

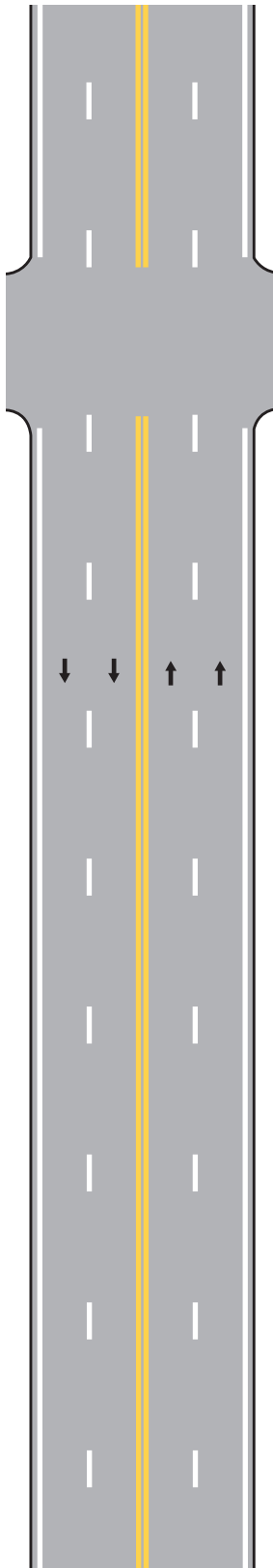
## **2013 Changes to the 2011 MMUTCD February 2013**

Pages 351, 372, 373, 389, 391, and 392 in the 2011 MMUTCD have been revised to bring the “shall” conditions regarding the use of “ONLY” legends into compliance with the federal manual, which utilizes “should” and “may” conditions. The “should” condition applies when an existing lane becomes used for an exclusive movement (e.g. a thru lane becomes a right turn only lane), otherwise the “may” condition is applied (e.g. a lane is added at an intersection for a turning movement). The pages noted above have been replaced with the federal manual page. No revision number is listed on these pages.

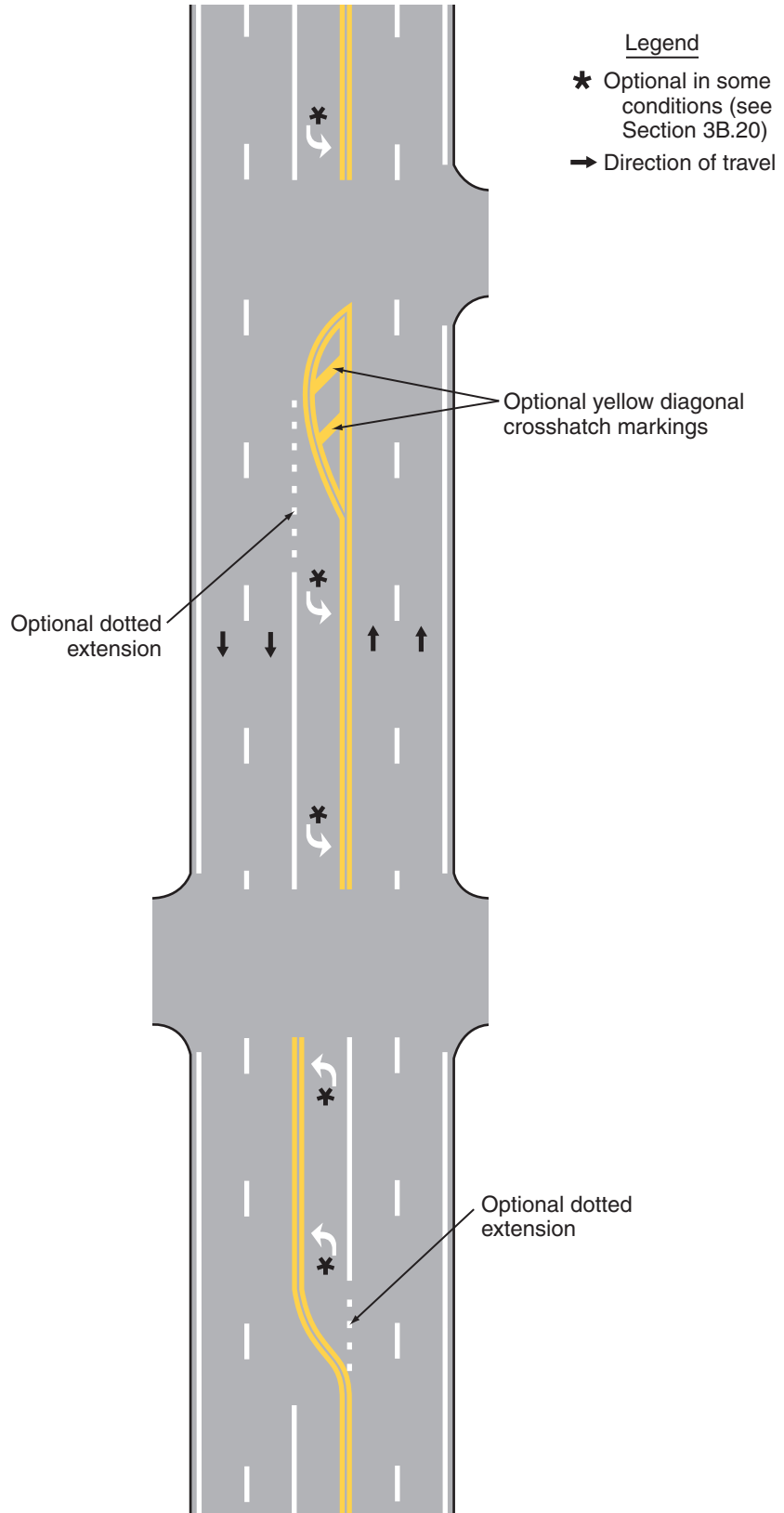
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**Figure 3B-2. Examples of Four-or-More Lane, Two-Way Marking Applications**

