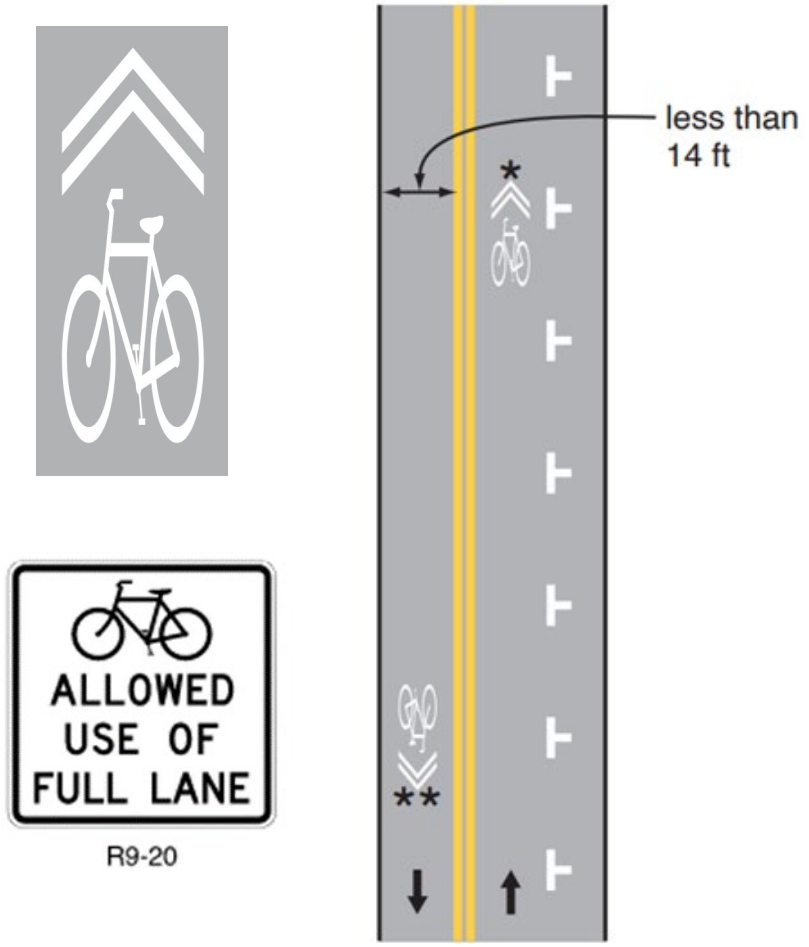
D2-2a

M1-9

M1-8b

Shared-Lane Marking

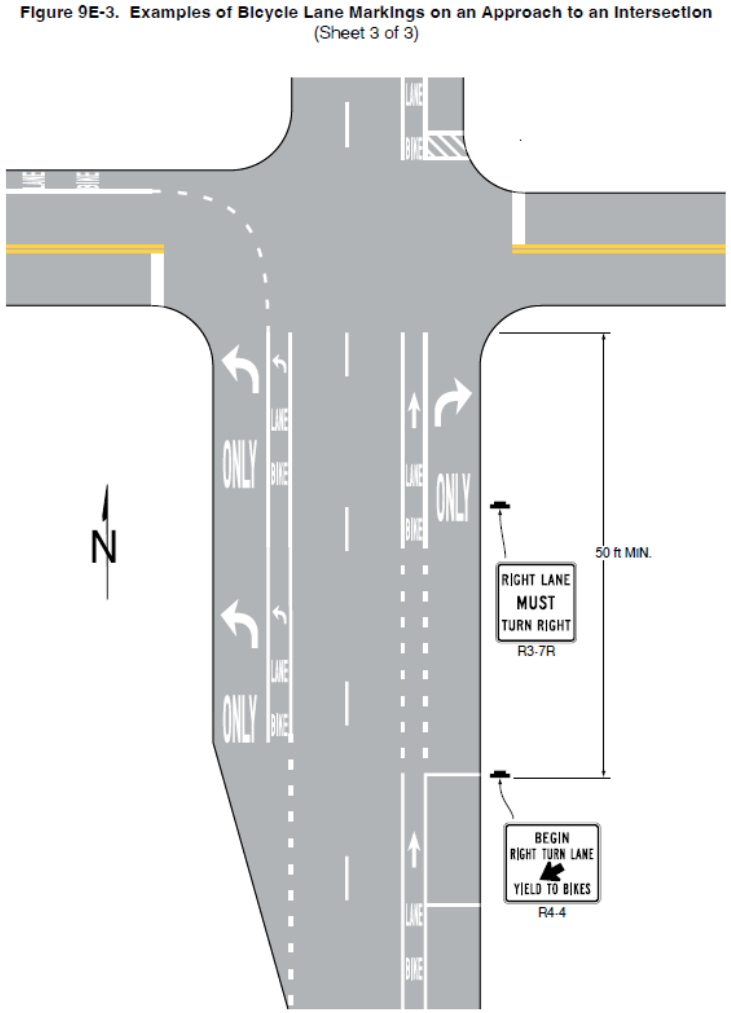
- Should not be used on roadways with speed limits of 40 mph or greater
- May be used with, or instead of, the R9-20 Bicycles Allowed Use of Full Lane sign
- Shall not be used with green-colored pavement as a background
