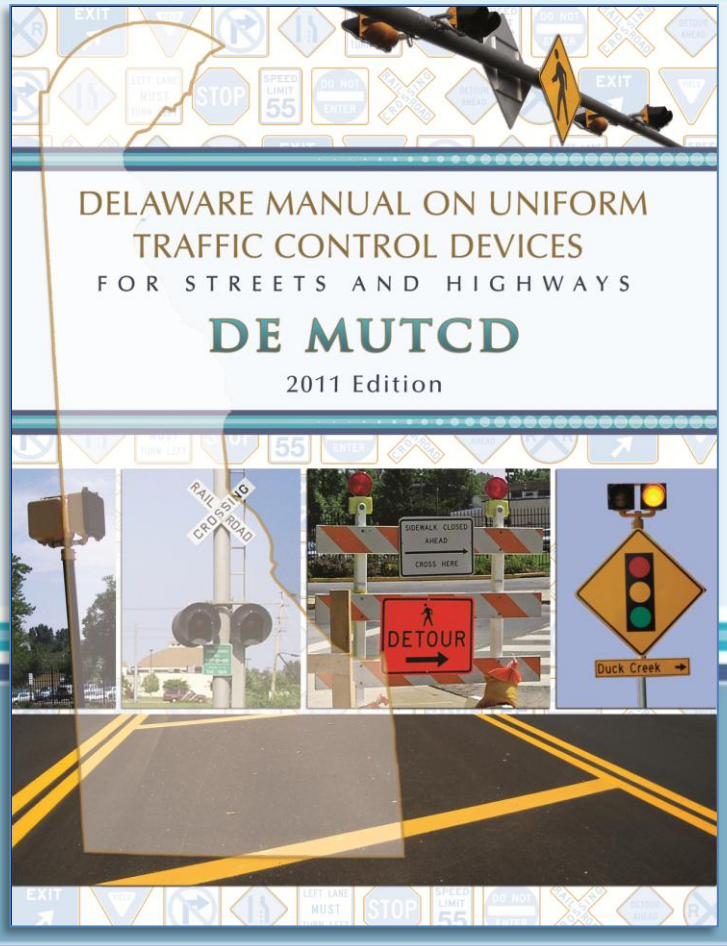
DelDOT
Delaware Department of Transportation

Delaware MUTCD



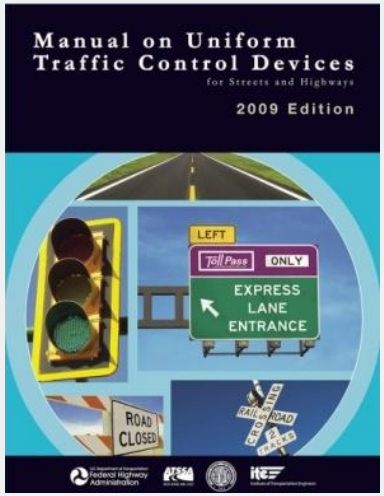
Overview of 2011 Manual

Part 1 – General
Part 2 – Signs
Part 3 – Markings
Part 7 – School Areas
Part 8 – Rail Crossings
Part 9 – Bicycle Facilities

Winter Workshop
February 25, 2011

Delaware MUTCD

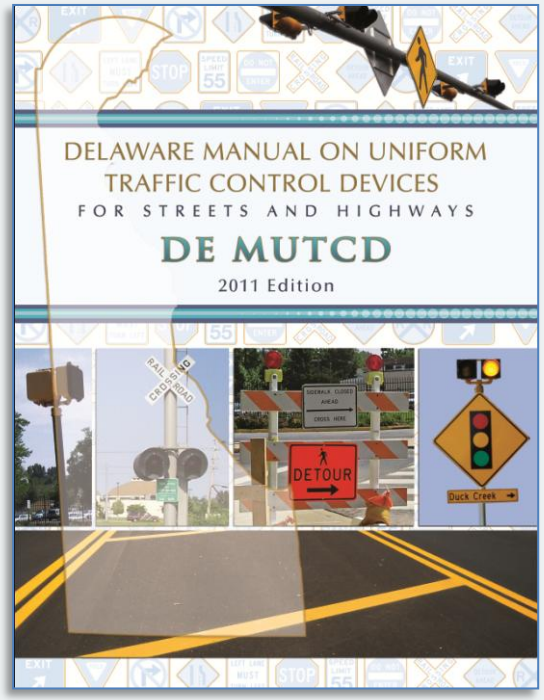
- Federal MUTCD published in Dec. 2009



- DE MUTCD committee began meeting in Jan. 2010 to establish DE-specific guidance
- DE MUTCD submitted to Delaware Register for public comment in Spring 2011
  http://regulations.delaware.gov/services/current_issue.shtml
- All presentation materials are DRAFT

PARTS

- **1: General**
- **2: Signs**
- **3: Markings**
- 4: Highway Traffic Signals
- 5: Low-Volume Roads
- 6: Temporary Traffic Control
- **7: School Areas**
- **8: Rail Grade Crossings**
- **9: Bicycle Facilities**



2009 MUTCD and DE MUTCD Format Revisions

- Paragraphs are numbered
- *Guidance is italicized*
- No more metric
- Definitions relocated to Part 1

Guidance:

01A *(DE Revision) The Keep Right sign should be installed at median op*
approach ends where the median width is greater than or equal to 4 feet

Option:

01B (DE Revision) The Keep Right sign may be installed at median open
approach ends where the median width is greater than or equal to 18 feet

Guidance:

02 *At locations where it is not readily apparent that traffic is required t*
should be used.

03 *If used, the Keep Right sign should be installed as close as practical*
parkways, islands, and underpass piers. The sign should be mounted on
other obstruction separating opposite directions of traffic in the center o
to pass to the right-hand side of the sign.

Standard:

04 **The Keep Right sign shall not be installed on the right-hand side**
traffic must pass to the left-hand side of the sign.

- **Standards remain bold**
- Options and support remain unformatted
- Delaware Revisions in blue with line in margin and "(DE Revision)" at beginning of paragraph

Section 1A.13 Definitions of Headings, Words, and Phrases in this Manual

01 **(DE Revision) When used in this Manual, the text headings of Standard, Guidance, Option, and Support shall be defined as follows:**

A. Standard—a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. All Standard statements are labeled, and the text appears in bold type. The verb "shall" is typically used. The verbs "should" and "may" are not used in Standard statements. Standard statements are sometimes modified by Options.

B. Guidance—a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. All Guidance statements are labeled, and the text appears in unbold type. The verb "should" is typically used. The verbs "shall" and "may" are not used in Guidance statements. Guidance statements are sometimes modified by Options.

C. Option—a statement of practice that is a permissive condition and carries no requirement or recommendation. Option statements sometime contain allowable modifications to a Standard or Guidance statement. All Option statements are labeled, and the text appears in unbold type. The verb "may" is typically used. The verbs "shall" and "should" are not used in Option statements.

D. Support—an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements are labeled, and the text appears in unbold type. The verbs "shall," "should," and "may" are not used in Support statements.