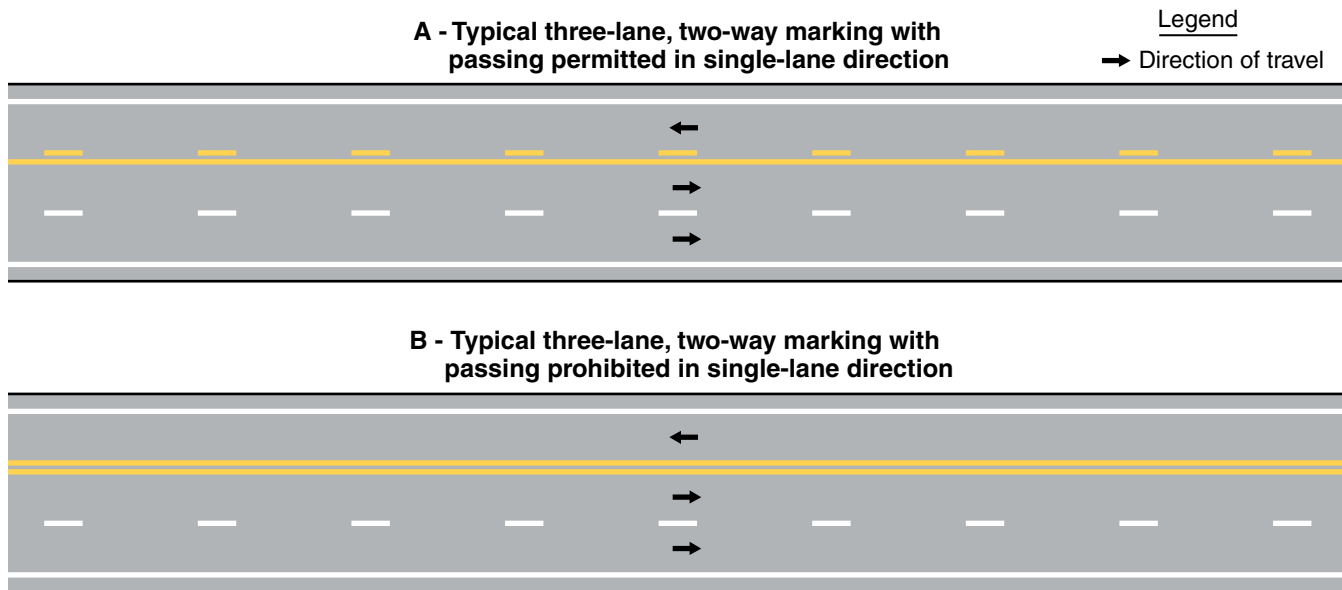
**A - Typical multi-lane, two-way marking**



**B - Typical multi-lane, two-way marking with single lane left turn channelization**



**Figure 3B-3. Examples of Three-Lane, Two-Way Marking Applications**



**Section 3B.02 No-Passing Zone Pavement Markings and Warrants**

**Standard:**

- 01 No-passing zones shall be marked by either the one direction no-passing zone pavement markings or the two-direction no-passing zone pavement markings described in Section 3B.01 and shown in Figures 3B-1 and 3B-3.
- 02 When center line markings are used, no-passing zone markings shall be used on two-way roadways at lane-reduction transitions (see Section 3B.09) and on approaches to obstructions that must be passed on the right (see Section 3B.10).
- 03 On two-way, two- or three-lane roadways where center line markings are installed, no-passing zones shall be established at vertical and horizontal curves and other locations where an engineering study indicates that passing must be prohibited because of inadequate sight distances or other special conditions.
- 04 On roadways with center line markings, no-passing zone markings shall be used at horizontal or vertical curves where the passing sight distance is less than the minimum shown in Table 3B-1 for the 85<sup>th</sup>-percentile speed or the posted or statutory speed limit. The passing sight distance on a vertical curve is the distance at which an object 3.5 feet above the pavement surface can be seen from a point 3.5 feet above the pavement (see Figure 3B-4). Similarly, the passing sight distance on a horizontal curve is the distance measured along the center line (or right-hand lane line of a three-lane roadway) between two points 3.5 feet above the pavement on a line tangent to the embankment or other obstruction that cuts off the view on the inside of the curve (see Figure 3B-4).

**Support:**

- 05 The upstream end of a no-passing zone at point “a” in Figure 3B-4 is that point where the sight distance first becomes less than that specified in Table 3B-1. The downstream end of the no-passing zone at point “b” in Figure 3B-4 is that point at which the sight distance again becomes greater than the minimum specified.
- 06 The values of the minimum passing sight distances that are shown in Table 3B-1 are for operational use in marking no-passing zones and are less than the values that are suggested for geometric design by the AASHTO Policy on Geometric Design of Streets and Highways (see Section 1A.11).

85th-Percentile or Posted or Statutory Speed Limit	Minimum Passing Sight Distance
25 mph	450 feet
30 mph	500 feet
35 mph	550 feet
40 mph	600 feet
45 mph	700 feet
50 mph	800 feet
55 mph	900 feet
60 mph	1,000 feet
65 mph	1,100 feet
70 mph	1,200 feet

- 10 White chevron crosshatch markings (see Section 3B.24) may be placed in the neutral area of exit ramp and entrance ramp gores for special emphasis as shown in Figures 3B-8 and 3B-10 and Drawing A of Figure 3B-9. The channelizing lines and the optional chevron crosshatch markings at exit ramp and entrance ramp gores may be supplemented with white retroreflective or internally illuminated raised pavement markers (see Sections 3B.11 and 3B.13) for enhanced nighttime visibility.

