National Committee on
Uniform Traffic Control Devices

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Item No.: 20B-RW-02

NCUTCD Proposal for Changes to the Manual on Uniform Traffic Control Devices

TECHNICAL COMMITTEE:	Regulatory and Warning Signs Committee
ITEM NUMBER:	20B-RW-02
TOPIC:	Bus Transit/BRT Traffic Control – Signs, Markings, Signals
ORIGIN OF REQUEST:	Discussion at January 2017 RWSTC Meeting Task Force: Harry Campbell (MTC), Rich Deal (MTC), Rob Dingess (MTC), Robert Garbacz (STC), Jason Kennedy (RWSTC), Randy McCourt(c-RWSTC), Rich Meredith (RWSTC), Ravi Raut (STC), Gerry Wilhelm (RWSTC), Brent Ogden (RRTC), Robert Ziemba (STC), Shannon Bonilla (GMI), Maurice Palumbo (GMI), Mike Tantillo (GMI)
AFFECTED SECTIONS OF MUTCD:	**Edit:** 1C.03(1A.13) (Definitions) **RW:** 2B.02 (Size of Regulatory Signs) 2B.20 (Mandatory Movement Lane Control Signs) 2B.23a (Bus Lane Regulatory Signs) (NEW) 2B.23b (Examples of Bus Lane Applications) (NEW) 2C.02 (Application of Warning Signs) 2C.49 (Vehicular Traffic Warning Signs) 2C.50a (Bus Warning Signs) (NEW) **GMI:** 2G.03 (Regulatory Signs for Preferential Lanes 2G.05 (Preferential Lane Periods of Operation Regulatory Signs) 2G.06 (Preferential Lane Advance Regulatory Sign) 2G.07 (Preferential Lane Ends Regulatory Signs 2G.08 (Warning Signs on Median Barrier for Preferential Lanes) 2G.10 (Preferential Lane Guide Signs) **Markings:** 3A.05 (Colors) 3B.20 (Pavement Word, Symbol and Arrow Markings) 3D.01a (Bus Lane Markings)

3D.02 (Preferential Lane Longitudinal Marking for Motor Vehicles)
3G.07 (Red-Colored Pavement for Public Transit Systems)
Signals:
4D.03a (Provision for Transit)
4F.17aD.26a (Bus Lane Traffic Control Signals)
4F.18~~D.27~~ (Preemption and Priority Control of Traffic Control Signals
RR/LRT:
8E.01 (Introduction) (Note: added 14B-RR-02, 6-28-2014)
8E.02 (Bus Only Signs)
8E.02 (Bus-Activated Blank-Out Turn Prohibition Signs)
8E.04 (Highway-Busway Grade Crossing Advance Warning Signs)
8E.05 (Busway Warning Sign)
8E.06 (Bus Approaching Activated Blank-Out Warning Sign)
8E.07 (Use of Traffic Control Signals for Control of Buses at Busway Grade Crossings)
8E.08 (Busway Automatic Gates)
8E.09 (Traffic Control Signals Near Highway-Bus Grade Crossings)
8E.10 (Pathway-Busway Grade Crossings)

DEVELOPMENT HISTORY: Previously approved Council items since 2009 MUTCD as of 8-24-19 shown in green double underline and green double strike though.

- Approved by Task Force: 05/14/2020
- Approved by Edit Committee: 01/08/2020
- Approved by RW Technical Committee: 06/17/2020
- Approved by GMI Technical Committee: 06/17/2020
- Approved by Markings Technical Committee: 06/18/2020
- Approved by Signals Technical Committee: 06/18/2020
- Approved by Railroad and Light Rail Technical Committee: 06/19/2020
- Approved by Task Force following sponsor comments: 12/11/2020
- Approved by Edit Committee following sponsor comments: 01/06/2021
- Approved by RW Technical Committee following sponsor comments: 01/11/2021
- Approved by GMI Technical Committee following sponsor comments: 1/13/2021
- Approved by Markings Technical Committee following sponsor comments: 01/14/2021
- Approved by Signals Technical Committee following sponsor comments: 01/13/2021
- Approved by RR/LRT Technical Committee following sponsor comments: 1/11/2021
- Approved by NCUTCD Council: 01/19/2021

This is a proposal for recommended changes to the MUTCD that has been approved by the NCUTCD Council. This proposal does not represent a revision of the MUTCD and does not constitute official MUTCD standards, guidance, or options. It will be submitted to FHWA for

consideration for inclusion in a future MUTCD revision. The MUTCD can be revised only by the FHWA through the federal rulemaking process

SUMMARY:

At the January 2017 NCUTCD meeting the topic of traffic control for bus rapid transit (BRT) was raised at the Regulatory and Warning Signs Technical Committee. A question regarding bus application and where signs for bus applications could be found was raised. Numerous metropolitan areas have implemented BRT in the past decade. There is current experience with what is successfully working in BRT traffic control and what traffic control needs for bus operation are based upon field conditions. At June 2014 Mid-Year meeting several changes were approved by Council in the RR/LRT and Markings chapters of the MUTCD for bus applications. On December 4, 2019 FHWA issued Interim Approval #22 that addresses optional use of red-colored pavement for transit lanes. For a practitioner addressing bus transit/BRT operations on surface streets, at a minimum, they would need to consider 14 sections in 5 different parts of the manual. The objective of this proposal is to reflect the state of best practice for bus transit/BRT traffic control within the MUTCD and to locate that information in the parts/sections where users would most easily find them.

DISCUSSION:

In June of 2014 the RR/LRT Technical Committee advanced a proposal to add a new section 8E to address busway grade crossings (bus rapid transit) traffic control (8E.02-06). At the same time the Markings Technical Committee advanced a proposal for use of red-colored pavement markings for public transit systems (3G.07). These were approved by council June 28, 2014. The purpose of these changes was to provide standardization of traffic control devices for grade crossings of highways with busways and exclusive lanes for transit.

The work completed by the RR/LRT Technical Committee included various regulatory and warning signs and was approved by RWSTC prior to council approval. At the time it was a free-standing proposal. It built off the concept that busways are transit (similar to LRT being transit) and a separate section for traffic control for light rail transit had been provided in part 8. However, elements of Section 8E (02 through 06) as approved involve aspects of five RWSTC sections:

- Section 2B.18 (Movement Prohibition Signs) including blank-out regulatory signs
- Section 2B.20 (Mandatory Movement Lane Control Signs)
- Section 2B.22 (Advance Intersection Lane Control Signs)
- Section 2B.54 (No Turn on Red Signs)
- Section 2C.49 (Vehicular Traffic Warning Signs) including blank-out warning signs

Section 8E also involves aspects of part 4 (traffic signals) and addresses traffic signal priority applications but without reference to signs or markings in applications of exclusive phases for

bus transit. The only other topic areas in Section 8E are related to the use of gates at-grade crossings of highway or pedestrian facilities.

In section 3G (markings), the red-colored pavement was broadly cast for all public transit systems in the June 2014 approval of section 3G.07. However, the use of word pavement markings for transit (BUS or LRT) are in another section (3B.20) unrelated to the colored pavement discussion.
Scattered references to bus or bus lanes are provided in Section 2G (GMI), yet the bus applications were generally copies of HOV lane applications (mostly freeway) in preferential lanes. Part 2B does not include bus lane regulatory applications even though there are several mandatory lane sign applications for bus lanes (Sections 2B.18 through 2B.22).

Between 2003 and 2012 there had been significant research in bus rapid transit applications. Since that time many systems have been implemented across the USA. Little research had been completed after implementation of these systems that has assessed traffic control needs, its successes, gaps and areas for improvement. NACTO has produced its *Transit Street Users Guide*[1] focusing on urban areas. Many of these applications draw upon MUTCD elements but also have issues of inconsistency – where overhead, post mounted signs apply, where color pavement is applied and how. This guide identified the need for design support and organization regarding bus lane applications.

These inconsistencies and the scattered nature of bus traffic control devices lend themselves to non-uniform applications and confusion for practitioners and users of the manual. The Bus/BRT Task Force was formed and reviewed the following questions.

QUESTIONS:

1. Given the nature of bus transit, where would the best place be for practitioners to find traffic control measures in a uniform and simple fashion? Would the current approach where applications are scattered between five different parts be optimal? In the recent cases of Low-Volume Road and SROPT the decision was to incorporate like devices within the confines of the parts where the "like devices" are. With the core devices being signs, markings and signals – would it be best to consolidate these devices in single bus/transit related sections of those parts? In contrast, other parts (railroad/LRT, bicycle, school) contain devices related to the chapter title in a consolidated fashion. Which circumstance does this situation best fit for the future of the MUTCD where tags and searches are readily possible?
   ACTION: The Task Force is proposing changes to incorporate all bus/BRT warning and regulatory signs, markings, signal and grade crossing gates discussions in the applicable new "bus" sections of Parts 2 (signs), 3 (markings, 4 (signals) and 8 (RR/LRT gated crossings).
2. For active signs used for BRT (part time warning or part time regulatory), should these be framed together in Part 2 or as they are currently being documented in the section 8E approach?

[1] Transit Street User Guide, NACTO, 2015.

ACTION: The Task Force is proposing to RWSTC for Chapter 2 changes (below) to incorporate active warning and regulatory signs for BRT/busway in the applicable sections 2B and 2C.

3. Since there are dozens of metropolitan areas that have implemented BRT, has the MUTCD adequately met their needs? A research statement was developed together with the Research Committee to address the status of practice in this area in 2017 but was not funded by TCRP or NCHRP. In lieu of funding, the Task Force undertook a survey. *ACTION: The task force completed a survey (see below) in the spring of 2018 and discussed the results as they affect the MUTCD.*

SURVEY OF TRAFFIC CONTROL APPLICATIONS FOR BUS TRANSIT

Metropolitan areas have implemented bus rapid transit systems over the past decade as a cost-effective means to deliver high quality corridor transit services. As these systems emerged, they have adapted traffic control strategies from light rail transit, railroads and exclusive/managed lanes. Several systems have migrated to exclusive/dedicated rights-of-way which has created unique needs for traffic control. Over the past 10 years, little research has been conducted on the effectiveness traffic control strategies outlined in early research[2]. In some cases, the lack of uniform traffic control devices has resulted in significant crash frequencies that have impacted safety, mobility, reliability and operational costs. A short ten question survey was prepared and issued to NCUTCD members, APTA, ITE, AASHTO, NACTO, and directly to specific transit properties that have recent BRT applications (see Table 1). Responses from 110 practitioners were obtained.

Table 1. Listing of Survey Outreach Site

WEST	**EAST**
Denver: Flatiron Flyer Eugene: EmX Los Angeles: MTA Orange, Harbor, El Monte and Rapid Oakland: AC Transit Rapid Bus Orange County: OCTA Bravo San Bernardino: sbX Santa Clara: VTA Rapid 522 Seattle: KC Metro Rapid Ride Vancouver, WA: The Vine	Boston: MBTA Silver Bus Hartford: CTfastrak New York: City Bus Pittsburgh Busway Providence: Tunnel Richmond: GRTC Pulse Upper Darby, PA: Ardmore Busway
SOUTH/SOUTHWEST	**MIDWEST**
Atlanta: MARTA Q Austin: MetroRapid El Paso: Brio Las Vegas: MAX Miami: South Miami-Dade Busway Orlando: Lynx	Chicago: Loop Link Cleveland: Healthline Grand Rapids: Sliver Line Kansas City: MAX Minneapolis: Metro Red Line

[2] Bus Rapid Transit: Volume 1 Case Studies in BRT, TCRP Report 90, 2003.
Design, Operation, and Safety of At-Grade Crossings of Exclusive Busways, TCRP Report 117, TRB, 2007.
Bus Rapid Transit Practitioner's Guide, TCRP Report 118, TRB, 2007
Advanced Network Planning For Bus Rapid Transit: The "Quickway" Model as a Modal Alternative to "Light Rail Lite", US DOT FTA, FTA-FL-26-7104.2007.4, February 2008.
Bus Rapid Transit Applications Phase 2, Florida Department of Transportation District 4, December 2011.
A Guide for Implementing Bus on Shoulder (BOS) Systems, TCRP Report #151, TRB, 2012.
Use of Freeway Shoulders for Travel, Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy, FHWA-HOP-15-023, February 2016.

Responses varied from consultants (33%), transit agencies (28%), cities/counties (15%), DOTs (10%) and academics (2%). Participants averaged 24 years of professional experience. In the past 10 years most (75%) had been involved in the design and/or operation of exclusive or non-exclusive bus transit applications and several of the others had been involved with LRT. Nearly 80% were familiar or somewhat familiar with the MUTCD. The three most frequent traffic control devices that they had utilized on projects were bus only pavement markings (2/3), transit signal priority (over half), exclusive bus traffic signal phases (nearly half) and bus only (exclusive lane use) signs (nearly half). There was significant experience with exclusive bus lane applications

When asked if they had observed issues associated with the public's proper comprehension of bus related traffic control devices the largest answer was yes (43%), no (31%), N/A (26%). Specific questions regarding median running bus operation indicated most (63%) did not have experience with these operations and for the professionals who did, the majority had not experienced issues in these facilities with left turning conflicts/driver confusion/intrusion into the exclusive busway or pedestrian clearance issues.

Crash history with various bus applications was queried. Most respondents characterized crash occurrence as insignificant to occasional crash for busway, BRT, bus in HOV lane and bus on shoulder. However, surface street bus applications had more frequent crash experience. The final question asked if there were possible changes to traffic control devices on projects they worked on that could lower crash frequency and/or improve transit operational performance. About half said yes. The majority of comments surrounded the traffic control of exclusive and semi-exclusive bus lanes regarding making them clear to drivers through signing, marking and exclusive signals. The differentiation of exclusive and semi-exclusive (right turns allowed) seems to be challenging for many practitioners due to lack of uniform guidance.

EXPERIMENTATION AND RESEARCH

Several agencies have been experimenting with concepts documented in 2011-2014 as part of prior council approvals. Red-colored pavement was selected with the early experimental cities because of its existing use for this purpose in other jurisdictions internationally. Several communities including Chicago, New York, Washington, DC, San Francisco, Santa Rosa, San Diego, Seattle and Portland have advanced application of red pavement. Reports documenting performance have been prepared for on-going experimentation in San Francisco and New York. Key findings noted:

- Violations of common bus lane restrictions increase as congestion (volume-to-capacity) increases
- Reduction of illegal occupancy of transit lanes by non-transit vehicles
- Reduction in travel time of transit vehicles
- Reduction in illegal parking in transit lanes
- Reduction in bus lane violations and crashes
- Red-colored pavement did not induce drivers of private vehicles to make turns from the incorrect lane

NOTE: While not all of these effects were observed at all experimental sites, the majority of sites observed showed at least one of these positive operational effects from the installation of red-colored pavement.