- **Standards are requirements that <u>SHALL</u> be followed unless there is an Option**
- DE Standard: **Reverted to 2003 MUTCD language allowing engineering judgment**
- *Guidance is recommended and <u>SHOULD</u> be followed*
- Options <u>MAY</u> be followed and are sometimes modifications to Standards and Guidance

Part 2: Signs

Section 2A.10 Sign Colors

Option:

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

Guidance:

06A *(DE Revision) A fluorescent yellow background should be used for overhead warning signs.*

- DE Guidance: *Fluorescent yellow (FY) sheeting should be used for overhead warning signs*
- **Fluorescent yellow-green (FYG) background for all school signs**

NCC Industrial Track Greenway, Boulden Blvd crossing

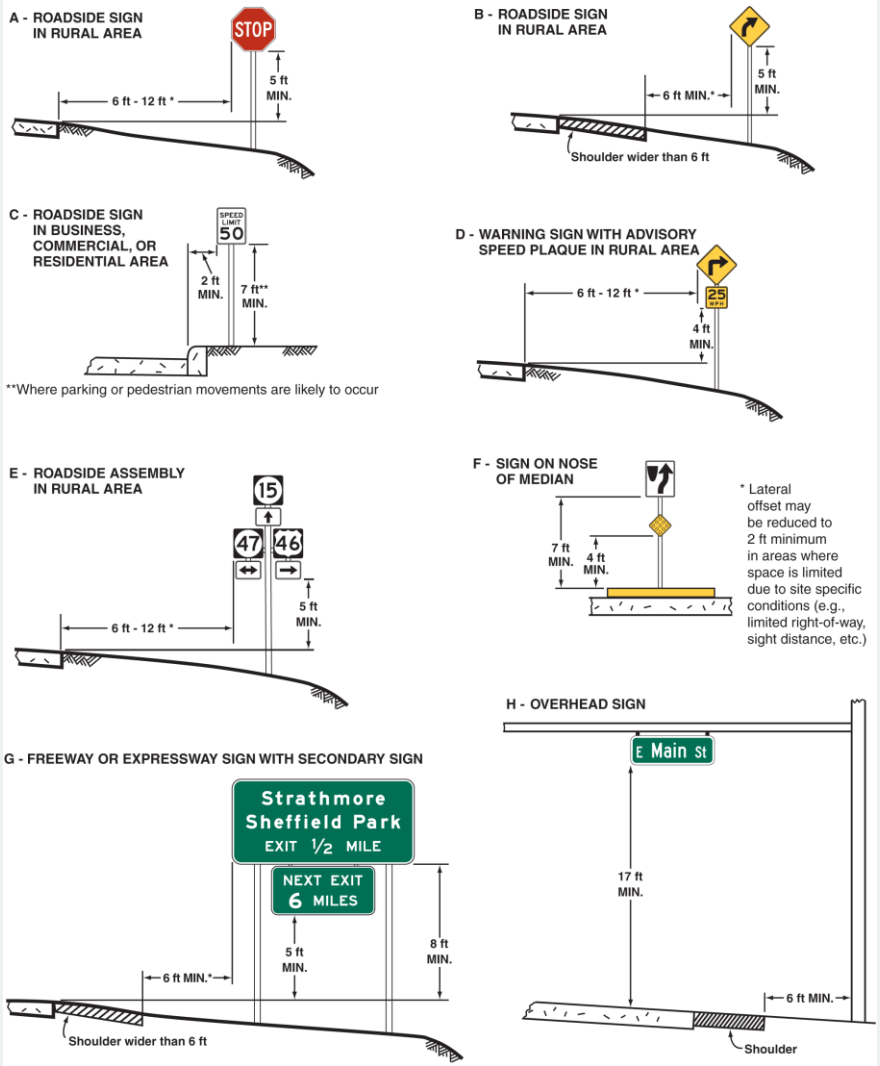
FY sheeting used on overhead Pedestrian warning sign

Plaque shall be FYG

Section 2A.13 Word Messages

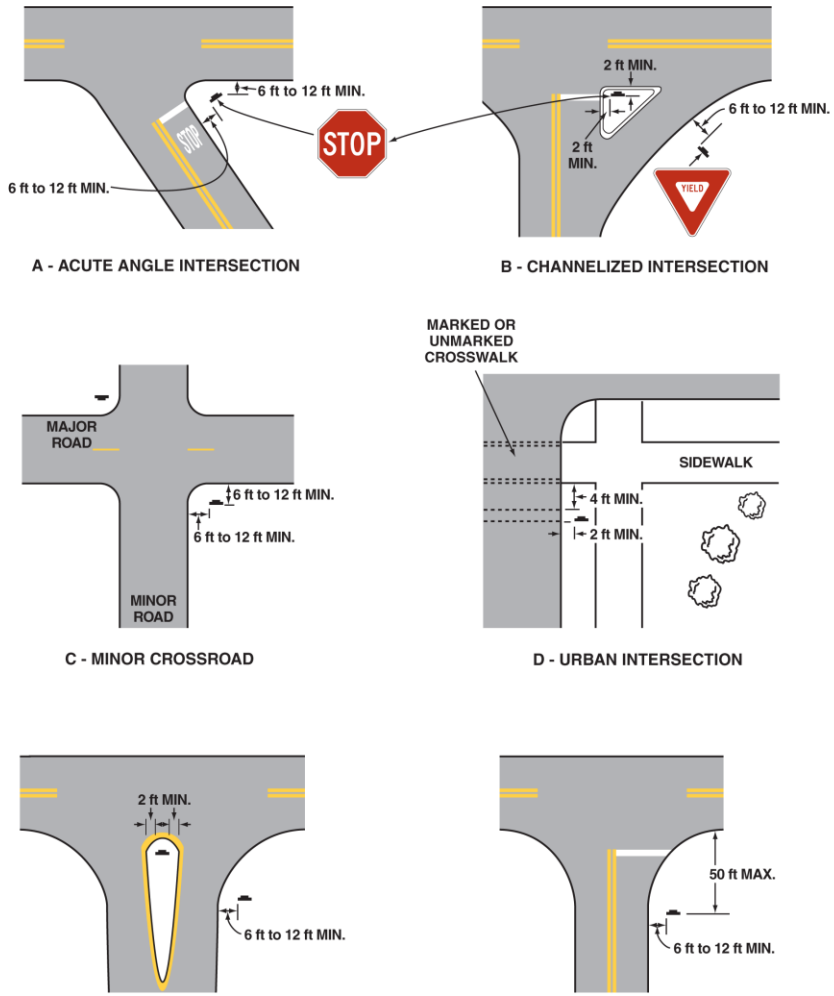
Section 2A.16 Standardization of Location & Section 2A.19 Lateral Offset

Figure 2A-2. Examples of Heights and Lateral Locations of Sign Installations
(Delaware Revision)



Note:
See Section 2A.19 for reduced lateral offset distances that may be used in areas where lateral offsets are limited, and in business, commercial, or residential areas where sidewalk width is limited or where existing poles are close to the curb.

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.