### **Section 3B.06 Edge Line Pavement Markings**

#### **Standard:**

- 01 **If used, edge line pavement markings shall delineate the right or left edges of a roadway.**  
 02 **Except for dotted edge line extensions (see Section 3B.08), edge line markings shall not be continued through intersections or major driveways.**  
 03 **If used on the roadways of divided highways or one-way streets, or on any ramp in the direction of travel, left edge line pavement markings shall consist of a normal solid yellow line to delineate the left-hand edge of a roadway or to indicate driving or passing restrictions left of these markings.**  
 04 **If used, right edge line pavement markings shall consist of a normal solid white line to delineate the right-hand edge of the roadway.**

#### *Guidance:*

- 05 *Edge line markings should not be broken for minor driveways.*

#### Support:

- 06 Edge line markings have unique value as visual references to guide road users during adverse weather and visibility conditions.

#### Option:

- 07 Wide solid edge line markings may be used for greater emphasis.

### **Section 3B.07 Warrants for Use of Edge Lines**

#### **Standard:**

- 01 **Edge line markings shall be placed on paved streets or highways with the following characteristics:**  
 A. **Freeways,**  
 B. **Expressways, and**  
 C. **Rural arterials with a traveled way of 20 feet or more in width and an ADT of 6,000 vehicles per day or greater.**

#### *Guidance:*

- 02 *Edge line markings should be placed on paved streets or highways with the following characteristics:*  
 A. *Rural arterials and collectors with a traveled way of 20 feet or more in width and an ADT of 3,000 vehicles per day or greater.*  
 B. *On other paved streets and highways where an engineering study indicates a need for edge line markings.*  
 03 *Edge line markings should not be placed where an engineering study or engineering judgment indicates that providing them is likely to decrease safety.*

#### Option:

- 04 Edge line markings may be placed on streets and highways with or without center line markings.  
 05 Edge line markings may be excluded, based on engineering judgment, for reasons such as if the traveled way edges are delineated by curbs, parking, or other markings.  
 06 If a bicycle lane is marked on the outside portion of the traveled way, the edge line that would mark the outside edge of the bicycle lane may be omitted.  
 07 Edge line markings may be used where edge delineation is desirable to minimize unnecessary driving on paved shoulders or on refuge areas that have lesser structural pavement strength than the adjacent roadway.

### **Section 3B.08 Extensions Through Intersections or Interchanges**

#### **Standard:**

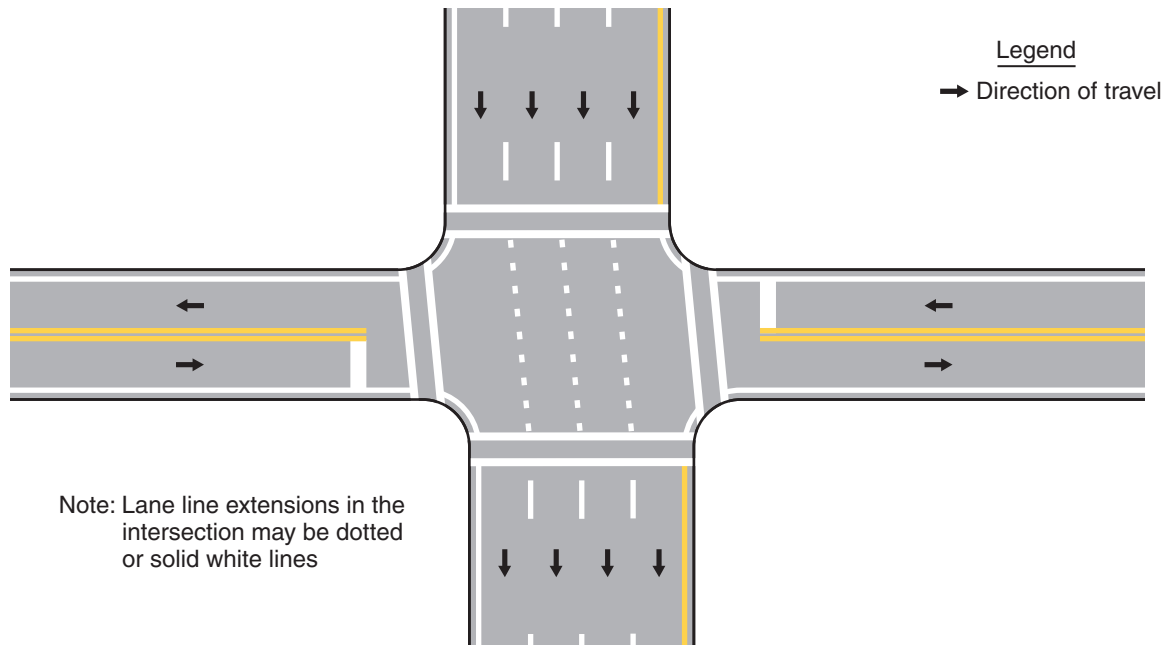
- 01 **Except as provided in Paragraph 2, pavement markings extended into or continued through an intersection or interchange area shall be the same color and at least the same width as the line markings they extend (see Figure 3B-13).**