Washington DC has experimented with red pavement for bus lanes to enhance understanding of compliance in collaboration with automated enforcement. NACTO has also documented use of red pavement markings and indicated bus lane applicates for cases where bus headways are 10 minutes or less. Some of the reported challenges of the red bus lanes involve adjacent property use issues including driveway access, lane crossings or intrusion for curbside access.

Additionally, research has been underway to determine the color box for red pavement markings. On December 4, 2019 FHWA issued Interim Approval #22 (IA-22) "Red-Colored Pavement for Transit Lanes". This interim approval sets the conditions for the applications of red pavement marking in more locations than on an experimental basis. The red color for pavement marking is not the same red as defined by FHWA for signs. The daytime chromaticity coordinates for the color used for red-colored pavement is noted in Table 2. There is no nighttime chromaticity requirement for red-colored pavement. It is noted in the interim approval that red-colored pavement may be retroreflective, but there is no requirement or recommendation that it be retroreflective.

Table 2. Red Pavement Chromaticity

1		2		3		4	
x	y	x	y	x	Y	x	Y
0.420	0.330	0.450	0.380	0.560	0.370	0.540	0.320

The interim approval notes that if red paint or other marking materials applied to the roadway surface are used to provide red coloring, consideration should be given to selecting pavement marking materials that will minimize loss of traction for pedestrians, bicycles, and motorcycles where such users are expected to use or cross the facility.

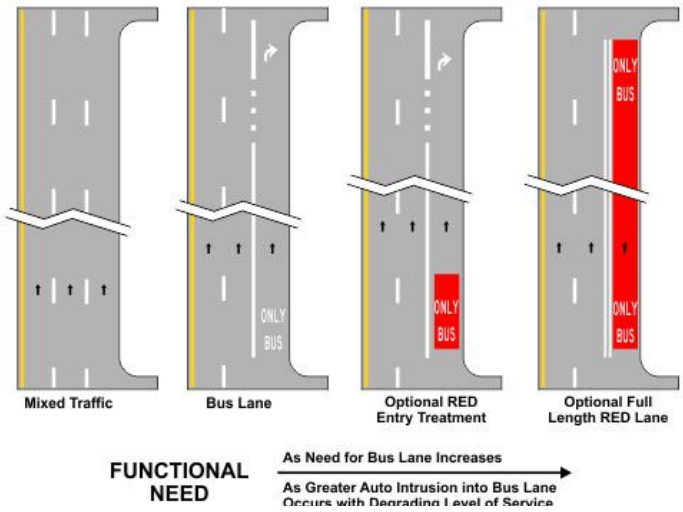


Figure 1

The task force took key findings from the survey (to establish greater uniformity of traffic control devices to make exclusive and semi-exclusive bus lanes more recognizable) and the findings from experimentation (that violations of bus lanes increase with congestion, ie. volume-to-capacity and level of service degradations) to create a framework for application of red-colored pavement. Figure 1 shows options for bus lanes as operational conditions (and general vehicle intrusions) might vary.

Bus on shoulder operations have advanced in the past ten years in several metropolitan areas. Pilot projects and installations from Boston, Chicago, Northern Virginia/DC, Columbus, Miami,

Minneapolis, Raleigh, San Diego, and Seattle have practical experiences with signs and pavement markings to address issues associated with these bus operational enhancements. Most have established signs the define authorized bus use only. Since a symbol sign does not exist in the MUTCD for these applications, review of the various sign types was undertaken to define functional needs and redundancy with unique word signs, reviewing current preferential lane signs designs.

FINDINGS

Based upon the work of the Task Force, research and its survey, three major findings emerged:

- A need for greater clarity in addressing exclusive and semi-exclusive transit lane operations, particularly better signing combined with colored pavement marking and signal applications in combination – uniformly.
- Establishing a more complete suite of bus lane signs using existing layouts and symbols already in the MUTCD.
- Better organization of bus applications in the MUTCD.

To accomplish this, the following recommendations are advanced as part of this proposal to change the MUTCD (see below):

Follow the model created by Markings Technical Committee by creating sections specific to public transit for red pavement color:

1. Create a new sign section in Chapter 2B for bus lane regulatory signs. Collect all bus lane signs, add semi-exclusive bus lane signs (for right turn, business access conditions separate from preferential/exclusive lane treatments) and reference Chapters 2G, 3D and 4D to coordinate sign applications with marking and signals. Locate following all lane use control sections, after Section 2B.23. Include examples of bus lanes in a following section. Signs should build upon and reflect existing MUTCD sign types R3-5, R3-11a, R3-14a, R3-15, R3-15a using similar text, symbols and the approved bus symbol in place of the diamond.
2. Create a new sign section in Chapter 2C for bus warning signs. Add busway crossing plaque and part time warning using a blank-out sign to a new section near 2C.49.
3. Within the new bus sign section in Chapter 2B, create a suite of bus signs and remove references from part 2G for bus exclusive lanes which will now be referenced in part 2B. Extract bus signs out of sections 2G.03, 05, 06, 07, 08 and 10 and place after 2G.15 using layouts, symbols and text for post and overhead mounted bus signs.
4. Add new section to markings Chapter 3Dfor bus line markings (see Figure 2) red-colored pavement marking (with reference to Section 3G.07) and associated signs sections.
5. Retain colored pavement marking Section 3G.07 for red pavement color. Edit for a reference to new section in Chapter 3D to address both exclusive and semi-exclusive treatments.
6. Add a new section to Chapter 4D before old Section 4D.27 to address transit displays with references to Part 2 for signs and Part 8 for special displays for buses.

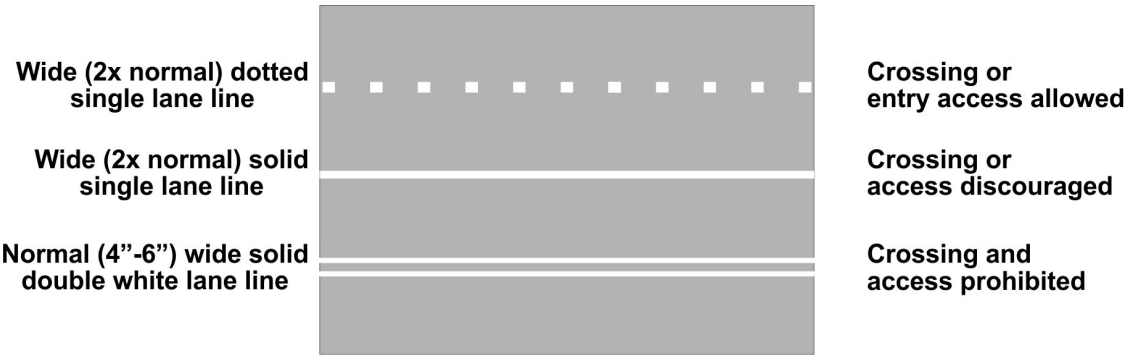


Figure 2. Right Hand BUS Lane Line Types

7. Retain gated crossing discussion in Chapter 8E. Move sections associated with regulatory and warning signs to Part 2 (Sections 8E.02 through 8E.06). Move Section 8E.07 to Part 4 as part of item (f) above.
8. Advance a definition for BRT to Edit Committee to complement the recently approved busway definition in Section 1A.13.
   a. Busway – a special roadway designed for exclusive use by buses. It might be constructed at, above, or below grade and might be located in separate rights-of-way or within highway corridors. [Definition from AASHTO Glossary, Approved by NCUTCD Council June 2018]
   b. Bus Rapid Transit (BRT) – a frequent bus-based public transit service that might include dedicated lanes, busways, mixed flow lanes and traffic signal priority. [From TCRP Report 118 Bus Rapid Transit Practitioner’s Guide, 2007 – Approved by Edit Committee January 8, 2020]

SPONSOR COMMENTS [Added this paragraph after sponsor comments, in addition to the response to comments matrix, as a summary]

There were several broad sponsor comments that the Task Force reviewed and made findings, as noted below:

- Overhead signs would change from a shall to a should condition unless an engineering studies determines otherwise.
- To be uniform (signs and pavement markings) the term BUS is used rather than BUSES
- BUS MERGING warning signs would be used for both on- and off-ramp conflict areas for bus on shoulder operation as the regulatory bus on shoulder sign already defines that operation.
- Clarified that exclusive bus operation should use LRT signals but standard traffic signal control indications may be used as long as they are not visible to other road users (to avoid confusion) and have a BUS SIGNAL sign.
- Red colored pavement should be used for public transit (not shall).
- Retain the public transit definition from the Interim approval for Chapter 3D.

RECOMMENDED MUTCD CHANGES

The following presents the proposed changes to the MUTCD within the context of the current MUTCD language. Proposed additions to the MUTCD are shown in blue underline and

proposed deletions from the MUTCD are shown in ~~red strikethrough~~. Changes previously approved by NCUTCD Council (but not yet adopted by FHWA) are shown in green double underline for additions and ~~green double strikethrough~~ for deletions. In some cases, background comments may be provided with the MUTCD text. These comments are indicated by [highlighted light blue in brackets].

Note: when **Chapter 8E** is referenced in the text proposal, it is referring to NCUTCD Proposal 14B-RR-02, approved by Council on June 28, 2014 which was a recommended added section to the MUTCD.

CHAPTER 1C. DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

Section 1C.02~~1A.13~~ Definitions of Headings, Words, and Phrases in this Manual [16B-EC-01, 6-26-2014]

Standard:

02 **Unless otherwise defined in this Section, or in other Parts of this Manual, words or phrases shall have the meaning(s) as defined in the most recent editions of the "Uniform Vehicle Code," "AASHTO Transportation Glossary (Highway Definitions)," and other publications mentioned in Section ~~1A.11~~1A.04.** [16B-EC-01, 6-26-2014]

03 **The following words and phrases, when used in this Manual, shall have the following meanings:**

25a Busway – a special roadway designed for use by buses. It might be constructed at, above, or below grade and might be located in separate rights-of-way or within highway corridors. [Approved by NCUTCD Council June 2018]

25b Bus Rapid Transit (BRT) - a frequent bus-based public transportation service that includes dedicated lanes, busways, and/or mixed flow lanes with traffic signal priority. [Approved by Edit Committee January 8, 2020]

CHAPTER 2B. REGULATORY SIGNS, BARRICADES, AND GATES

Section 2B.03 Size of Regulatory Signs

Table 2B-1. Regulatory Sign and Plaque Sizes

Sign or Plaque	Sign Designation	Section	Conventional Road	Expressway	Freeway	Minimum	Oversized
~~R3-5gP~~	~~Bus Lane (plaque)~~	~~2B.20~~	~~30 x 12~~	~~30 x 12~~			
Mandatory Movement Lane Control	**R3-5,5a** R3-XXe	**2B.20** 2B.23a	**30 x 36**	**30 x 36**	—	—	—

Section 2B.20 Mandatory Movement Lane Control Signs (R3-5, R3-5a, R3-7, and R3-20)

Standard:

01 **If used, the Mandatory Movement Lane Control (R3-5, R3-5a, and R3-7) sign (see Figure 2B-4) shall indicate only the single vehicle movement that is required from the lane. If used, the Mandatory Movement Lane Control sign shall be located in advance of the intersection, such as near the upstream end of the mandatory movement lane, and/or at the intersection where the regulation applies. When the mandatory movement applies to lanes exclusively designated for HOV traffic, the HOV 2+ (R3-5cP) supplemental plaque shall be used. When the mandatory movement applies to lanes that are not HOV facilities, but are lanes exclusively designated for ~~buses and/or~~ taxis, and/or bicycles, the ~~word message~~ TAXI LANE (R3-5dP) ~~and/or~~ ~~R3-5gP~~ and/or bike symbol LANE (R3-5hP) supplemental plaques shall be used** (see Section 2B.23a for bus lane signs), (approved by Council 6-25-18, Bicycle # 6, attachment # 25, 14A.BIK.03)

R3-5hP (30" x 12") mounted above R3-5a 3 (bicyclists go straight in that lane)

02 **The Mandatory Movement Lane Control (R3-7) sign shall include the legend RIGHT (LEFT) LANE MUST TURN RIGHT (LEFT). The Mandatory Movement Lane Control (R3-5 and R3-5a) symbol signs shall include the legend ONLY.**

03 **The R3-7 word message sign shall be for post-mounting only.**

04 **Where the number of lanes available to through traffic on an approach is three or more, Mandatory Movement Lane Control (R3-5 and R3-5a) symbol signs, if used, shall be mounted overhead over the specific lanes to which they apply (see Section 2B.19).**

Guidance:

05 *If the R3-5 or R3-5a sign is post-mounted on an approach with two or fewer through lanes, a supplemental plaque (see Figure 2B-4), such as LEFT LANE (R3-5bP), HOV 2+ (R3-5cP), TAXI LANE (R3-5dP), CENTER LANE (R3-5eP), RIGHT LANE (R3-5fP~~), BUS LANE (R3-5gP~~), or BOTH LANES, should be added above the sign to indicate the specific lane to which the mandatory movement applies. If Mandatory Lane Movement Control (R3-5) symbol signs with supplemental R3-5bP or R3-5fP plaques are used, they should be mounted adjacent to and along only the full width portion of the turn lane.*

Section 2B.21 Advance Intersection Lane Control Signs (R3-8 Series)

Guidance:

06 *If the Optional Movement Lane Control sign is post-mounted on an approach with two or fewer through lanes, a supplemental plaque (see Figure 2B-4), such as LEFT LANE (R3-5bP), HOV 2+ (R3-5cP), TAXI LANE (R3-5dP), CENTER LANE (R3-5eP), or RIGHT LANE (R3-5fP), ~~or BUS LANE (R3-5gP),~~ should be added above the R3-6 sign to indicate the specific lane from which the optional movements can be made.*

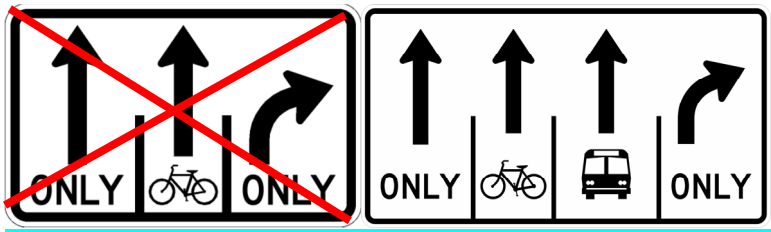
Section 2B.22 Advance Intersection Lane Control Signs (R3-8 Series)

Option:

01 Advance Intersection Lane Control (R3-8, R3-8a, and R3-8b) signs (see Figure 2B-4) may be used to indicate the configuration of all lanes ahead.

