National Committee on
Uniform Traffic Control Devices

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National Committee on Uniform Traffic Control Devices (NCUTCD)
Recommended Changes to Proposed Text for 11th Edition of the MUTCD
Docket Number: FHWA-2020-0001

Federal Register Item Numbers: 29-45 (see listing below)
NPA MUTCD Section Numbers: Sections 2A.01 - 2A.22
Summary: See summary that precedes each section
Legend: Base text shown in proposal is the NPA "clean" proposed text.

- Addition to NPA text: Added text proposed by NCUTCD.
- Deletion of NPA text: ~~Deleted text proposed by NCUTCD~~.
- Moving NPA text: Moved text proposed by NCUTCD.
- NPA text added by FHWA and not previously approved by Council: NPA text not previously approved by Council but recommended for approval.
- Explanatory note (normally accompany each change within the NPA text): [Note that explains purpose of recommended change.]
- References in 00X-XXX-00 format refer to previous NCUTCD recommendations approve by Council and sent to FHWA, which may be seen on the NCUTCD website at https://ncutcd.org.

The following pages present NCUTCD recommendations for changes to the MUTCD NPA proposed text and figures for Chapter 2A. Below is a summary of the NCUTCD position for each section of this chapter. A more detailed summary is provided at the beginning of each section.

- NPA #29: Section 2A.01. Changes recommended based on Council action in spring 2021.
- NPA #30: Section 2A.02. Changes recommended based on Council action in spring 2021.
- NPA #N/A: Section 2A.03. Changes recommended based on Council action in spring 2021.
- NPA #31: Section 2A.04. Changes recommended based on Council action in spring 2021.
- NPA #32: Section 2A.05. Changes recommended based on Council action in spring 2021.
- NPA #N/A: Section 2A.06. Changes recommended based on Council action in spring 2021 and Table 2A-5
- NPA #33: Section 2A.07. Changes recommended based on Council action in spring 2021.
- NPA #34: Section 2A.08. Changes recommended based on Council action in spring 2021.
- NPA #35: Section 2A.09. Changes recommended based on Council action in spring 2021.
- NPA #36: Section 2A.10. Changes recommended based on Council action in spring 2021.
- NPA #37: Section 2A.11. Changes recommended based on Council action in spring 2021 and Figure 2A-1.
- NPA #38: Section 2A.12. Changes recommended based on Council action in spring 2021 and Figure 2A-4.

- NPA #N/A: Section 2A.13. NCUTCD agrees with NPA content
- NPA #39: Section 2A.14. Changes recommended based on Council action in spring 2021.
- NPA #40: Section 2A.15. Changes recommended based on Council action in spring 2021.
- NPA #N/A: Section 2A.16. NCUTCD agrees with NPA content
- NPA #41: Section 2A.17. Changes recommended based on Council action in spring 2021.
- NPA #N/A: Section 2A.18. NCUTCD agrees with NPA content
- NPA #42: Section 2A.19. Changes recommended based on Council action in spring 2021.
- NPA #43: Section 2A.20. Changes recommended based on Council action in spring 2021 and Table 2A-1.
- NPA #44: Section 2A.21. Changes recommended based on Council action in spring 2021.
- NPA #45: Section 2A.22. Changes recommended based on Council action in spring 2021.

General Comment on Tables: NCUTCD notes that the assigned numbering for tables in Chapter 2A is completely different between the draft NPA text as seen in docket items -0004 and -0038, and the draft NPA tables as seen in docket item -0006, as illustrated here:

Draft Text (Clean and Mark-Up):
Table 2A-1. Use of Sign Shapes
Table 2A-2. Common Uses of Sign Colors
Table 2A-3. Illumination of Sign Elements
Table 2A-4. Retroreflection of Sign Elements
Table 2A-5. Minimum Maintained Retroreflectivity Levels

Draft Tables:
Table 2A-1. Illumination of Sign Elements
Table 2A-2. Retroreflection of Sign Elements
Table 2A-3. Minimum Maintained Retroreflectivity Levels
Table 2A-4. Use of Sign Shapes
Table 2A-5. Common Uses of Sign Colors

This should be rectified prior to the Final Rule.

In our comments, NCUTCD presumes that the table numbers in the draft NPA tables document (docket item -0006) are correct, and our proposed changes and edits of Chapter 2A reflect this.

Section 2A.01 Comments: NCUTCD recommends change to NPA text as shown regarding site roadways in accordance with NCUTCD recommendation 15A-EC-01. This recommended change occurs in numerous sections throughout the NPA MUTCD text.

Section 2A.01 Function and Purpose of Signs

Support:

This Manual contains Standards, Guidance, and Options for the signing of all types of highways, and ~~private roads~~ site roadways open to public travel. The functions of signs are to provide regulations, warnings, and guidance information for road users. Words, symbols, and

arrows are used to convey the messages. Signs are not typically used to confirm rules of the road (see Paragraph 4 of this Section). (change the text to "site roadways" to match definition and NCUTCD recommendation 15A-EC-01)
Detailed sign requirements are located in the following Chapters of Part 2:
Chapter 2B—Regulatory Signs, Barricades, and Gates
Chapter 2C—Warning Signs and Object Markers
Chapter 2D—Guide Signs for Conventional Roads
Chapter 2E—Guide Signs for Freeways and Expressways
Chapter 2F—Toll Road Signs
Chapter 2G—Preferential and Managed Lane Signs
Chapter 2H—General Information Signs
Chapter 2I—General Service Signs
Chapter 2J—Specific Service Signs
Chapter 2K—Tourist-Oriented Directional Signs
Chapter 2L—Changeable Message Signs
Chapter 2M—Recreational and Cultural Interest Area Signs
Chapter 2N—Emergency Management Signs
Definitions and acronyms that are applicable to signs are given in Chapter 1C.

Guidance:
Signs should not be used on a frequent basis to confirm rules of the road or statutes. Instead, when determined necessary to advise of new regulations as part of an educational campaign, temporary signs or messages should be used instead of permanent signs. These temporary signs or messages should be used sparingly and only at strategic locations, and should be considered only as a supporting element of a larger educational campaign rather than as the primary source of notification. If engineering judgment determines a need for a permanent sign to distinguish between differing requirements of similar statutes in different States or jurisdictions, then a sign should be located in the vicinity of the State or jurisdictional boundary, removed from warning, directional, and higher priority regulatory signs, so as not to contribute to sign clutter (see Section 2A.19).

Section 2A.02 Comments: NCUTCD recommends changes to NPA text as shown. The "site roadways" recommended change occurs in numerous sections throughout the NPA MUTCD text. Other recommended change corrects reference to Section 1D.05.

Section 2A.02 Standardization of Application
Support:
It is recognized that urban traffic conditions differ from those in rural environments, and in many instances signs are applied and located differently. Where pertinent and practical, this Manual sets forth separate recommendations for urban and rural conditions.
Low-volume rural roads typically include access to rural residences, agricultural, recreational, resource management and development such as mining, logging, and grazing, and local roads in rural areas. On low volume rural roads, the use of traffic control devices is limited to essential information regarding regulation, guidance and warning. On low-volume rural roads,

it is important to consider the needs of unfamiliar road users for occasional, recreational, and commercial transportation purposes.

Guidance:

Signs should be used only where justified by engineering judgment or studies, as provided in Section ~~1A.09~~ 1D.05. (corrected reference)

Results from traffic engineering studies of physical and traffic factors should indicate the locations where signs are deemed necessary or desirable.

Roadway geometric design and sign application should be coordinated so that signing can be effectively placed to give the road user any necessary regulatory, warning, guidance, and other information

Standard:

Each standard sign shall be displayed only for the specific purpose as prescribed in this Manual. Before any new highway, ~~private road~~ site roadway open to public travel (see definition in Section 1A.13), detour, or temporary route is opened to public travel, all necessary signs shall be in place. (change the text to "site roadways" consistent with NCUTCD definition and prior NCUTCD recommendation 15A-RW-01)

Signs required by road conditions or restrictions shall be removed when those conditions cease to exist or the restrictions are withdrawn.

Section 2A.03 Comments: NCUTCD recommends revising from "defined" to "described' with additional Section reference since it is describing these devices.

Section 2A.03 Classification of Signs

Standard:

Signs shall be defined by their function as follows:

A. Regulatory signs give notice of traffic laws or regulations.

B. Warning signs give notice of a situation that might not be readily apparent.

C. Guide signs show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information.

Support:

Barricades are ~~defined~~ described in Section 2B.76 and 6K.07.

Gates are ~~defined~~ described in Section 2B.77.

Object markers are ~~defined~~ described in Section 2C.69.

Section 2A.04 Comments: NCUTCD recommends the following changes consistent with NCUTCD recommendation 20B-RW-03:

- Add references to dynamic message signs, hybrid signs and blank-out signs
- Downgrade from Standard to Guidance the requirement that modification of a MUTCD standard sign shall not be allowed

- Give owners of site roadways the same option as public agencies to develop special word legends
- Recommend a new definition for scanning graphics and revise the text accordingly
- Add a requirement for scanning graphics for connected and automated vehicles (CAV)
- Revise university or college graphic permissions to allow a logo vs. a seal, and prohibit pictorial representations
- Allow the use of scanning graphics to work with driver automotive technologies

Section 2A.04 Design of Signs

Support:

This Manual shows many typical standard signs and object markers approved for use on streets, highways, bikeways, and pedestrian crossings.

In the specifications for individual signs and object markers, the general appearance of the legend, color, and size are shown in the accompanying tables and illustrations, and are not always detailed in the text.

Detailed drawings of standard signs, object markers, alphabets, symbols, and arrows (see Figure 2D-4) are shown in the "Standard Highway Signs" publication. Section 1A.05 contains information regarding how to obtain this publication.

The basic requirements of a sign are that it be legible to those for whom it is intended and that it be understandable in time to permit a proper response. Desirable attributes include:

A. High visibility by day and night; and
B. High legibility (adequately sized letters, symbols, or arrows, and a short legend for quick comprehension by a road user approaching a sign).

Standardized colors and shapes are specified so that the several classes of traffic signs can be promptly recognized. Simplicity and uniformity in design, position, and application are essential for a sign to be effective.

Standard:

The term legend shall include all word messages and symbol and arrow designs that are intended to convey specific meanings.

Uniformity in design shall include shape, color, dimensions, legends, letter style, borders, and illumination or retroreflectivity.

Standardization of these designs does not preclude further improvement by minor modifications to the orientation of symbols (see Section 2A.09), width of borders, or layout of word messages, but all shapes and colors shall be as indicated.

All symbols (see Section 2A.09) shall be unmistakably similar to, or mirror images of, the adopted symbol signs, all of which are shown in the "Standard Highway Signs" publication (see Section 1A.05). Symbols and colors shall not be modified unless otherwise provided in this Manual. All symbols, colors, or other design features for signs not shown in the "Standard Highway Signs" publication shall follow the procedures for experimentation and change described in Chapter 1B.

Where a standard word message is applicable, the wording shall be as provided in this Manual.

In situations where word messages are required other than those provided in this Manual, the signs shall be of the same shape and color as standard signs of the same functional type.

Where a standard sign is a symbol legend, an alternative word legend shall not be allowed in place of the symbol, except as otherwise provided in this Manual.

Dynamic message signs, hybrid signs and blank-out signs shall meet the design requirements of paragraphs 06 through 09. They shall display duplicates of standard signs or other sign legends using standard symbols, the Standard Alphabets and letter forms, route shields and other typical sign legends with no apparent loss of resolution or recognition to the road user when compared with static versions of the same sign or legend, except as noted in Section 2L.04 for hybrid and blank-out signs. (addition of electronic display text per 20B-RW-03)

~~**Standard:**~~ *Guidance:*

Where a standard sign provided in this Manual or the "Standard Highway Signs" publication is applicable, an alternative legend sign or alternative sign design ~~shall~~ should not be allowed in place of the standardized legend or design except as provided in this Manual.

Where a standard sign provided in this Manual or the "Standard Highway Signs" publication is applicable, but the legend is variable, such as for destination names, an alternative sign design or dimensions ~~shall~~ should not be allowed in place of the standardized design for the non-variable elements except as provided in this Manual.

These statements are too broad, with too many variables in the field for a standard to be practical. Recommend changing to a Guidance condition to discourage alternative legends while still allowing for engineering judgment to govern when a nonstandard legend is beneficial.

Option:

State and local highway agencies and owners of site roadways open to public travel may develop special word legend signs in situations where roadway conditions make it necessary to provide road users with additional regulatory, warning, or guidance information, such as when road users need to be notified of special regulations or warned about a situation that might not be readily apparent. Unlike colors that have not been assigned or symbols that have not been approved for signs, new word legend signs may be used without the need for experimentation.