- Black background markings may be used as an option



Bicycle Lanes at Intersection Approaches (1/2)

Through bicycle lane shall not be:

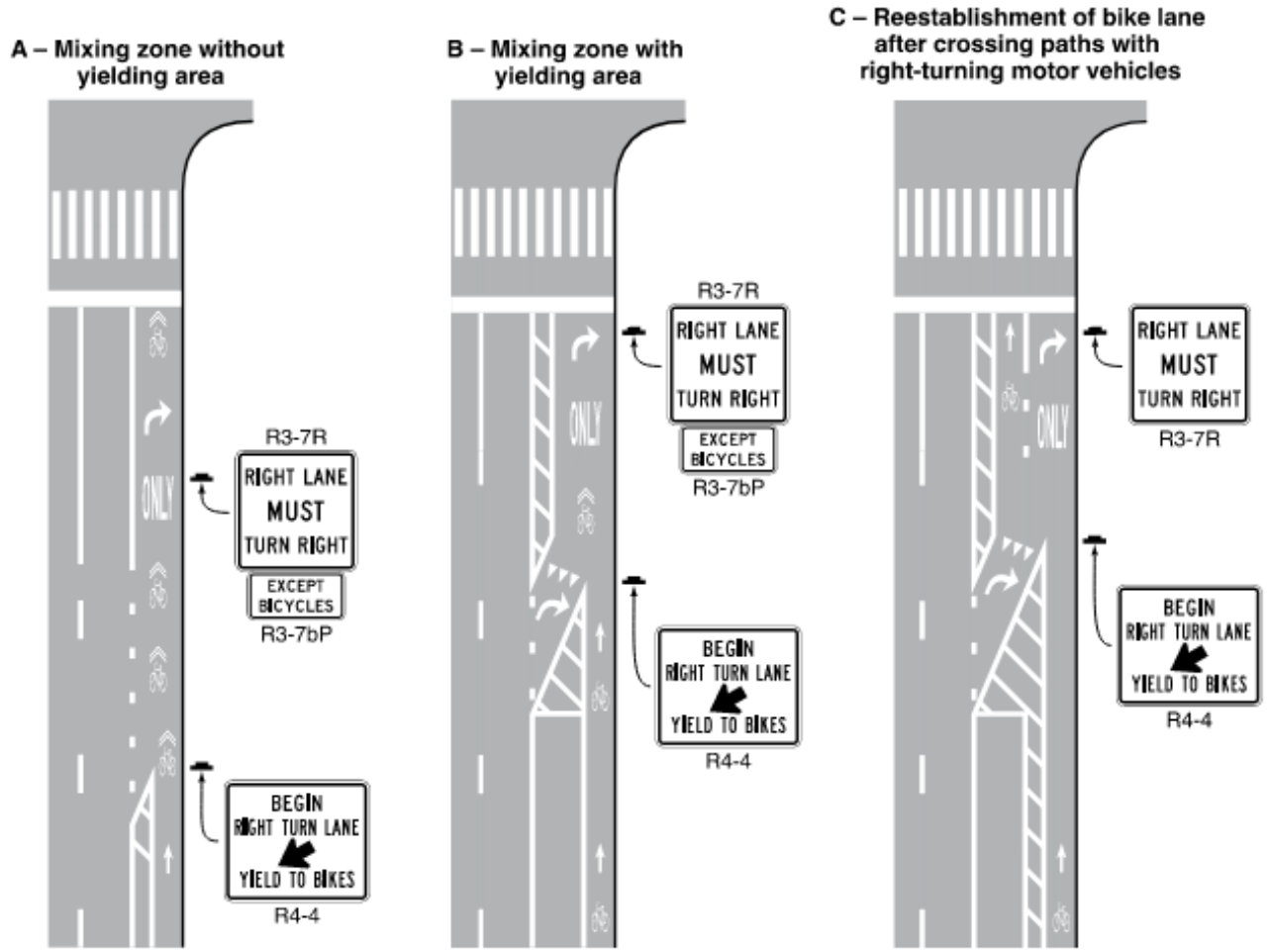
- Positioned to the right of a right-turn-only lane or left of a left-turn-only lane unless controlled by a bicycle signal indication that removes conflicts
- Painted with dots within a general-purpose turn lane



