

MUTCD Update for NACTO Members

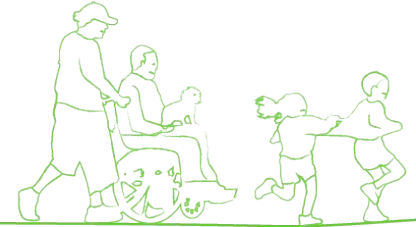
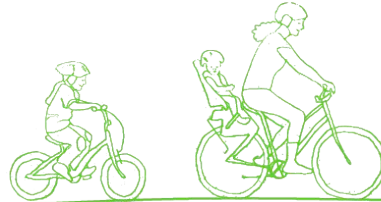
February 27, 2024



This meeting will be recorded



- A recording and copy of the slides will be shared with NACTO members and those registered for today's meeting.
 - We are capped at 500 seats for today's update.
- If you don't want to be on the recording, please keep your camera off.



Josh



Matthew



Stefanie



Registration is open now!

\$750 early bird registration through 2/29 | \$850 Member registration
events.bizzabo.com/DesigningCities2024

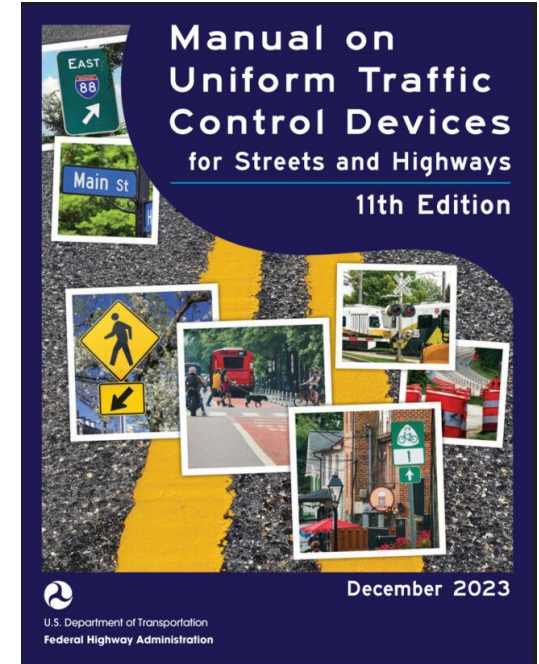
Reminder: You can use NACTO Design Guides on federally-funded projects



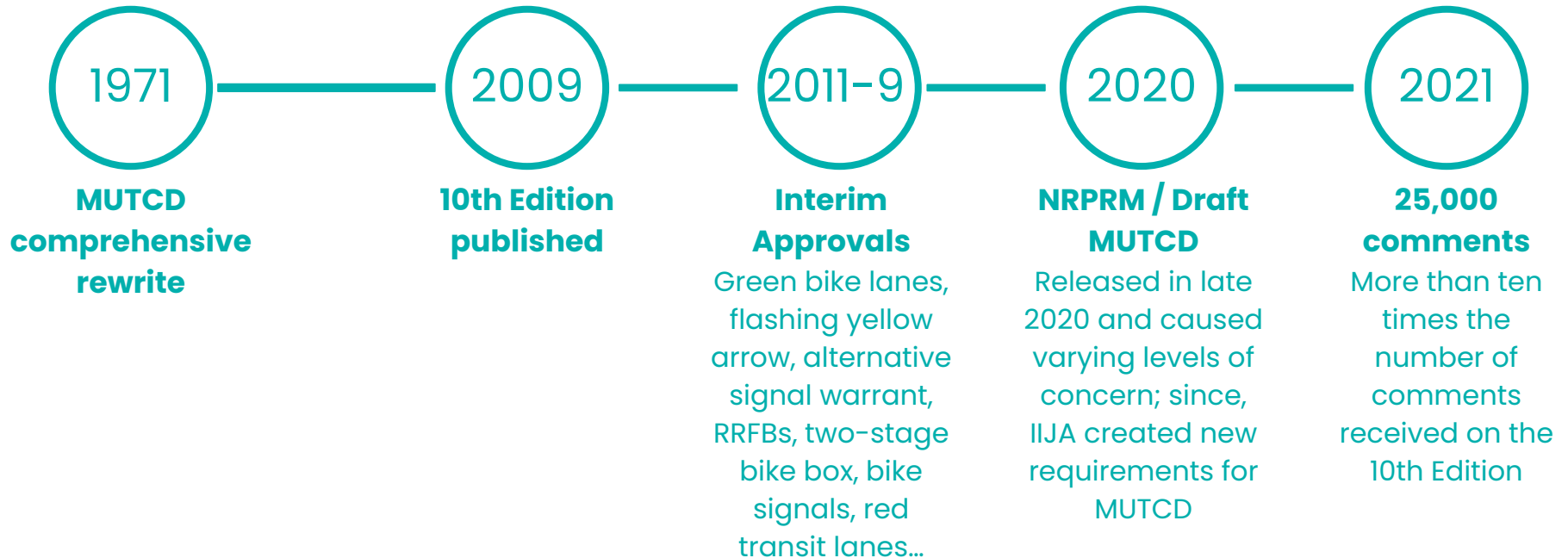
- On city-owned streets that are not on [NHS](#), cities can use NACTO's design guides without additional approval from states
 - States can approve use of NACTO design guides for projects on the NHS - [FHWA Clarifying Memo](#)
- Cities need to [adopt NACTO guides](#) a part of their local approach to street design
 - Adopt via departmental memo, Council ordinance

It's here!