NCUTCD recommends giving owners of site roadways the same option as public road agencies to develop special word legends on their roadways about a situation that might not be readily apparent per 14A-RW-03.

Support:

The message conveyed by some special word legend signs might be unclear to the road user. Although experimentation is not required for such word legends, they might still warrant an evaluation to determine comprehension or possible misinterpretation of the intended message by the road user.

Scanning graphics are graphics designed for scanning by machine, and include bar codes, quick-response (QR) codes or other matrix bar code formats, or similar graphics. This proposed definition (a) avoids the need to repeat "QR Codes, bar codes, or other graphics …" multiple times, and (b) eliminates the phrase "optical scanning" which implies a particular type of technology (optical). Also note that "QR code" is a proprietary technology, and the more generic term is matrix bar code or 2D bar code. NCUTCD recommends adding this "Scanning Graphics" definition to Part 1, and then carry this change throughout other sections of the MUTCD that reference QR Codes, etc. (including the new Part 5).

Standard:

Unless otherwise provided in this Manual for a specific sign~~, and~~ or as provided in the Option statement that follows, telephone numbers~~;~~, Internet addresses~~;~~, e-mail addresses~~;~~,

domain names~~;~~, uniform resource locators (URL)~~;~~, metadata tags ("hash-tags")~~;~~, and scanning graphics ~~quick-response (QR) codes; bar codes or other graphics for optical scanning~~ for the purpose of obtaining information shall not be displayed on any sign, plaque, sign panel, or changeable message sign.

Option:

Internet addresses, e-mail addresses, telephone numbers, ~~quick-response (QR) codes, bar codes~~ scanning graphics or other graphics for the purpose of obtaining information (other than those for maintenance or inventory purposes, see Paragraphs 20 and 21 of this Section) may be displayed on the face of signs, plaques, sign panels, and changeable message signs that are not visible to motor vehicle drivers and intended for viewing only by:

A. pedestrians,
B. bicyclists,
C. occupants of parked vehicles, and
D. automated vehicle systems

~~, and oriented away from and not visible to operators of motor vehicles.~~

NCUTCD recommends text from recommendation 14A-RW-03 as being clear about the driver, and avoid confusion with an automated operator and providing the list above rather than a long sentence for clarity – additional text for CAV added to list.

Standard:

When scanning graphics of any type is used for support of automated driving systems, the sign shall have no apparent loss of resolution or recognition to the road user.

(This text is related to Part 5 on CAVs. It is text that was not included in the NPA. This is needed to avoid strict interpretation which would limit future technological advances. The limitation establishes the performance for such application)

Pictographs (see definition in Section 1C.02) shall not be displayed on signs except as specifically provided in this Manual. Pictographs shall be simple, dignified, and devoid of any advertising and not contain any scanning graphics ~~quick-response (QR) codes, bar codes, or other graphics designed for optical scanning~~ for the purpose of obtaining information. When used to represent a political jurisdiction (such as a State, county, or municipal corporation) the pictograph shall be the official ~~designation~~ logo adopted by the jurisdiction. When used to represent a college or university, the pictograph shall be the official ~~seal~~ logo adopted by the institution. ~~Pictorial representations of university or college programs shall not be permitted to be displayed on a sign.~~ College/university pictographs shall not include pictorial representations of university or college programs, or athletic mascots. Many colleges have both seals and symbols, but the seal is often little recognized and/or difficult to read. NCUTCD agrees with banning symbols other than the official seal or symbol - for example, athletic mascots shall not be used. Also recommend editorial rewording of last sentence.

Business Identification sign panels (see definition in Section 1A.13) shall not be displayed on signs except as specifically provided in this Manual. Business Identification sign panels, including any logo displayed thereupon, shall not contain any scanning graphics ~~quick-response (QR) codes, bar codes, or other graphics designed for optical scanning~~ for the purpose of obtaining information which are visible to the road user from the roadway.

No items other than official traffic control signs, inventory stickers or decals, sign installation dates, sign sizes, sign designations, anti-vandalism stickers, ~~and~~ inventory or maintenance codes, and scanning graphics shall be mounted on the back of a sign.

Option:

Date of fabrication, sign designation, sign size, and manufacturer name, or scanning graphics may be displayed on the front of a sign face in accordance with the provisions of Paragraph 22 of this Section.

Standard:

If displayed on the sign face, the date of fabrication, sign designation, sign size, and manufacturer name shall be completely within the border or inset along the bottom edge of the sign. The letter height or scanning graphics shall not exceed ¾ of the width of the border or inset or, if no border is used, shall not exceed 1¾ inches and shall be within 2 inches of the edge of the sign. The color of the lettering within the border shall be the same as the color of the sign background. The color of the lettering or scanning graphics within the inset shall be the same as the color of the sign legend ~~border~~. For changeable message signs or blank-out signs, such information, if displayed, shall be embossed in a non-contrasting color in the housing of the sign.

Very small QR codes/bar codes will likely be unrecognizable to the passing driver (just look like a vague blur) and should not cause any distraction to them, any more than very small text. However, inclusion of such codes could be beneficial for the purposes of agency inventory management purposes. In the future, CAVs may also be able to effectively detect very small scanning graphics like these.

Section 2A.05 Comments: NCUTCD recommends that Guidance on lateral offset be relocated to Section 2A.15 Lateral Offset.

Section 2A.05 Shapes

Standard:

Particular shapes, as shown in Table ~~2A-1~~ 2A-4, shall be used exclusively for specific signs or series of signs, unless otherwise provided in this Manual for a particular sign or class of signs. (editorial correction)

~~*Guidance:*~~

~~*Where the lateral space available in which to install a diamond-shaped warning sign is constrained, such as mounting on a narrow median barrier or adjacent to a retaining wall, the following methods should be considered to maintain the diamond-shaped sign:*~~

A. ~~*Angle the sign toward the roadway while still maintaining adequate legibility.*~~
B. ~~*Install the sign at a different location that still provides adequate advance warning, supplementing the sign with a Distance plaque (see Section 2C.61), if appropriate.*~~
C. ~~*Reduce the size of the sign at the advance warning location, but supplement it with a duplicate sign on the opposite side of the roadway (see Section 2A.11).*~~
D. ~~*In addition to either angling or reducing the size of the sign at the advance warning location, supplement with a duplicate warning sign and Distance plaque at an upstream location.*~~

E. ~~Mount the sign asymmetrically on the sign support, such as when the support is mounted on a bridge parapet or railing, such that the edge of the sign does not overhang the roadway.~~

F. ~~Increase the mounting height of the sign to above the statutory maximum vehicle height for the tallest vehicle allowed on that roadway.~~

Relocate the Guidance provisions to Section 2A.15 Lateral Offset

Option:

~~Where the methods described in Paragraph 2 of this Section are impracticable, the legend of the~~ A warning sign may be displayed in a vertically oriented rectangle where the available lateral space precludes use of a diamond shape (see Section 2A.15). Note added to address the relocation of content to Section 2A.15

Standard:

~~Other~~ M~~m~~odifications to sign shapes, such as cutting off the left and right points of a diamond, shall not be allowed. (editorial revision)

Table 2A-4. Use of Sign Shapes

Shape	Signs
Octagon*	Stop (R1-1)**
Equilateral Triangle (downward-pointing)*	Yield (R1-2)**
Circle*	Grade Crossing Advance Warning (W10-1)**
Pennant (Isosceles Triangle with longer axis horizontal, pointed right)*	No Passing Zone (W14-3)**
Pentagon (upward-pointing)*	School (S1-1) (squared bottom corners)** County Route (M1-6) (tapered lower sides)**
Crossbuck (two rectangles in a perpendicular "X" configuration)*	Grade Crossing (R15-1)**
Diamond	Warning Series
Rectangle (including square)	Regulatory Series Guide Series*** Warning Series
Trapezoid*	Recreational and Cultural Interest Area Guide Series (isosceles or right-angled) National Forest Route Sign (M1-1) (isosceles)**

* This shape shall be limited exclusively to the sign(s) indicated.
** This sign shall be exclusively the shape shown.
*** Guide series includes general service, specific service, tourist-oriented directional, general information, recreational and cultural interest area, and emergency management signs.

Note: Signs with standardized designs shall not be modified to accommodate a different shape except as provided in this Manual.

NCUTCD agrees with Table 2A-4 as presented in the NPA.

Section 2A.06 Comments: NCUTCD agrees with Section 2A.06 with minor editorial comments. except the expansion of Chapter 2L (Changeable Message Signs) has resulted in a revision of Table 2A-5 Common Uses of Sign Colors, since not all changeable message signs can display all standard sign colors, and these are addressed in Chapter 2L.

Section 2A.06 Colors

Standard:

The colors to be used on signs and their specific use on signs shall be as provided in the applicable Sections of this Manual. The color coordinates and values shall be as described in 23 CFR, Part 655, Subpart F, Appendix.

Support:

Common uses of sign colors are shown in Table ~~2A-2~~ 2A-5. Color schemes on specific signs are shown in the illustrations located in each applicable Chapter.

Whenever white is specified in this Manual or in the "Standard Highway Signs" publication (see Section 1A.05) as a color, it is understood to include silver-colored retroreflective coatings or elements that reflect white light.

The colors coral and light blue are being reserved for uses that will be determined in the future by the Federal Highway Administration.

Information regarding color coding of destinations on guide signs, including community wayfinding signs, is contained in Chapter 2D.

Option:

The approved fluorescent version of the standard red, yellow, green, or orange color may be used as an alternative to the corresponding standard color.

Table 2A-5 Comments: NCUTCD generally agrees with Table 2A-5, but the expansion of Chapter 2L (Changeable Message Signs) has resulted in a revision of the table, as not all changeable message signs can display all standard sign colors. NCUTCD recommends deleting the bottom portion of the table subtitled "Changeable Message Signs" in accordance with NCUTCD recommendation 20B-RW-03, as part of changes made with the new Section 2L.04 on Dynamic Electronic Signs called "Design Characteristics of Messages" (to be submitted with NCUTCD comments on Chapter 2L).

Table 2A-5. Common Uses of Sign Colors

Type of Sign	Legend								Background										
	Black	Green	Red	White	Yellow	Orange	Fluorescent Yellow-Green	Fluorescent Pink	Black	Blue	Brown	Green	Orange*	Red*	White	Yellow*	Purple	Fluorescent Yellow-Green	Fluorescent Pink
Regulatory	X		X	X					X					X	X				
Prohibitive			X	X**										X**	X				
Permissive		X													X				
Warning	X															X			
Pedestrian	X															X		X	
Bicycle	X															X		X	
Guide				X								X							
Interstate Route				X						X				X					
State Route	X														X				
U.S. Route	X														X				
County Route					X					X									
Forest Route				X							X								
Street Name				X								X							
Destination				X								X							
Reference Location				X								X							
Information				X						X		X							
Evacuation Route				X						X									
Road User Service				X						X									
Recreational				X							X	X							
Temporary Traffic Control	X												X						
Incident Management	X												X						X
School	X																	X	
ETC-Account Only	X																X*****		
Changeable Message Signs																			
Regulatory			X****	X					X										
Warning					X				X										
Temporary Traffic Control					X	X			X										
Guide				X					X			X***							
Motorist Services				X					X	****									
Incident Management					X			X	X										
School, Pedestrian, Bicycle					X		X		X										

* Fluorescent versions of these background colors may also be used.
** Legend and background color combination for use only as identified for specific signs in this Manual or *Standard Highway Signs*.
*** These alternative background colors would be provided by blue or green lighted pixels such that the entire CMS would be lighted, not just the legend.
**** Red is used only for the circle and diagonal or other red elements of a similar static regulatory sign.
***** The use of purple on signs is restricted per the provisions of Chapter 2F.

Notes:
1. The purpose of the information in this table is to provide a general overview of common color combinations. The color combinations and orientations for signs with standardized designs shall not be modified. For signs with unique legends,
2. The colors shown for changeable message signs are for those with electronic displays.

Section 2A.07 Comments: NCUTCD generally agrees with 2A.07 as presented, except to add Stop and Yield sign sizes when a site roadway intersects a street or highway, to be consistent with NCUTCD recommendation 15A-RW-01. See NCUTCD comments on Chapter 2B for comments on Table 2B-1.

Section 2A.07 Dimensions

Support:

The "Standard Highway Signs" publication (see Section 1A.05) prescribes design details for different sizes of each sign or plaque depending on the type of traffic facility, including bikeways. Smaller sizes are designed to be used on bikeways and some other off-road applications. Larger sizes are designed for use on freeways and expressways, and can also be used in oversized applications to enhance road user safety and convenience on other facilities, especially on multi-lane divided highways and on undivided highways having five or more lanes of traffic and/or high speeds. The intermediate sizes are designed to be used on other highway types. Minimum sizes of signs and plaques for specific applications are prescribed in the various sign size tables in each Chapter of this Manual.