Bicycle Lanes at Intersection Approaches (2/2)

- Bicycle travel may be accommodated within turn lane using shared-lane markings
- Mixing zones require bicycles and general traffic to share space

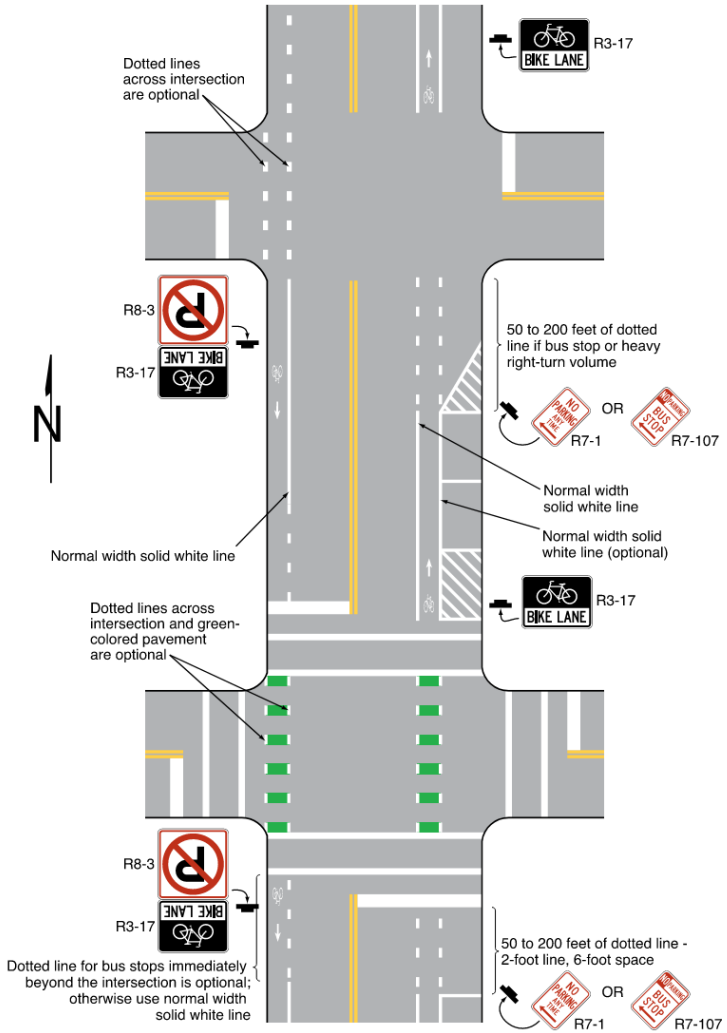
Figure 9E-5. Examples of Pavement Markings for Mixing Zones