02 The word messages ONLY, OK, THRU, ALL, ~~or~~ HOV 2+, ~~or~~ BIKE or bicycle symbol or travel mode symbols may be used within the border in combination with the arrow symbols of the R3-8 sign series. The HOV 2+ (R3-5cP) supplemental plaque may be installed at the top outside border of the R3-8 sign over the applicable lane designation on the sign. The diamond symbol may be used instead of the word message HOV. The minimum allowable vehicle occupancy requirement may vary based on the level established for a particular facility.

[14A-BIK-04, 6-26-2014, Attachment # 26, Bicycle # 7]



Examples of R3-8 (modified) with mode symbols Note: ONLY removed from mode symbols

Guidance:

03 If used, an Advance Intersection Lane Control sign should be placed at an adequate distance in advance of the intersection so that road users can select the appropriate lane (see Figure 2A-4). If used, the Advance Intersection Lane Control sign should be installed either in advance of the tapers or at the beginning of the turn lane.

Option:

04 An Advance Intersection Lane Control sign may be repeated closer to the intersection for additional emphasis.

Standard:

05 Where three or more approach lanes are available to traffic, Advance Intersection Lane Control (R3-8 series) signs, if used, shall be post-mounted in advance of the intersection and shall not be mounted overhead (see Section 2B.19).

Section 2B.23a Bus Lane Regulatory Signs

Support:

01 Bus lanes can be located on surface streets (such as arterial streets) and access-controlled facilities (such as freeways and expressways). Bus lanes can be exclusive or semi-exclusive operations that prohibit general purpose traffic from lanes or limit general purpose access to certain movements (such as right turns or driveway access). Bus lanes can be used for busway, bus rapid transit or general bus services. For transit signal priority with exclusive or semi-exclusive bus operations refer to Section 4D.27.

[14B-RR-02, 6/28/2014 -Refer to Section 8E.02 – to be removed and replaced by these paragraphs]

Standard:

[Switch order of paragraphs 25, 08 & 07 moved to 01a, 01b and 02a]

01 **Where a general purpose lane on a freeway or expressway transitions to a bus lane or where a bus lane on shoulder begins, the BUS LANE AHEAD (R3-XXi) sign or SHOULDER AUTHORIZED BUS ONLY AHEAD (R3-XXc) sign shall be used in advance and placed adjacent to or above the lane (see Figure 2B-5A).**

02 **BUS ONLY Lane Control (R3-XXa or R3-XXb) signs and BUS ONLY pavement markings (Section 3D.01a) shall be placed at the beginning point of the lane control.**

03 **For bus lanes on conventional roads, a post-mounted BUS ONLY Lane Control (R3-XXa) sign or overhead (R3-XXb) sign (see Figure 2B-5A) shall be used to specify the position of the bus lane (right, center, left).**

04 **Where the bus only operation is limited to a period of time, BUS ONLY Lane Control (R3-XXa or R3-XXb) signs or SHOULDER AUTHORIZED BUS ONLY (R3-XXc) signs shall include the applicable hours and days of operation following the information sequence in Section 2G.05, or Active Traffic Management CMS shall be used.**

05 **Where a bus lane on a freeway or expressway transitions to a general purpose lane, or a bus lane on shoulder ends, the BUS LANE ENDS (R3-XXj) sign or SHOULDER AUTHORIZED BUS ONLY ENDS (R3-XXc) sign shall be placed adjacent to or above the bus lane end point (see Figure 2B-5A).**

Guidance:

06 *BUS ONLY Lane Control (R3-XXa and/or R3-XXb) signs should be placed downstream of locations where significant entering traffic occurs from side streets or ramps. On conventional roads, this should be downstream of signalized intersections. For freeways and expressways, this should be at intervals of one-mile or less unless access to the lane is restricted.*

07 *For bus lanes on conventional roads at signalized intersections, an overhead BUS ONLY Movement Prohibition (R3-XXe) sign (see Figure 2B-5A) should also be mounted over the specific lanes to which they apply (see Section 2B.18).*

08 *For bus lanes on conventional roads which have three or more through general purpose lanes in one direction and either: the bus lane is not the right most through vehicle lane (or left most on a one way street) or where signal spacing exceeds 1,000 feet, an overhead BUS ONLY Lane Control (R3-XXb) sign (see Figure 2B-5A) should be mounted over the appropriate lane (see Section 2B.19).*

09 *For bus lanes on freeways and expressways with two or fewer general purpose lanes in one direction, a post-mounted BUS ONLY Lane Control (R3-XXa) sign (see Figure 2B-5A) should be used adjacent to the bus lane.*

10 *Where a shoulder of a freeway or expressway with two or fewer general purpose lanes in one direction is used for authorized buses, a post mounted SHOULDER AUTHORIZED BUS ONLY (R3-XXc) sign (see Figure 2B-5A) should be used adjacent to that shoulder.*

11 *For bus lanes on freeways and expressways with three or more general purpose lanes in one direction, an overhead BUS ONLY Lane Control (R3-XXb) sign (see Figure 2B-5A) should be placed over the appropriate lane.*

12 *Where a shoulder of a freeway or expressway with three or more general purpose lanes in one direction is used for authorized buses, an overhead lane control SHOULDER AUTHORIZED BUS ONLY (R3-XXc or R3-XXd) sign (see Figure 2B-5A) should be placed over the appropriate lane.*

13 *Where an exclusive bus lane bypasses a ramp meter lane, the BUS ONLY Lane Control (R3-XXa and/or R3-XXb) sign (see Figure 2B-5A) should be mounted adjacent to, or above, the full width portion of the bypass lane.*

Option:

14 Where a shoulder of a freeway or expressway with three or more general purpose lanes in one direction is used for authorized buses only during limited periods of time and shoulder use is restricted to operating speeds 35 mph or lower, a post mounted sign (R3-XXc) may be used adjacent to that shoulder.

14a A decision regarding whether to use a post-mount for situations noted in paragraphs 11 and 14 may be based on an engineering study that considers road user visibility of the sign, the available space, the existing signs for the adjacent general-purpose traffic lanes, roadway and traffic characteristics, the proximity to existing overhead signs, the ability to install overhead signs, and any other unique local factors.

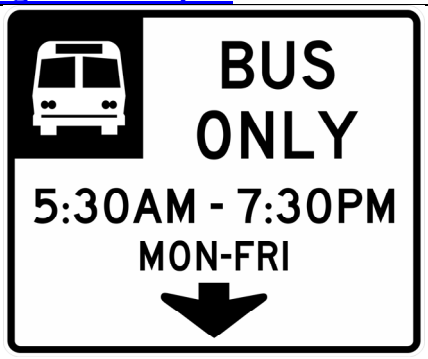
14b For bus lanes on conventional roads, BUS LANE ENDS signs may be used when the bus lane transitions out of extended exclusive operation to semi-exclusive or mixed flow (e.g. allowing turning traffic approaching intersections).

481 **Figure 2B-5a) - Bus Regulatory Signs and Plaques**

R3-XXa R3-XXa1 (replaces R3-11b)

R3-XXaa R3-XXaa1 Symbols

Post mount

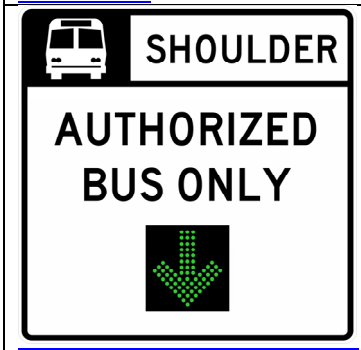


R3-XXb* (replaces R3-14c) Overhead

R3-XXc

Freeway/Expressway post mount (may include time restrictions, ahead, begin or ends)

Freeway/Expressway overhead mount (may also include arrow)



R3-XXd* similar to HOV version Figure 2G-1)

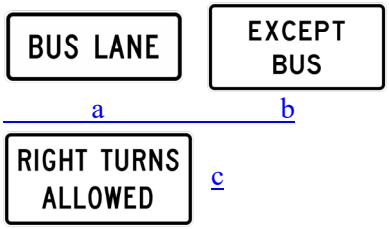
Overhead

R3-XXe (replaces R15-4e from 14B-RR-02

Intersection signal mast arm or post mount

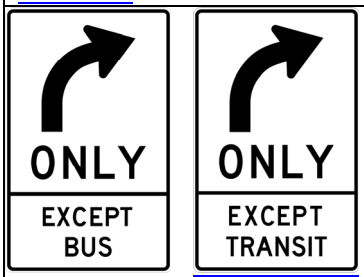
(may also be an insert to a multi-lane R3-8 series - refer to R3-8 Modified below)

Intersection signal mast arm or post mount

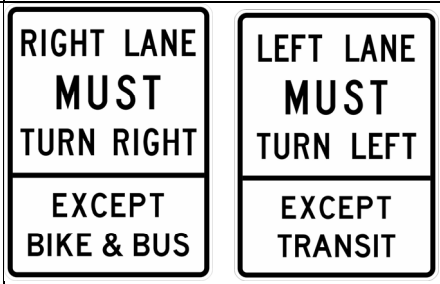


R3-XXfP series (replaces R3-5gP)

Plaques to supplement R3-5, R3-6, or R3-8 series signs or BUS ONLY sign



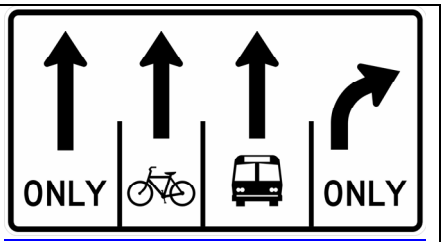
R3-XXg (part of the R3-5 series) Intersection signal mast arm or post mount



R3-XXh (part of R3-7 series) Post mount

R3-XXi (replaces R3-12f and R3-15d)

Overhead or post mount

		
R3-XXj (replaces R3-12g and R3-15e) Overhead or post mount	R3-XXkP Intersection signal mast arm	R3-8 (Modified) Advance Intersection Lane Control

*Note: these signs may use a static or active arrow display. The examples shown in R3-XXb and R3-XXd are intended to show different combinations of the lower text/symbols in application. In an active display the lane-use control signal in the R3-XXd sign would either display a green arrow or a red X depending upon status.

Note that hours of operation samples are shown for specific time periods or over the day as examples. Hours of operation are not necessary for all hours of the day.

Sign configuration of R3-XXi and R3-XXj can be reconfigured vertically in limited horizontal space.

15 The BUS LANE plaque (R3-XXfPa) or EXCEPT BUS plaque (R3-XXfPb) (see Figure 2B-5A) may be used to supplement R3-1, R3-2, R3-5, R3-6, R3-8 or R5-1 signs for lanes on streets that are exclusively to be used by buses. The RIGHT TURNS ALLOWED plaque (R3-XXfPc) may be used to supplement bus only lane control (R3-XXa, R3-XXaa, R3-XXe, R3-XXee) signs.

16 Arrows for the overhead BUS ONLY (R3-XXb), SHOULDER AUTHORIZED BUS ONLY (R3-XXd) (see Figure 2B-5A) may be static or changeable message sign displays (hybrid or DMS). These signs may be used on conventional roads with three or more through general purpose lanes in one direction.

17 BUS ONLY Lane Control signs and BUS ONLY pavement markings may be supplemented with red-colored pavement (Section 3D.01a).

18 The SHOULDER AUTHORIZED BUS ONLY (R3-XXc) sign may include text as appropriate for AHEAD, BEGIN, ENDS and hours of operation. Additional text of "24 Hours" may be provided for emphasis where appropriate.

Support:

19 Day long (24 hours) bus only operation does not need to be shown on BUS ONLY signs.

Standard:

20 **Where the bus lane permits use by other vehicle classes (for example bicycle, light rail, streetcar, taxi, trucks, motorcycle or others, see Section 3D.01a, paragraph 12a), no more than two other classes shall be displayed as text on one sign (R3-XXa and R3-XXa1). Where symbols are used for vehicle classes, no more than one other standard symbol shall be used on one BUS ONLY Lane Control (R3-XXaa and R3-XXaa1) sign (see Figure 2B-5A).**

21 **Where a bus is permitted the through movement from an exclusive turn lane for general purpose vehicle traffic, an EXCEPT BUS Turn Movement Lane Use sign (R3-XXg) (see Figure 2B-5A) shall be used at the intersection.**

22 **Where the R3-7 sign is used and buses are permitted to make a through movement from the turn lane, the EXCEPT BUS Mandatory Movement Lane Control (R3-XXh) sign shall be used at the beginning of the turn lane.**

Option:

23 The EXCEPT BUS Turn Movement Lane Use (R3-XXg) sign (see Figure 2B-5A) may be overhead on the signal mast arm, post-mounted or both.

24 The EXCEPT BUS Turn Movement Lane Use (R3-XXg) sign or EXCEPT BUS Mandatory Movement Lane Control (R3-XXh) sign may replace the word BUS with the word TRANSIT where transit vehicles other than a bus (eg. streetcar, LRT) share the lane.