Section 2B.03 Size of Regulatory Signs

Guidance:

01A *(DE Revision) At intersections of multi-lane roads with single lane roads, the regulatory sign sizes on all approaches to the intersection should be as required for multi-lane roads.*

Standard:

03 **Except as provided in Paragraphs 4 and 5, the minimum sizes for regulatory signs facing traffic on multi-lane conventional roads shall be as shown in the Multi-lane column of Table 2B-1.**

Option:

04 Where the posted speed limit is 35 mph or less on a multi-lane highway or street, other than for a STOP sign, the minimum size shown in the Single Lane column in Table 2B-1 may be used.

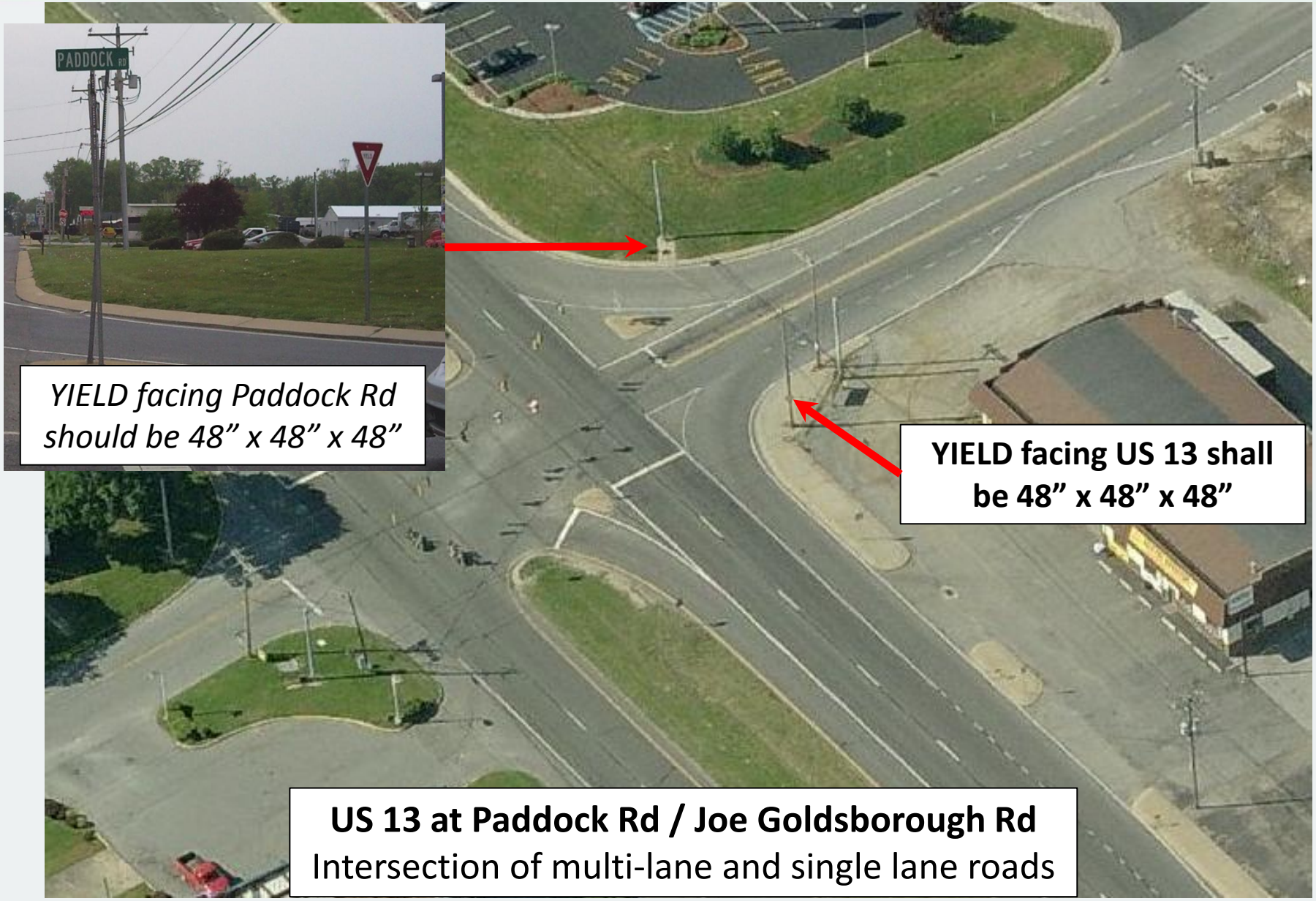
05 Where a regulatory sign, other than a STOP sign, is placed on the left-hand side of a multi-lane roadway in addition to the installation of the same regulatory sign on the right-hand side or the roadway, the size shown in the Single Lane column in Table 2B-1 may be used for both the sign on the right-hand side and the sign on the left-hand side of the roadway.

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 1 of 5)
(DE Revision)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Stop	R1-1	2B.05	36 x 36* **	36 x 36	36 x 36	—	30 x 30*	48 x 48
Yield	R1-2	2B.08	36 x 36 x 36*	48 x 48 x 48	48 x 48 x 48	60 x 60 x 60	30 x 30 x 30*	—
To Oncoming Traffic (plaque)	R1-2aP	2B.10	24 x 18	24 x 18	36 x 30	48 x 36	24 x 18	—
To U-Turning Traffic (plaque)	R1-2aP-DE	2B.10	24 x 18	24 x 18	36 x 30	—	—	—

- **Sizes shall follow Table 2B-1**
- **Larger sizes for multi-lane roads with a posted speed limit ≥ 40 MPH**
- Single Lane size can be used on multi-lane road if same sign is posted on left-hand and right-hand side
- DE Guidance: *At intersections of multi-lane and single lane roads, larger sizes should be used on all approaches (e.g., YIELD signs)*

Section 2B.03 Size of Regulatory Signs



Section 2C.59 CROSS TRAFFIC DOES NOT STOP Plaque (W4-4P)

Whites Ln at Whiteleysburg Rd

Crash history indicated side-street motorists assumed all-way stop

- W4-4P installed below STOP
- **2-WAY plaque no longer permitted**

Section 2B.10 STOP Sign or YIELD Sign Placement

Standard:

01 **The STOP or YIELD sign shall be installed on the near side of the intersection on the right-hand side of the approach to which it applies. When the STOP or YIELD sign is installed at this required location and the sign visibility is restricted, a Stop Ahead sign (see Section 2C.36) shall be installed in advance of the STOP sign or a Yield Ahead sign (see Section 2C.36) shall be installed in advance of the YIELD sign.**

02 **The STOP or YIELD sign shall be located as close as practical to the intersection it regulates, while optimizing its visibility to the road user it is intended to regulate.**

Guidance:

07 *STOP or YIELD signs should not be placed farther than 50 feet from the edge of the pavement of the intersected roadway (see Drawing F in Figure 2A-3).*

08 *A sign that is mounted back-to-back with a STOP or YIELD sign should stay within the edges of the STOP or YIELD sign. If necessary, the size of the STOP or YIELD sign should be increased so that any other sign installed back-to-back with a STOP or YIELD sign remains within the edges of the STOP or YIELD sign.*