Extensions of Bicycle Lanes Through Intersections

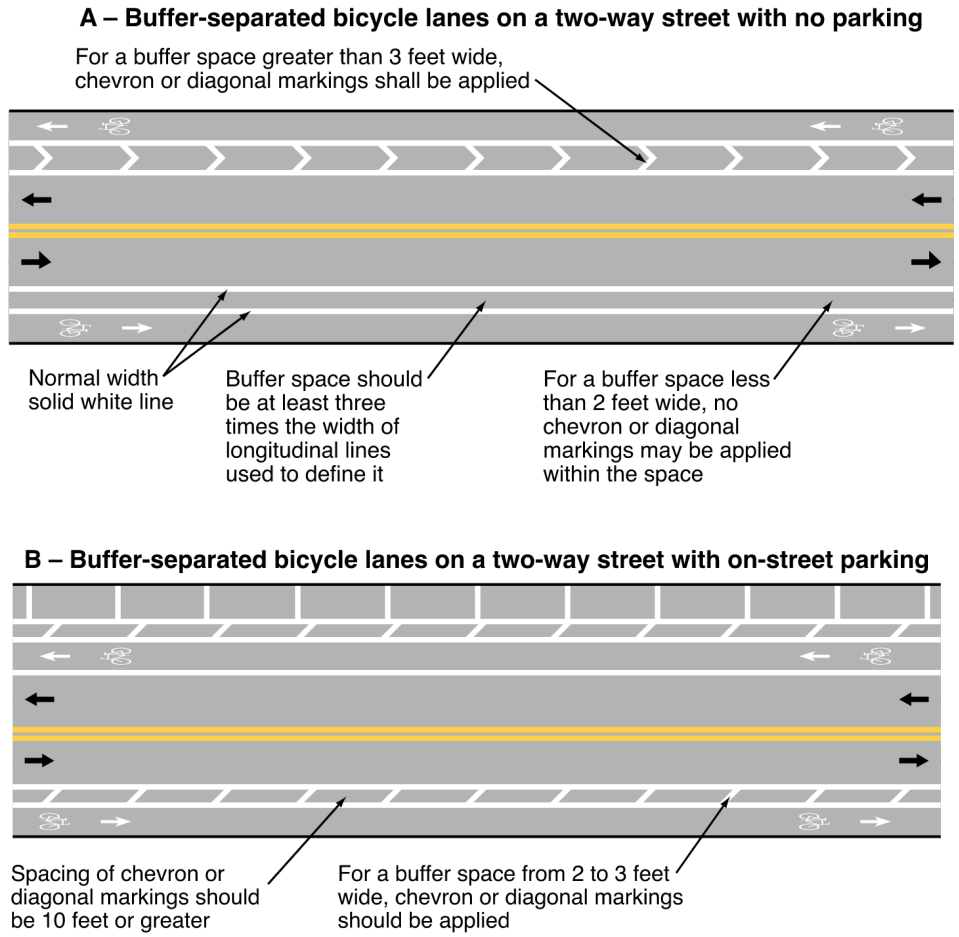
- Shared-lane markings and chevrons **shall not** be used through intersections
- Requires dotted lane line patterns
- Lateral limits of bicycle lane extensions through intersections shall be marked when the bicycle lane is contiguous to a crosswalk