- Released in December, effective as of January 18, 2024
 - First update since 2009
 - By law, must be updated every four years going forward
- States have two years to adopt, have their own that is in substantial conformance



How we got to the 11th Edition



A coalition pushing for change

- Cities and agencies sent comments directly to FHWA
- Member staff participated in our National Standards peer network
- Cities collaborated on a list of 400 specific comments elevated by NACTO staff
- Joined the National Committee on Uniform Traffic Control Devices with three seats



What we requested:

- Restructure the document as a proactive safety regulation
- Modernize method for setting speed zones
- Make it easier to install crosswalks and pedestrian signals
- Remove the new section on automated vehicles
- Explicitly allow use of green bike lanes, red transit lanes, and asphalt art
- Eliminate geometric restrictions for urban bikeways
- Change the update process to be more inclusive and transparent

What's in the MUTCD, 11th Edition



- The MUTCD applies to:
 - Pretty much every type of street or roadway
 - Most rigorously applied on federally-funded projects
- It covers *signs, signals, and markings*
 - Precisely how they look
 - What they are supposed to mean
 - Some aspects of how you are supposed to use these devices.
- Limits
 - It does not cover the built aspects of geometric design e.g. turn radius
 - But...markings are part of geometric design, especially for urban bike, ped, & transit infrastructure.
 - Traffic laws differ from city to city, so meaning of signals varies
 - There is no MUTCD police

Section 1A.03 Target Road Users



01 Traffic control devices can be targeted at operators of motor vehicles, including driving automation systems, and at vulnerable road users.

02 Targeted operators of motor vehicles include motorists, public transportation operators, truck drivers, and motorcyclists. Targeted users also include vulnerable road users, who have little to no protection from crash forces. These users are defined in Title 23, U.S.C. 148(a). They include bicyclists and pedestrians, including persons with disabilities. Pedestrians with disabilities might be blind or vision-impaired, have mobility limitations, or other impairments. Protection of vulnerable users is a priority in this Manual as directed in Section 11135 of the Infrastructure Investment and Jobs Act.

03 Operators of motor vehicles and vulnerable road users are both likely to be present on roadways where adjacent land use suggests that trips could be served by varied modes. Application of traffic control devices on these roadways requires careful consideration of measures to set and design for appropriate speeds; separation of various users in time and space; improvement of connectivity and access for pedestrians, bicyclists, and transit riders, including for people with disabilities; and implementation of safety countermeasures.

The Manual is not a replacement for engineering judgement



Section 1A.04 Use of the MUTCD

02 Where the content of this Manual requires a decision for implementation, such decisions shall be made by an engineer, or an individual under the supervision of an engineer, who has the appropriate levels of experience and expertise to make the traffic control device decision. Those decisions shall be made using engineering judgment or engineering study, as required by the MUTCD provision.

...

04 In making traffic control device decisions, individuals should consider the impacts of the decision on the following: safety and operational efficiency (mobility) of all road users at that location, the effective use of agency resources, cost-effectiveness, and enforcement and education aspects of traffic control devices.

Speed limits

Maximum (or minimum) **speed limits** are typically established by law.

Speed zones are street sections that have a different speed limit than that established by statute. These are set with an *engineering study*.

Section 2B.21: Speed Limit Sign



06 Speed zones (other than statutory speed limits) shall only be established on the basis of an engineering study that has been performed in accordance with traffic engineering practices. The engineering study shall consider the roadway context.

07 Among the factors that should be considered when conducting an engineering study for establishing or reevaluating speed limits within speed zones are the following:

- A. Roadway environment (such as roadside development, number and frequency of driveways and access points, and land use), functional classification, public transit volume and location or frequency of stops, parking practices, and pedestrian and bicycle facilities and activity;
- B. Roadway characteristics (such as lane widths, shoulder condition, grade, alignment, median type, and sight distance);
- C. Geographic context (such as an urban district, rural town center, non-urbanized rural area, or suburban area), and multi-modal trip generation;
- D. Reported crash experience for at least a 12-month period;
- E. Speed distribution of free-flowing vehicles including the pace, median (50th-percentile), and 85th percentile speeds; and
- F. A review of past speed studies to identify any trends in operating speeds.

08 When the 85th-percentile speed is appreciably greater than the posted speed limit, and the roadway context does not support setting a higher speed limit, the engineering study should consider whether changes to geometric features, enforcement, and/or other speed-reduction countermeasures might improve compliance with the posted speed limit. A similar approach should be used if the results of past speed studies indicate that the 85th-percentile speed has consistently increased.