Standard:

25 [moved, vacant]

26 **Where a separate bus signal is provided which displays similar faces as general traffic signal displays, the BUS SIGNAL (R3-XXk) sign shall be placed adjacent to the bus signal display.**

Option:

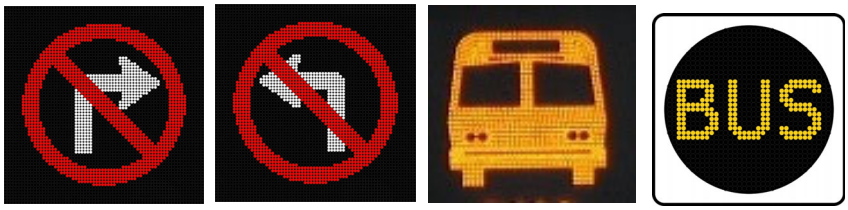
27 [moved, vacant]

28 Where a bus signal uses Light Rail Transit Signals, a BUS SIGNAL sign (R2-XXk) may be used adjacent to the display.

29 A bus-activated blank-out Movement Prohibition (R3-XXl and R3-XXla) sign may include a supplementary part time warning blank out BUS APPROACHING SYMBOL (W11-XXm) sign or blank out BUS message sign (W11-XXn, Figure 2B-5B) (see Section 2C.49 and Chapter 2L).~~blank-out BUS COMING message or a Bus Approaching blank-out warning sign (see~~

~~Section 8E.05), or both. If used, the word message and the Bus Approaching sign may be flashed.~~ [Text moved from Section 8E.03 (14B-RR-02, 6-28-2014), flashing statement added in paragraph 29]

Figure 2B-5B Bus Blank Out Signs



R3-XXl R3-XXla W11-XXm W11-XXn

Guidance:

30 *A bus-activated blank-out ~~turn~~ Movement Prohibition sign (R-XXl, R3-XXla) ~~(R3-1, R3-2, R3-4, R3-18 or R3-27)~~ should be used where an intersection is within 100' of a highway-busway grade crossing and is controlled by STOP sign, or is controlled by traffic control signals with permissive turn movements for road users crossing the ~~busway~~ exclusive bus movement.* [Text moved from Section 8E.03 (14B-RR-02, 6-28-2014)]

Option:

31 Blank out warning BUS APPROACHING SYMBOL (W11-XXm) or BUS TEXT (W11-XXn) signs (see Figure 2B-5B) may be used to supplement regulatory turn prohibition signs for exclusive bus lanes. These signs may use not more than one of the following flashing elements:

A. flash the warning text/symbol;

B. flash the regulatory turn prohibition sign;

C. supplementary warning beacons; or

D. a flashing LED border (refer to Section 2B.18, paragraph 12a).

32 As an alternative to bus-activated blank-out ~~turn~~Movement Prohibition signs at intersections with traffic control signals, exclusive traffic control signal phases such that all movements that cross the busway have a steady red indication may be used in combination with No Turn on Red (R10-11, R10-11a, or R10-11b) signs (see Section 2B.54). [Text moved from Section 8E.03 (14B-RR-02, 6-28-2014)]

Standard:

33 **Turn prohibition signs that are associated with preemption or priority shall be visible only when the highway-busway grade crossing turn prohibition is in effect.** [Text moved from Section 8E.03(14B-RR-02, 6-28-2014)]

Section 2B.23b Examples of Bus Lane Applications

Figure 2B-5c Bus Lane Examples on Urban Streets

Figure 2B-5c. Bus Lane Examples on Urban Streets

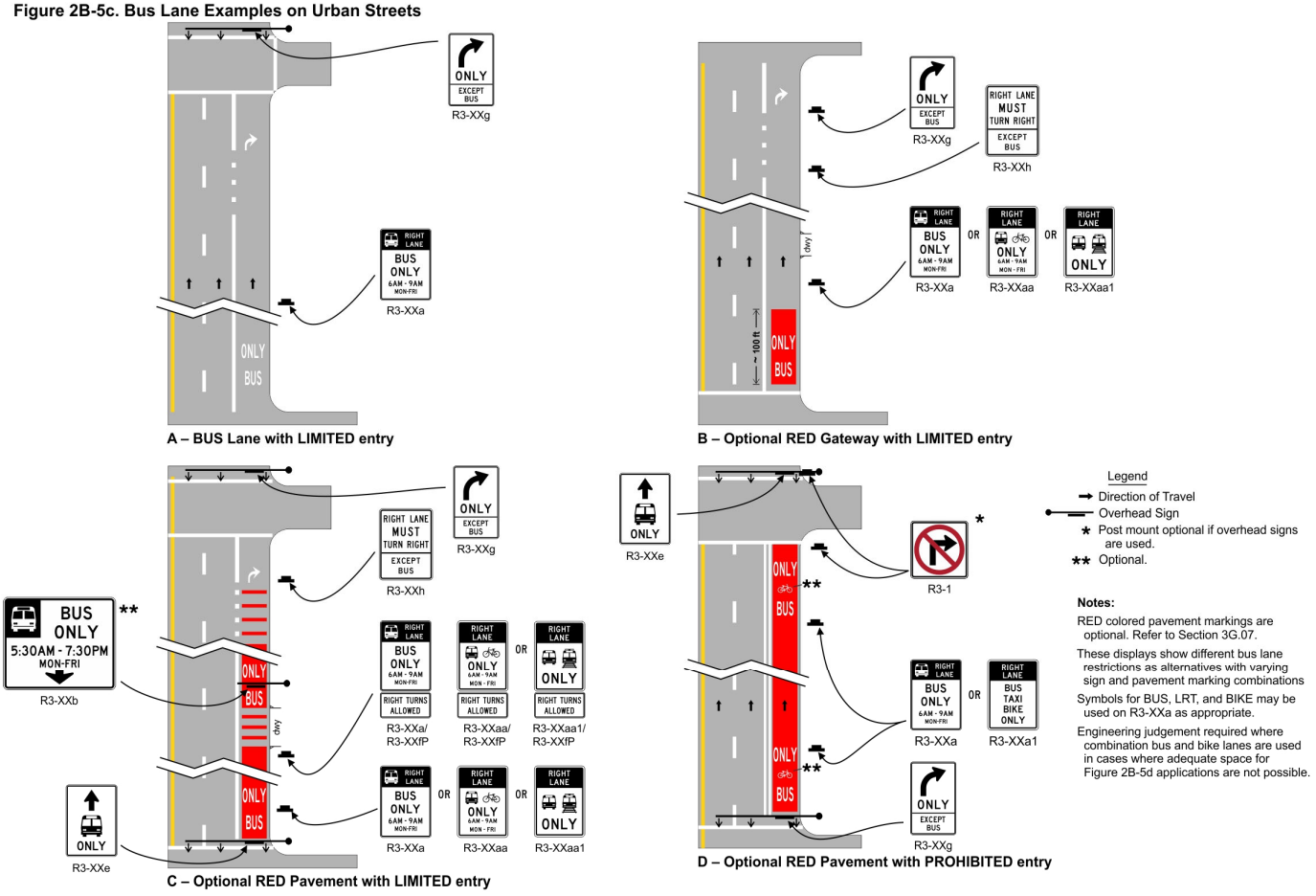
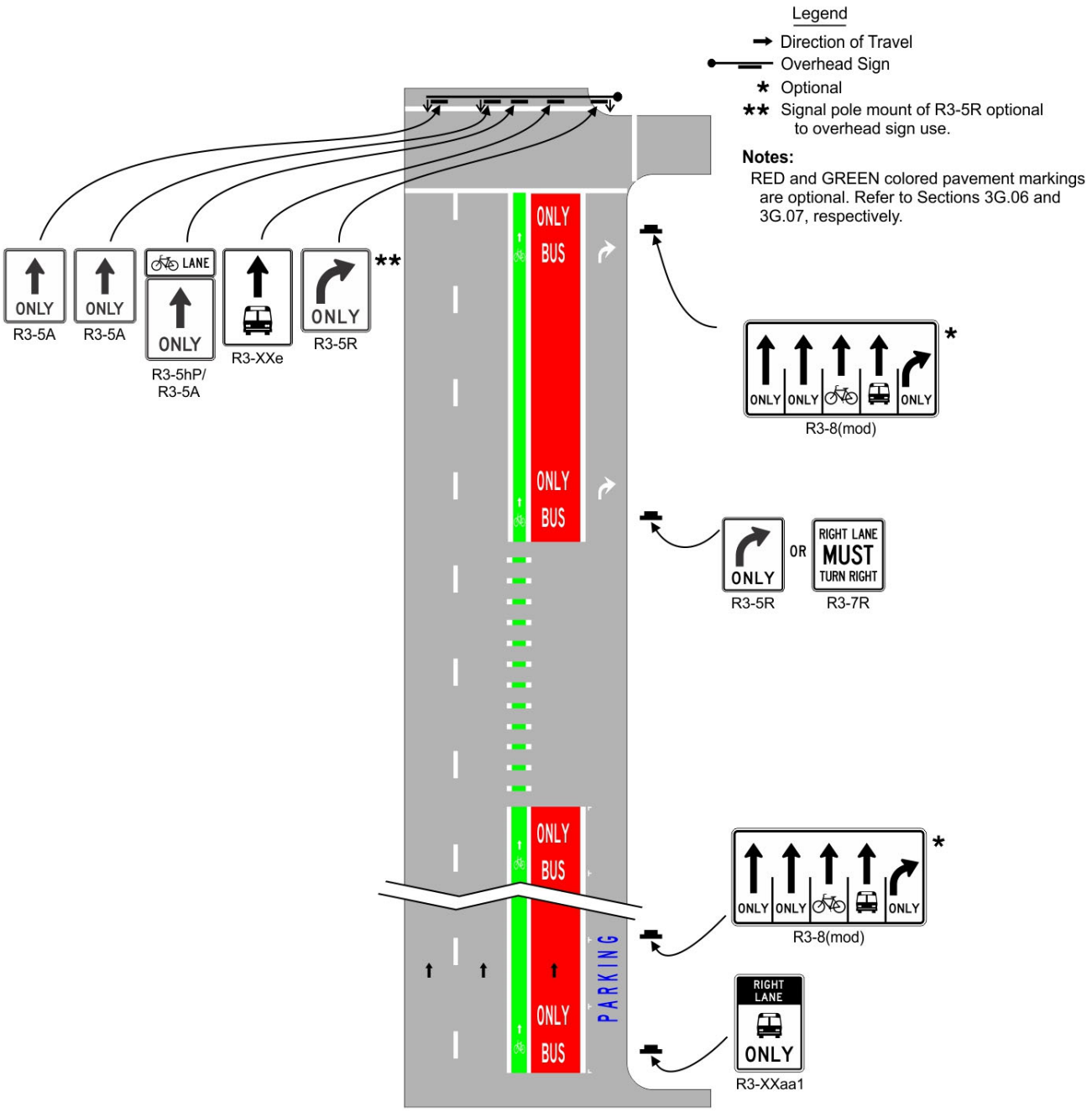


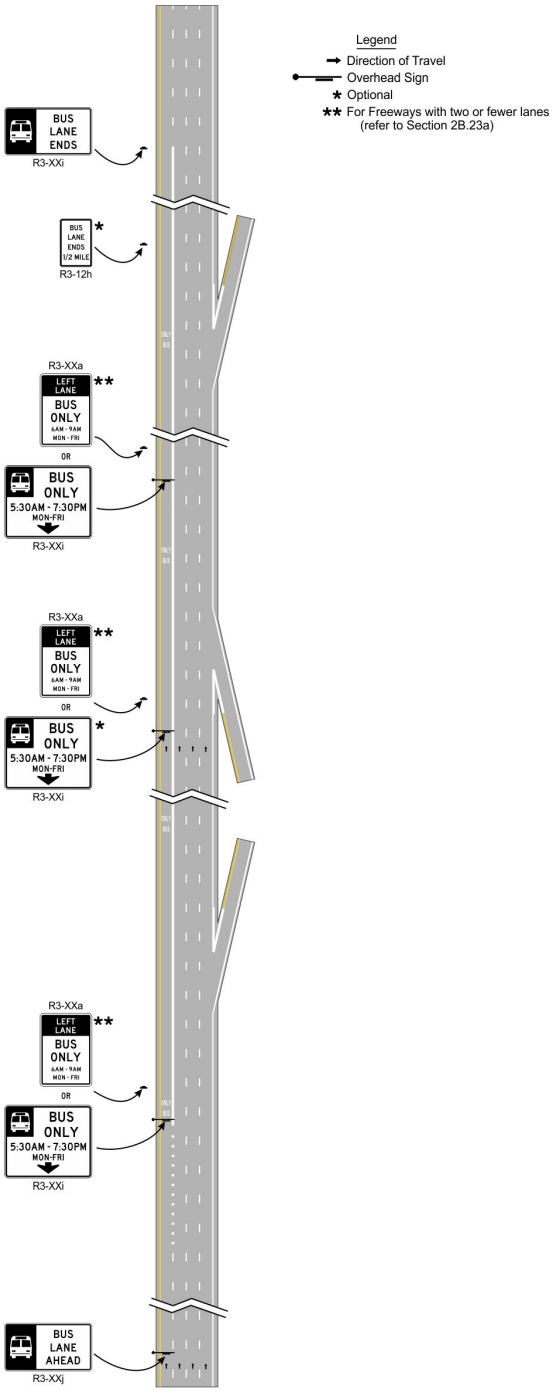
Figure 2B-5d. Example of Intersection Area –Semi-Exclusive Bus Lane/Cross over Queue Jumps

Figure 2B-5d. Semi-Exclusive BUS Lanes (Urban Examples)



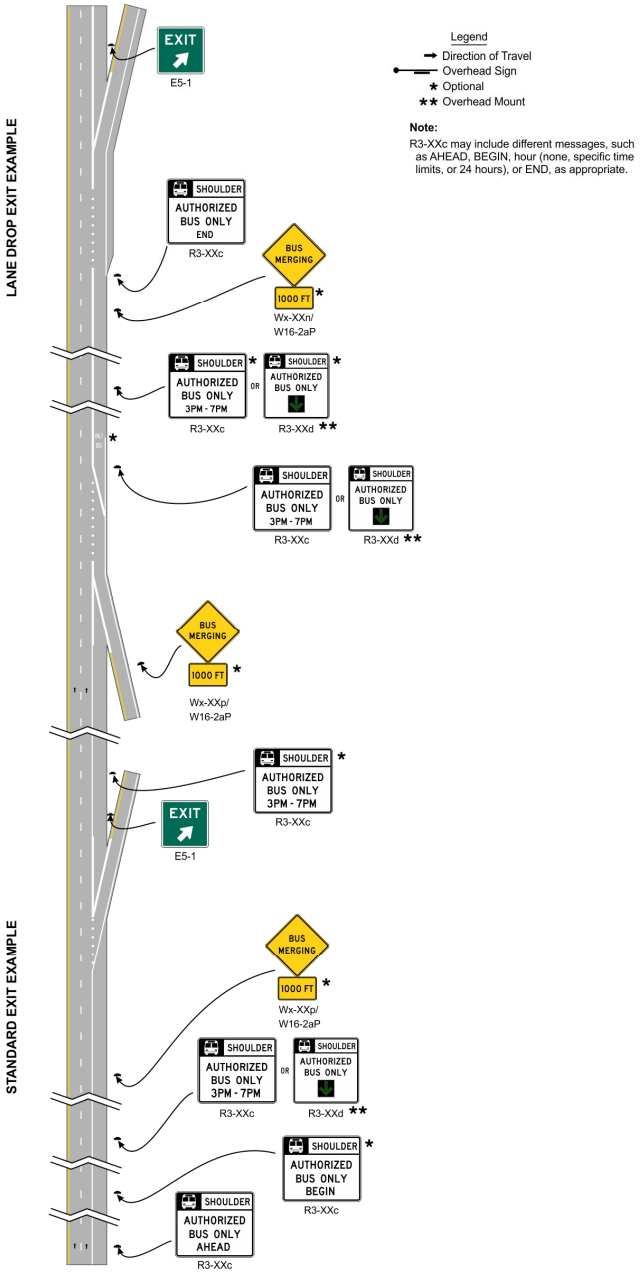
[Figure 2B-5e
Freeway/Expressway Bus Lane]