Standard:

The sign dimensions prescribed in the sign size tables in the various Parts and Chapters in this Manual and in the "Standard Highway Signs" publication (see Section 1A.05) shall be used unless engineering judgment determines that other sizes are appropriate in accordance with the following. Except as provided in Paragraph 3 of this Section, where engineering judgment determines that sizes smaller than the prescribed dimensions are appropriate for use, the sign dimensions shall not be less than the minimum dimensions specified in this Manual. The sizes shown in the Minimum columns that are smaller than the sizes shown in the Conventional Road columns in the various sign size tables in this Manual shall only be used on low-speed roadways, alleys, site roadways open to public travel, and on low-volume rural roads with operating speeds of 30 mph or less; and only where the reduced legend size would be adequate for the regulation or warning or where physical conditions preclude the use of larger sizes.

Option:

For alleys with restrictive physical conditions and vehicle use that limits installation of the Minimum size sign (or the Conventional Road size sign if no Minimum size is shown), both the sign height and the sign width may be decreased by up to 6 inches.

Guidance:

The sizes shown in the Freeway and Expressway columns in the various sign size tables in this Manual should also be used for other higher-speed applications on conventional roads based upon engineering judgment, to provide larger signs for increased visibility and recognition.

The sizes shown in the Oversized columns in the various sign size tables in this Manual size should be used for those special applications where speed, volume, or other factors result in conditions where increased emphasis, improved recognition, or increased legibility is needed, as determined by engineering judgment or study.

Except as provided in Paragraph 7 of this Section, and where specifically prohibited in this Manual, increases above the minimum prescribed sizes should be used where greater legibility or emphasis is needed. If signs larger than the prescribed sizes are used, the overall sign dimensions should be increased in 6-inch increments.

Standard:

Where a maximum allowable sign size is prescribed, increases in sign size shall not be allowed.

Where engineering judgment determines that sizes that are different from the minimum prescribed dimensions are appropriate for use, standard shapes and colors shall be used. Standard proportions shall be retained as much as practicable.

Guidance:

Except where specifically prohibited in this Manual, when supplemental plaques are installed with larger sized signs, a corresponding increase in the size of the plaque and its legend should also be made. The resulting plaque size should be approximately in the same relative proportion to the larger sized sign as the conventional sized plaque is to the conventional sized sign.

Standard:

Where a site roadway open to public travel intersects with a street or highway, the sign size for the regulatory STOP or YIELD sign facing the site roadway approach shall be sizes shown in Table 2B-1.

Add Stop and Yield sign sizes when a site roadway intersects a street or highway per 15A-RW-01. Table 2B-1 is addressed in NCUTCD's comments on Chapter 2B.

Section 2A.08 Comments: NCUTCD agrees with Section 2A.08 except as follows

- The Standard Highway Signs publication needs to be consistently titled appropriately
- Retain parenthetical definition of "solidus"
- Delete support information that is more appropriate to include this information the Standard Highway Signs publication
- Add reference to Section 2E.12 regarding Series E Modified alphabets

Section 2A.08 Word Messages

Standard:

Except as provided otherwise in this Manual, all word messages shall be aligned horizontally across a sign, reading left to right.

Except as provided in Section 2A.04, all word messages shall use standard wording as shown in this Manual and in the "Standard Highway Signs" publication (see Section 1A.05).

All sign lettering, numerals, and other characters shall be of the Standard Alphabets as provided in the "Standard Highway Signs ~~and Markings~~" publication, unless provided otherwise in this Manual. Editorial change - matches other changes throughout NPA to delete "and Markings" from the name of the document.

The sign lettering for names of places, streets, and highways shall be composed of a combination of lower-case letters with initial upper-case letters. The sign lettering for other legends shall be composed of upper-case letters, unless otherwise provided in this Manual for a particular sign or type of message.

Except as provided in Chapter 2E of this Manual ,when a mixed-case legend is used, the nominal loop height of the lower-case letters shall be 3/4 of the height of the initial upper-case letter.

The unique letter forms for each of the Standard Alphabet series shall not be stretched, compressed, warped, or otherwise manipulated.

Support:
Section 2D.07 contains information regarding the acceptable methods of modifying the length of a word for a given letter height and series.
See Section 2E.12 for provisions regarding the use of Series E (modified) and Series E(modified)-Alternate alphabets." (add reference to 2E.12)
Guidance:
Word messages should be as brief as practical to convey a clear, simple meaning, and the lettering should be large enough to provide the necessary legibility distance. A minimum specific ratio of 1 inch of letter height per 30 feet of legibility distance should be used.
Abbreviations (see Section 1D.10) should be kept to a minimum, except as otherwise prescribed in this Manual.
Word messages should not contain periods, apostrophes, question marks, ampersands, or other punctuation or characters that are not letters, numerals, or hyphens unless necessary to avoid confusion.
Support:
Diacritical marks on words or names that are adapted to English are not normally needed on signs for comprehension or navigational purposes
Guidance:
The solidus (slanted line or forward slash) is intended to be used for fractions only and should not be used to separate words on the same line of legend. Instead, a hyphen should be used for this purpose, such as "TRUCKS - BUSES." (revise per 14A-RW-04)
Standard:
Fractions shall be displayed with the numerator and denominator diagonally arranged about the solidus. The overall height of the fraction is measured from the top of the numerator to the bottom of the denominator, each of which is vertically aligned with the upper and lower ends of the solidus. The overall height of the fraction shall be determined by the height of the numerals within the fraction, and shall be 1.5 times the height of an individual numeral within the fraction.
Except as otherwise provided in this Manual, distances shall be displayed on signs using fractions of a mile rather than decimals.
Support:
The "Standard Highway Signs" publication (see Section 1A.05) contains details regarding the layouts of fractions on signs.
Guidance:
When initials are used to represent an abbreviation for separate words (such as "U S" for a United States route), the initials should be separated by a space of between 1/2 and 3/4 of the letter height of the initials.
When an Interstate route is displayed in text form instead of using the route shield, a hyphen should be used for clarity, such as "I-50."
~~Support:~~
~~Letter height is expressed in terms of the height of an upper-case letter. For mixed-case legends (those composed of an initial upper-case letter followed by lower-case letters), the height of the lower-case letters is derived from the specified height of the initial upper-case letter based on a prescribed ratio. Letter heights for mixed-case legends might be expressed in terms of both the upper- and lower-case letters, or in terms of the initial upper-case letter alone. When the height of a lower-case letter is specified or determined from the prescribed ratio, the reference is to the nominal loop height of the letter. The term loop height refers to the portion of a lower-case letter~~

~~that excludes any ascending or descending stems or tails of the letter, such as with the letters "d" or "q." The nominal loop height is equal to the actual height of a non-rounded lower-case letter whose form does not include ascending or descending stems or tails, such as the letter "x." The rounded portions of a lower-case letter extend slightly above and below the baselines projected from the top and bottom of such a non-rounded letter so that the appearance of a uniform letter height within a word is achieved. The actual loop height of a rounded lower-case letter is slightly greater than the nominal loop height and this additional height is excluded from the expression of the lower-case letter height~~ (delete per 14A-RW-04)

Section 2A.09 Comments: NCUTCD generally agrees with Section 2A.09, except we recommend changing the usage of recreational and cultural interest symbols only within a recreational and cultural area from a Standard to Guidance, since usage outside the area is addressed in Chapter 2M. The connection to the recreational or cultural area may be a highway intersection where drivers might benefit from use of these symbols on highway directional signing. Also, presently snowmobiles and ATVs are prevalent outside recreational areas and the use of a common symbol is preferred.

Section 2A.09 Symbols

Standard:

Symbol designs shall in all cases be unmistakably similar to those shown in this Manual and in the "Standard Highway Signs" publication (see Section 1A.05).

Support:

New symbol designs are adopted by the Federal Highway Administration based on research evaluations to determine road user comprehension, sign conspicuity, and sign legibility.

Sometimes a change from word messages to symbols requires significant time for public education and transition. Therefore, this Manual sometimes includes the practice of using educational plaques to accompany new symbol signs.

Guidance:

New standardized warning or regulatory symbol signs should be accompanied by an educational plaque where engineering judgment determines that the plaque will improve road user comprehension during the transition from word message to symbol signs.

Option:

Educational plaques may be left in place as long as they are in serviceable condition.

State and/or local highway agencies may conduct research studies to determine road user comprehension, sign conspicuity, and sign legibility in compliance with the provisions for official experimentation when a new symbol design is under consideration (see Section 1A.10).

Although most standard symbols are oriented facing left, mirror images of these symbols may be used where the reverse orientation might better convey to road users a direction of movement.

Standard:

A symbol used for a given category of signs (regulatory, warning, or guide) shall not be used for a different category of signs, except as specifically authorized in this Manual.

~~A recreational and cultural interest area symbol (see Chapter 2M) shall not be used on streets or highways outside of recreational and cultural interest areas.~~

A recreational and cultural interest area guide sign symbol (see Chapter 2M) shall not be used on any regulatory or warning sign on any street, road, or highway.

Guidance:

A recreational and cultural interest area symbol (see Chapter 2M) should not be used on streets and highways outside of recreational and cultural interest areas.

Option:

Recreational and cultural interest area guide signs may be used on any road to direct persons to facilities, structures, and places, and to identify various services available to the general public. (revise to allow recreational and cultural interest signs outside R&C areas)

Support:

Section 2M.07 contains provisions for the use of recreational and cultural interest area symbols to indicate prohibited activities or items in non-road applications**.**

Section 2A.10 Comments: NCUTCD agrees with 2A.10 as presented in the NPA.

Section 2A.10 Sign Borders

Standard:

Unless otherwise provided, signs shall have a border of the same color as the legend in order to outline their distinctive shape and thereby give them easy recognition and a finished appearance.

The corners of all sign borders shall be rounded, except for STOP signs.

Guidance:

A dark border on a light background should be set in from the edge, while a light border on a dark background should extend to the edge of the sign. A border for 30-inch signs with a light background should be from 1/2 to 3/4 inch in width, 1/2 inch from the edge. For similar signs with a light border, a width of 1 inch should be used. For other sizes, the border width should be of similar proportions, but should not exceed the stroke-width of the major lettering of the sign. On signs exceeding 72 x 120 inches in size, the border should be 2 inches wide. On unusually large signs with oversized letter heights, route shields, or other legend elements, the border should be 2-½ inches wide and should not exceed 3 inches in width. Except for STOP signs and as otherwise provided in Section 2E.14, the corners of the sign should be rounded to a radius that is concentric with that of the border.

Support:

See Section 2A.20 regarding the use of light-emitting diode (LED) units within the border of a sign.

Section 2A.11 Comments: NCUTCD generally agrees with 2A.11, except the text regarding retroreflective material on a sign support be revised from a Standard to a Guidance condition.

Section 2A.11 Enhanced Conspicuity for Standard Signs

Option:

Based upon engineering judgment, where the improvement of the conspicuity of a standard regulatory, warning, or guide sign is desired, any of the following methods may be used, as appropriate, to enhance the sign's conspicuity (see Figure 2A-1):

A. Increasing the size of a standard regulatory, warning, or guide sign.
B. Dual signing of a standard regulatory, warning, or guide sign by adding a second identical sign on the left-hand side of the roadway at the same location.
C. Adding a solid yellow or fluorescent yellow rectangular header panel above a standard regulatory sign, with the width of the panel corresponding to the width of the standard regulatory sign. A legend of "NOTICE," "STATE LAW," or other appropriate text may be added in black letters within the header panel for a period of time determined by engineering judgment.
D. Adding a NEW plaque (see Section 2C.60) above a new standard regulatory or warning sign, for a period of time determined by engineering judgment, but not to exceed six months, to call attention to the new sign.
E. Adding one or more red or orange flags (cloth or retroreflective sheeting) above a standard regulatory or warning sign, with the flags oriented at 45 degrees to the vertical.
F. Adding a solid yellow, a solid fluorescent yellow, or a diagonally striped black and yellow (or black and fluorescent yellow) strip of retroreflective sheeting at least 3 inches wide around the perimeter of a standard warning sign. This may be accomplished by affixing the standard warning sign on a background that is 6 inches larger than the size of the standard warning sign.
G. Adding a warning beacon (see Section 4S.03) to a standard regulatory (other than a STOP, DO NOT ENTER, WRONG WAY, or a Speed Limit sign), warning, or guide sign.
H. Adding a speed limit sign beacon (see Section 4S.04) to a standard Speed Limit sign.
I. Adding a stop beacon (see Section 4S.05) to a STOP sign.
J. Adding a rectangular rapid-flashing beacon (see Chapter 4L) to a Pedestrian or School warning sign at an uncontrolled, midblock crosswalk.
K. Adding light-emitting diode (LED) units within the symbol, legend, or border of a standard regulatory, warning, or guide sign, as provided in Section 2A.20.
L. Adding a strip of retroreflective material to the sign support in accordance with the provisions of Paragraph 4 of this Section.
M. Using other methods that are specifically allowed for certain signs as described elsewhere in this Manual.