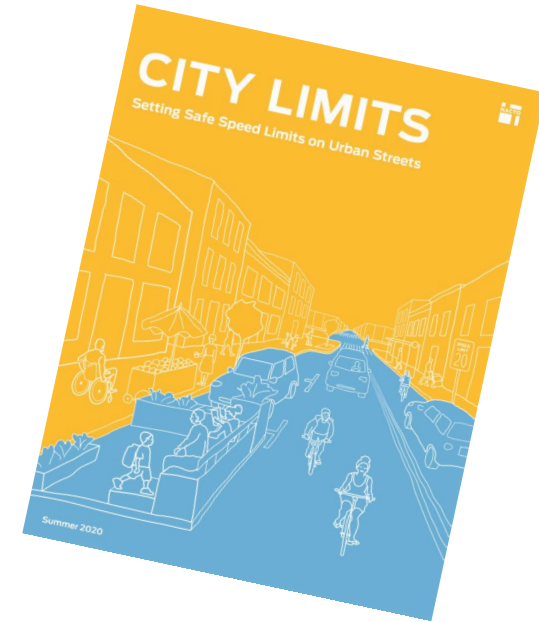
09 On urban and suburban arterials, and on rural arterials that serve as main streets through developed areas of communities, the 85th-percentile speed should not be used to set speed limits without consideration of all factors described in Paragraph 7 of this Section.

So how should we set speed zones?

04 Jurisdictions can use speed limit setting tools and methods such as expert systems and those consistent with the safe system approach as part of the required engineering study for a non-statutory speed limit. As speed limit setting tools vary, jurisdictions need to be aware of their limitations and advantages, possible variation between the tools and the need to explore gaps or weaknesses of tools, and weigh the output accordingly in consideration of setting speed limits.

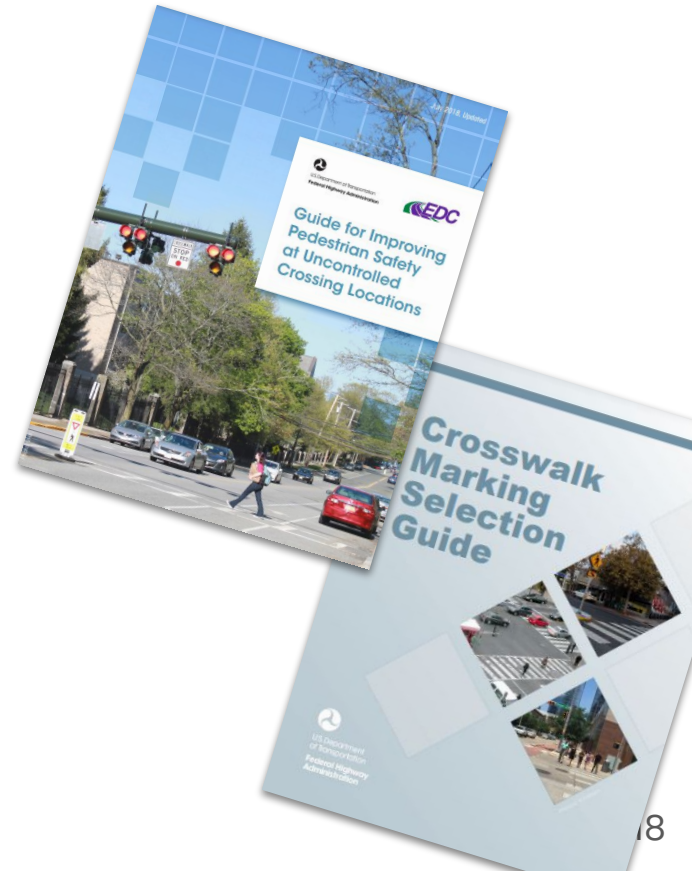
Speed limits: Resources

- Use the safe systems approach in NACTO's *City Limits: Setting Safe Speed Limits on Urban Streets*
 - Data-supported, draws from real examples in North American cities, covers multiple types of speed setting and management tools
- Use FHWA's USLIMITS2
 - An online expert systems tool, where data is processed by web-based software to make a recommended speed limit based on volume, speed, and contextual data
- Look for more guidance coming from FHWA in 2024
 - NACTO has talked to FHWA staff and will continue to advocate for transparency and discussions in developing the guidelines
 - Better, but not perfect, guidance



Crosswalk markings

- MUTCD is aligned with the [FHWA STEP Guide](#)
 - If the street is too fast, busy, or wide for a marked crosswalk alone, MUTCD supports making it slower, narrower, or raised.
- Many types of crosswalk markings are allowed
 - [Recent FHWA guidance](#) supports using higher-visibility crosswalks, provides guidance on which types to use



New: sidewalk extensions!



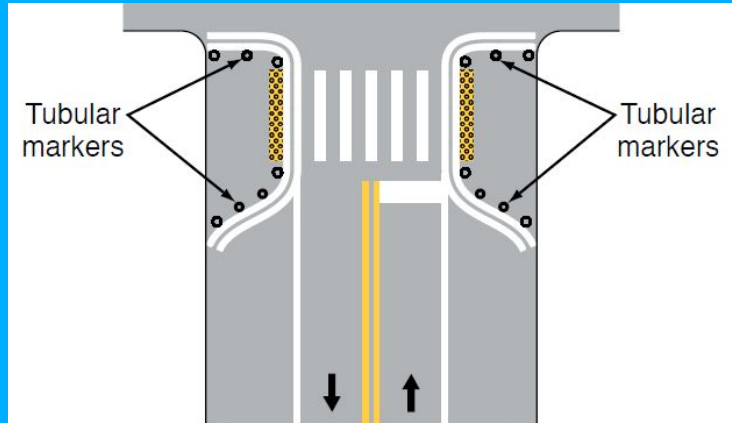
Section 3J.07 Sidewalk Extensions Designated by Pavement Markings

05 Sidewalk extensions designated by pavement markings shall be established using double solid lines connecting to the outside physical curb or, in the absence of a curb, to the edge of the roadway. The color of the double solid line shall comply with the provisions of Section 3A.03.