#### Option:

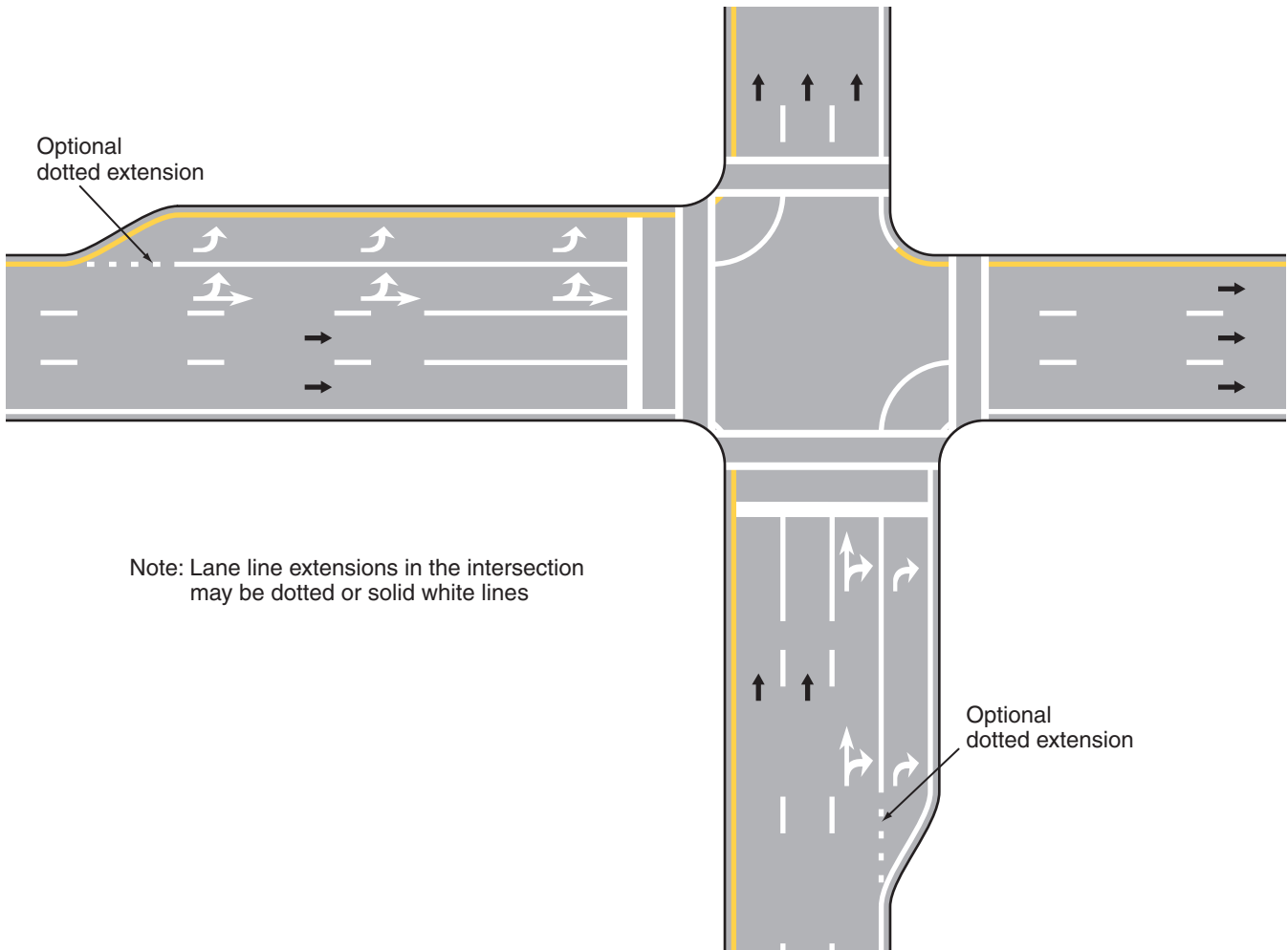
- 02 A normal line may be used to extend a wide line through an intersection.

### Figure 3B-13. Examples of Line Extensions through Intersections (Sheet 1 of 2)

**A - Typical pavement markings with offset lane lines continued through the intersection and optional crosswalk lines and stop lines**

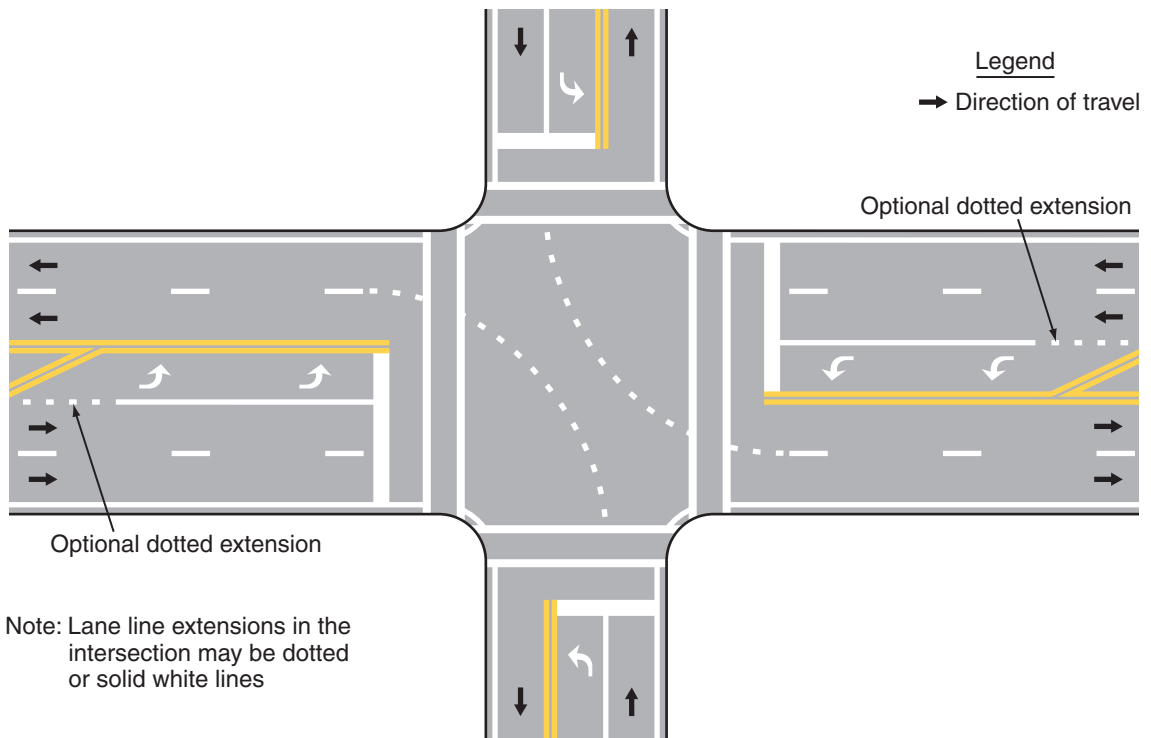


**B - Typical pavement markings with double-turn lanes, lane-use turn arrows, and optional crosswalk lines, stop lines, and line extensions into intersection for double turns**