Support:

Sign conspicuity improvements can also be achieved by removing non-essential and illegal signs from the right-of-way (see Section 1D.04), and by relocating signs to provide better spacing. Section 2A.19 contains information on excessive use of signs.

Standard:

Strobe lights shall not be used to enhance the conspicuity of highway signs.

If a strip of retroreflective material is used on the sign support, it shall be at least 2 inches in width, ~~it shall be placed for the full length of the support from the sign to within 2 feet above the edge of the roadway,~~ and its color shall match the background color of the sign, except that the color of the strip for the YIELD and DO NOT ENTER signs shall be red. The retroreflective strip shall not display any legend or other information.

For a post-mounted sign installation, placing a duplicate sign in the same assembly facing the same direction of traffic shall not be considered an acceptable method of enhancing conspicuity.

Guidance:

If a strip of retroreflective material is used on the sign support, it should be placed for the full length of the support from the sign to within two feet above the edge of the roadway

Figure 2A-1. Examples of Enhanced Conspicuity for Signs

A – W16-15P plaque above a regulatory or warning sign if the regulation or condition is new

B – Red or orange flags above a regulatory, warning, or guide sign

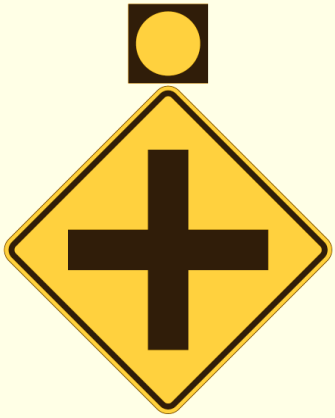
C – W16-18P plaque above a regulatory sign

D – Solid yellow, solid fluorescent yellow, or diagonally striped black and yellow (or black and fluorescent yellow) strip of retroreflective sheeting around a warning sign

E – Vertical retroreflective strip on sign support

F – LED units within the symbol, legend, or border

FG – Supplemental beacon



NCUTCD generally agrees with Figure 2A-1, but recommends the figure be modified to include a School Warning sign with LEDs in the border and reordering of items in the figure.

Section 2A.12 Comments: NCUTCD generally agrees with 2A.12, except for some editorial changes regarding figure references and reference to the Emergency Stopping Only sign rather than "for passing only."

Section 2A.12 Standardization of Location

Support:

Standardization of position cannot always be attained in practice. Examples of heights and lateral locations of signs for typical installations are illustrated in Figure 2A-2, and examples of locations for some typical signs at intersections are illustrated in Figures 2A-3 and 2A-4 ~~and 2-5A and B.~~ (Sheets 1 – 4). (fix figure reference)

Examples of advance signing on intersection approaches are illustrated in Figures 2A-4 (Sheets 1 – 4) ~~and 2A-5A and B~~. (fix figure reference)

Chapters 2B, 2C, and 2D contain provisions regarding the application of regulatory, warning, and guide signs, respectively.

Standard:

Signs requiring separate decisions by the road user shall be spaced sufficiently far apart for the appropriate decisions to be made.

Guidance:

One of the factors considered when determining the appropriate spacing of signs should be the posted or 85th-percentile speed.

Except as provided in Paragraph 8 of this Section, signs should be located on the right-hand side of the roadway where they are easily recognized and understood by road users. Signs in other locations should be considered only as supplementary to signs in the normal locations, except as otherwise provided in this Manual.

Signs should be individually installed on separate posts or mountings except where:

A. *One sign supplements another;*
B. *Route or directional signs are grouped to clarify information to motorists;*
C. *Regulatory signs that do not conflict with each other are grouped, such as Turn Prohibition signs posted with ONE WAY signs or a parking regulation sign posted with a Speed Limit sign; or*
D. *Street Name signs are posted with a STOP or YIELD sign.*

Signs should be located so that they:

A. *Are outside the clear zone unless placed on a crashworthy support (see Section ~~2A.15~~ 1D.13)* (fix section reference)
B. *Optimize nighttime visibility,*
C. *Minimize the effects of mud splatter and debris,*
D. *Do not obscure each other,*
E. *Do not obscure the sight distance to approaching vehicles on the major street for drivers who are stopped on minor-street approaches, and*
F. *Are not hidden from view.*

Except for Stop, Yield, Do Not Enter, and Wrong Way signs, or as otherwise provided in this Manual, where a sign indicates an action by a road user in the left lane or at the left-hand side of a one-way road, such as Lane Ends Merge Right, the sign should be located on the left-hand side

of the roadway. In the case of a divided road, the sign should be located in median if adequate width is available.

Support:

Signs located on the left-hand side of a one-way road or in the median of a divided road, in accordance with the Guidance above, may be supplemented by an identical sign located on the right-hand side of the road.

The clear zone is the total roadside border area, starting at the edge of the traveled way, available for use by errant vehicles. The width of the clear zone is dependent upon traffic volumes, speeds, and roadside geometry. Additional information can be found in AASHTO's "Roadside Design Guide" (see Section 1A.05).

Guidance:

With the increase in traffic volumes and the need to provide road users regulatory, warning, and guidance information, an order of priority for sign installation should be established.

Support:

An order of priority is especially critical where space is limited for sign installation and there is a demand for several different types of signs. Overloading road users with too much information is not desirable. Primacy according to type of sign will depend on the specific situation and conditions of the site at which the signs are to be installed. For example, in the vicinity of an exit ramp, guide signs and warning signs for the exit ramp might take precedence over regulatory signs that confirm rules of the road, such as EMERGENCY STOPPING ONLY or ~~for passing or~~ for the mainline speed limit where there is no change in the speed zone.

Reference is to a sign and "for passing only" is not a sign.

Guidance:

Because regulatory and warning information is typically more critical to the road user than guidance information, regulatory and warning signing whose locations are critical should be displayed rather than guide signing in cases where conflicts occur. In such cases, the guide sign should be relocated to another appropriate location where it will still be effective. In other cases, such as at a decision point, the guide sign should take precedence over other signs whose locations are not as critical to an immediate decision or action necessary by the road user. In all cases, careful attention should be given to minimizing sign clutter. Community wayfinding and acknowledgment guide signs should have a lower priority as to placement than other guide signs. Information of a less critical nature should be moved to less critical locations or omitted.

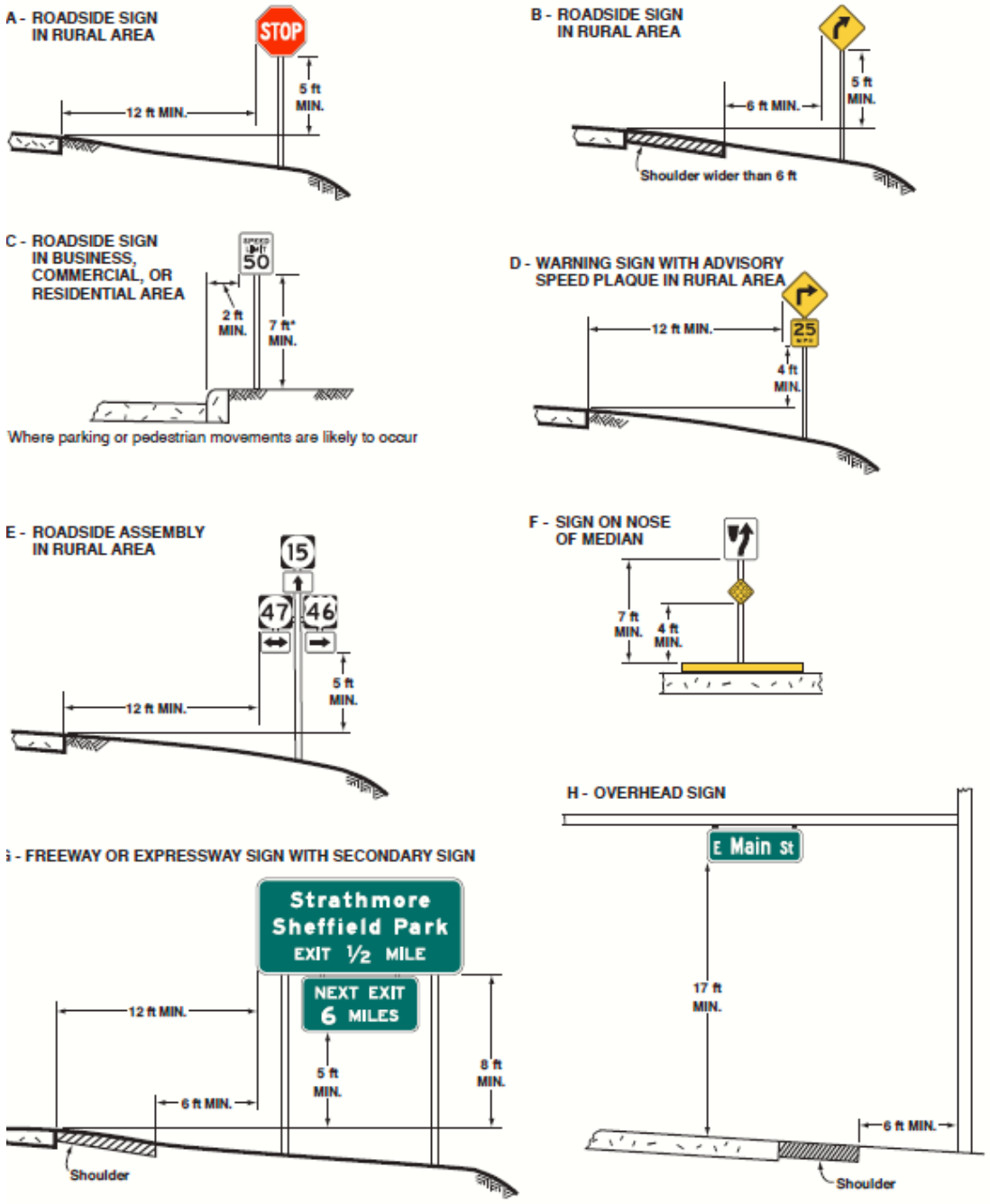
Option:

Under some circumstances, such as on curves to the right, signs may be placed on median islands or on the left-hand side of the road. A supplementary sign located on the left-hand side of the roadway may be used on a multi-lane road where traffic in a lane to the right might obstruct the view to the right.

Guidance:

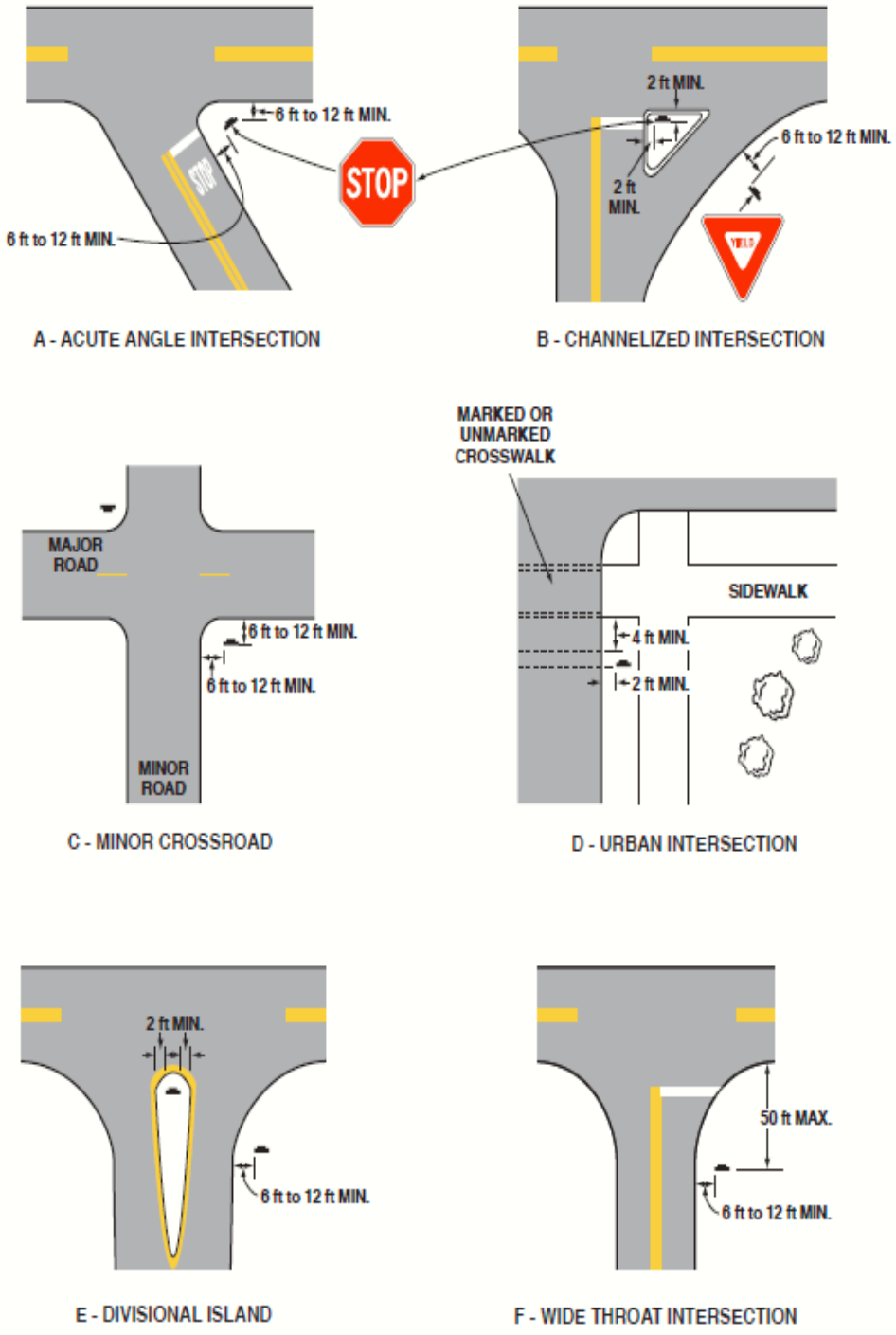
In urban areas where crosswalks exist, signs should not be placed within 4 feet in advance of the crosswalk (see Drawing D in Figure 2A-3).