R1-1

R1-2

- **Shall be installed on right-hand side**
- **As close as practical to intersection, while optimizing visibility**
- *No farther than 50 ft from edge of intersecting road* (i.e., does not have to be adjacent to stop line)
- *Back-to-back signs should stay within edges of STOP or YIELD* (now includes DO NOT ENTER)

Section 2B.10 STOP Sign or YIELD Sign Placement

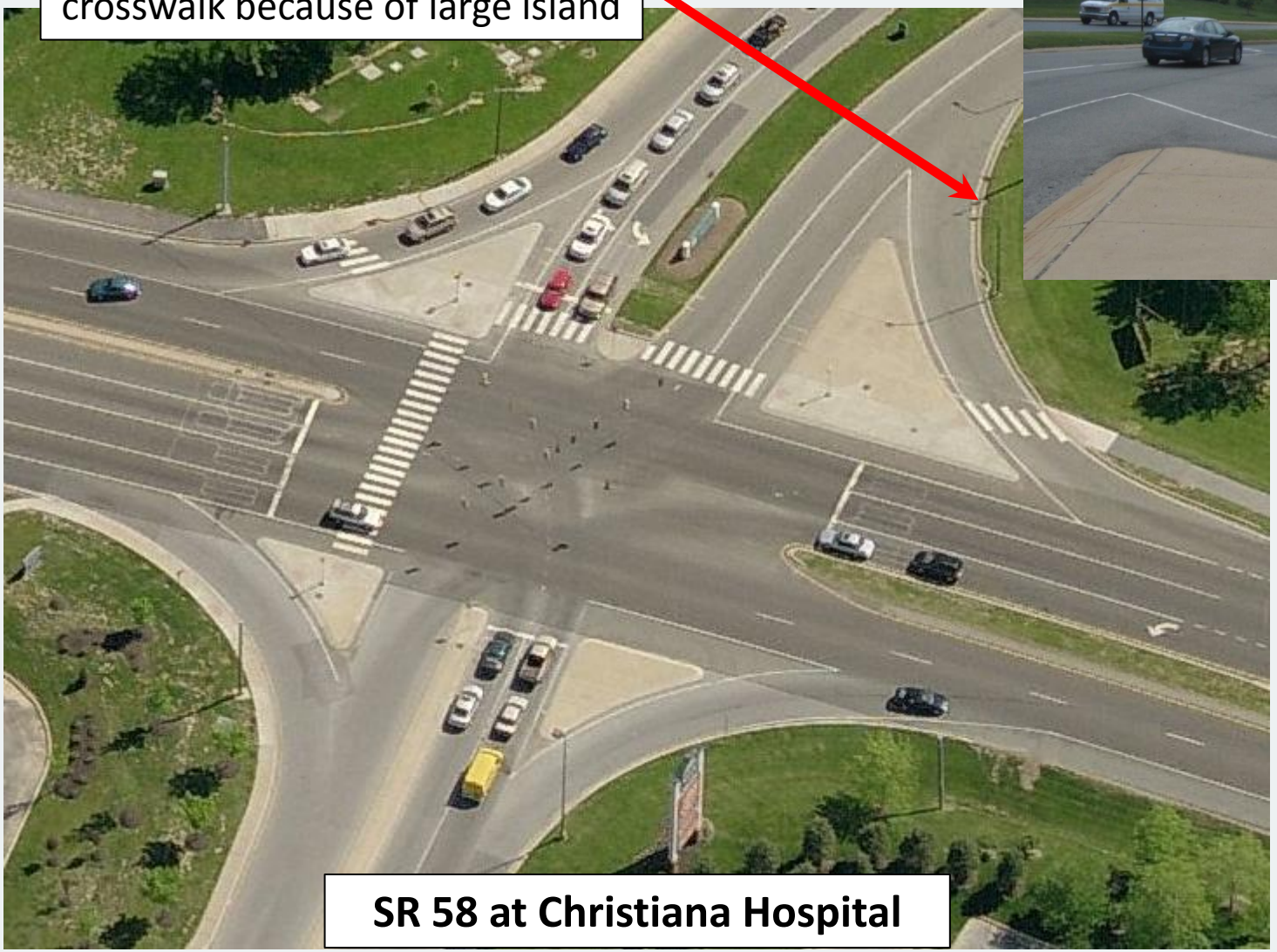
Sign on back (Keep Right) should stay within edges of STOP

STOP shall be 36” x 36” on a multi-lane approach and it shall be installed on the right-hand side

Lantana Dr at SR 7

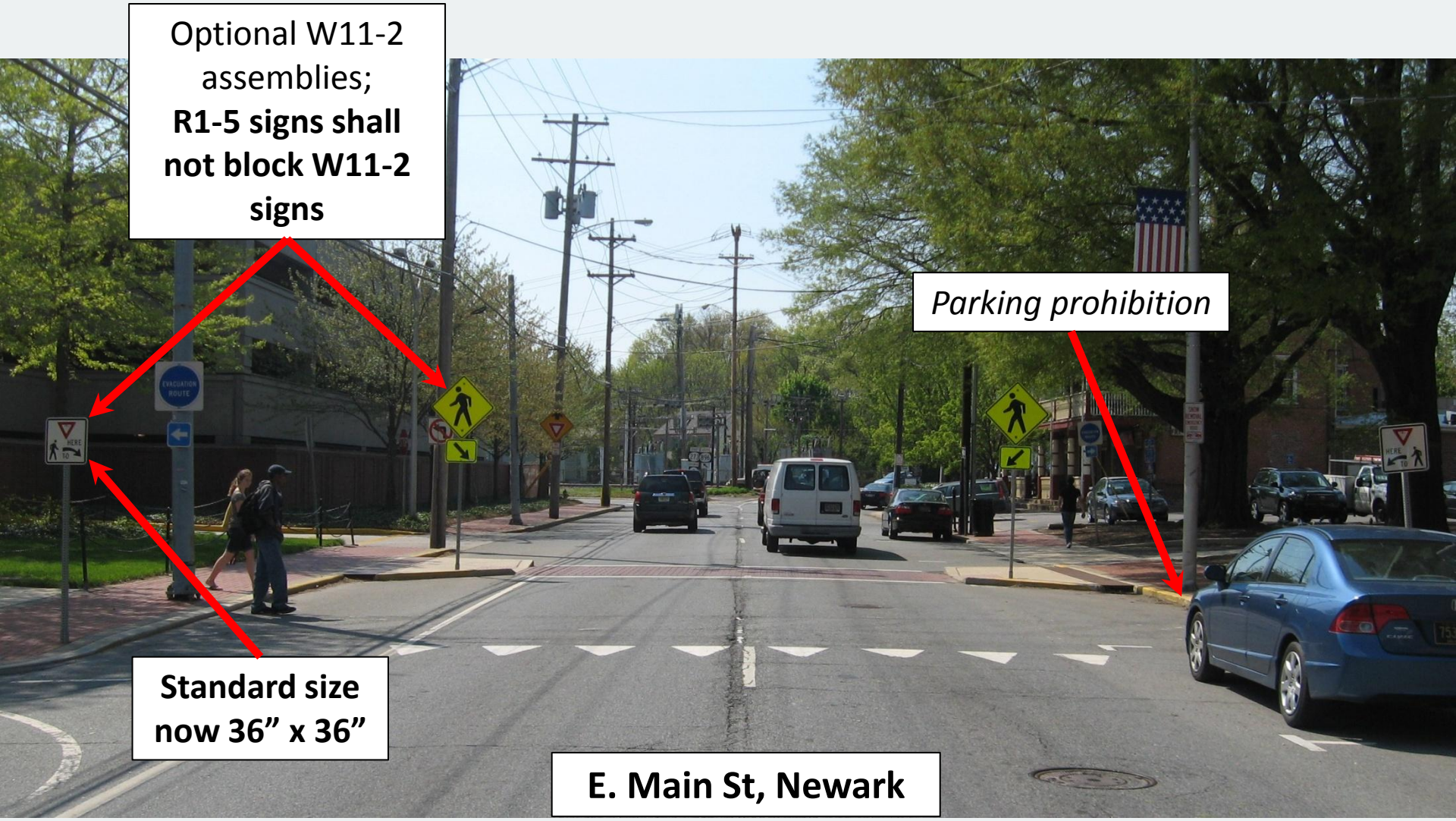
Section 2B.10 STOP Sign or YIELD Sign Placement