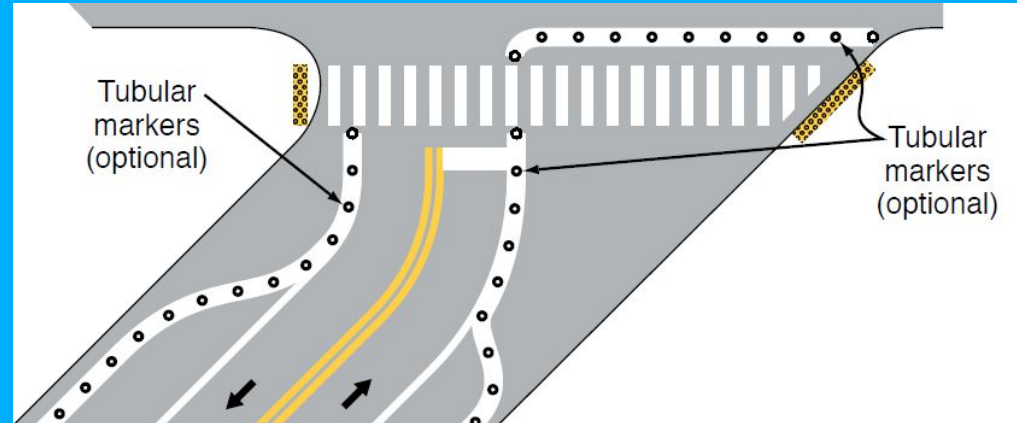
08 Channelizing devices such as tubular markers (see Chapter 3I) should be used to provide conspicuity for, and to prevent vehicles from traversing, the area of the sidewalk extension designated by pavement markings. They should be located adjacent to the double solid line outside the traveled way.

12 Crosswalk markings shall not be extended through sidewalk extensions designated by pavement markings.

Sidewalk extension



Not a sidewalk extension



- Note differences in lines, location of detectable warning surface, crosswalk marking, and placement of tubular markers
- Asphalt art can be applied in either
- Additional guidance expected from FHWA this year

Asphalt art is explicitly allowed, with some rules



Section 3H.03 Aesthetic Surface Treatments

05 Aesthetic surface treatments shall not interfere with traffic control devices.

06 Aesthetic surface treatments shall not be of a surface that can confuse pedestrians with vision disabilities that rely on tactile treatments or cues for navigation.

07 Colors used for aesthetic surface treatments shall be outside the chromaticity coordinates that define the ranges of acceptable colors for traffic control devices.

08 Patterns that constitute a purely aesthetic surface treatment shall be devoid of advertising and shall not contain elements of retroreflectivity.

09 Patterns that constitute a purely aesthetic surface treatment for the interior area of a crosswalk shall not be designed to encourage road users to remain in the crosswalk, engage or interact with the pattern, or otherwise inhibit users from crossing the street in a safe and efficient manner.

Adding asphalt art to your streets

- Asphalt art is not a traffic control device. It can be used both in the roadway (e.g., in an intersection) and outside of it (e.g., in a paint-and-post curb extension, on sidewalks).
- Setting local policies and standards in partnership with your disability community and others
- More information: asphaltart.bloomberg.org/faq/



Signals: Potential Challenges for Your City



- No pedestrian network or bike network warrant for signals
- Bike signals are subject to many new restrictions
- Pedestrian clearance time and pre-emption
 - Flashing Hand can be truncated or even eliminated by rail or emergency vehicle pre-emption, potentially stranding pedestrians in street (4F.19)
- Warrants are key area for **proactive adoption of local standards** by cities

Roadway capacity removed from signals guidance



- Responsive to requests made by NACTO members and coalition
- Removes an inappropriate geometric consideration

12 Section 4B.05 – Adequate Roadway Capacity

13 Support:

14 The delays inherent in the alternating assignment of right of way at intersections controlled by traffic
15 control signals can frequently be reduced by widening the major roadway, the minor roadway, or both
16 roadways. Widening the minor roadway often benefits the operations on the major roadway, because it
17 reduces the green time that must be assigned to minor roadway traffic. In urban areas, the effect of
18 widening can be achieved by eliminating parking on intersection approaches. It is desirable to have at
19 least two lanes for moving traffic on each approach to a signalized location. Additional width on the
20 departure side of the intersection, as well as on the approach side, will sometimes be needed to clear
21 traffic through the intersection effectively.

22 Guidance:

23 Adequate roadway capacity should be provided at a signalized location. Before an intersection is
24 widened, the additional green time pedestrians need to cross the widened roadways should be considered
25 to determine if it will exceed the green time saved through improved vehicular flow.