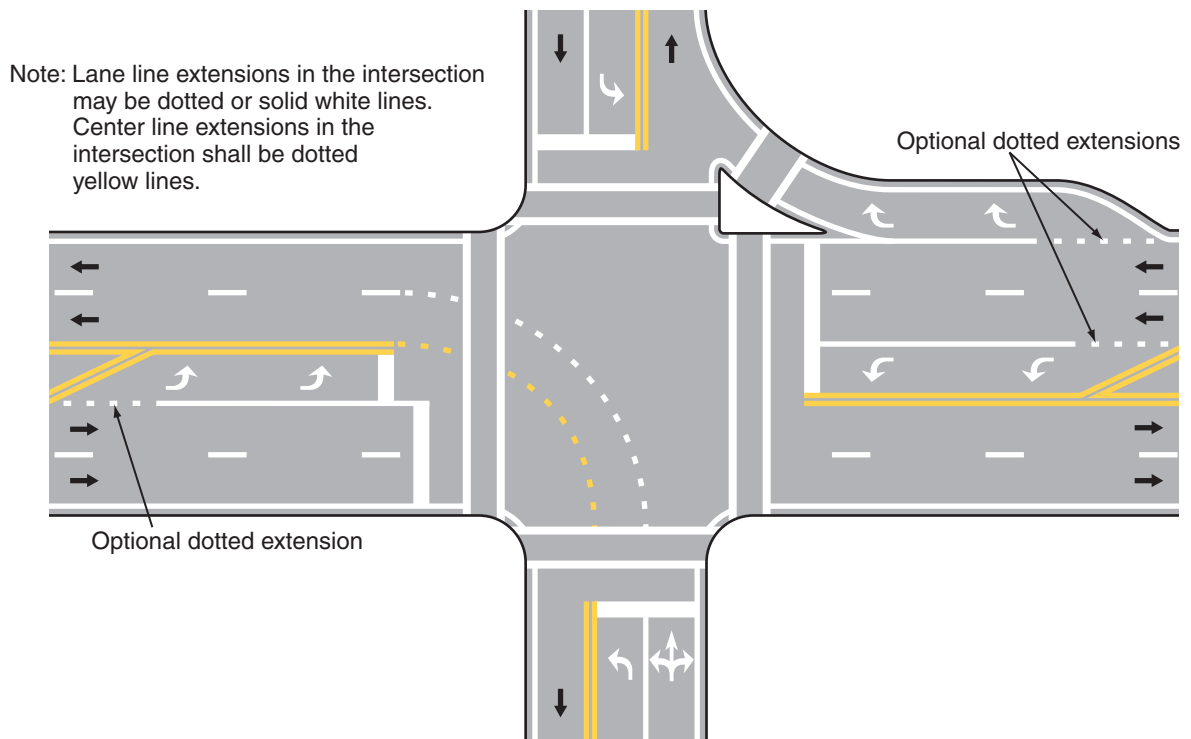


**Figure 3B-13. Examples of Line Extensions through Intersections (Sheet 2 of 2)**

**C - Typical dotted line markings to extend lane line markings into the intersection**



**D - Typical dotted line markings to extend center line and lane line markings into the intersection**



*Guidance:*

- 03 *Where highway design or reduced visibility conditions make it desirable to provide control or to guide vehicles through an intersection or interchange, such as at offset, skewed, complex, or multi-legged intersections, on curved roadways, where multiple turn lanes are used, or where offset left turn lanes might cause driver confusion, dotted line extension markings consisting of 2-foot line segments and 2- to 6-foot gaps should be used to extend longitudinal line markings through an intersection or interchange area.*

*Option:*

- 04 Dotted edge line extensions may be placed through intersections or major driveways.

*Guidance:*

- 05 *Where greater restriction is required, solid lane lines or channelizing lines should be extended into or continued through intersections or major driveways.*

**Standard:**

- 06 **Solid lines shall not be used to extend edge lines into or through intersections or major driveways.**

*Guidance:*

- 07 *Where a double line is extended through an intersection, a single line of equal width to one of the lines of the double line should be used.*

- 08 *To the extent possible, pavement marking extensions through intersections should be designed in a manner that minimizes potential confusion for drivers in adjacent or opposing lanes.*

**Section 3B.09 Lane-Reduction Transition Markings***Support:*

- 01 Lane-reduction transition markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. Lane-reduction transition markings are not used for lane drops.

**Standard:**

- 02 **Except as provided in Paragraph 3, where pavement markings are used, lane-reduction transition markings shall be used to guide traffic through transition areas where the number of through lanes is reduced, as shown in Figure 3B-14. On two-way roadways, no-passing zone markings shall be used to prohibit passing in the direction of the convergence, and shall continue through the transition area.**

*Option:*

- 03 On low-speed urban roadways where curbs clearly define the roadway edge in the lane-reduction transition, or where a through lane becomes a parking lane, the edge line and/or delineators shown in Figure 3B-14 may be omitted as determined by engineering judgment.

*Guidance:*

- 04 *For roadways having a posted or statutory speed limit of 45 mph or greater, the transition taper length for a lane-reduction transition should be computed by the formula  $L = WS$ . For roadways where the posted or statutory speed limit is less than 45 mph, the formula  $L = WS^2/60$  should be used to compute the taper length.*

*Support:*

- 05 Under both formulas, L equals the taper length in feet, W equals the width of the offset distance in feet, and S equals the 85<sup>th</sup>-percentile speed or the posted or statutory speed limit, whichever is higher.