Figure 2B-5e. Freeway/Expressway Bus Lane



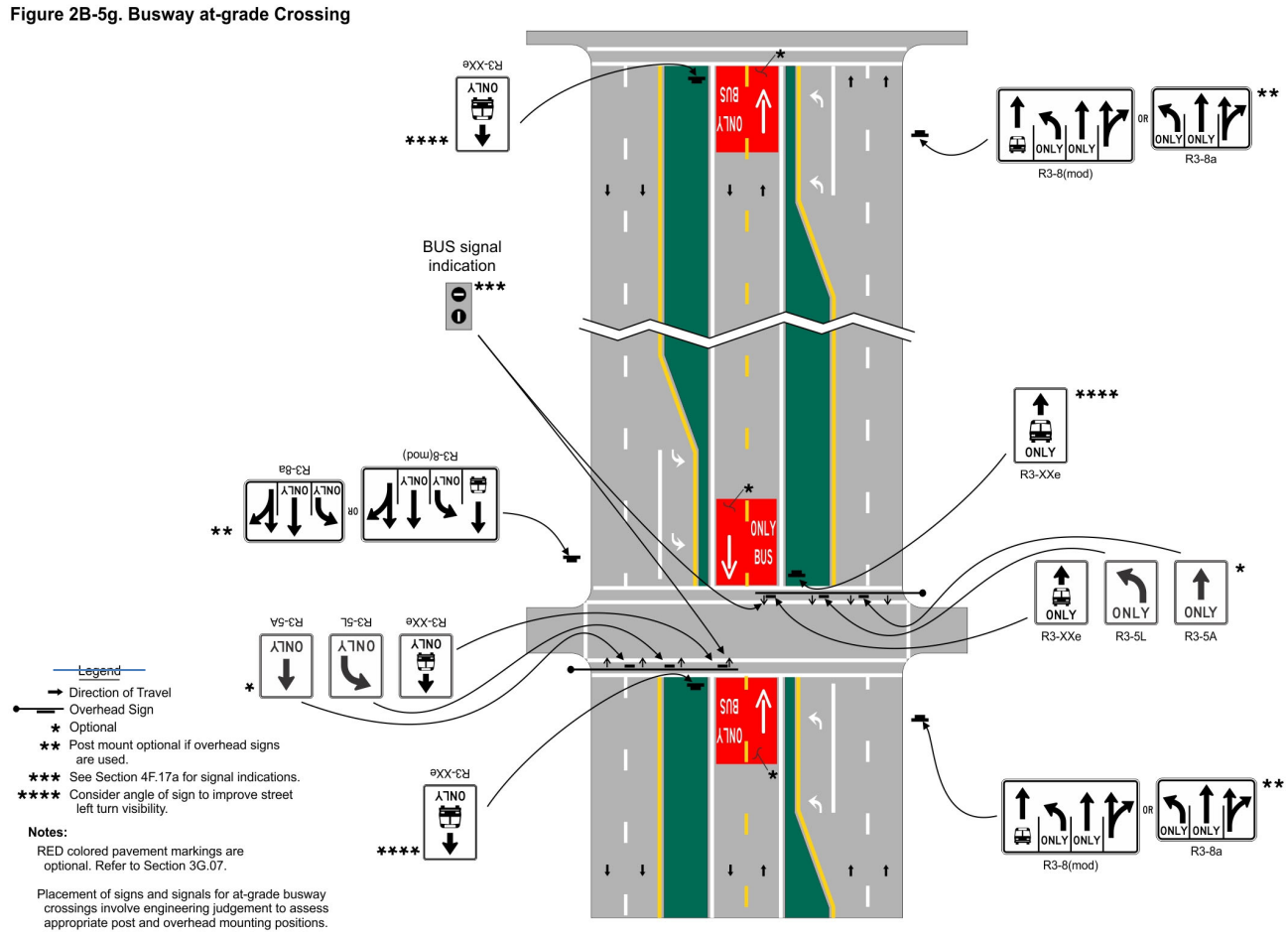
[Figure 2B-5f
Bus on Shoulder Example]

Figure 2B-5f. Bus Lane on Shoulder



577

Figure 2B-05g. Busway at-grade crossing



CHAPTER 2C: WARNING SIGNS AND OBJECT MARKERS

Section 2C.02 Application of Warning Signs

Table 2C-1. Categories of Warning Signs and Plaques

Category	Group	Section	Signs or Plaques	Sign Designations
Traffic Related	Vehicular Traffic	2C.49	Truck Crossing, Truck (symbol), Emergency Vehicle, Tractor, Bicycle, Golf Cart, Horse-Drawn Vehicle, Trail, Crossing, Busway	W8-6; W11-1,5,5a,8,10,11, 12P,14,15,15P,15a; W16-13P, W11-XXo

Section 2C.03 Design of Warning Signs

Table 2C-2. Warning Sign and Plaque Sizes

Sign or Plaque	Sign Designation	Section	Conventional Road Single/Multi-lane	Expressway	Freeway	Minimum	Oversized
W11-XXm	Bus Approaching	2C.49	24 x 24 / 24 x 24	-	-	-	30 x 30
W11--XXn	Bus	2C.50a	18 x 18 / 18 x 18	-	-	-	-
W11-XXo	Busway	2C.50a	30 x 30 / 36 x 36	36 x 36	-	24 x 24	48 x 48
W16-xxP	Busway Crossing (plaque)	2C-50a	24 x 18 / 30 x 24	30 x 24	30 x 24		
Wx-XXp	Bus Merging	2C-50a		36 x 36	48 x 48	36 x 36	

Section 2C.49 Vehicular Traffic Warning Signs (W8-6, W11-1, W11-5, W11-5a, W11-8, W11-10, W11-11, W11-12P, W11-14, W11-15, ~~and~~ W11-15a and W11-XXo)

Option:

01 Vehicular Traffic Warning (W8-6, W11-1, W11-5, W11-5a, W11-8, W11-10, W11-11, W11-12P, W11-14, W11-15, ~~and~~ W11-15a, and W11-XXo) signs (see Figure 2C-10) may be used to alert road users to locations where unexpected entries into the roadway by trucks, bicyclists, farm vehicles, emergency vehicles, golf carts, horse-drawn vehicles, buses or other vehicles might occur. The TRUCK CROSSING (W8-6) ~~word message~~ sign may be used as an alternate to the Truck Crossing (W11-10) ~~symbol~~ sign. (approved by Council 1-19-12, Attachment # 8, RW #8)

Figure 2C-10 Vehicular Traffic Warning Signs and Plaques

Add to Figure 2C-10
W11-XXo

Section 2C.50a Bus Warning Signs

Guidance:

01 ~~*A Highway-Busway Grade Crossing Advance Warning sign*~~ *The BUSWAY (W11-XXo) sign (see Figure 2C-10)should be used ~~on each highways~~ in advance of ~~every~~ busway grade crossings except in business or commercial areas where active highway-busway grade crossing traffic control devices are in use. A BUSWAY CROSSING (W16-XXP) ~~supplemental~~ plaque (see Figure 2C-12) should be installed with ~~every~~ Highway-Busway Grade Crossing Advance Warning signs.* [Text moved from Section 8E.04 (14B-RR-02, 6-28-2014)]

Figure 2C-12 Supplemental Warning Plaques

Add to Figure 2C-12
W16-XXP

Support:

02 ~~The Bus Approaching-Activated Blank-Out warning~~The blank out warning BUS APPROACHING (W11-XXm) symbol or BUS (W11-XXn) text signs supplement~~s~~ the traffic control devices to warn road users crossing the busway of an approaching bus. [Text moved from Section 8E.06(14B-RR-02, 6-28-2014)]

Option:

03 A BUS APPROACHING activated blank-out warning sign may be used at signalized intersections near busway grade crossings or at crossings controlled by STOP signs. [Text moved from Section 8E.06 (14B-RR-02, 6-28-2014)]

Guidance:

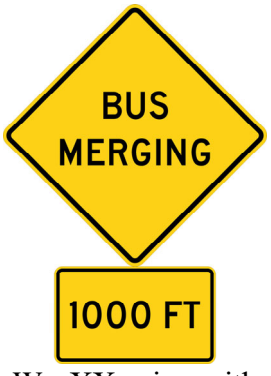
04 *When a warning sign applicable only to a bus lane is installed on a median barrier with limited lateral clearance, the warning sign application should be similar to Warning Signs on Median Barriers for Preferential Lanes (see Section 2G.08).*

05 *Where a bus on shoulder operation transitions back to a general purpose lane or crosses a ramp, the BUS MERGING sign (Wx-XXp) should be used (Figure 2C-12a).*

Option:

06 The BUS MERGING sign may be supplemented with a XXX FEET (W16-2aP) plaque.

Figure 2C-12a Bus Merging Sign



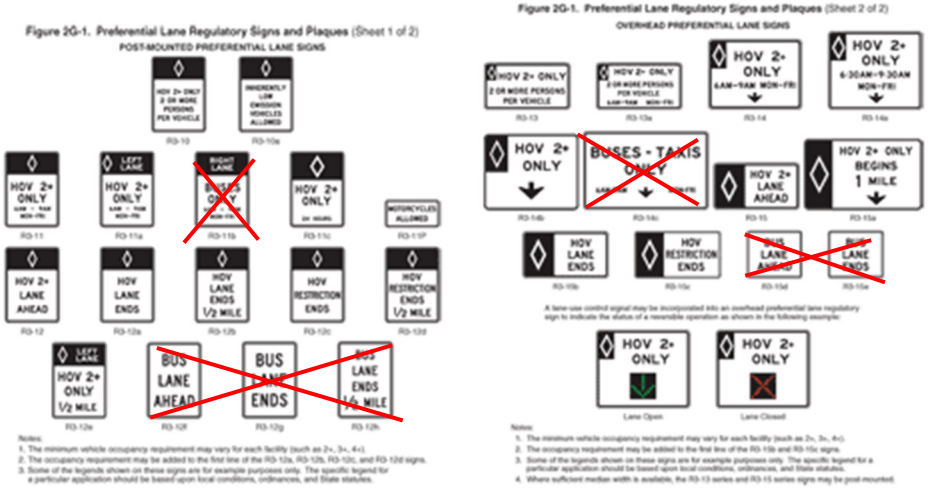
Wx-XXp sign with
W16-2aP plaque

CHAPTER 2G. PREFERENTIAL AND MANAGED LANE SIGNS

Section 2G.03 Regulatory Signs for Preferential Lanes – General

Standard:

01 **When a preferential lane is established, the Preferential Lane regulatory signs (see Figure 2G-1) and pavement markings (see Chapter 3D) for these lanes shall be used to advise road users.**



Support:

02 Preferential Lane (R3-10 series through R3-15 series) regulatory signs consist of several different general types of regulatory signs as follows (see Figure 2G-1):

A. Vehicle Occupancy Definition signs define the vehicle occupancy requirements applicable to an HOV lane (such as "2 OR MORE PERSONS PER VEHICLE") or types of vehicles not meeting the minimum occupancy requirement (such as motorcycles or ILEVs) that are allowed to use an HOV lane (see Section 2G.04).

B. Periods of Operation signs notify road users of the days and hours during which the preferential restrictions are in effect (see Section 2G.05).

C. Preferential Lane Advance signs notify road users that a preferential lane restriction begins ahead (see Section 2G.06).

D. Preferential Lane Ends signs notify users of the termination point of the preferential lane restrictions (see Section 2G.07).

Standard:

03 **Regulatory signs applicable only to a preferential lane shall be distinguished from regulatory signs applicable to general-purpose lanes by the inclusion of the applicable symbol(s) and/or word(s) (see Figure 2G-1).**

Support:

04 The symbol and word message displayed on a particular Preferential Lane regulatory sign will vary based on the specific type of allowed traffic and on other related operational constraints that have been established for a particular lane, such as an HOV lane~~, a bus lane,~~ or a taxi lane (see Section 2B.23a for bus lane).

Section 2G.05 Preferential Lane Periods of Operation Regulatory Signs (R3-11 Series and R3-14 Series)

Guidance:

01 The sizes of post-mounted Periods of Operation (R3-11 series) signs should remain consistent to accommodate any manual addition or removal of a single line of text for each sign.

Support:

02 Consistent sign sizes are beneficial for agencies when ordering sign materials, as well as when making text changes to existing signs if changes occur to operating times or occupancy restrictions in the future. For example, the R3-11c sign has space for one line located below "24 HOURS" if an agency determines that it is appropriate to display additional information (such as "MON – FRI"), yet the R3-11c sign has the same dimensions as the other R3-11 series signs.

Standard:

03 **When used, the post-mounted Periods of Operation (R3-11 series) signs shall be located adjacent to the preferential lane, and the overhead Periods of Operation (R3-14 series) signs shall be mounted directly over the lane.**

04 **The legend format of the post-mounted Periods of Operation (R3-11 series) signs shall have the following sequence:**

- **A. Top Lines: Lanes applicable, such as "RIGHT LANE" or "2 RIGHT LANES" or "THIS LANE"**
- **B. Middle Lines: Eligible uses, such as "HOV 2+ ONLY" (or 3+ or 4+ if appropriate) ~~or "BUSES ONLY"~~ or other applicable uses or eligible turning movements**
- **C. Bottom Lines: Applicable times and days, such as "7 AM – 9 AM" or "6:30 AM – 9:30 AM, MON-FRI"**

05 **The legend format of the overhead Periods of Operation (R3-14 series) signs shall have the following sequence:**

- **A. Top Line: Eligible uses, such as "HOV 2+ ONLY" (or 3+ or 4+ if appropriate) ~~or "BUSES ONLY"~~ or other applicable uses or eligible turning movements**
- **B. Bottom Lines: Applicable times and days, with the time and day placed above the down arrow, such as "7 AM – 9 AM" or "6:30 AM – 9:30 AM, MON-FRI" (When the operating periods exceed the available line width, the hours and days of the week shall be stacked as shown for the R3-14a sign in Figure 2G-1.)**

06 **For preferential lanes that are in effect on a full-time basis, either the full-time Periods of Operation (~~R3-11b and~~ R3-14b) signs shall be used, or the legends of the part-time Periods of Operations (R3-11, R3-11a, R3-14, R3-14a) signs shall be modified to display the legend 24 HOURS.**

Section 2G.06 Preferential Lane Advance Regulatory Signs (R3-12, R3-12e, ~~R3-12f~~, R3-15, and R3-15a~~, and R3-15d)~~

Guidance:

01 The Preferential Lane Advance (R3-12, ~~R3-12f~~, and R3-15~~, and R3-15d~~) signs should be used for advance notification of a barrier-separated, buffer-separated, or contiguous preferential lane that is added to the general-purpose lanes (see Figure 2G-12).

02 The Preferential Lane Advance (R3-12e and R3-15a) signs should be used for advance notification of a general-purpose lane that becomes a preferential lane (see Figure 2G-13).