26 Other methods of increasing the roadway capacity at signalized locations that do not involve
27 roadway widening, such as revisions to the pavement markings and the careful evaluation of proper lane-
28 use assignments (including varying the lane use by time of day), should be considered where appropriate.
29 Such consideration should include evaluation of any impacts that changes to pavement markings and lane
30 assignments will have on bicycle travel.

31

Signals: Warrants



- Used to determine whether installing a signal is justified
 - Treat signals as a problem; safety is secondary to free-flow traffic
- NACTO requested but did not get an update to match STEP guide/new Crosswalk guidance.
 - But slightly easier to meet pedestrian volume warrant
- Key area for **proactive adoption of local standards** by cities

Signals: Warrants

Pedestrian volume warrant slightly more flexible, but still very high threshold.

Figure 4C-6. Warrant 4, Pedestrian Peak Hour



Engineers can justify a signal that doesn't meet warrants



Section 4C.01: Studies and Factors for Justifying Traffic Control Signals

20 The satisfaction of a warrant (or warrants) is one of the relevant factors in the engineering study, but it is not intended to be the only factor or even the overriding consideration. Agencies can install a traffic control signal at a location where no warrants are met, but only after conducting an engineering study that documents the rationale for deciding that the installation of a traffic control signal is the best solution for improving the overall safety and/or operation at the location.

Table 4C-3. Minimum Number of Reported Crashes in a Three-Year Period

| Number of through lanes on each approach | | Total of angle and pedestrian crashes (all severities) ^a | | Total of fatal-and-injury angle and pedestrian crashes ^a | |
|--|--------------|---|------------|---|------------|
| Major Street | Minor Street | Four Legs | Three Legs | Four Legs | Three Legs |
| 1 | 1 | 6 | 5 | 4 | 4 |
| 2 or more | 1 | 6 | 5 | 4 | 4 |
| 2 or more | 2 or more | 6 | 5 | 4 | 4 |
| 1 | 2 or more | 6 | 5 | 4 | 4 |

^a Angle crashes include all crashes that occur at an angle and involve one or more vehicles on the major street and one or more vehicles on the minor street

- Crash warrants still reactive – wait for crash history.
- Don't distinguish by severity: death and severe injury are the same as complaints of pain.
- Potential action area for cities: set severity-based thresholds, prospective safety warrant.

NEW MUTCD Part V – AV Traffic Control Considerations

- Chapter kept from draft over NACTO and member agency objections
- Normalizes still nascent technology without clear understanding of impacts
- Language improved, but questions remain – streets are designed for AVs instead of AVs being required to work on the already-existing streets cities have.
→ Example: “Should consider” 6 inch pavement marking widths

Section 5A.04 Traffic Control Device Design and Use Considerations

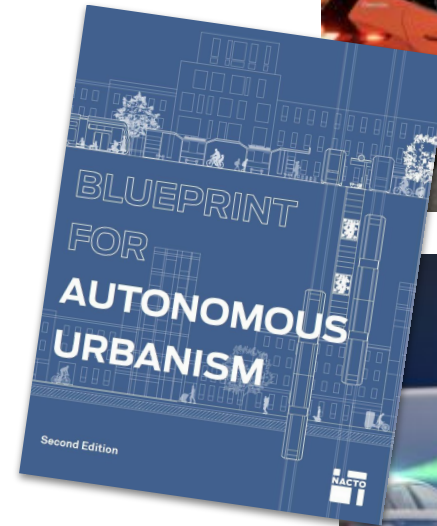
03 Agencies should adopt traffic control device maintenance policies and or practices with consideration to both the human driver and driving automation system technology needs (see Sections 1D.10, 2A.19, 3A.05 and 4A.10).

04 Engineering judgment (see Section 1D.03) used to determine traffic control device selection and placement should consider uniformity in application and location needed to support both the human driver and driving automation system technology.

NACTO's AV Peer Network



- Working with members on AV policy
 - Join us! Email josh.naramore@nacto.org
- Engaging the AV industry on issues of safety and data sharing



Transit lanes

- Red transit lanes are allowed
 - Text isn't crystal-clear about using red in transit lanes that cars can cross e.g. BAT lanes
 - NACTO following up with FHWA
- Transit signals have new restrictions
 - No triangle signal for change interval
 - Still no option to use red line for transit signal.



Section 3H.07 Red-Colored Pavement for Public Transit Systems



01 Red-colored pavement is used to enhance the conspicuity of locations, station stops, or travel lanes in the roadway exclusively reserved for vehicles of public transit systems or multi-modal facilities where public transit is the primary mode. These public transit vehicles include buses, streetcars, trolleys, light-rail trains, and rapid transit fleets.

02 Red-colored pavement may be used where engineering judgment determines that one or more of the following conditions are expected to result from its application:

- A. Increased travel speeds will be expected by the public transport vehicle after an exclusive lane or facility is provided,
- B. Reduced overall service time through the corridor will be expected by the public transport vehicle,
- C. Decreased rates of illegal parking or occupation of the transit or multi-mode lane or facility will be expected.