*Guidance:*

- 06 *Where observed speeds exceed posted or statutory speed limits, longer tapers should be used.*

*Option:*

- 07 On new construction, where no posted or statutory speed limit has been established, the design speed may be used in the transition taper length formula.

*Guidance:*

- 08 *Lane line markings should be discontinued one-quarter of the distance between the Lane Ends sign (see Section 2C.42) and the point where the transition taper begins.*

- 09 *Except as provided in Paragraph 3 for low-speed urban roadways, the edge line markings shown in Figure 3B-14 should be installed from the location of the Lane Ends warning sign to beyond the beginning of the narrower roadway.*

*Support:*

- 10 Pavement markings at lane-reduction transitions supplement the standard signs. See Section 3B.20 for provisions regarding use of lane-reduction arrows.



## Option:

- 02 Word, symbol, and arrow markings, including those contained in the “Standard Highway Signs and Markings” book (see Section 1A.11), may be used as determined by engineering judgment to supplement signs and/or to provide additional emphasis for regulatory, warning, or guidance messages. Among the word, symbol, and arrow markings that may be used are the following:
- A. Regulatory:
    1. STOP
    2. YIELD
    3. RIGHT (LEFT) TURN ONLY
    4. 25 MPH
    5. Lane-use and wrong-way arrows
    6. Diamond symbol for HOV lanes
    7. Other preferential lane word markings
  - B. Warning:
    1. STOP AHEAD
    2. YIELD AHEAD
    3. YIELD AHEAD triangle symbol
    4. SCHOOL XING
    5. SIGNAL AHEAD
    6. PED XING
    7. SCHOOL
    8. R X R
    9. BUMP
    10. HUMP
    11. Lane-reduction arrows
  - C. Guide:
    1. Route numbers (route shield pavement marking symbols and/or words such as I-81, US 40, STATE 135, or ROUTE 10)
    2. Cardinal directions (NORTH, SOUTH, EAST, or WEST)
    3. TO
    4. Destination names or abbreviations thereof

**Standard:**

- 03 **Word, symbol, and arrow markings shall be white, except as otherwise provided in this Section.**
- 04 **Pavement marking letters, numerals, symbols, and arrows shall be installed in accordance with the design details in the Pavement Markings chapter of the “Standard Highway Signs and Markings” book (see Section 1A.11).**

*Guidance:*

- 05 *Letters and numerals should be 6 feet or more in height.*
- 06 *Word and symbol markings should not exceed three lines of information.*
- 07 *If a pavement marking word message consists of more than one line of information, it should read in the direction of travel. The first word of the message should be nearest to the road user.*
- 08 *Except for the two opposing arrows of a two-way left-turn lane marking (see Figure 3B-7), the longitudinal space between word or symbol message markings, including arrow markings, should be at least four times the height of the characters for low-speed roads, but not more than ten times the height of the characters under any conditions.*
- 09 *The number of different word and symbol markings used should be minimized to provide effective guidance and avoid misunderstanding.*
- 10 *Except for the SCHOOL word marking (see Section 7C.03), pavement word, symbol, and arrow markings should be no more than one lane in width.*
- 11 *Pavement word, symbol, and arrow markings should be proportionally scaled to fit within the width of the facility upon which they are applied.*

## Option:

- 12 On narrow, low-speed shared-use paths, the pavement words, symbols, and arrows may be smaller than suggested, but to the relative scale.

13 Pavement markings simulating Interstate, U.S., State, and other official highway route shield signs (see Figure 2D-3) with appropriate route numbers, but elongated for proper proportioning when viewed as a marking, may be used to guide road users to their destinations (see Figure 3B-25).

**Standard:**

14 **Except at the ends of aisles in parking lots, the word STOP shall not be used on the pavement unless accompanied by a stop line (see Section 3B.16) and STOP sign (see Section 2B.05). At the ends of aisles in parking lots, the word STOP shall not be used on the pavement unless accompanied by a stop line.**

15 **The word STOP shall not be placed on the pavement in advance of a stop line, unless every vehicle is required to stop at all times.**

Option:

16 A yield-ahead triangle symbol (see Figure 3B-26) or YIELD AHEAD word pavement marking may be used on approaches to intersections where the approaching traffic will encounter a YIELD sign at the intersection.

**Standard:**

17 **The yield-ahead triangle symbol or YIELD AHEAD word pavement marking shall not be used unless a YIELD sign (see Section 2B.08) is in place at the intersection. The yield-ahead symbol marking shall be as shown in Figure 3B-26.**

Guidance:

18 *The International Symbol of Accessibility parking space marking (see Figure 3B-22) should be placed in each parking space designated for use by persons with disabilities.*

Option:

19 A blue background with white border may supplement the wheelchair symbol as shown in Figure 3B-22.

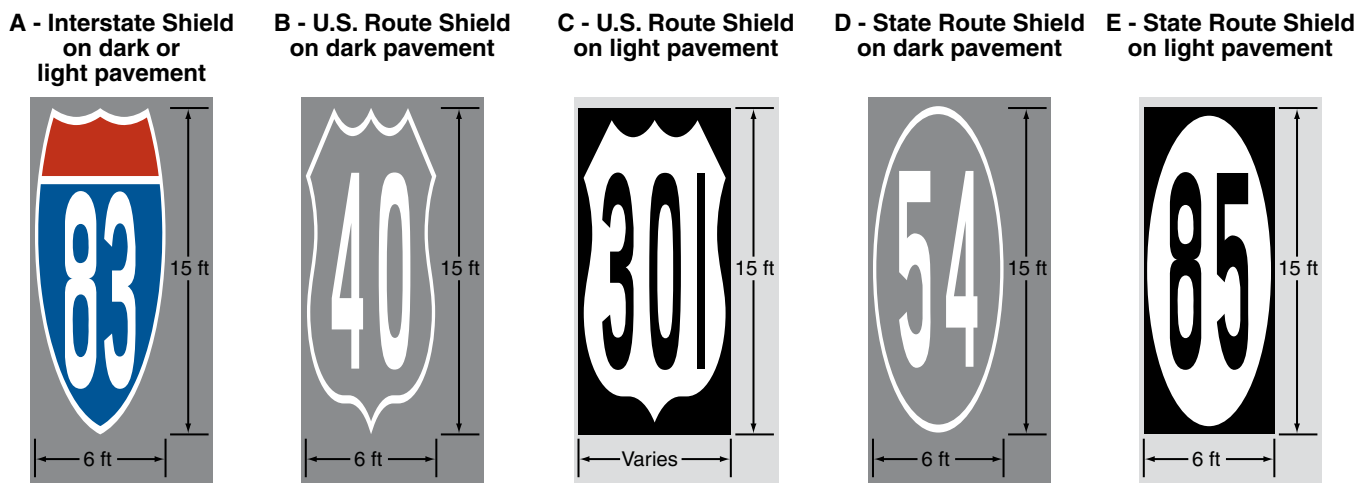
Support:

20 Lane-use arrow markings (see Figure 3B-24) are used to indicate the mandatory or permissible movements in certain lanes (see Figure 3B-27) and in two-way left-turn lanes (see Figure 3B-7).

Guidance:

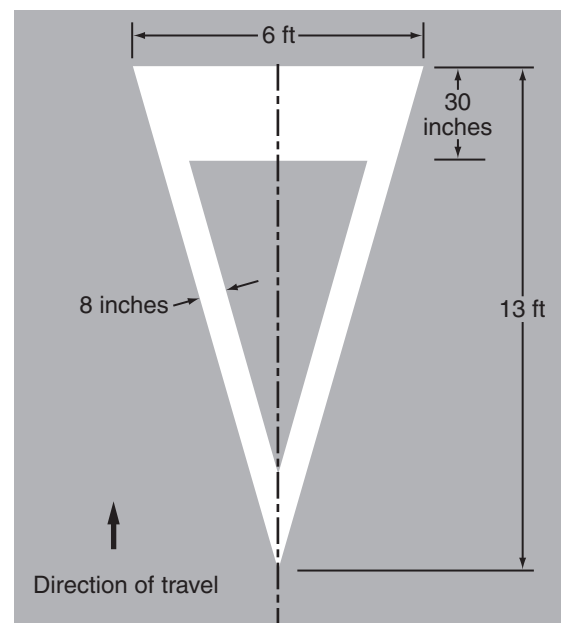
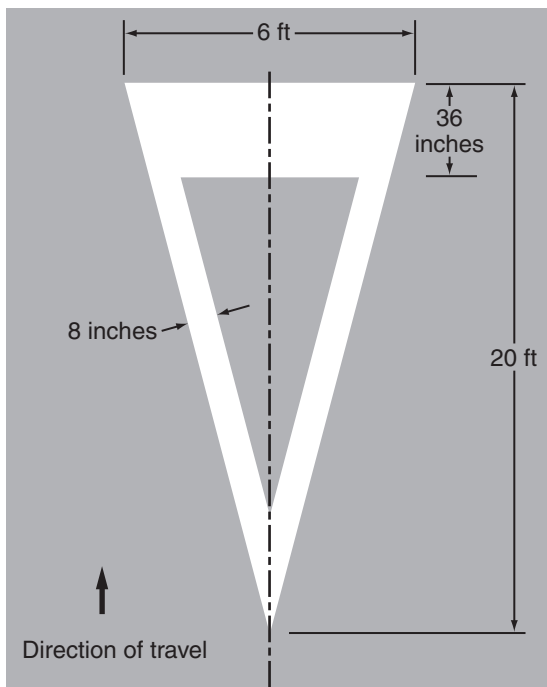
21 *Lane-use arrow markings (see Figure 3B-24) should be used in lanes designated for the exclusive use of a turning movement, including turn bays, except where engineering judgment determines that physical conditions or other markings (such as a dotted extension of the lane line through the taper into the turn bay) clearly discourage unintentional use of a turn bay by through vehicles. Lane-use arrow markings should also be used in lanes from which movements are allowed that are contrary to the normal rules of the road (see Drawing B of Figure 3B-13). When used in turn lanes, at least two arrows should be used, one at or near the upstream end of the full-width turn lane and one an appropriate distance upstream from the stop line or intersection (see Drawing A of Figure 3B-11).*

**Figure 3B-25. Examples of Elongated Route Shields for Pavement Markings**



Notes:

1. See the "Standard Highway Signs and Markings" book for other sizes and details
2. Colors and elongated shapes simulating State route shield signs may be used for route shield pavement markings where appropriate

**Figure 3B-26. Yield Ahead Triangle Symbols****A - Posted or Statutory Speed Limit of 45 mph or greater****B - Posted or Statutory Speed Limit of less than 45 mph****Option:**

- 22 An additional arrow or arrows may be used in a turn lane. When arrows are used for a short turn lane, the second (downstream) arrow may be omitted based on engineering judgment.

**Guidance:**

- 23 Where opposing offset channelized left-turn lanes exist, lane-use arrow markings should be placed near the downstream terminus of the offset left-turn lanes to reduce wrong-way movements (see Figure 2B-17).

**Support:**

- 24 An arrow at the downstream end of a turn lane can help to prevent wrong way movements.

**Standard:**

- 25 Where through lanes approaching an intersection become mandatory turn lanes, lane-use arrow markings (see Figure 3B-24) shall be used and shall be accompanied by standard signs.