Figure 9E-2. Example of Pavement Markings for Bicycle Lanes on a Two-Way Street



Buffer-Separated Bicycle Lanes

- Lateral separation between a bicycle lane and a general-purpose lane using pavement markings
- Can be used adjacent to on-street parking to reduce crashes with vehicle doors opening
- No vertical elements (separated bike lanes use vertical elements)

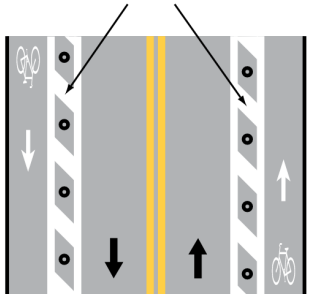


Separated Bicycle Lanes

- Provide a physical separation between a general-purpose lane and a bicycle lane using vertical objects or vertical separation between the general-purpose lane and bicycle lane

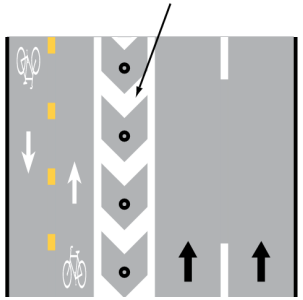
A – One-way bicycle lanes on a two-way street

Note: Diagonal or chevron markings shall be used if buffer width is 2 feet or greater for separated bicycle lanes.

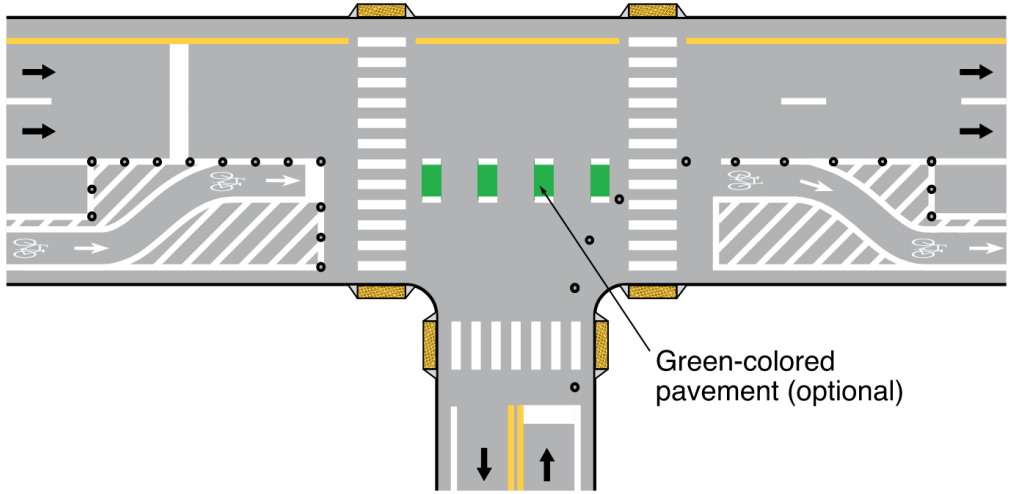


C – Two-way bicycle lane on a one-way street

Note: Diagonal or chevron markings shall be used if buffer width is 2 feet or greater for separated bicycle lanes.



D – Separated bicycle lane shifted toward the adjacent general-purpose lane

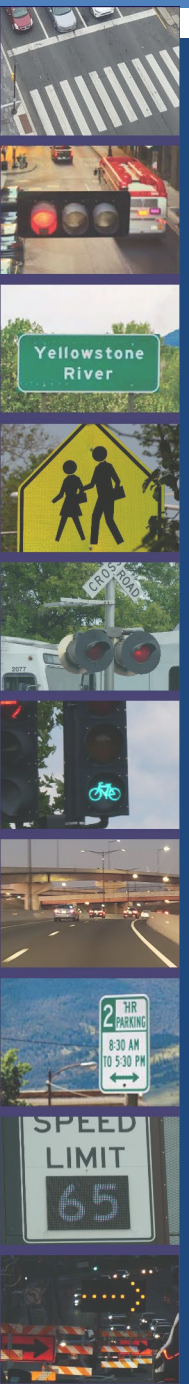


Bicycle Signal Faces (1/2)