03 If used, red-colored pavement shall be applied only in lanes, areas, or locations where general-purpose traffic is not allowed to use, queue, wait, idle, or otherwise occupy the lane, area, or location where red colored pavement is used.

04 Red-colored pavement shall be installed for the full width of the lane.

05 Red-colored pavement may be used for full-time or part-time operations.

06 Red-colored pavement may be installed for the entire length of a restricted lane or for only a portion (or portions) of the restricted lane.

07 Red-colored pavement may be installed in a broken pattern where entrance into the transit lane is permitted by general traffic, for example where general traffic is allowed in a transit lane in advance of a turn.

Part 9: Bicycle Facilities



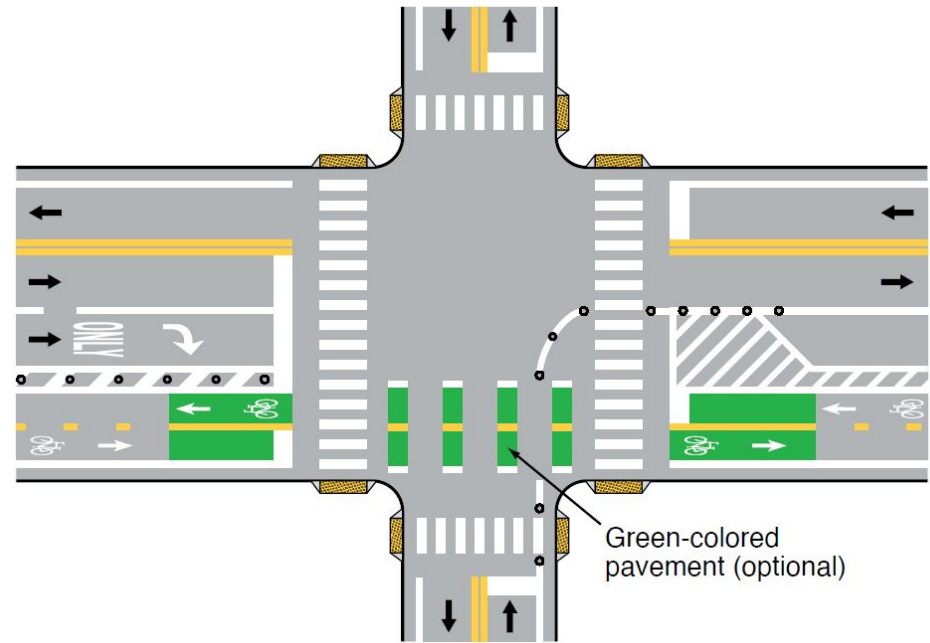
- Many new features included for first time
- Separated bike lanes!
 - New: can use separated bike lanes at roundabouts!
- Protected intersection/bend-out, bend-in and other designs!
- Two-stage turn boxes & bike boxes!
- New restrictions on bike signals
- Confusing sign requirements
- Still no marked bike lane to the right of right turn lane/left of left turn lane

Bikes: Intersection Geometry

Separated bike lane geometry is not restricted.

Some means of vertical separation required to do this geometry without a separate signal phase.

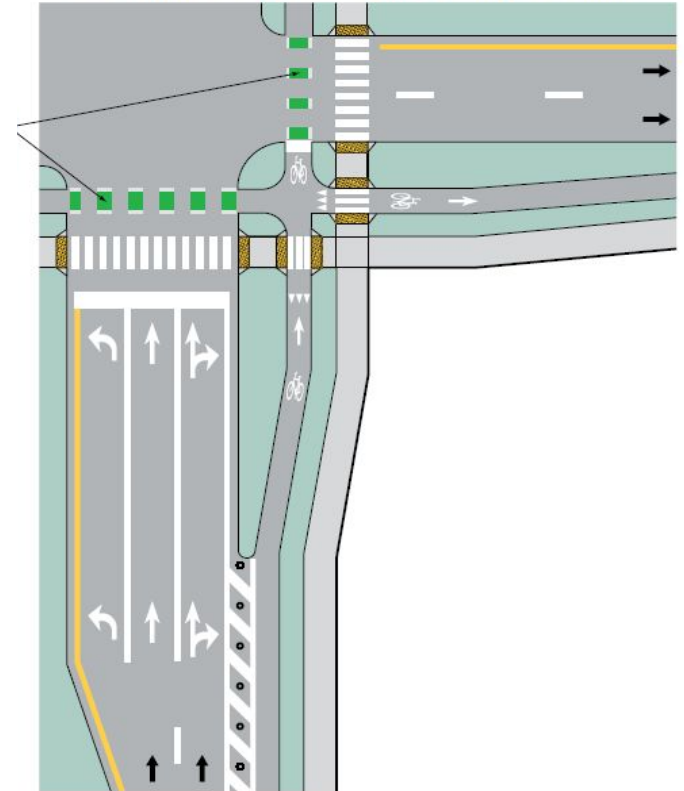
G – Separated two-way bicycle lane at an intersection



Intersection geometry for bikes

- Geometric decisions shouldn't be made based on this Manual
- Bend-out/setback geometry is shown in the guide
 - Helps illustrate how to apply different markings within this condition

E – Separated bicycle lane shifted away from traffic



Section 9E.02 Bicycle Lanes at Intersection Approaches



13 A buffer-separated or separated bicycle lane may be shifted closer to, or farther away from the adjacent general-purpose lane depending upon site-specific conditions (see Drawings D and E in Figure 9E-7).