Option:

03 ~~*The legends on the R3-12f and R3-15d signs may be modified to suit the type of preferential lane.*~~

Section 2G.07 Preferential Lane Ends Regulatory Signs (R3-12a, R3-12b, R3-12c, R3-12d~~,~~ ~~R3-12g, R3-12h~~, R3-15b, R3-15c, and ~~R3-15e~~)

Standard:

01 **A post-mounted Preferential Lane Ends (R3-12b ~~or R3-12h~~) sign shall be installed at least 1/2 mile in advance of the termination of a preferential lane.**

02 **Except as provided in Paragraph 6, a post-mounted Preferential Lane Ends (R3-12a ~~or R3-12g~~) sign shall be installed at the point where a preferential lane and restriction end and traffic must merge into the general-purpose lanes.**

03 **A post-mounted Preferential Lane Ends (R3-12d) sign shall be installed at least 1/2 mile in advance of the point where a preferential lane restriction ends and the lane becomes a general-purpose lane.**

04 **Except as provided in** Paragraph 7**, a post-mounted Preferential Lane Ends (R3-12c) sign shall be installed at the point where a preferential lane restriction ends and the lane becomes a general-purpose lane.**

Option:

~~05 The legends on the R3-12g and R3-15e signs may be modified to suit the type of preferential lane.~~

06 An overhead Preferential Lane Ends (R3-15b ~~or R3-15e~~) sign may be installed instead of or in addition to a post-mounted R3-12a ~~or R3-12g~~ sign at the point where a preferential lane and restriction ends and traffic must merge into the general-purpose lanes.

07 An overhead Preferential Lane Ends (R3-15c) sign may be installed instead of or in addition to a post-mounted R3-12c sign at the point where the preferential lane restriction ends and the lane becomes a general-purpose lane.

Section 2G.08 Warning Signs on Median Barriers for Preferential Lanes

Option:

01 When a warning sign applicable only to a preferential lane is installed on a median barrier with limited lateral clearance to the adjacent travel lanes or shoulders, the warning sign may have a vertical rectangular shape. For a High Occupancy Vehicle lane, such signs may be used instead of using the HOV Plaque (W16-11P) (see Section 2G.09) with a standard diamond-shaped warning sign.

Standard:

02 **When a vertical rectangular-shaped warning sign applicable only to a preferential lane is installed on a median barrier, the top portion of the sign shall be comprised of a white symbol or legend denoting the type of preferential lane (such as the diamond symbol for HOV ~~or the legend BUS LANE~~) on a black background with a white border, and the bottom portion of the sign shall be comprised of the standard word message or symbol of the standard warning sign as a black legend on a yellow background with a black border (see Figure 2G-4).**

Section 2G.10 Preferential Lane Guide Signs – General For reference, no change proposed to this section.

Standard:

08 **Signs applicable only to a preferential lane shall be distinguished from signs applicable to general-purpose lanes by the inclusion of the applicable symbol(s) and/or word(s).**

Support:

09 The symbol and/or word message that appears on a particular guide sign applicable only to a

757 preferential lane will vary based on the specific type of allowed traffic and on other related
758 operational constraints that have been established for a particular lane, such as an HOV lane, a
759 bus lane, or a taxi lane.

PART 3. MARKINGS
CHAPTER 3A. GENERAL

Section 3A.05 Colors

[In reference to paragraph 01 – note that the color box/coordinates for red pavement markings from Interim Approval #22 (3), 12-4-2019 should be added to the standard highway color definitions as defined in 23CFR, Part 655, Subpart F, Appendix – noted in Section 2A.10]

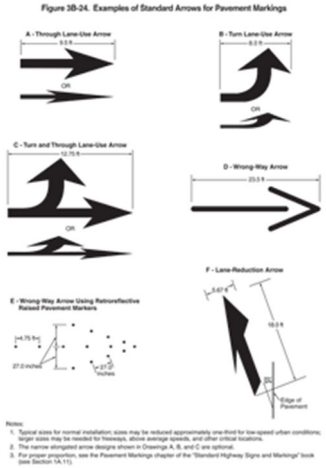
Section 3B.20 Pavement Word, Symbol, and Arrow Markings

Support:

01 Word, symbol, and arrow markings on the pavement are used for the purpose of guiding, warning, or regulating traffic. These pavement markings can be helpful to road users in some locations by supplementing signs and providing additional emphasis for important regulatory, warning, or guidance messages, because the markings do not require diversion of the road user's attention from the roadway surface. Symbol messages are preferable to word messages. Examples of standard word and arrow pavement markings are shown in Figures 3B-23 and 3B-24. For arrow pavement markings in the vicinity of ~~highway-rail~~ grade crossings, see Section 8B.27.~~23. For arrow pavement markings in the vicinity of highway-light rail transit grade crossing, see Section 8B.27-10C.25~~. [09A-RR-01, 6/20/2009]

Figure 3B-23. Example of Elongated Letters for Word Pavement Markings

Figure 3B-24. Examples of Standard Arrows for Pavement Markings



Option:

02 Word, symbol, and arrow markings, including those contained in the "Standard Highway Signs and Markings" book (see Section 1A.11), may be used as determined by engineering judgment to supplement signs and/or to provide additional emphasis for regulatory, warning, or guidance messages. Among the word, symbol, and arrow markings that may be used are the following:

A. Regulatory:
   1. STOP
   2. YIELD
   3. RIGHT (LEFT) TURN ONLY
   4. 25 MPH
   5. Lane-use and wrong-way arrows
   6. Diamond symbol for HOV lanes (see Chapter 3D)

7. Other preferential lane word markings (see Chapter 3D)

B. Warning:
   1. STOP AHEAD
   2. YIELD AHEAD
   3. YIELD AHEAD triangle symbol
   4. SCHOOL XING
   5. SIGNAL AHEAD
   6. PED XING
   7. SCHOOL
   8. R X R
   9. BUMP
   10. HUMP
   11. Lane-reduction arrows

C. Guide:
   1. Route numbers (route shield pavement marking symbols and/or words such as I-81, US 40, STATE 135, or ROUTE 10)
   2. Cardinal directions (NORTH, SOUTH, EAST, or WEST)
   3. TO
   4. Destination names or abbreviations thereof

Standard:

03 **Word, symbol, and arrow markings shall be white, except as otherwise provided in this Section.**

04 **Pavement marking letters, numerals, symbols, and arrows shall be installed in accordance with the design details in the Pavement Markings chapter of the "Standard Highway Signs and Markings" book (see Section 1A.11).**

CHAPTER 3D. MARKINGS FOR PREFERENTIAL LANES

Section 3D.01a Bus Lane Markings

Standard:

01 **Word markings for bus lanes shall be in accordance with the marking requirements in Sections 3B.20 and 3D.01.**

02 **Regulatory signs shall be used with bus lane markings (see Section 2B.23a).** [Part of moved text from Section 3G.07, paragraph 03]

03 **Where other vehicles are allowed to use the bus lane, no more than two additional word/symbol pavement messages shall be used in a lane in addition to BUS.**

04 **Bus lane longitudinal pavement markings shall be as described in this chapter (see Figures 2B-5c to 2B-5g).**

04a **If used, red-colored pavement shall be applied only in lanes, areas, or locations where general-purpose traffic is generally prohibited to use, queue, wait, idle, or otherwise occupy the red-colored lane area. ~~or location where red-colored pavement is used.~~** 14A-MRG-01, 6-28-2014, Section 3G.07, paragraph 02]

05 **Red-colored pavement shall not be used in lieu of those pavement markings that are required to designate a bus only lane.** [Interim Approval#22 (2a), 12-4-2019]

Option:

05a Red-colored pavement may be used to supplement standard longitudinal line and word markings for a transit lane where frequent intrusion into the transit lane and adjacent traffic congestion occurs or is anticipated.

05b Red-colored pavement may be used to enhance the conspicuity of locations, station stops or travel lanes in the roadway ~~exclusively~~ reserved for:

~~(1)~~ A. the exclusive use by public transit vehicles, ~~of public transit systems~~ ~~or (2)~~

B. multi-modal facilities where public transit is the primary mode (collectively referred to as transit lanes), or

C. ~~Red-colored pavement may be used to enhance the conspicuity of~~ travel lanes that are dedicated for such use on a part-time basis.

[14A-MRG-01, 6-28-2014 (as Section 3G.07 moved here), IA#22 (2), 12-2-2019 edits included]

05c Public transit vehicles include buses, ~~taxis,~~ streetcars, trolleys, light-rail trains, and rapid transit fleets. [14A-MRG-01, 6-28-2014]

05d Red-colored pavement may be used to supplement dotted lane extension lines through an intersection. [Interim Approval #22, 2c, 12-4-2019, modified]

05e Where vehicle entry into a semi-exclusive bus lane or across an exclusive bus lane is provided by a broken line pavement marking, red-colored pavement may be used to supplement the broken line pavement marking (see Figure 2B-5d). [Interim Approval #22, 2b, 12-4-2019, modified]

Guidance:

06 *Engineering judgement should be used to determine if bicycles are allowed to utilize a bus lane.*

07 *Where vehicle entry into a right turn lane or to a driveway across a bus lane is permitted, a dotted wide white line should be used (Section 3D.02) and should be treated as a line extension (Section 3A.06). If red-colored pavement is utilized to supplement the line marking, it should match the longitudinal lane line pattern across the bus lane.*

08 *Where a bus lane is adjacent to on-street parking a normal solid white lane should be used to separate the parking lane from the bus lane.*

09 *To address traction for all road users, where red-colored pavement is used, the selection of pavement marking material should meet Section 3A.04, paragraph 4.*

Option:

10 Where bus on shoulder enters and exits shoulder areas at ramps, dotted single edge or gore lines may be used.

11 [Moved to paragraph 05a]

12 [Moved to paragraph 05b]

~~Support:~~

12a [Moved to paragraph 05b]

~~**Standard:**~~

13 [Moved to paragraph 04a]

~~Option:~~

14 [Moved to paragraph 05e and 05d]

Section 3D.02 Preferential Lane Longitudinal Markings for Motor Vehicles

Support:

01 Preferential lanes can take many forms depending on the level of usage and the design of the facility. They might be barrier-separated or buffer-separated from the adjacent general-purpose lanes, or they might be contiguous with the adjacent general-purpose lanes. Barrier-separated preferential lanes might be operated in a constant direction or be operated as reversible lanes. Some reversible preferential lanes on a divided highway might be operated counter-flow to the direction of traffic on the immediately adjacent general purpose lanes. See Section 1A.13for definitions of terms.

02 Preferential lanes might be operated full-time (24 hours per day on all days), for extended periods of the day, part-time (restricted usage during specific hours on specified days), or on a variable basis (such as a strategy for a managed lane).

Standard:

03 **Longitudinal pavement markings for preferential lanes shall be as follows (these same requirements are presented in tabular form in Table 3D-1):**

- **A. Barrier-separated, non-reversible preferential lane—the longitudinal pavement markings for preferential lanes that are physically separated from the other travel lanes by a barrier or median shall consist of a normal solid single yellow line at the left-hand edge of the travel lane(s), and a normal solid single white line at the right-hand edge of the travel lane(s) (see Drawing A in Figure 3D-1).**
- **B. Barrier-separated, reversible preferential lane—the longitudinal pavement markings for reversible preferential lanes that are physically separated from the other travel lanes by a barrier or median shall consist of a normal solid single white line at both edges of the travel lane(s) (see Drawing B in Figure 3D-1).**
- **C. Buffer-separated (left-hand side) preferential lane—the longitudinal pavement markings for a full-time or part-time preferential lane on the left-hand side of and separated from the other travel lanes by a neutral buffer space shall consist of a normal solid single yellow line at the left-hand edge of the preferential travel lane(s) and one of the following at the right-hand edge of the preferential travel lane(s):**
  1. **A wide solid double white line along both edges of the buffer space where crossing the buffer space is prohibited (see Drawing A in Figure 3D-2).**

2. **A wide solid single white line along both edges of the buffer space where crossing the buffer space is discouraged (see Drawing B in Figure 3D-2).**
3. **A wide broken single white line along both edges of the buffer space, or a wide broken single white lane line within the allocated buffer space (resulting in wider lanes), where crossing the buffer space is permitted (see Drawing C in Figure 3D-2).**

D. Buffer-separated (right-hand side) preferential lane—the longitudinal pavement markings for a full-time or part-time preferential lane on the right-hand side of and separated from the other travel lanes by a neutral buffer space shall consist of a normal solid single white line at the right-hand edge of the preferential travel lane(s) if warranted (see Section 3B.07) and one of the following at the left-hand edge of the preferential travel lane(s) (see Drawing D in Figure 3D-2):

1. **A wide solid double white line along both edges of the buffer space where crossing the buffer space is prohibited.**
2. **A wide solid single white line along both edges of the buffer space where crossing of the buffer space is discouraged.**
3. **A wide broken single white line along both edges of the buffer space, or a wide broken single white line within the allocated buffer space (resulting in wider lanes), where crossing the buffer space is permitted.**
4. **A wide dotted single white lane line within the allocated buffer space (resulting in wider lanes) where crossing the buffer space is permitted for any vehicle to perform a right-turn maneuver.**

E. Contiguous (left-hand side) preferential lane—the longitudinal pavement markings for a full-time or part-time preferential lane on the left-hand side of and contiguous to the other travel lanes shall consist of a normal solid single yellow line at the left-hand edge of the preferential travel lane(s) and one of the following at the right-hand edge of the preferential travel lane(s):

1. **A wide solid double white lane line where crossing is prohibited (see Drawing A in Figure 3D-3).**
2. **A wide solid single white lane line where crossing is discouraged (see Drawing B in Figure 3D-3).**
3. **A wide ~~solid~~broken single white lane line where crossing is permitted (see Drawing C in Figure 3D-3).**

F. Contiguous (right-hand side) preferential lane—the longitudinal pavement markings for a full-time or part-time preferential lane on the right-hand side of and contiguous to the other travel lanes shall consist of a normal solid single white line at the right-hand edge of the preferential travel lane(s) if warranted (see Section 3B.07) and one of the following at the left-hand edge of the preferential travel lane(s) (see Drawing D in Figure 3D-3):

1. **A wide solid double white lane line where crossing is prohibited.**
2. **A wide solid single white lane line where crossing is discouraged.**
3. **A wide broken single white lane line where crossing is permitted.**
4. **A wide dotted single white lane where crossing is permitted for any vehicle to perform a right-turn maneuver.**

958 **Table 3D-1. Standard Edge Line and Lane Line Markings for Preferential Lanes**