Figure 2A-2. Examples of Heights and Lateral Locations of Sign Installations



NCUTCD agrees with Figure 2A-2 as presented in the NPA.

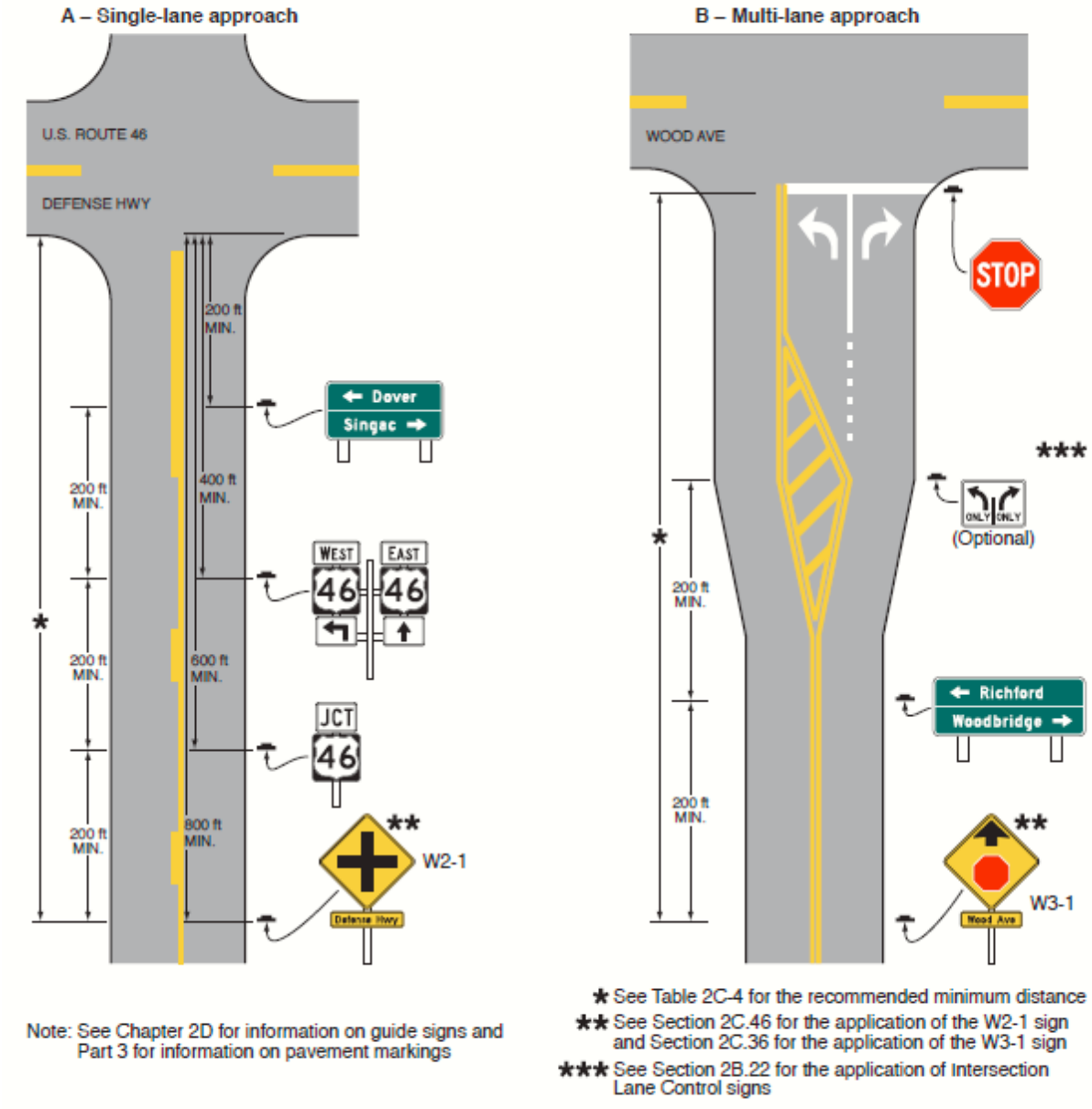
Figure 2A-3. Examples of Locations for Some Typical Signs at Intersections



Note: Lateral offset is a minimum of 6 feet measured from the edge of the shoulder, or 12 feet measured from the edge of the traveled way. See Section 2A.19 for lower minimums that may be used in urban areas, or where lateral offset space is limited.

NCUTCD agrees with Figure 2A-3 as presented in the NPA.

Figure 2A-4. Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach (Sheet 1 of 4)



Note: See Chapter 2D for information on guide signs and Part 3 for information on pavement markings

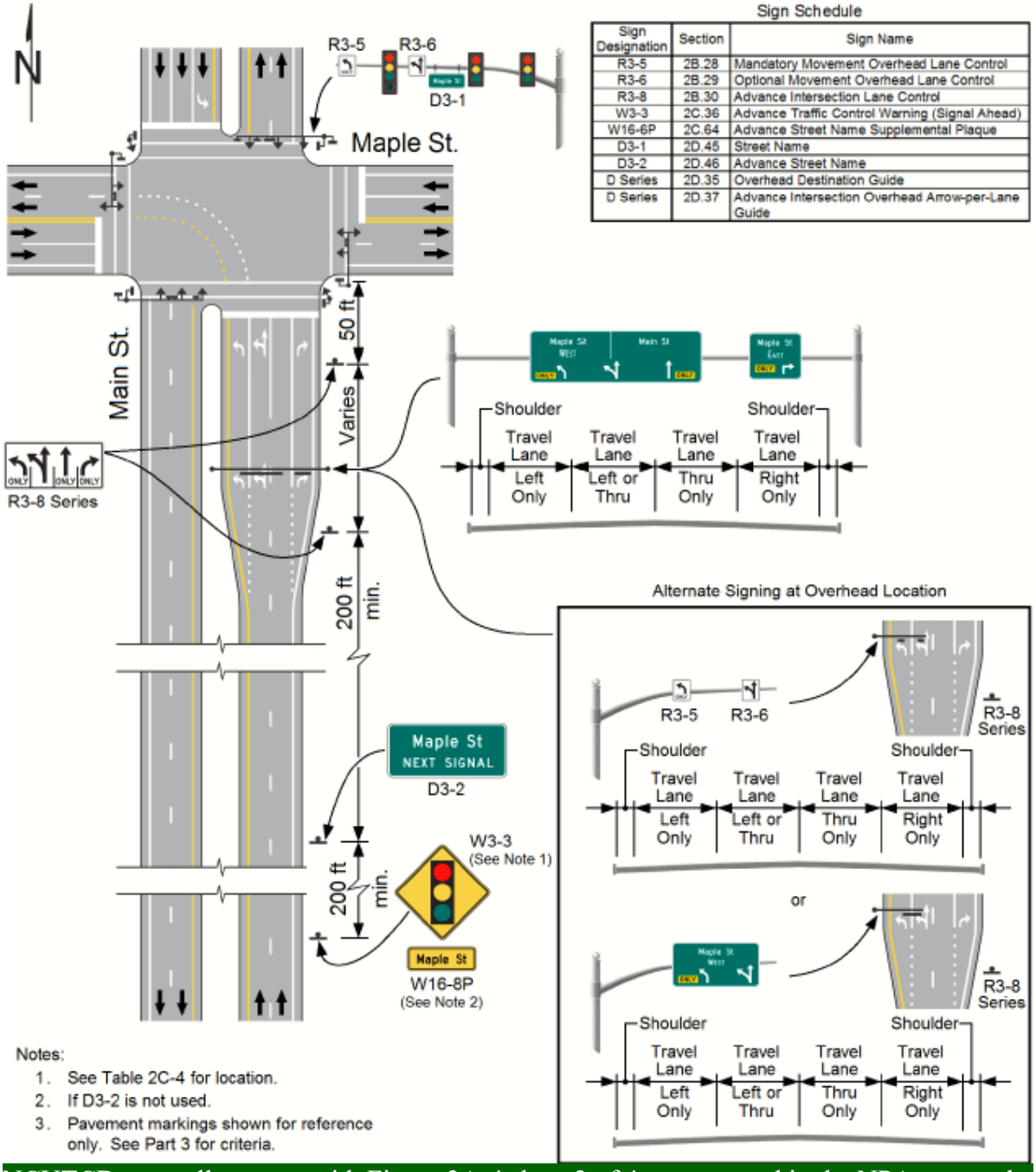
* See Table 2C-4 for the recommended minimum distance

** See Section 2C.46 for the application of the W2-1 sign and Section 2C.36 for the application of the W3-1 sign

*** See Section 2B.22 for the application of Intersection Lane Control signs

NCUTCD agrees with Figure 2A-4 sheet 1 of 4 as presented in the NPA.

Figure 2A-4. Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach
(Sheet 2 of 4)
C – Multi-lane approach with Optional Movement Turn Lanes