YIELD sign installed beyond crosswalk because of large island



SR 58 at Christiana Hospital

Section 2B.11 Yield Here To Pedestrians Signs and Stop Here For Pedestrians Signs (R1-5 Series)



Section 2B.13 Speed Limit Sign (R2-1)

01 **Speed zones (other than statutory speed limits) shall only be established on the basis of an engineering study that has been performed in accordance with traffic engineering practices. The engineering study shall include an analysis of the current speed distribution of free-flowing vehicles.**

07A (DE Revision) §4169 and 4170 of Title 21 of the Delaware Code establish policies for establishing speed limits.

10 *States and local agencies should conduct engineering studies to reevaluate non-statutory speed limits on segments of their roadways that have undergone significant changes since the last review, such as the addition or elimination of parking or driveways, changes in the number of travel lanes, changes in the configuration of bicycle lanes, changes in traffic control signal coordination, or significant changes in traffic volumes.*

11 *No more than three speed limits should be displayed on any one Speed Limit sign or assembly.*

12 *When a speed limit within a speed zone is posted, it should be within 5 mph of the 85th-percentile speed of free-flowing traffic.*

13 *Speed studies for signalized intersection approaches should be taken outside the influence area of the traffic control signal, which is generally considered to be approximately 1/2 mile, to avoid obtaining skewed results for the 85th-percentile speed.*

R2-1

- Clarification of speed studies
  - **Study includes analysis of free-flow speed distribution**
  - *List of significant changes to consider reevaluating speed zones*
  - *Posted speed limit should be within 5 MPH of the free-flow 85th-percentile speed*
  - *Obtain speeds outside ½-mile influence area of traffic signal*

Figure 2B-16. Keep Right, TURN LANE, and Divided Highway Crossing Signing for Median Openings along Divided Highways with Median Widths ≥ 4 Feet and < 18 Feet

(Delaware Revision)

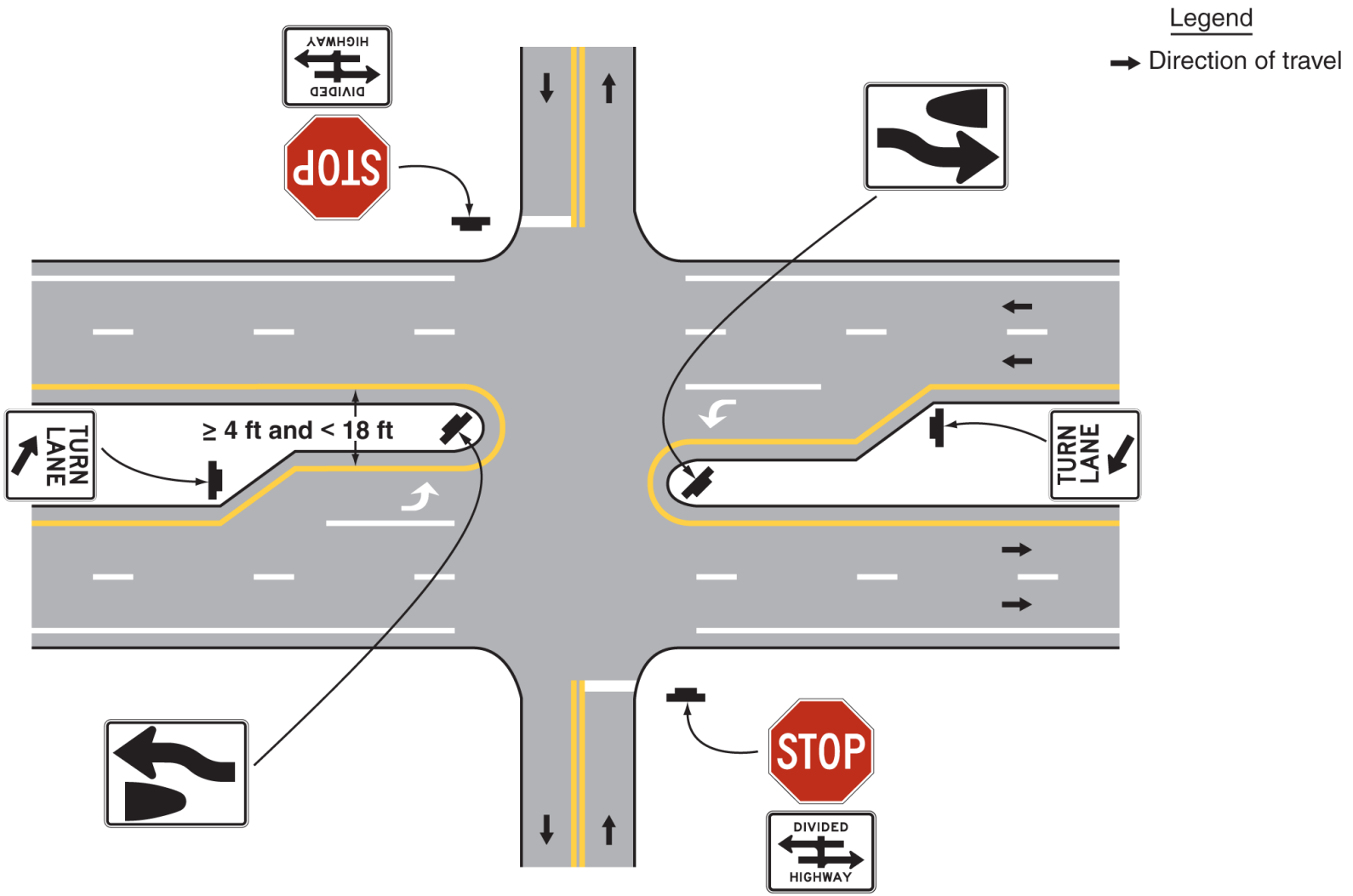
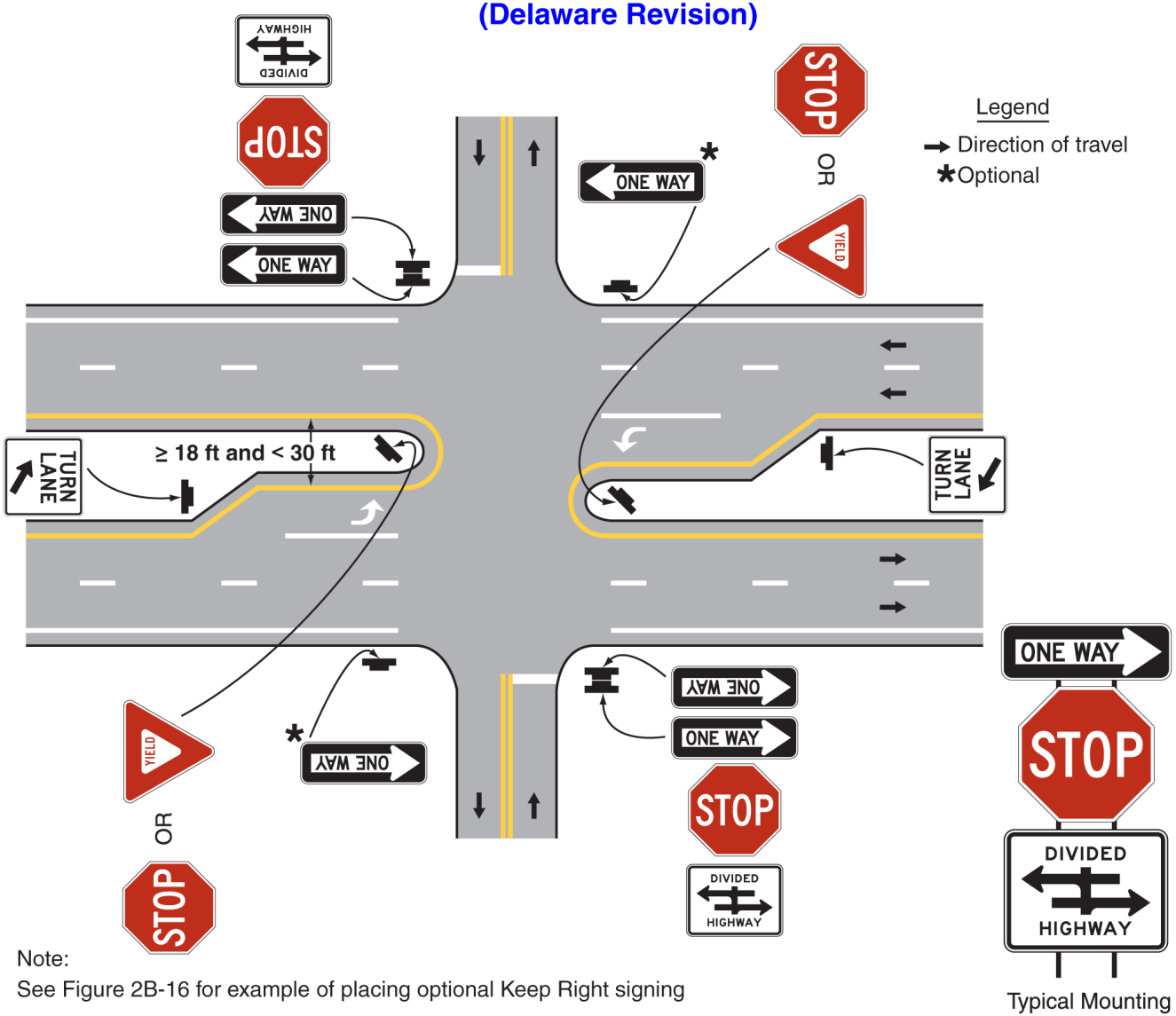