**Guidance:**

- 26 Where through lanes approaching an intersection become mandatory turn lanes, ONLY word markings (see Figure 3B-23) should be used in addition to the required lane-use arrow markings and signs (see Sections 2B.19 and 2B.20). These markings and signs should be placed well in advance of the turn and should be repeated as necessary to prevent entrapment and to help the road user select the appropriate lane in advance of reaching a queue of waiting vehicles (see Drawing A of Figure 3B-11).

**Option:**

- 27 On freeways or expressways where a through lane becomes a mandatory exit lane, lane-use arrow markings may be used on the approach to the exit in the dropped lane and in an adjacent optional through-or-exit lane if one exists.

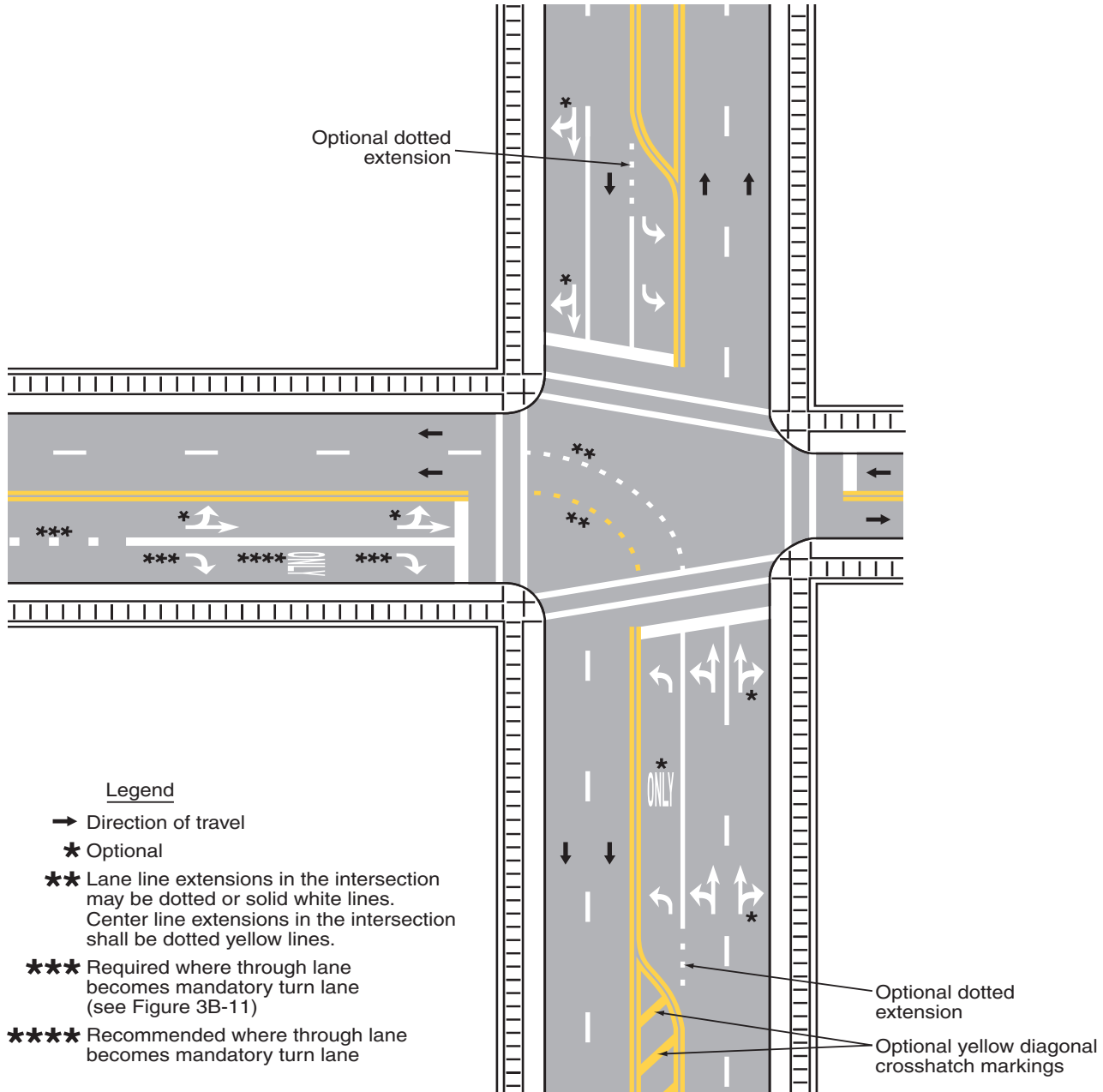
**Guidance:**

- 28 A two-way left-turn lane-use arrow pavement marking, with opposing arrows spaced as shown in Figure 3B-7, should be used at or just downstream from the beginning of a two-way left-turn lane.

**Option:**

- 29 Additional two-way left-turn lane-use arrow markings may be used at other locations along a two-way left-turn lane where engineering judgment determines that such additional markings are needed to emphasize the proper use of the lane.

**Figure 3B-27. Examples of Lane-Use Control Word and Arrow Pavement Markings**



**Standard:**

30 A single-direction lane-use arrow shall not be used in a lane bordered on both sides by yellow two-way left-turn lane longitudinal markings.

31 Lane-use, lane-reduction, and wrong-way arrow markings shall be designed as shown in Figure 3B-24 and in the “Standard Highway Signs and Markings” book (see Section 1A.11).

**Option:**

32 The ONLY word marking (see Figure 3B-23) may be used to supplement the lane-use arrow markings in lanes that are designated for the exclusive use of a single movement (see Figure 3B-27) or to supplement a preferential lane word or symbol marking (see Section 3D.01).

**Standard:**

33 The ONLY word marking shall not be used in a lane that is shared by more than one movement.