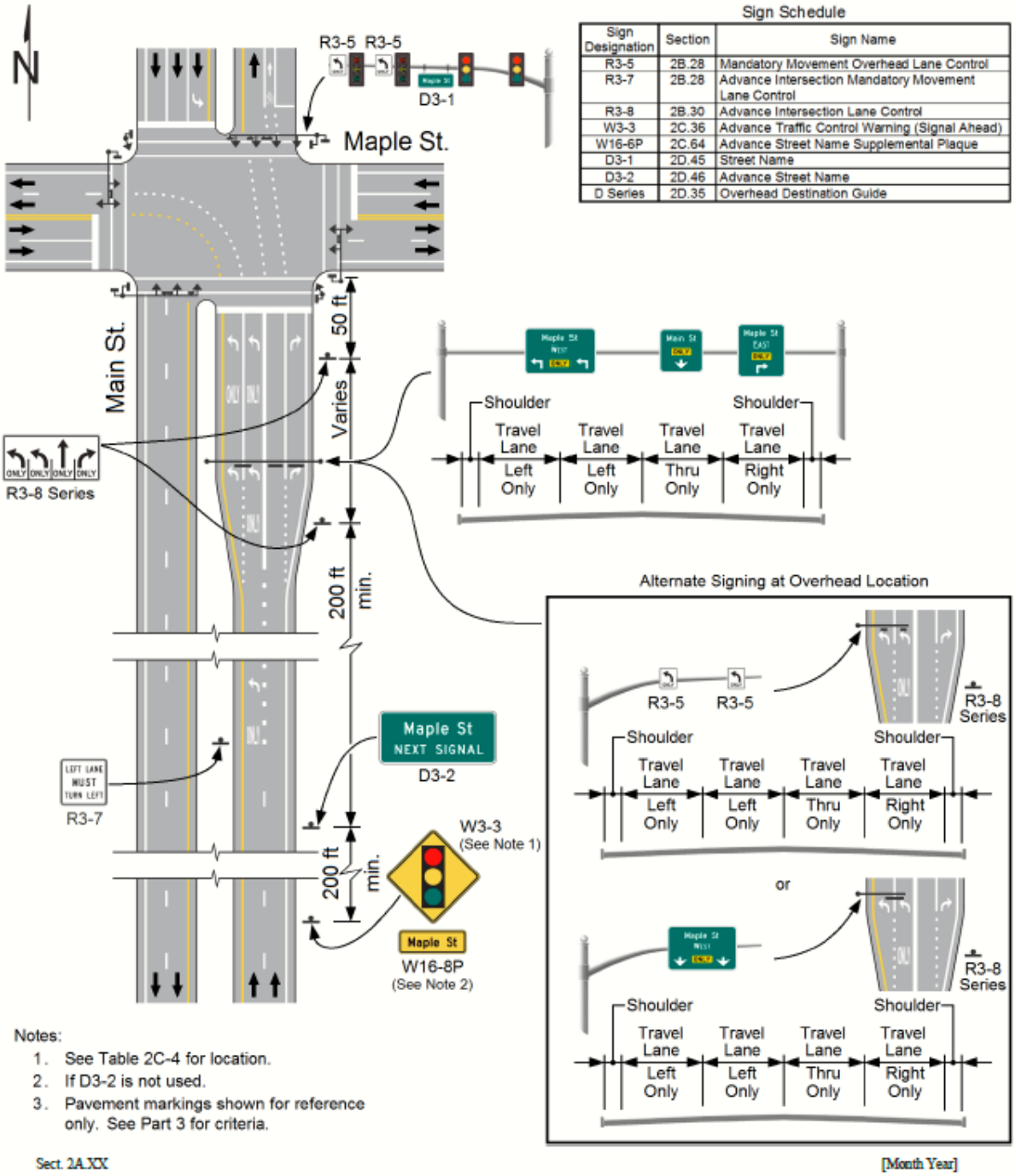


Sign Schedule

Sign Designation	Section	Sign Name
R3-5	2B.28	Mandatory Movement Overhead Lane Control
R3-6	2B.29	Optional Movement Overhead Lane Control
R3-8	2B.30	Advance Intersection Lane Control
W3-3	2C.36	Advance Traffic Control Warning (Signal Ahead)
W16-6P	2C.64	Advance Street Name Supplemental Plaque
D3-1	2D.45	Street Name
D3-2	2D.46	Advance Street Name
D Series	2D.35	Overhead Destination Guide
D Series	2D.37	Advance Intersection Overhead Arrow-per-Lane Guide

NCUTCD generally agrees with Figure 2A-4 sheet 2 of 4 as presented in the NPA except the W16-6P plaque number should be W16-8P in the sign schedule above.

Figure 2A-4. Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach
(Sheet 3 of 4)
D – Multi-lane approach with Mandatory Movement Turn Lanes

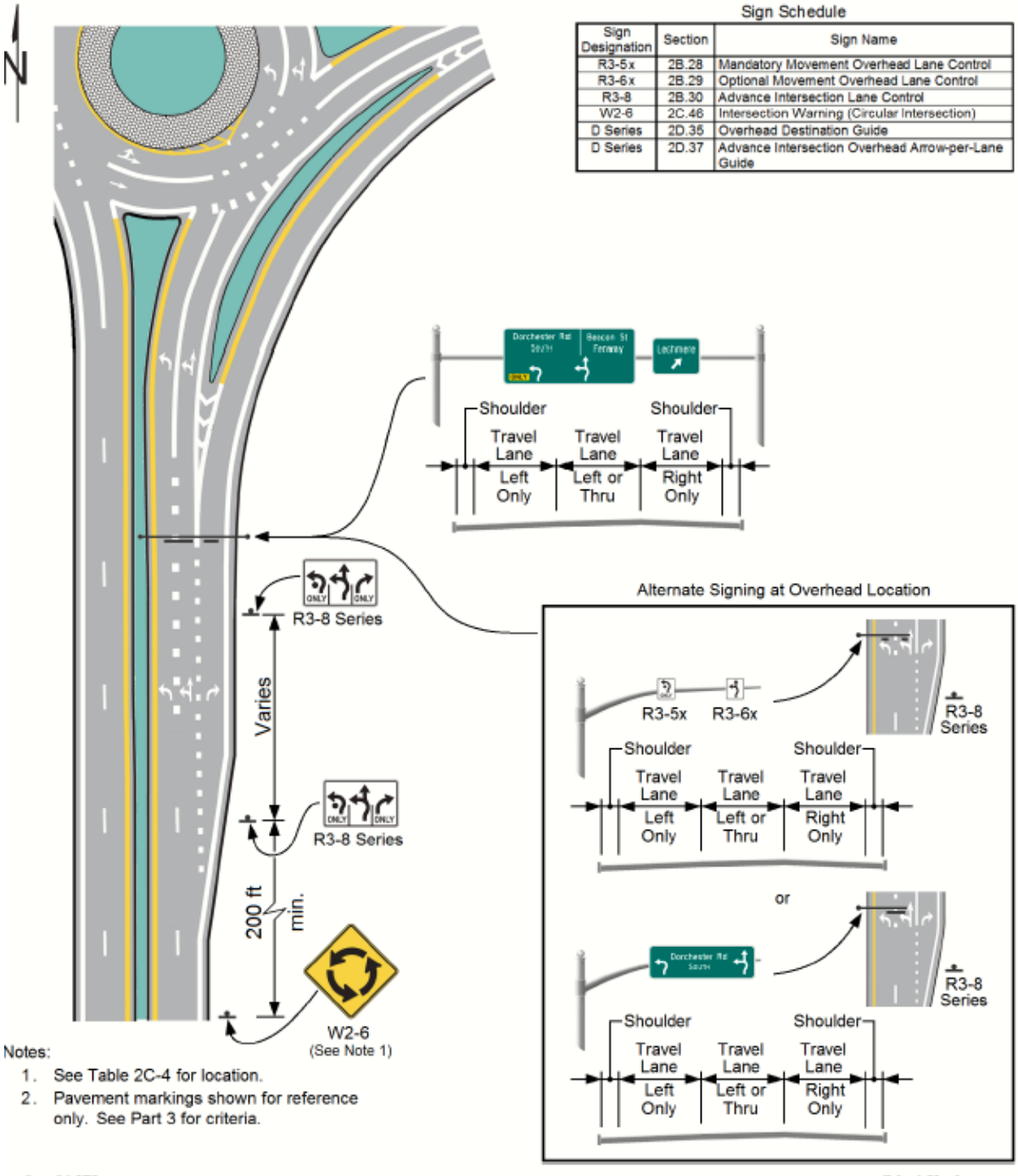


NCUTCD generally agrees with Figure 2A-4 sheet 3 of 4 except:

- Change the arrows in the Maple St sign in the alternate signing at overhead location detail above to be left turn arrows, not down arrows.
- In the sign schedule above, the W16-6P should be W16-8P.

824

Figure 2A-4. Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach
(Sheet 4 of 4)
E – Multi-lane approach to a Circular Intersection with Optional Movement Turn Lanes



825
826 NCUTCD agrees with Figure 2A-4 sheet 4 of 4 as presented in the NPA.

Section 2A.13 Comments: NCUTCD agrees with 2A.13 as presented in the NPA.

Section 2A.13 Overhead Sign Installations

Guidance:

Overhead signs should be used on freeways and expressways, at locations where some degree of lane-use control is desirable, and at locations where space is not available at the roadside.

Support:

The operational requirements of the present highway system are such that overhead signs have value at many locations. The factors to be considered for the installation of overhead sign displays are not definable in specific numerical terms. In some cases, overhead mounting of a sign might be required by other provisions of this Manual.

Option:

The following conditions (not in priority order) may be considered in an engineering study to determine if overhead signs would be beneficial:

A. Traffic volume at or near capacity,
B. Complex interchange design,
C. Three or more lanes in each direction,
D. Restricted sight distance,
E. Closely-spaced interchanges,
F. Multi-lane exits,
G. Large percentage of trucks,
H. Street lighting background,
I. High-speed traffic,
J. Consistency of sign message location through a series of interchanges,
K. Insufficient space for post-mounted signs, L. Junction of two freeways, and
M. Left-side exit ramps.

Over-crossing structures may be used to support overhead signs.

Support:

Under some circumstances, the use of over-crossing structures as sign supports might be the only practical solution that will provide adequate viewing distance. The use of such structures as sign supports might eliminate the need for the foundations and sign supports along the roadside.

Section 2A.14 Comments: NCUTCD recommends changes in 2A.14 in accordance with NCUTCD recommendation 20B-RW-01 to accommodate large guide signs on cut slopes.

Section 2A.14 Mounting Height

Standard:

The provisions of this Section shall apply unless specifically stated otherwise for a particular sign or object marker elsewhere in this Manual.

The minimum mounting heights prescribed in this Section or as provided otherwise in this Manual shall not supersede those necessary for crash performance of sign installations that are required to be crashworthy (see ~~Paragraph 2~~ of Section ~~2A.15~~ 1D.13).

All crashworthiness of traffic control devices is contained within Section 1D.13 per NPA.

Support:

In addition to the provisions of this Section, information affecting the minimum mounting height of signs as a function of crash performance can be found in AASHTO's "Roadside Design Guide" (see Section 1A.05).

Standard:

The minimum height, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement, of signs installed at the side of the road in rural areas shall be 5 feet (see Figure 2A-2).

The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, of signs installed at the side of the road in business, commercial, or residential areas where parking or pedestrian movements are likely to occur, or where the view of the sign might be obstructed, shall be 7 feet (see Figure 2A-2).

Option:

The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the height specified in Paragraphs 4 and 5 of this Section.

Standard:

The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs installed above sidewalks shall be 7 feet.

If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6C.03), the secondary sign shall not project more than 4 inches into the pedestrian facility.

Option:

Except as required in Paragraph 10 of this Section, signs that are placed 30 feet or more from the edge of the traveled way may be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

Standard:

Directional signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. All route signs, warning signs, and regulatory signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. If a secondary sign is mounted below another sign on a freeway or expressway, the major sign shall be installed with a minimum height of 8 feet and the secondary sign shall be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

Where large signs having an area exceeding 50 square feet are installed on multiple breakaway posts, the clearance from the ground to the bottom of the sign shall be at least 7 feet for the portion of the sign within the clear zone.

Guidance:

A large sign having an area exceeding 50 square feet installed on multiple breakaway posts should be mounted at least 3 feet above the ground for the portion of the sign outside of the clear zone. Where the sign has the potential to be obscured by vegetation, engineering judgment should be used to determine if a higher mounting height is needed based on local conditions.

Support:

In a steep cut section, maintaining a 7-foot mounting height above the ground at the far side of the sign could result in an excessive mounting height above the pavement (very tall posts and reduced headlight illumination). (NCUTCD recommends revisions to accommodate large guide signs in cut slopes per 20B-RW-01)

Option:

A route sign assembly consisting of a route sign and auxiliary signs (see Section 2D.31) may be treated as a single sign for the purposes of this Section.

The mounting height may be adjusted when supports are located near the edge of the right-of-way on a steep backslope in order to avoid the sometimes less desirable alternative of placing the sign closer to the roadway.

Standard:

Overhead signs shall provide a vertical clearance of not less than 17 feet to the sign, light fixture, or sign bridge over the entire width of the pavement and shoulders except where the structure on which the overhead signs are to be mounted or other structures along the roadway near the sign structure have a lesser vertical clearance.

Option:

If the vertical clearance of other structures along the roadway near the sign structure is less than 16 feet, the vertical clearance to an overhead sign structure or support may be as low as 1 foot higher than the vertical clearance of the other structures in order to improve the visibility of the overhead signs.

In special cases the clearance to overhead signs may be reduced if necessary because of substandard dimensions in tunnels and other major structures such as double-deck bridges.

Guidance:

While a maximum mounting height for signs is generally not prescribed in this Manual, agencies should ensure that signs are not mounted at such a height as to be out of the road user's normal field of vision (see Paragraph 2 of Section 1D.11), especially in urban settings where signs are mounted on traffic signal or light poles.

Support:

Figure 2A-2 illustrates some examples of the mounting height requirements contained in this Section.

Section 2A.15 Comments: NCUTCD generally agrees with 2A.15 as presented in the NPA, except for the following:

- Relocate crashworthiness information to a new Section 1D.13 (see NCUTCD docket comment on Chapter 1D)
- Clarify sign support location to account for barrier deflection in accordance with NCUTCD recommendation 20B-RW-01
- Address sign angle per Section 2A.05
- Include text relocated from Section 2A.05
- Address vertical clearance of signs overhanging travel lanes

Section 2A.15 Lateral Offset

Standard:

For overhead sign supports, the minimum lateral offset from the edge of the shoulder (or if no shoulder exists, from the edge of the pavement) to the near edge of overhead sign

supports (cantilever or sign bridges) shall be 6 feet. Overhead sign supports shall have a barrier or crash cushion to shield them if they are within the clear zone.

Post-mounted sign and object marker supports shall be crashworthy (See Section 1D.13) if within the clear zone.