Figure 2B-16A. ONE WAY, TURN LANE, and Divided Highway Crossing Signing for Median Openings along Divided Highways with Median Widths ≥ 18 Feet and < 30 Feet

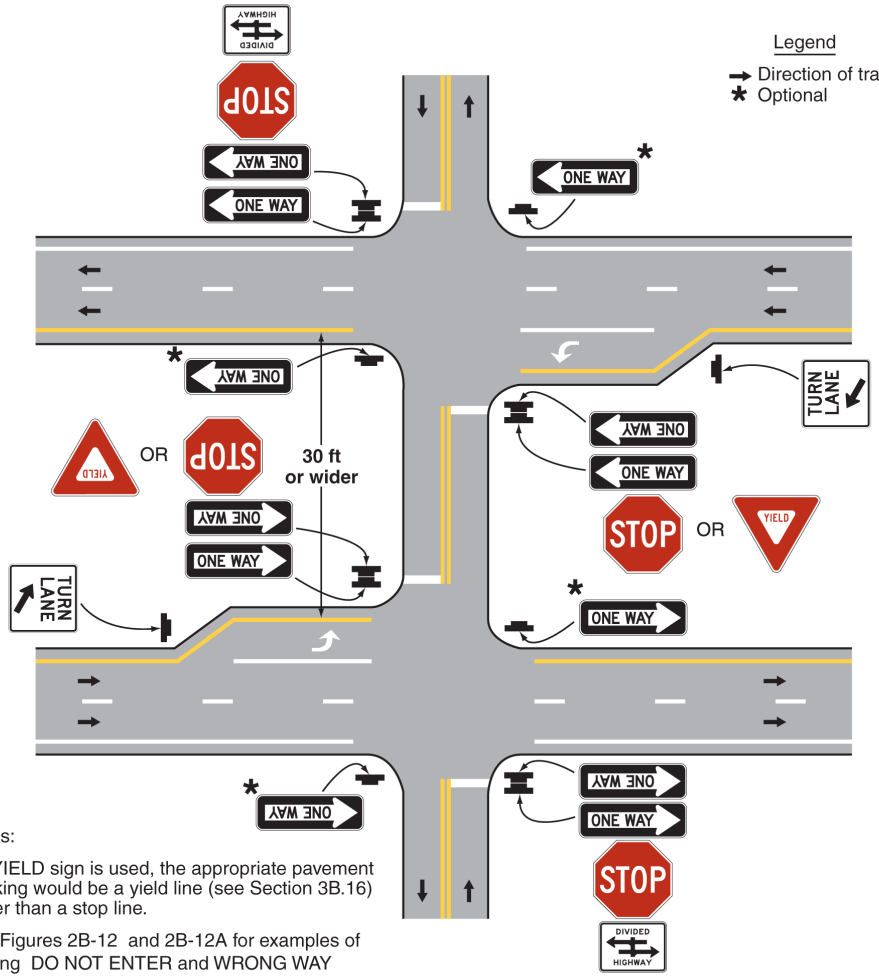
(Delaware Revision)



Note:
See Figure 2B-16 for example of placing optional Keep Right signing

Divided Highways – Unsignalized Intersections

Figure 2B-15. ONE WAY, TURN LANE, and Divided Highway Crossing Signing for Median Openings along Divided Highways with Median Widths of 30 Feet or Wider
(Delaware Revision)



Notes:

If a YIELD sign is used, the appropriate pavement marking would be a yield line (see Section 3B.16) rather than a stop line.