Type of Preferential Lane	Left-Hand Edge Line	Right-Hand Edge Line
Contiguous, Left-Hand Side	A normal solid single yellow line	A wide solid double white line where crossing is prohibited (see Drawing A of Figure 3D-3) A wide solid single white line where crossing is discouraged (see Drawing B of Figure 3D-3) A wide broken single white line where crossing is permitted (see Drawing C of Figure 3D-3) For additional bus lane applications refer to section 2B.23B
Contiguous, Right-Hand Side	A wide solid double white line where crossing is prohibited (see Drawing D of Figure 3D-3) A wide solid single white line where crossing is discouraged (see Drawing D of Figure 3D-3) A wide broken single white line where crossing is permitted (see Drawing D of Figure 3D-3) A wide dotted single white line where crossing is permitted for any vehicle to perform a right-turn maneuver (see Drawing D of Figure 3D-3) For additional bus lane applications refer to section 2B.23B	A normal solid single white line

Figure 3D-2. Markings for Buffer-Separated Preferential Lanes (Sheet 2 of 2)

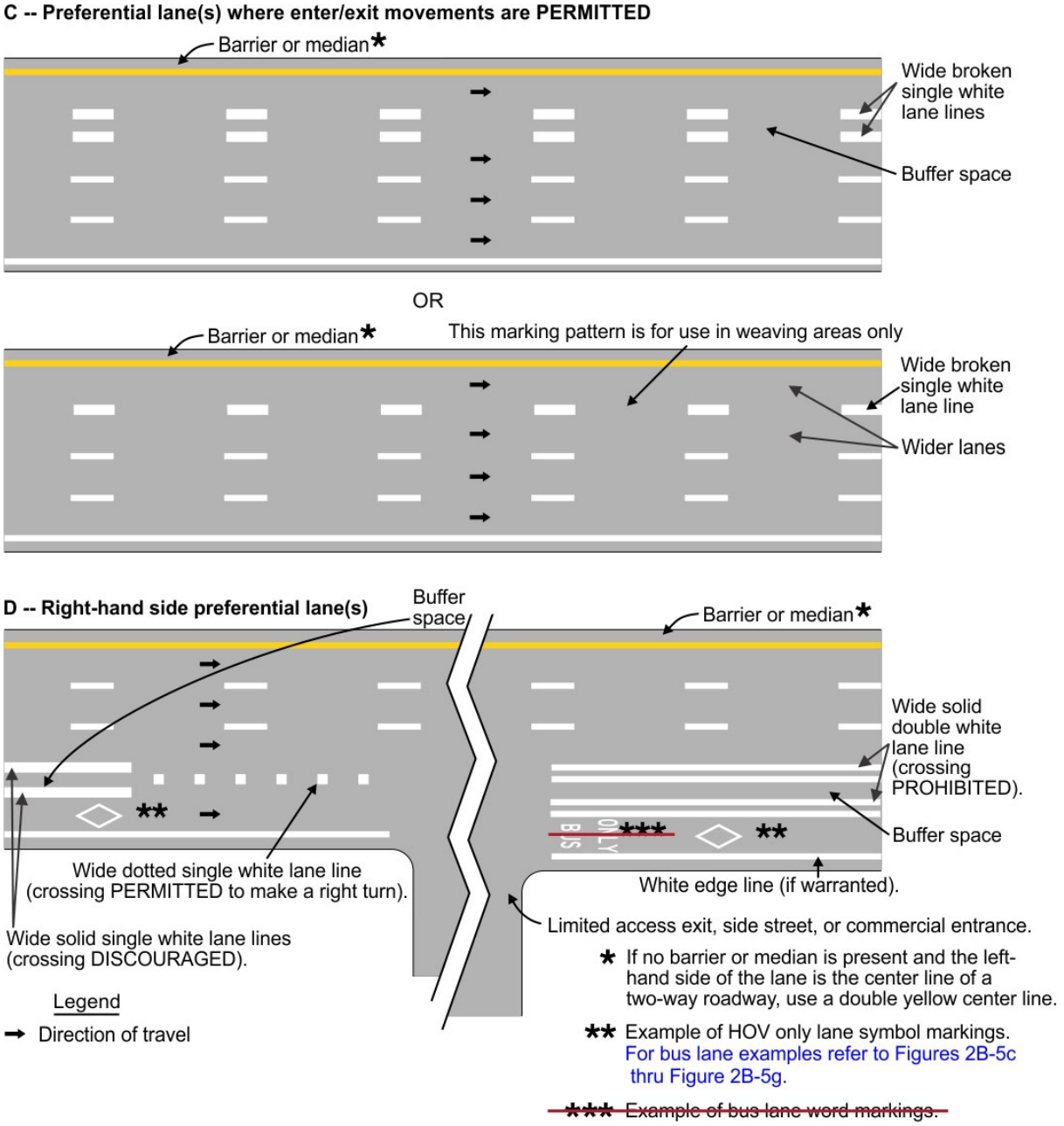


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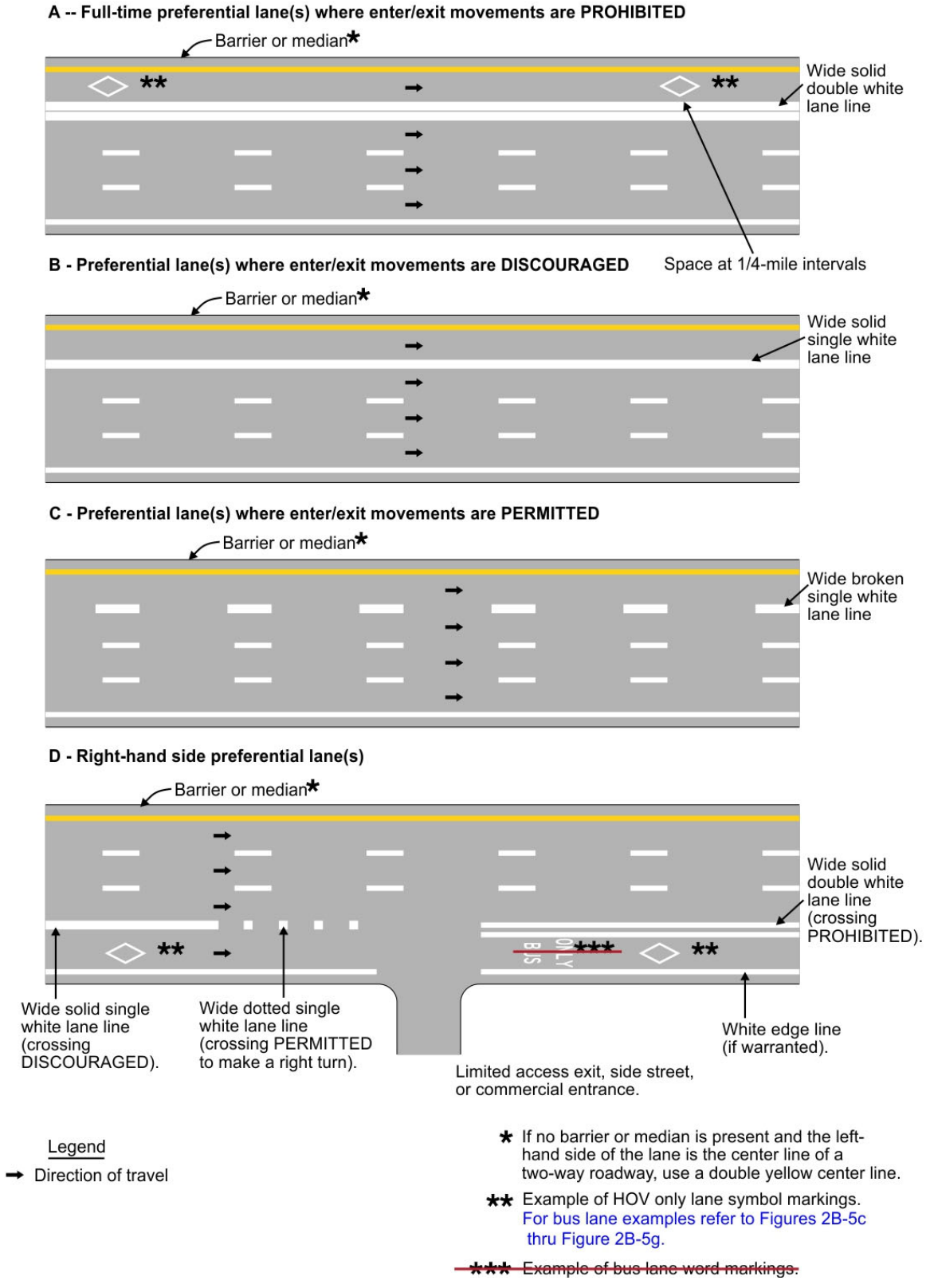
Figure 3D-3. Markings for Contiguous Preferential Lanes



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

14A-MRG-01, 6-28-2014]

Guidance:

01a *Red-colored pavement should be limited to preferential lanes for public transit (see Section 3D.01a).*

~~Option:~~

01 ~~Red colored pavement may be 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, taxis, streetcars, trolleys, light-rail trains, and rapid transit fleets.~~

~~**Standard:**~~

02 ~~**If used, red colored pavement shall be applied only in lanes, areas, or locations where general-purpose traffic is generally prohibited to use, queue, wait, idle, or otherwise occupy the lane area or location where red colored pavement is used.**~~ [Moved to Section 3D.01a, paragraphs 11 & 12]

03 ~~**Regulatory signs (see Section 2B.XX) shall be used to establish the allowable use of the lane, area, or location. Regulatory signs shall also be used when it is determined that other vehicles will be allowed to enter the lane to turn or bypass queues**~~[Addressed in Section 2B.23A, paragraphs 1-10, and referenced in Section 3D.01a, paragraph 02]

~~*Guidance:*~~

04 ~~*Travel lanes used by public transit vehicles and other modes should not use red colored pavement.*~~

PART 4. HIGHWAY TRAFFIC SIGNALS

CHAPTER 4D. DESIGN OF TRAFFIC CONTROL SIGNALS~~FEATURES~~
[14A-STC-01, 6-28-2014]

Section 4D.03a Provision for Transit

Support:

Sections 4F.17a and 8C.11 contain information regarding bus and LRT signals.

Guidance:

Where it is desired to control bus, streetcar and/or LRT as exclusive movements with traffic control signals, separate signals should display the transit indications.

CHAPTER 4F. STEADY (STOP-AND-GO) OPERATION OF TRAFFIC CONTROL SIGNALS [14A-STC-01, 6-28-14]

Section 4F.17a4 Bus Traffic Control Signals

Support:

01 Transit signal priority can support speed and reliability operational improvement to bus rapid transit, busway or other bus operations.

01a Busway grade crossings can occur at intersections or at midblock locations, including public and private driveways. [Moved from paragraph 04]

Standard:

02 **Traffic signal indications that are to exclusively control bus operation shall be distinctive from other traffic signal control indications (other than LRT signal indications).**

~~Option~~: *Guidance:*

[Full replacement of paragraph 03]

03 *Special bus signals using LRT signal indications in accordance with Section 8C.11 and Figure 8C-3 should be provided for the following potential applications where engineering judgement indicates a need for exclusive traffic control of transit:*

A. Busway (see Figure 2B-05g); or

B. Bus or Bus Rapid Transit in semi-exclusive, mixed-use alignments or in queue jump lanes;

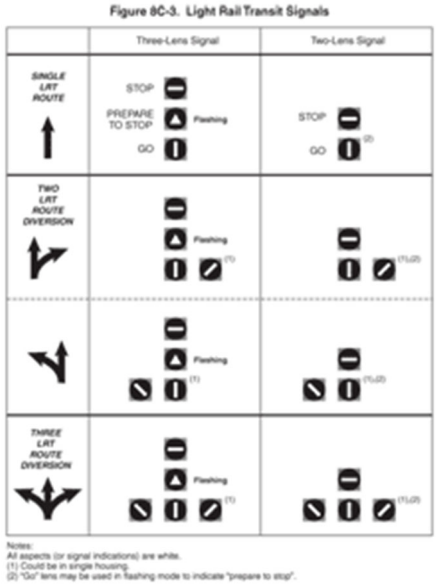
~~03 Where exclusive traffic control is provided for bus rapid transit, busway, bus operation in semi-exclusive or bus in mixed-use alignments, and, If if engineering judgment indicates that special light rail transit signal indications would reduce road user confusion that might otherwise occur if standard traffic signal indications were used to control these movements, special bus signals may include light rail transit signal indications complying with Section 8C.11 and as illustrated in Figure 8C-3 may be used for preemption or priority control of the following exclusive bus movements. at signalized intersections:~~

~~A. Public transit buses in "queue jumper" lanes, and~~

~~B. Bus rapid transit in semi-exclusive or mixed-use alignments.~~

[Moved from Section 4D.27, paragraph 18]

Figure 8C-3 Light Rail Transit Signals [For reference only]



Support:

04 Busway grade crossings can occur at intersections or at midblock locations, including public and private driveways.

~~*Guidance:*~~

~~05 *Bus movements at busway grade crossings that are equipped with traffic control signals should be controlled by special bus signal indications. Bus signals that are used to control only bus movements should display the light rail transit signal indications illustrated in Figure 8C-3 and Figure 2B-05g.*~~

Option:

06 Standard traffic control signal indications may be used instead of bus signals to control the busway movements. ~~of buses.~~

Standard:

07 **If a separate set of standard traffic control signal indications (red, yellow, and green circular and arrow indications) are used to control bus movements, the indications shall be positioned so they are not ~~readily~~ visible to motorists, pedestrians, and bicyclists (see Section ~~4D.12~~4D.05). ~~and a~~The BUS SIGNAL (R3-XXkP) sign shall be installed adjacent to (including above or below) the signal face(s) that contain these indications.** CREATE NEW PARAGRAPH 7a

07a **If the busway crossing control is separate from the intersection control, the two shall be interconnected. The signal indications conflicting with the bus phase shall not be shown until after the bus has cleared the crossing.**

~~*Option:*~~

~~08 *Bus signals may be used at busway grade crossings and at intersections where buses operate in mixed traffic in conjunction with standard traffic control signals where special bus signal phases are used to accommodate turning bus vehicles or where additional bus clearance time is desirable.*~~

Guidance:

09 *Bus signal faces should be separated vertically or horizontally from the nearest highway traffic signal face for the same approach by at least 3 feet.*

[Switched order of paragraphs 10 & 11]

Support:

~~11~~10 Section ~~4D.27~~4F.18 contains information about preemption and priority control of traffic control signals.

Option:

~~10~~11 At busway grade crossings, BRT or bus queue jumper locations with traffic control signals, preemption control or priority control of the traffic control signal may be given to buses. [Approved 6-28-2014, 14B-RR-02, moved from Section 8E.07]

Section ~~4D.27~~ 4F.18 Preemption and Priority Control of Traffic Control Signals

Option:

01 Traffic control signals may be designed and operated to respond to certain classes of approaching vehicles by altering the normal signal timing and phasing plan(s) during the approach and passage of those vehicles. The alternative plan(s) may be as simple as extending a currently displayed green interval or as complex as replacing the entire set of signal phases and timing.