- New device included in new Chapter 4H:
  - Provides a protected movement for bicyclists
  - Allows separation of bicyclists in space and time
  - Flashing yellow bicycle indication allowing conflicting movements with turning motorists is prohibited

Bicycle Signal Faces (2/2)

- Not allowed at PHBs
  - PHB is a pedestrian-specific device
  - Statutory obligation to provide for protection of vulnerable road users
  - Consider other treatments to accommodate bicycle mobility and safety (geometric, roadway configuration changes)



RESOURCES

Webinars

Training Aids

Technical Assistance

U.S. Department of Transportation

Federal Highway Administration

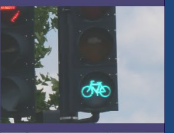
Additional Resources (Available on MUTCD web site)

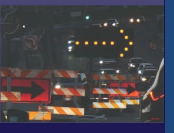
- Recorded webinars available on the MUTCD web site:
  1. MUTCD 11th Edition Overview (March 6, 2024)
  2. An Overview of the 11th Edition Changes Related to Vulnerable Road Users (April 11, 2024)
- Informational and training aids:
  - **Preamble** to the Final Rule
  - **Markup** (redline) showing text changes from previous edition
  - **Supplementary table** of dispositions for final rule
  - **Slideshow** of major changes (coming soon)

MUTCD









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- ☑ *Standard Highway Signs*
- ☑ Frequently Asked Questions
- ☑ MUTCD News Feed

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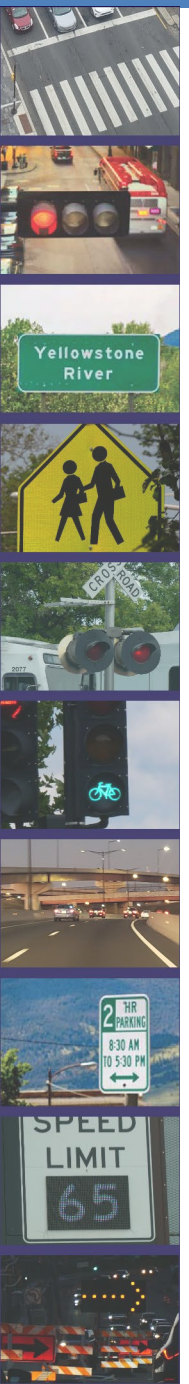

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Kevin J. Sylvester P.E., PTOE Team Leader	**Duane Thomas, P.E.** Highway Traffic Signals, Rail/Light-Rail Transit
S. Usman Ali, P.E., PTOE, RSP Traffic Control for Automated Vehicles, *Standard Highway Signs*	**Ashley Timm, P.E.** Pavement Markings, *Standard Highway Signs*
Marty Calawa, P.E. Regulatory & Rulemakings Management, General (Part 1)	**Toni Whitfield, P.E.** General Info & Motorist Services Signs, Changeable Message Signs
J. Eric Ferron, P.E. Temporary Traffic Control	**Matt Zeller, P.E.** Regulatory & Warning Signs, School Zones
Dean Mentjes Outreach & Training Coordination, Bicycle Facilities, Vulnerable Users	**Adison Zoretic, P.E., PTOE** Pooled-Fund Study, Guide & Managed Lane Signs, *Standard Highway Signs*

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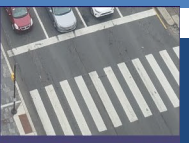
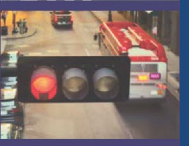
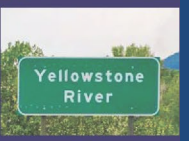



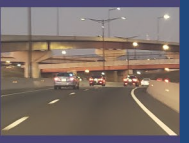


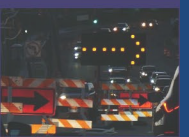

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