14 A buffer-separated or separated bicycle lane shifted away from the adjacent general-purpose lane at an intersection can create space for a motor vehicle to queue between the general-purpose lane and the extension of the bicycle lane. This design can also improve the safety and comfort of bicyclists by reducing the speed of turning motor vehicles, improving sightlines, and creating additional buffer space prior to the conflict point with turning motor vehicles.

15 The purpose of shifting a buffer-separated or separated bicycle lane away from the adjacent general-purpose lane is to allow the driver of a turning vehicle to undertake the tasks of turning and scanning for bicycle cross traffic in isolation versus simultaneously. Sufficient sight distance for both drivers and bicyclists is important in this design (see Drawing E in Figure 9E-7).

Bikes: Geometry

- Marked bike lanes to the right of right turn lanes/left of left turn lanes still heavily restricted
- Fully separate turn phase and bike phase still required
- Requested to change—important topic for interim approval



Bikes: Contraflow Lanes

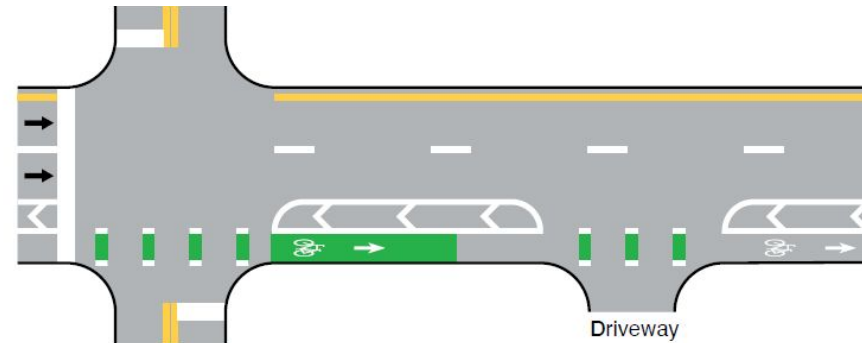
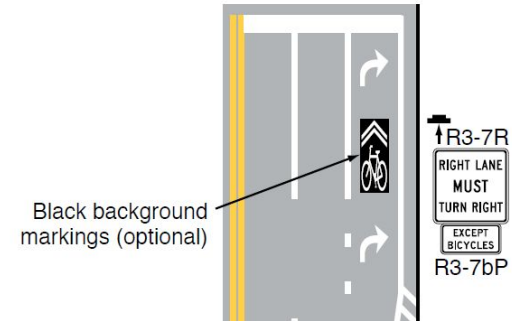
- Contraflow bike lanes **are** allowed
- It is OK to place your contraflow bike lanes next to parking
 - “Should not” ≠ “Shall not”
 - Look out for state efforts to convert to more restrictive “shall not”



Bikes: Use of Green

- Solid green color OK in bike lanes
- At intersections, use dashed green for crossbikes
- Crossbikes over driveways can be either dashed or solid
- Green turn boxes and bike boxes OK
- No green-backed sharrows
 - But you can use black-backed sharrows

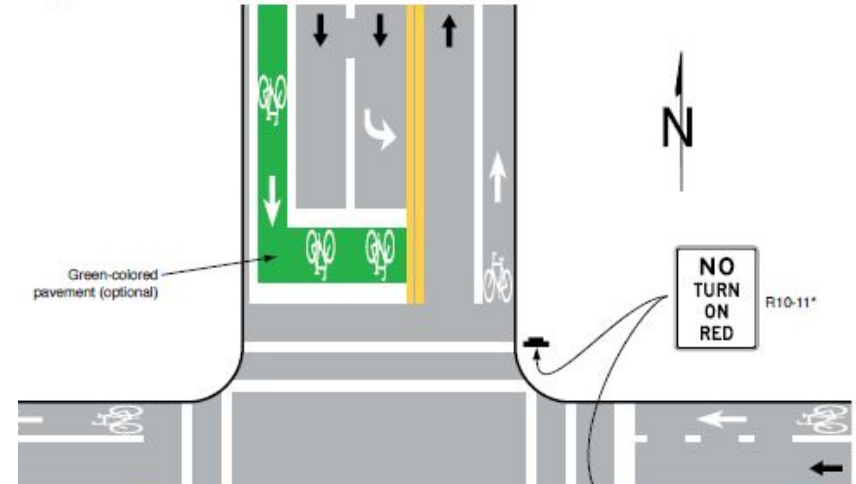
C – Shared-lane marking with optional black background markings



Bikes: Bike Boxes

- Can be green or not
- New sign details to pay attention to
- No right on red
- Bike box across multiple lanes requires ped countdown signal