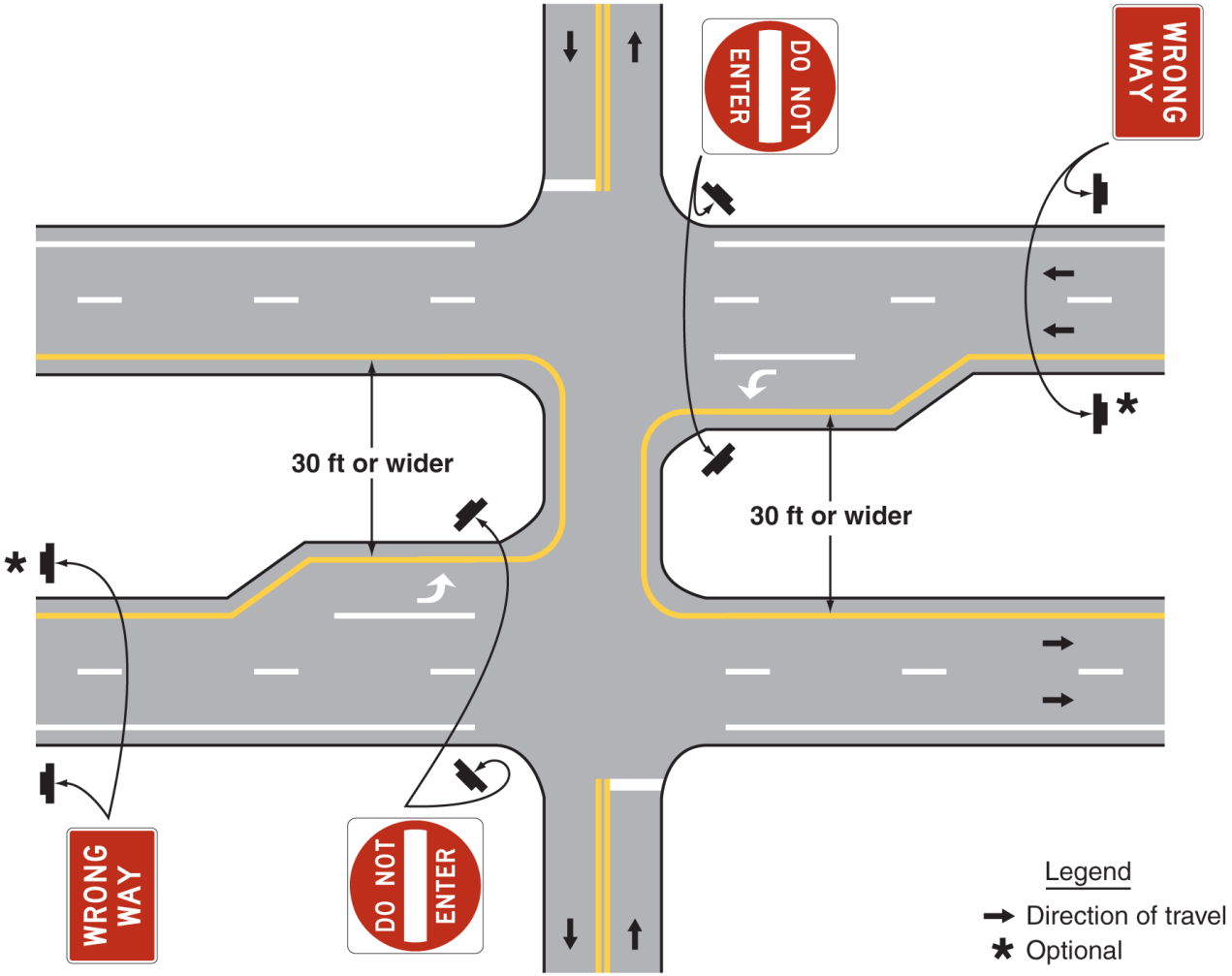
See Figures 2B-12 and 2B-12A for examples of placing DO NOT ENTER and WRONG WAY signing.

Double yellow center line should be placed in the median if the median width is greater than or equal to 50 ft. Engineering judgement should be used to determine whether a double yellow center line should be placed in the median if the median width is greater than or equal to 30 ft and less than 50 ft.

Section 2B.37 DO NOT ENTER Sign (R5-1) & Section 2B.38 WRONG WAY Sign (R5-1a)

Figure 2B-12. Locations of Do Not Enter and Wrong-Way Signing for Median Openings along Divided Highways with Median Widths of 30 Feet or Wider Intersections of Divided Highways with State-Maintained Roadways (excluding Subdivision Streets)

(Delaware Revision)



Section 2B.41 Wrong-Way Traffic Control at Interchange Ramps

Should have additional DO NOT ENTER sign based on DE Guidance

SR 1 northbound off-ramp to SR 72

Section 2B.43 Roundabout Directional Arrow Signs (R6-4, R6-4a, and R6-4b)

Guidance:

01 *Where the central island of a roundabout allows for the installation of signs, Roundabout Directional Arrow (R6-4 series) signs (see Figure 2B-20) should be used in the central island to direct traffic counter-clockwise around the central island, except as provided in Paragraph 11 in Section 2B.40.*

Standard:

02 **The R6-4 sign shall be a horizontal rectangle with two black chevron symbols pointing to the right on a white background. The R6-4a sign shall be a horizontal rectangle with three black chevron symbols pointing to the right on a white background. The R6-4b sign shall be a horizontal rectangle with four black chevron symbols pointing to the right on a white background. No border shall be used on the Roundabout Directional Arrow signs.**

03 **Roundabout Directional Arrow signs shall be used only at roundabouts and other circular intersections.**

Support:

13 Using ONE WAY signs on the central island of a roundabout might result in some drivers incorrectly concluding that the cross street is a one-way street. Using Roundabout Directional Arrow signs might reduce this confusion. However, using ONE WAY signs might be necessary in States that have defined a roundabout as a series of T-intersections. (From Section 2B.40)