~~Support:~~

~~Information on the FHWA's policy on crashworthiness of devices on the National Highway System and other roadways is available at the FHWA Office of Departure Web site at https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/policy_memo_guidance.cfm.~~

(move to new consolidated crashworthiness Section 1D.13)

Guidance:

For post-mounted signs, the minimum lateral offset should be 12 feet from the edge of the traveled way. If a shoulder wider than 6 feet exists, the minimum lateral offset for post-mounted signs should be 6 feet from the edge of the shoulder.

Supports for signs mounted laterally behind a longitudinal barrier should be placed so the near edge of support is located beyond the deflection distance of the longitudinal barrier.

(clarify sign support location to account for barrier deflection per 20B-RW-01)

Support:

The minimum lateral offset requirements for object markers are provided in Chapter 2C.

The minimum lateral offset is intended to keep trucks and cars that use the shoulders from striking the signs or supports. The minimum lateral offset requirements do not supersede the requirement for crashworthiness (see Paragraph 2 of this Section) if the sign is located within the clear zone.

Guidance:

All supports should be located as far as practical from the edge of the shoulder. Advantage should be taken to place signs behind existing roadside barriers, on over-crossing structures, or other locations that minimize the exposure of the traffic to sign supports.

Option:

Lesser lateral offsets may be used on connecting roadways or ramps at interchanges, but not less than 6 feet from the edge of the traveled way.

On conventional, low-volume rural, and special-purpose roads in areas where it is impractical to locate a sign with the lateral offset prescribed by this Section because of roadside features such as terrain or vegetation, a lateral offset of at least 2 feet may be used.

A lateral offset of at least 1 foot from the face of the curb may be used in business, commercial or residential areas where sidewalk width is limited or where existing poles are close to the curb.

Guidance:

Overhead sign supports and post-mounted sign and object marker supports should not intrude into the usable width of a sidewalk or other pedestrian facility.

Where the lateral space available in which to install a sign is constrained, such as mounting on a median barrier or adjacent to a retaining wall, and the sign cannot be reasonably relocated to a different location without lateral constraints, one or more of the following methods should be used:

A. Angle the sign up to 45 degrees. NPA Section 2A.05 proposes that signs may be angled while still retaining adequate visibility, without specifying a specific maximum angle. Recommend using the Section 2G.03 language that allows angling up to 45 degrees.

B. Reduce the size of the sign at the laterally constrained location, but supplement it with a duplicate sign on the opposite side of the roadway (see Section 2A.11).

C. Mount the sign asymmetrically on the sign support, such as when the support is mounted on a bridge parapet or railing, such that the edge of the sign does not overhang the roadway.

D. Display the legend of the warning sign in a vertically oriented rectangle (see Section 2A.05).

The edges of signs that are post-mounted on a median barrier should not project beyond the outer edges of the barrier. (this is the Guidance statement that was relocated from 2A.05 with revised wording in 20B-RW-01)

Standard:

Signs that are post-mounted on a median barrier that overhang any portion of the traveled way shall be mounted with a vertical clearance that complies with the provision of Section 2A.14 for overhead mounting. Relocated from NPA 2A.05 and revised for clarification. Current language in 2G.03 applies to signs greater than 72 in. and overhangs any portion of the roadway. Recommend a simpler rule that signs must have a minimum 17 ft. vertical clearance if they overhang the travel lanes.

Support:

Figures 2A-2 and 2A-3 illustrate some examples of the lateral offset requirements contained in this Section.

Section 2A.16 Comments: NCUTCD agrees with 2A.16 as presented in the NPA.

Section 2A.16 Orientation

Guidance:

Unless otherwise provided in this Manual, signs should be vertically mounted at right angles to the direction of, and facing, the traffic that they are intended to serve.

Where mirror reflection from the sign face is encountered to such a degree as to reduce legibility, the sign should be turned slightly away from the road. Signs that are placed 30 feet or more from the pavement edge should be turned toward the road. On curved alignments, the angle of placement should be determined by the direction of approaching traffic rather than by the roadway edge at the point where the sign is located.

Option:

On grades, sign faces may be tilted forward or back from the vertical position to improve the viewing angle.

Section 2A.17 Comments: NCUTCD generally agrees with 2A.17 as presented in the NPA except the NPA adds a Standard statement relative to mounting of electronic equipment on existing supports that may compromise the crashworthiness of the sign supports. NCUTCD recommends rewording of the content regarding equipment.

Section 2A.17 Posts and Mountings

Standard:

Sign posts, foundations, and mountings shall be so constructed as to hold signs in a proper and permanent position, and to resist swaying in the wind or displacement by vandalism.

Support:

The latest edition of AASHTO's "Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" contains additional information regarding posts and mounting (see Page i for AASHTO's address).

Option:

Where permitted, signs may be placed on existing supports used for other purposes, such as highway traffic signal supports, highway lighting supports, and utility poles.

Support:

See Section 2A.11 for criteria for enhanced conspicuity of standard signs.

See Section 2A.15 for lateral and height placement criteria for signs placed on existing supports.

Standard:

If mounted to the sign support, equipment for powering electronic components of a sign, including solar panels, shall be mounted so as not to compromise the crashworthy performance of the sign installation (see Section ~~2A.15~~ 1D.13). Such equipment shall be mounted ~~either below or behind the sign so as not to detract from or obscure the face of the sign, either directly or by casting shadows onto the sign, and~~ so as not to obscure the shape of the sign. It is not practical to completely prevent shadows on a sign. NCUTCD recommends deleting text regarding equipment mounting, since it would be dependent on crashworthiness in terms of whether or not it is mounted below or behind the sign.

Section 2A.18 Comments: NCUTCD agrees with 2A.18 as presented in the NPA.

Section 2A.18 Maintenance

Guidance:

Maintenance activities should consider proper position, cleanliness, legibility, and daytime and nighttime visibility (see Section 2A.21). Damaged or deteriorated signs, gates, or object markers should be replaced.

To assure adequate maintenance, a schedule for inspecting (both day and night), cleaning, and replacing signs, gates, and object markers should be established. Employees of highway, law enforcement, and other public agencies whose duties require that they travel on the roadways should be encouraged to report any damaged, deteriorated, or obscured signs, gates, or object markers at the first opportunity.

Steps should be taken to see that weeds, trees, shrubbery, and construction, maintenance, and utility materials and equipment do not obscure the face of any sign or object marker.

A regular schedule of replacement of lighting elements for illuminated signs should be maintained.

Section 2A.19 Comments: NCUTCD recommends revisions with some editorial changes and adding a Support statement relative to "vanity" signs. NCUTCD recommends clarifying the definition of vanity signs to limit their usage.

Section 2A.19 Excessive Use of Signs

Guidance:

Signs should be used and located judiciously, minimizing their proliferation in order to maintain their effectiveness. Regulatory and warning signs should be used conservatively because these signs, if used to excess, tend to lose their effectiveness. Route signs and directional guide signs for primary routes and destinations should be used frequently at strategic locations because their use promotes efficient operations by keeping road users informed of their location. In all cases, however, sign clutter (see Paragraph 2 of this Section) should be avoided and minimized as much as practicable.

Support:

Sign clutter is the proliferation of sign installations or assemblies along the roadway or roadside, either separately or grouped, to such an extent that adequate spacing between installations necessary for orderly processing of the sign messages by the driver cannot be achieved. Sign clutter can reduce the effectiveness of one or more signs in a sequence of signs.

Vanity sign messages are signs or portions of signs that display information that is of little value or interest to the majority or significant number of road users. Vanity sign messages often take the form of General Information signs, but provide no navigational guidance or orientation to the road user, and v~~V~~anity signs are usually ~~are~~ of importance only to the entity requesting the sign. Vanity sign messages include, but are not limited to, additional messages added to the allowable Jurisdictional Boundary (I2-5) sign (See Section 2H.05) or standalone signs that note something special about the jurisdiction (birthplace or home of a noted personage, local sports team accomplishment, facts like elevation or population, appealing qualities about the community like "friendly" or "open for business", etc.). Vanity signs can result in sign clutter and undermine the basic role of official traffic control devices in providing only as much information to the road user as necessary to promote the safe and efficient operation of streets and highways. Add sentence to provide examples of common vanity sign messages.

Guidance:

Signs and other traffic control devices should be installed and maintained from a systematic standpoint rather than individually. When a new sign is installed, the existing signs in the vicinity should be considered for replacement, relocation, or removal as a result of the new sign that is installed. Where ~~E~~existing systems ~~of signs~~ are showing evidence of sign clutter, ~~should be reviewed periodically for evidence of sign clutter and adjustments should be made accordingly~~ the existing system should be reviewed to identify opportunities to remove, relocate, or simplify signage to alleviate the clutter. Add additional text to clarify definition of vanity signs.

Section 2A.20 Comments: The NPA does not include fluorescent yellow-green as a color for school, pedestrian, and bicycle devices - this should be added. NCUTCD recommends increasing the maximum flash rate of LEDs from 60 to 120 times per minute, which is acceptable based on a Canadian research study and is outside the range of potential physiological impacts. NCUTCD recommends revising text in accordance with recommendations, including 14A-RW-07 and 20B-RW-03.

Section 2A.20 Retroreflection and Illumination

Support:

There are many materials currently available for retroreflection and various methods currently available for the illumination of signs and object markers. New materials and methods continue to emerge. New materials and methods can be used as long as the signs and object markers meet the standard requirements for color, both by day and by night.

Paragraphs 3 through 7 of this Section regarding illumination apply to nighttime visibility of signs whose legends are otherwise visible under daytime viewing conditions without illumination. Paragraphs 8 through 20 of this Section regarding illumination apply to the use of illuminated elements that supplement a sign legend to enhance conspicuity of the sign. Changeable message or blank-out signs whose legends change or extinguish by means of illuminated elements are addressed elsewhere in this Manual.

Standard:

Regulatory, warning, and guide signs, and object markers, shall be retroreflective (see Section 2A.08) or illuminated to show the same shape and similar color by both day and night, unless otherwise provided in this Manual for a particular sign or group of signs.

Where the color black is specified for the legend or background of a sign, an opaque or non-retroreflective material shall be used.

The requirements for sign illumination shall not be considered to be satisfied by street or highway lighting.

Option:

Sign elements may be illuminated by the means shown in Table ~~2A-3~~ 2A-1.

Retroreflection of sign elements may be accomplished by the means shown in Table ~~2A-4~~ 2A-2.

~~Light-emitting diode (LED) units may be used individually within the border, symbol or legend of a sign to enhance the sign conspicuity and legibility (see Section 2A.11).~~

~~Except as provided in Paragraph 17 of this Section, LED units may either operate continuously or be actuated~~ (delete per 14A-RW-07 and 20B-RW-03)

Support:

The application of LED units in compliance with Paragraph 14 of this Section does not create a changeable message sign because the legend of the sign is always displayed when the LED units are not illuminated.

~~LED units that are used to illuminate the full sign display, background, and legend, are changeable message signs (CMS), which are covered in Chapters 2B, 2C, and 2L, and Part 7.~~ (delete per 14A-RW-07 and 20B-RW-03)

Standard:

Where LED units are used to enhance conspicuity of a sign (see Paragraph 8 of this Section), the sign shall otherwise comply with the requirements for retroreflection and illumination for nighttime viewing.

Except as provided in Paragraphs 20 and 21 of this Section, and for changeable message signs, neither individual LEDs nor groups of LEDs shall be placed within the background area of a sign.

The application of LEDs to display sign legends or symbols shall use a maximum pitch of 20 mm to cover the stroke width of the letter or symbol.

~~If used,~~ T~~t~~he LEDs shall not protrude outside the sign border or legend when used in such applications and shall have a maximum diameter of 1/4 inch and shall be the following colors based on the type of sign:

A. **White or red, with STOP, YIELD, DO NOT ENTER, or WRONG WAY signs.**
B. **White, with other regulatory signs.**
C. **White or yellow, with warning signs.**
D. **White or green, with guide signs.**
E. **White, yellow, or orange, with temporary traffic control signs.**
F. **White ,~~or~~ yellow, or fluorescent yellow-green with school area or pedestrian or bicycle warning signs.**

If flashed on a sign for enhanced conspicuity (Section 2A.11), ~~all~~ LED units shall flash simultaneously at a ~~any~~ steady rate between 50 and ~~60~~ 120 times per minute. All the LED units ~~in a sign legend or border~~ shall be illuminated simultaneously with no sequential (chasing) or variable flash (dancing) rates except as provided in Section 2L.04.. ~~A cluster of LEDs shall not be used within the border of a sign.~~ Revise per NCUTCD recommendations 14A-RW-07 and 20B-RW-03. It is recommended that fluorescent yellow-green be added as a color for LEDs used with school, pedestrian and bicycle signs, and that a flash rate of 50-120 times per minute be permitted for LEDs.