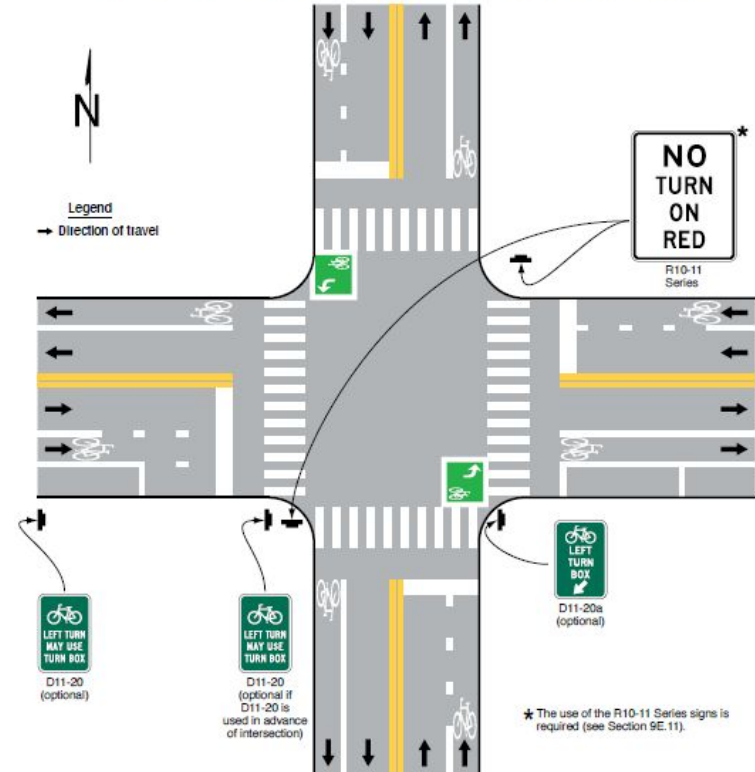
Figure 9E-12. Examples of Intersection Bicycle Boxes (Sheet 2 of 2)



Bikes: Two-Stage Boxes

- Two-stage turn boxes are allowed
 - New signs needed in some cases
 - Use green guide signs unless bikes aren't allowed to turn from the motor vehicle lanes.

Figure 9D-7. Example of Two-Stage Bicycle Turn Box when Use is Optional



Bikes: Signals

- Shall not use with Hybrid Beacon
- Shall not use where there are turn conflicts
- But Leading Bike Intervals are explicitly permitted
 - But which signals do you use for them?
- New, untested signs are required but not explained



R10-40



R10-40a



R10-41



R10-41a



R10-41b



R10-41c



What's next: Our plan for support, engagement, and action



Action from NACTO



- Ongoing dialogue with FHWA
- Developing Requests for Interpretation
- Getting city data to inform Interim Approvals
- Identifying technical corrections for potential amendments that FHWA could make soon
- Supporting your work on state manuals
- Develop longer-term vision

Action: Technical Corrections



Ideal for items that FHWA could change in an amendment process.

NACTO will develop written requests for feedback from National Standards Peer Network. Aiming for support from the NCUTCD.

What we'll address this way:

- What should the phrasing be for Leading Bike Intervals?
- Bike symbol on signs in place of word "bike"
- Bus symbol on signs

Timeline: February 2024

Action: Request for Interpretation



- Timeline: March - April 2024
- Ideal for areas where FHWA believed they were allowing something, but language is ambiguous or there are internal contradictions in the MUTCD.
- Strategy: Work with Bike League, APBP, and other partners to craft requests

What we'll address this way:

- Confirm that the following are permitted:
 - Separated bike lanes to the right of right turn lanes/left of left turn lanes
 - Red transit lanes where other modes are allowed (e.g. bus-bike lanes)
 - For asphalt art, how much contrast is needed between the art and a crosswalk?
 - Also for asphalt art, what is the definition of "Illustration"?
 - For bike boxes and two-stage turn boxes, where are signs required or not required?

Action: Interim Approvals



- Objective: Track requests to be updated in next MUTCD
- Usually requires city data or research findings before FHWA will consider
- Up to six years for MUTCD changes (4 year Federal + 2 year state cycle)

What we'll address this way:

- **Marked bike lanes next to turn lanes** – Flexible use of **bike signals**
- Flexible design for **transit signals**

Timeline: Summer 2024, but likely long timeline

MUTCD syntheses for our members



- The 11th Edition has a lot of information, new additions, and changes from past editions and IAs
- NACTO will create shorter reference guides for our members
- If interest, facilitate peer-network discussions to ideate and problem-solve

We plan to help!



- Working with our National Standards Peer Network and partners at the national level, we will develop high-level briefs on what to watch while your state moves to adopt the MUTCD
 - Some states have already begun their process
 - We can help make peer-to-peer connections within states
 - If interested, email matthew@nacto.org

Get involved with our work



- National Standards Peer Network
→ Email matthew@nacto.org
- Autonomous Vehicles Peer Network
→ Email josh.naramore@nacto.org
- Urban Bikeway Design Guide technical working group
→ Email stefanie.seskin@nacto.org

Reminders:



- This meeting will be recorded.
 - We are capped at 500 seats for today's update.
 - We will share the slides and recording with members this week.
- Complete our Member Values Survey. Your feedback informs our programs, projects, and events.
 - bit.ly/NACTO-members-2024
- Receive AICP credit for attending today's session
 - planning.org/events/eventsingle/9285855/

Stay in touch:

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