Support:

02 Preemption control (see definition in Section 1A.13) is typically given to trains, boats, emergency vehicles, and light rail transit.

03 Examples of preemption control include the following:

A. The prompt displaying of green signal indications at signalized locations ahead of fire vehicles, law enforcement vehicles, ambulances, and other official emergency vehicles;
B. A special sequence of signal phases and timing to expedite and/or provide additional clearance time for vehicles to clear the tracks prior to the arrival of rail traffic; and
C. A special sequence of signal phases to display a steady red indication to prohibit turning movements toward the tracks during the approach or passage of rail traffic.

04 Priority control (see definition in Section 1A.13) is typically given to certain non-emergency vehicles such as light-rail transit vehicles operating in a mixed-use alignment and buses.

05 Examples of priority control include the following:

A. The displaying of early or extended green signal indications at an intersection to assist ~~public~~ transit vehicles in remaining on schedule, and
B. Special phasing to assist ~~public~~ transit vehicles in entering the travel stream ahead of the platoon of traffic.

06 Some types or classes of vehicles supersede others when a traffic control signal responds to more than one type or class. In general, a vehicle that is more difficult to control supersedes a vehicle that is easier to control.

Option:

07 Preemption or priority control of traffic control signals may also be a means of ~~assigning priority right-of-way~~ providing a special message to specified classes of vehicles at certain non-intersection locations such as on approaches to one-lane bridges and tunnels, movable bridges, highway maintenance and construction activities, metered freeway entrance ramps, and transit operations, that they are permitted to proceed. [14A-STC-01, 6-28-14]

Standard:

08 **During the transition into preemption control:**

A. The yellow change interval, and any red clearance interval that follows, shall not be shortened or omitted.

B. The shortening or omission of any pedestrian walk interval ~~and/or pedestrian change interval~~ shall be permitted.

C. The shortening or omission of any pedestrian change interval shall be permitted only for boats at movable bridges and for rail traffic to which other traffic is required to yield the right-of-way by law. [12B-STC-02, 6-28-2013]

D. The return to the previous green signal indication shall be permitted following a steady yellow signal indication in the same signal face, omitting the red clearance interval, if any.

09 **During preemption control and during the transition out of preemption control:**

A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted.

B. A signal indication sequence from a steady yellow signal indication to a green signal indication shall not be permitted.

10 **During priority control and during the transition into or out of priority control:**

A. The shortening or omission of any yellow change interval, and of any red clearance interval that follows, shall not be permitted.

B. The shortening of any pedestrian walk interval below that time described in Section 4E.06 shall not be permitted.

C. The omission of a pedestrian walk interval and its associated change interval shall not be permitted unless the associated vehicular phase is also omitted or the pedestrian phase is exclusive.

D. The shortening or omission of any pedestrian change interval shall not be permitted.

E. A signal indication sequence from a steady yellow signal indication to a green signal indication shall not be permitted.

Guidance:

11 *Except for traffic control signals interconnected with light rail transit systems, traffic control signals with railroad preemption or coordinated with flashing-light signal systems should be provided with a back-up power supply.*

12 *When a traffic control signal that is returning to a steady mode from a dark mode (typically upon restoration from a power failure) receives a preemption or priority request, care should be exercised to minimize the possibility of vehicles or pedestrians being misdirected into a conflict with the vehicle making the request.*

Option:

13 During the change from a dark mode to a steady mode under a preemption or priority request, the display of signal indications that could misdirect road users may be prevented by one or more of the following methods:

A. Having the traffic control signal remain in the dark mode,
B. Having the traffic control signal remain in the flashing mode,
C. Altering the flashing mode,
D. Executing the normal start-up routine before responding, or
E. Responding directly to initial or dwell period.

Guidance:

14 *If a traffic control signal is installed near or within a grade crossing or if a grade crossing with active traffic control devices is within or near a signalized highway intersection, Chapter 8C should be consulted.*

15 *Traffic control signals operating under preemption control or under priority control should be operated in a manner designed to keep traffic moving.*

16 *Traffic control signals that are designed to respond under preemption or priority control to more than one type or class of vehicle should be designed to respond in the relative order of importance or difficulty in stopping the type or class of vehicle. The order of priority should be: train, boat, heavy vehicle (fire vehicle, emergency medical service), light vehicle (law enforcement), light rail transit, rubber-tired transit.*

Option:

17 A distinctive indication may be provided at the intersection to show that an emergency vehicle has been given control of the traffic control signal (see Section 11-106 of the "Uniform Vehicle Code"). In order to assist in the understanding of the control of the traffic signal, a common distinctive indication may be used where drivers from different agencies travel through the same intersection when responding to emergencies.

~~18 If engineering judgment indicates that light rail transit signal indications would reduce road user confusion that might otherwise occur if standard traffic signal indications were used to control these movements, light rail transit signal indications complying with Section 8C.11 and as illustrated in Figure 8C-3 may be used for preemption or priority control of the following exclusive movements at signalized intersections:~~

~~A. Public transit buses in "queue jumper" lanes, and~~

~~B. Bus rapid transit in semi-exclusive or mixed-use alignments.~~

[Moved to Section 4F.17a]

PART 8: TRAFFIC CONTROL FOR RAILROAD AND LIGHT RAIL TRANSIT GRADE CROSSINGS

CHAPTER 8E. BUSWAY GRADE CROSSINGS

[14B-RR-02, 6-28-2014, shown for reference]

Section 8E.01 Introduction

Support:

01 The design and operation of a busway is similar to light-rail transit in a semi-exclusive alignment.

Guidance:

02 *Highway-busway grade crossings should be equipped with an active busway grade crossing warning system unless an engineering study indicates that the use of STOP signs or YIELD signs alone would be adequate.*

Standard:

03 **Where a busway and a railroad are adjacent to one another such that the active grade crossing warning system and the active busway grade crossing warning system share common grade crossing traffic control devices, the warning system for the railroad shall control the operation of ~~all~~ grade crossing traffic control devices, and the warning system for the busway shall be interconnected with the active grade crossing warning system to provide notification of an approaching bus to the active grade crossing warning system.**

~~Section 8E.02 Bus Only Lane Signs~~

~~Option:~~

~~01 A Bus Only Lane (R15-4d or R15-4e) sign may be used on a roadway lane limited to only bus use to indicate the restricted use of a lane.~~

~~02 The overhead R15-4e Bus Only Lane sign may be used as an alternative to the post-mounted R15-4d sign.~~

~~*Guidance:*~~

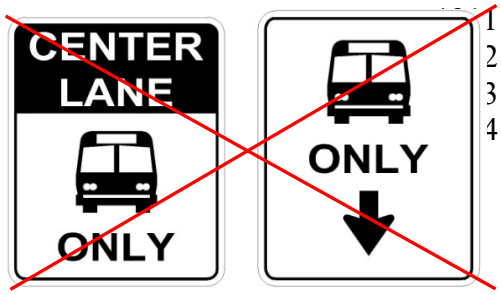
~~03 *If used, the R15-4d Bus Only Lane sign should be installed on a post adjacent to the roadway containing the bus lane.*~~

~~Support:~~

~~04 See Chapter 2G for additional information regarding preferential lane signing. See Chapter 3D for information regarding preferential lane pavement markings.~~

~~**Standard:**~~

~~05 **If used, the R15-4e Bus Only Lane sign shall be mounted over the lane to which it applies.**~~



~~R15-4d R15-4e~~

~~Bus Only Lane Signs~~

~~Section 8E.03 Bus-Activated Blank-Out Turn Prohibition Signs~~ [Moved to Section 2B.23A, paragraphs 29-33]

~~Support:~~

~~01 Busway operations can include the use of bus-activated blank-out signs for turn prohibition signs. The signs are typically used on roads paralleling a busway where road users might turn across a busway.~~

~~*Guidance:*~~

~~02 *A bus-activated blank-out turn prohibition sign (R3-1, R3-2, R3-4, R3-18 or R3-27) should be used where an intersection is within 100' of a highway-busway grade crossing and is controlled by STOP sign, or is controlled by traffic control signals with permissive turn movements for road users crossing the busway.*~~

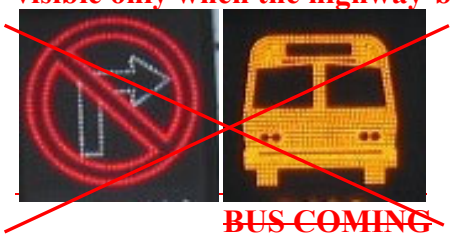
~~Option:~~

~~03 A bus-activated blank-out turn prohibition sign may include a blank-out BUS COMING message or a Bus Approaching blank-out warning sign (see Section 8E.05), or both. If used, the word message and the Bus Approaching sign may be flashed.~~

~~04 As an alternative to bus-activated blank-out turn prohibition signs at intersections with traffic control signals, exclusive traffic control signal phases such that all movements that cross the busway have a steady red indication may be used in combination with No Turn on Red (R10-11, R10-11a, or R10-11b) signs (see Section 2B.54).~~

~~**Standard:**~~

~~05 **Turn prohibition signs that are associated with preemption or priority shall be visible only when the highway-busway grade crossing turn prohibition is in effect.**~~



~~**BUS COMING**~~

~~**Bus-Activated Blank-Out Turn Prohibition Sign**~~

~~Section 8E.04 Highway-Busway Grade Crossing Advance Warning Signs~~

~~*Guidance:*~~

~~01 *A Highway-Busway Grade Crossing Advance Warning sign should be used on each highway in advance of every busway grade crossing except in business or commercial areas where active highway-busway grade crossing traffic control devices are in use.*~~

~~02 *A BUSWAY supplemental plaque should be installed with every Highway-Busway Grade Crossing Advance Warning sign.*~~

~~Highway-Busway Grade Crossing Advance Warning Sign~~

~~**Section 8E-05 Busway Warning Sign**~~ [Moved to 2C.49 and 2C.50a]

~~Option:~~

~~01 A Busway Warning sign with a one-direction arrow for one-way busways or a two-direction arrow for two-way busways may be used at the crossing point of highway-busway grade crossings where there are no active traffic control devices.~~

~~02 As an alternative to the Busway Warning sign, the legend "TWO-WAY BUSWAY" may be used at two-way busways.~~

~~Busway Warning Sign~~

~~**Section 8E.06 Bus Approaching-Activated Blank-Out Warning Sign**~~[Moved to Section 2C.50a, paragraphs 03, 04]

~~Support:~~

~~01 The Bus Approaching-Activated Blank-Out warning sign supplements the traffic control devices to warn road users crossing the busway of an approaching bus.~~

~~Option:~~

~~02 A Bus Approaching-Activated Blank-Out warning sign may be used at signalized intersections near busway grade crossings or at crossings controlled by STOP signs.~~

~~Bus-Activated Blank-out Sign~~

~~Section 8E-07 Use of Traffic Control Signals for Control of Buses at Busway Grade Crossings~~ [Moved to Section 4F.17a]

~~Support:~~

~~01 Busway grade crossings can occur at intersections or at midblock locations, including public and private driveways.~~

~~*Guidance:*~~

~~02 *Bus movements at busway grade crossings that are equipped with traffic control should be controlled by special bus signal indications. Bus signals that are used to control only bus movements should display the light rail transit signal indications illustrated in Figure 8C-3.*~~

~~Option:~~

~~03 Standard traffic control signal indications may be used instead of bus signals to control the movement of buses.~~

~~**Standard:**~~

~~05 **If a separate set of standard traffic control signal indications (red, yellow, and green circular and arrow indications) is used to control bus movements, the indications shall be positioned so they are not readily visible to motorists, pedestrians, and bicyclists (see Section 4D.12).**~~

~~**If the busway crossing control is separate from the intersection control, the two shall be interconnected. The signal indications conflicting with the bus phase shall not be shown until after the bus has cleared the crossing.**~~

~~Option:~~

~~06 Bus signals may be used at busway grade crossings and at intersections where buses operate in mixed traffic in conjunction with standard traffic control signals where special bus signal phases are used to accommodate turning bus vehicles or where additional bus clearance time is desirable.~~

~~*Guidance:*~~

~~07 *Bus signal faces should be separated vertically or horizontally from the nearest highway traffic signal face for the same approach by at least 3 ft.*~~

~~Option:~~

~~08 At busway grade crossings with traffic control signals, preemption control or priority control of the traffic control signal may be given to buses.~~

~~Support:~~

~~09 Section 4D.27 contains information about preemption and priority control of traffic control signals.~~

Section 8E.08 Busway Automatic Gates

[14B-RR-02, Approved 6-28-2014, shown for reference]

Option:

01 Automatic gates may be used to supplement traffic control signals at highway-

busway grade crossings.

Standard:

02 **Busway automatic gates, if used, shall conform to standards set forth in Section 8C.04 for Automatic Gates and shall be standard railroad size, striped with 16-inch alternate vertical, fully retroreflectorized red and white stripes. Flashing red lights in accordance with the Standards for those on railroad gates shall be included on the gate arm and they shall only be operated if the gate is closed or in the process of being opened or closed. In the horizontal position, the top of the gate shall be approximately 4 feet above the pavement.**

03 **Busway automatic gates, if used, shall be interconnected with the busway traffic control signals.**

04 **Busway automatic entrance gates shall be designed to fail-safe in the down position.**

05 **Four quadrant Busway Automatic Gates shall conform to requirements set forth in Section 8C.06.**

Support:

06 Section 8C.04 contains further details regarding automatic gates and Section 8D.06 contains details regarding pedestrian automatic gates.

Section 8E.09 Traffic Control Signals Near Highway-Busway Grade Crossings

Support:

01 If a traffic control signal is near an active busway grade crossing warning system, refer to ~~Manual Parts~~ Sections 8C.09, 8C.10, 8C.11 and 8C.12.

Section 8E.10 Pathway-Busway Grade Crossings

Option:

01 A pathway-busway grade crossing may be controlled using bus signals for the busway approaches and pedestrian signals for the pathway approaches if the operation of the busway provides for the bus to be able to stop before entering the pathway.

02 A Busway Warning sign may be used at pathway-busway grade crossings with no active traffic control devices.

Standard:

03 **If an active busway grade crossing warning system is used at a pathway-busway grade crossing, a bell or other audible warning device shall be provided for each pathway approach to the crossing.**

C:NCUTCD/January 2021 20B-RW-02, Bus Transit BRT Traffic Control REVISED following sponsor comments, READY FOR COUNCIL 1-14-21, approved by Council 1-19-21