Where used in STOP or YIELD signs, flashing LED units shall operate continuously. Actuation of the LED units shall not be allowed.

Where LED units are used along the edge of a sign, at least one LED unit shall be placed along each edge of the sign, in addition to one LED unit at each corner of the sign, so that the distinct outline of the sign shape is recognized under nighttime viewing conditions. The LED units along each side of the sign shall be spaced approximately equidistantly. For a circular sign shape, the number of LED units shall clearly form the appearance of a circle and not be perceived as some other shape.

The uniformity of the sign design shall be maintained without any decrease in visibility, legibility, or driver comprehension during either daytime or nighttime conditions. The LED units shall have the capability to be dimmed automatically by a timing mechanism or a device sensitive to ambient light (photoelectric cell) such that the LEDs do not reduce the visibility of the sign legend .

Option:

For STOP, YIELD, DO NOT ENTER, and WRONG WAY signs, LEDs may be placed within the border or within one border width within the background of the sign.

Support:

For STOP/SLOW paddles used by flaggers, see Section 6D.02. For STOP paddles used by adult crossing guards, see Section 7D.02.

Other methods of enhancing the conspicuity of standard signs are described in Section 2A.11.

Information regarding the use of retroreflective material on the sign support is contained in Section 2A.11.

Table 2A-1 Illumination of Sign Elements

Means of Illumination	Sign Element to be Illuminated
Light behind the sign face	• Symbol or word message • Background • Symbol, word message, and background (through translucent material)
Attached or independently mounted light source designed to direct essentially uniform illumination onto the sign face.	• Entire sign face
~~Light emitting diodes (LEDs)~~	~~• Symbol or word message~~ ~~• Portions of the sign border~~
LED and ~~O~~other devices or treatments that highlight the sign shape, color, and/or message: Luminous tubing Fiber optics Incandescent light bulbs Luminescent panels	• Symbol or word message • Sign border • Entire sign face • Entire background

NCUTCD recommends revising Table 2A-1 to consolidate LEDs with other visual treatments and to appropriately expand the applicability of these treatments to improve illumination.

Table 2A-2. Retroreflection of Sign Elements

Means of Retroreflection	Sign Element
Prismatic reflector "buttons" or similar units	Symbol Word message Border
A material that has a smooth, sealed outer surface over a microstructure that reflects light	Symbol Word message Border Background

NCUTCD agrees with Table 2A-2 as presented in the NPA.

Section 2A.21 Comments: NCUTCD generally agrees with 2A.21 as presented in the NPA with some minor editorial comments and references.

Section 2A.21 Maintaining Minimum Retroreflectivity

Support:

Retroreflectivity is one of several factors associated with maintaining nighttime sign visibility (see Section 2A.~~22~~ 20).

Standard:

Public agencies or officials having jurisdiction shall use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in Table 2A-5.

Support:

Compliance with the Standard in Paragraph 2 of this Section is achieved by having a method in place and using the method to maintain the minimum levels established in Table ~~2A-5~~ 2A-3. Provided that an assessment or management method is being used, an agency or official having jurisdiction would be in compliance with the Standard in Paragraph 2 of this Section even if there are some individual signs that do not meet the minimum retroreflectivity levels at a particular point in time**.**

Guidance:

Except for those signs specifically identified in Paragraph 5 of this Section, one or more of the methods described in "Maintaining Traffic Sign Retroreflectivity" (see Section 1A.05) or a method developed based on an engineering study should be used to maintain sign retroreflectivity at or above the minimum levels in Table ~~2A-5~~ 2A-3. Signs that are below the minimum levels should be replaced.

Option:

Highway agencies may exclude the following signs from the retroreflectivity maintenance guidelines described in this Section:

A. Parking, Standing, and Stopping signs (R7 and R8 series)
B. Walking/Hitchhiking/Crossing signs (R9 series, R10-1 through R10-4b)
C. Acknowledgment signs
D. Bikeway signs that are intended for exclusive use by bicyclists or pedestrians

Table 2A-3. Minimum Maintained Retroreflectivity Levels [1]

Sign Color	Beaded Sheeting			Prismatic Sheeting	Additional Criteria
	Sheeting Type (ASTM D4956)				
	I	II	III		
White on Green	W*; G ≥ 7	W*; G ≥ 15	W*; G ≥ 25	W ≥ 250; G ≥ 25	Overhead
	W*; G ≥ 7	W ≥ 120; G ≥ 15			Post-mounted
White on Blue	W*; B ≥ 3	W*; B ≥ 5	W*; B ≥ 12	W ≥ 250; B ≥ 12	Overhead
	W*; B ≥ 3	W ≥ 120; B ≥ 7			Post-mounted
White on Brown	W*; Br ≥ 1	W*; Br ≥ 5	W*; Br ≥ 10	W ≥ 350; Br ≥ 10	Overhead
	W*; Br ≥ 1	W ≥ 150; Br ≥ 5			Post-mounted
Black on Yellow or Black on Orange	Y*; O*	Y ≥ 50; O ≥ 50			[2]
	Y*; O*	Y ≥ 75; O ≥ 75			[3]
White on Red	W ≥ 35; R ≥ 7				[4]
Black on White	W ≥ 50				–

[1] The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/m^2 measured at an observation angle of 0.2° and an entrance angle of -4.0°.

[2] For word legend and fine symbol signs measuring at least 48 inches and for all sizes of bold symbol signs

[3] For word legend and fine symbol signs measuring less than 48 inches

[4] Minimum sign contrast ratio ≥ 3:1 (white retroreflectivity ÷ red retroreflectivity)

* This sheeting type shall not be used for this color for this application

Bold Symbol Signs

• W1-1,2 – Turn and Curve • W1-3,4 – Reverse Turn and Curve • W1-5 – Winding Road • W1-6,7 – Large Arrow • W1-8 – Chevron • W1-10 – Intersection in Curve • W1-11 – Hairpin Curve • W1-15 – 270 Degree Loop • W2-1 – Cross Road • W2-2,3 – Side Road • W2-4,5 – T and Y Intersection • W2-6 – Circular Intersection • W2-7,8 – Double Side Roads	• W3-1 – Stop Ahead • W3-2 – Yield Ahead • W3-3 – Signal Ahead • W4-1 – Merge • W4-2 – Lane Ends • W4-3 – Added Lane • W4-5 – Entering Roadway Merge • W4-6 – Entering Roadway Added Lane • W6-1,2 – Divided Highway Begins and Ends • W6-3 – Two-Way Traffic • W10-1,2,3,4,11,12 – Grade Crossing Advance Warning	• W11-2 – Pedestrian Crossing • W11-3,4,16-22 – Large Animals • W11-5 – Farm Equipment • W11-6 – Snowmobile Crossing • W11-7 – Equestrian Crossing • W11-8 – Fire Station • W11-10 – Truck Crossing • W12-1 – Double Arrow • W16-5P,6P,7P – Pointing Arrow Plaques • W20-7 – Flagger • W21-1 – Worker

Fine Symbol Signs (symbol signs not listed as bold symbol signs)

Special Cases

- W3-1 – Stop Ahead: Red retroreflectivity ≥ 7
- W3-2 – Yield Ahead: Red retroreflectivity ≥ 7; White retroreflectivity ≥ 35
- W3-3 – Signal Ahead: Red retroreflectivity ≥ 7; Green retroreflectivity ≥ 7
- W3-5 – Speed Reduction: White retroreflectivity ≥ 50
- For non-diamond shaped signs, such as W14-3 (No Passing Zone), W4-4P (Cross Traffic Does Not Stop), or W13-1P,2,3,6,7 (Speed Advisory Signs), use the largest sign dimension to determine the proper minimum retroreflectivity level.

NCUTCD agrees with Table 2A-3 as presented in the NPA.

Section 2A.22 Comments: NCUTCD agrees with 2A.22 as presented in the NPA.

Section 2A.22 Median Opening Treatments for Divided Highways

Guidance:

A divided highway crossing should be signed and marked as separate intersections when both of the following conditions are present:

A. The paths of opposing left turns from the divided highway cross each other (see Figure 2A-5) and

B. There is adequate storage in the interior approaches for the design vehicles expected to cross the divided highway.

If either one or both of the conditions in Paragraph 1 of this Section do not exist, the divided highway crossing should be signed and marked as a single intersection.

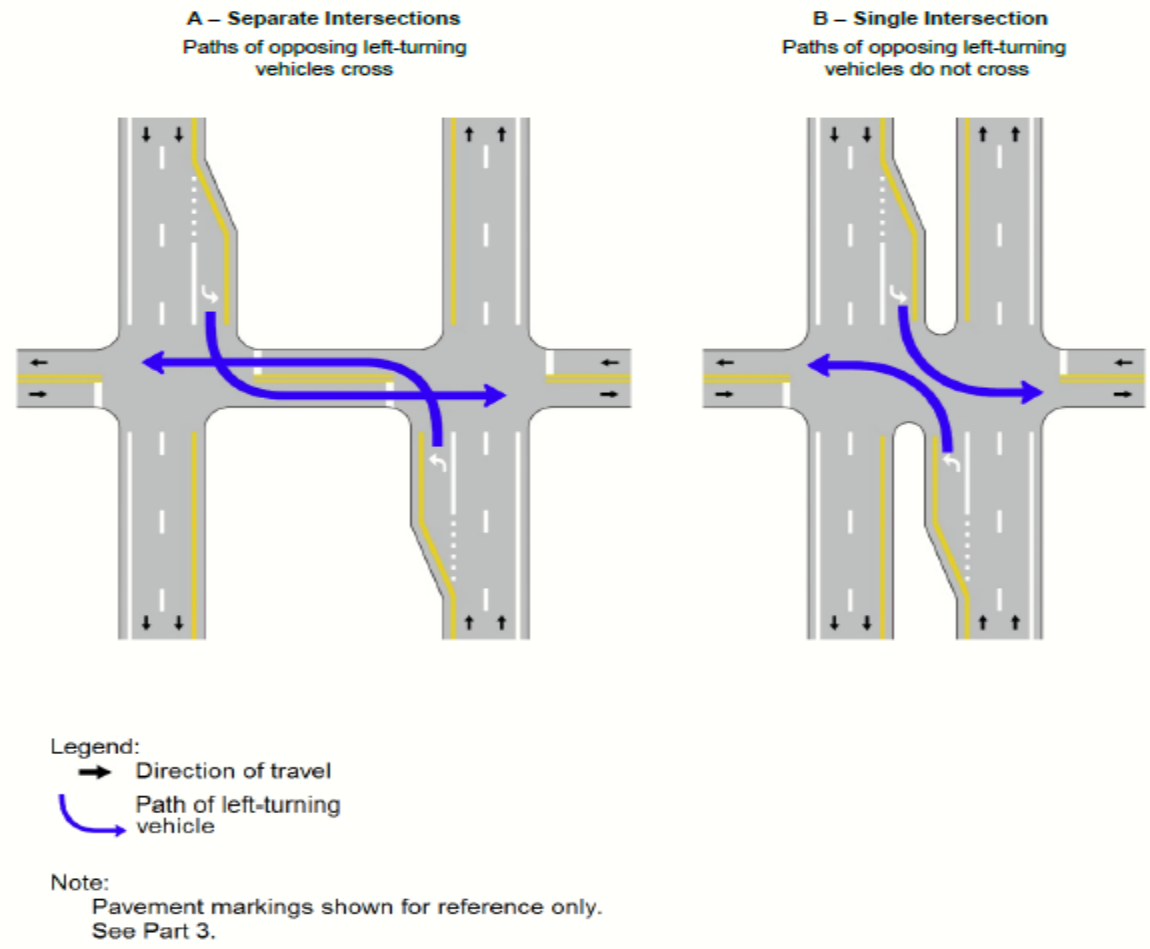
At the crossing of two divided highways, engineering judgment should be used to determine the number of separate intersections.

Support:

Divided highway crossings with median widths between 30 feet and 85 feet might function as either one or two intersections depending upon the interaction of the opposing left-turn vehicle paths and the available interior storage in the median for a crossing vehicle. Other factors that could determine whether a divided highway crossing is operating as one or two intersections include:

A. the geometric design of the divided highway crossing,
B. the use of positive offset mainline left turn lanes,
C. the length of the median opening (as measured parallel to the centerline of the divided highway),
D. the geometric design of the median noses,
E. other roadway geometric considerations such as a skewed side street approach or a variable median width,
F. intersection sight distance,
G. the physical characteristics of the design vehicle, and
H. the observed prevailing driver behavior with regard to opposing left turn path interaction.

Figure 2A-5. Intersection Configuration at a Divided Highway Crossing



NCUTCD agrees with Figure 2A-5 as presented in the NPA.