R6-4

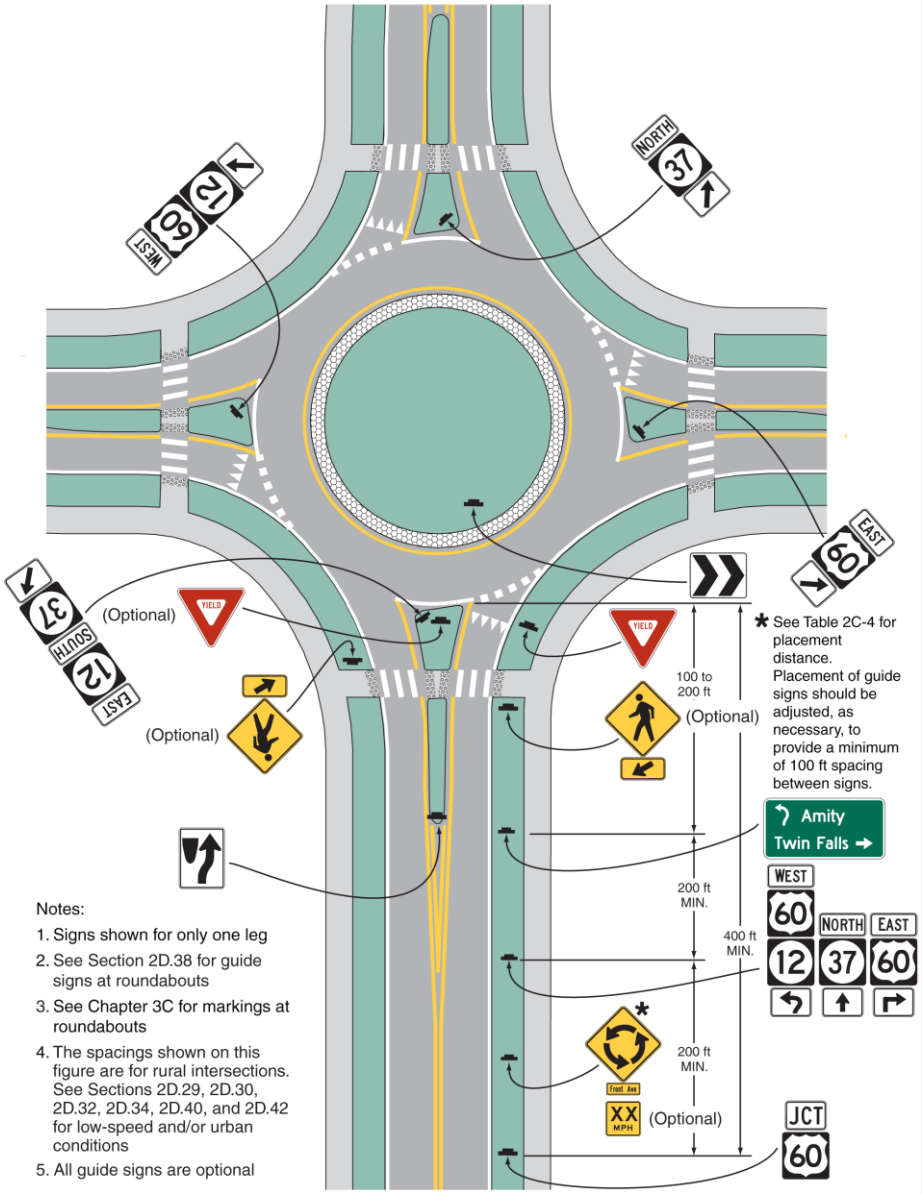
R6-4a

West Park Drive & East Park Drive

Levels Road & St. Annes Church Road

Section 2B.45 Examples of Roundabout Signing

Figure 2B-22. Example of Regulatory, Warning, and Guide Signs for a One-Lane Roundabout
(Delaware Revision)



Section 2C.04 Size of Warning Signs

Standard:

01 **Except as provided in Section 2A.11, the sizes for warning signs shall be as shown in Table 2C-2.**

03 **Except as provided in Paragraph 5, the minimum size for all diamond-shaped warning signs facing traffic on a multi-lane conventional road where the posted speed limit is higher than 35 mph shall be 36 x 36 inches.**

Option:

05 If a diamond-shaped warning sign is placed on the left-hand side of a multi-lane roadway to supplement the installation of the same warning sign on the right-hand side of the roadway, the minimum size identified in the Single Lane column in Table 2C-2 may be used.

Table 2C-2. Warning Sign and Plaque Sizes (Sheet 1 of 4)
(DE Revision)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Horizontal Alignment	W1-1,2,3,4,5	2C.07	30 x 30*	36 x 36	36 x 36	36 x 36	—	48 x 48
Combination Horizontal Alignment/Advisory Speed	W1-1a,2a	2C.10	36 x 36	36 x 36	48 x 48	48 x 48	—	48 x 48
One-Direction Large Arrow	W1-6	2C.12	48 x 24	48 x 24	60 x 30	60 x 30	—	60 x 30
Two-Direction Large Arrow	W1-7	2C.47	48 x 24	48 x 24	—	—	—	60 x 30
Chevron Alignment	W1-8	2C.09	18 x 24	18 x 24	30 x 36	36 x 48	—	24 x 30

- **Sizes shall follow Table 2C-2**
- **Larger sizes for multi-lane roads with a posted speed limit > 35 MPH**
- Single Lane sizes can be used if same sign is posted on left-hand and right-hand side

Section 2C.05 Placement of Warning Signs

Guidance:

03 *Warning signs should be placed so that they provide an adequate PRT. The distances contained in Table 2C-4 are for guidance purposes and should be applied with engineering judgment. Warning signs should not be placed too far in advance of the condition, such that drivers might tend to forget the warning because of other driving distractions, especially in urban areas.*

- *Advance placement based on Table 2C-4, which has new values*

Condition B to 0 MPH: Stop and yield conditions

Table 2C-4. Guidelines for Advance Placement of Warning Signs

Posted or 85th-Percentile Speed	Advance Placement Distance[1]								
	Condition A: Speed reduction and lane changing in heavy traffic[2]	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0[3]	10[4]	20[4]	30[4]	40[4]	50[4]	60[4]	70[4]
20 mph	225 ft	100 ft[6]	N/A[5]	—	—	—	—	—	—
25 mph	325 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
30 mph	460 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
35 mph	565 ft	100 ft[6]	N/A[5]	N/A[5]	N/A[5]	—			
40 mph	670 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—			
			125 ft	100 ft[6]	100 ft[6]	N/A[5]			
			200 ft	175 ft	125 ft	100 ft[6]			
			275 ft	225 ft	200 ft	125 ft	N/A[5]	—	—
			350 ft	325 ft	275 ft	200 ft	100 ft[6]	—	—
65 mph	1,200 ft	475 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft[6]	—
70 mph	1,250 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph	1,350 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft[6]

Condition B to XX MPH: Speed reduction in advance of hazard (e.g., curve)

Condition A: Speed reduction and lane changing in heavy traffic

Section 2C.05 Placement of Warning Signs

Guidance:

04 *(DE Revision) Minimum spacing between warning signs with different messages should be based on the estimated PRT for driver comprehension of and reaction to the second sign. The minimum warning sign spacing contained in Table 2C-4A should be applied with engineering judgment.*

05 *The effectiveness of the placement of warning signs should be periodically evaluated under both day and night conditions.*

Option:

06 Warning signs that advise road users about conditions that are not related to a specific location, such as Deer Crossing or SOFT SHOULDER, may be installed in an appropriate location, based on engineering judgment, since they are not covered in Table 2C-4.

- DE Guidance: *Table 2C-4A for minimum spacing between warning signs*
- Appropriate to install some signs adjacent to hazard (e.g., Pedestrian warning sign adjacent to crossing)

Table 2C-4A. Guidelines for Minimum Spacing between Warning Signs (DE Revision)

Posted or 85th Percentile Speed	Minimum Spacing	Posted or 85th Percentile Speed	Minimum Spacing
20 mph	100 ft	45 mph	300 ft
25 mph	100 ft	50 mph	400 ft
30 mph	100 ft	55 mph	500 ft
35 mph	150 ft	60 mph	600 ft
40 mph	200 ft	65 mph	700 ft

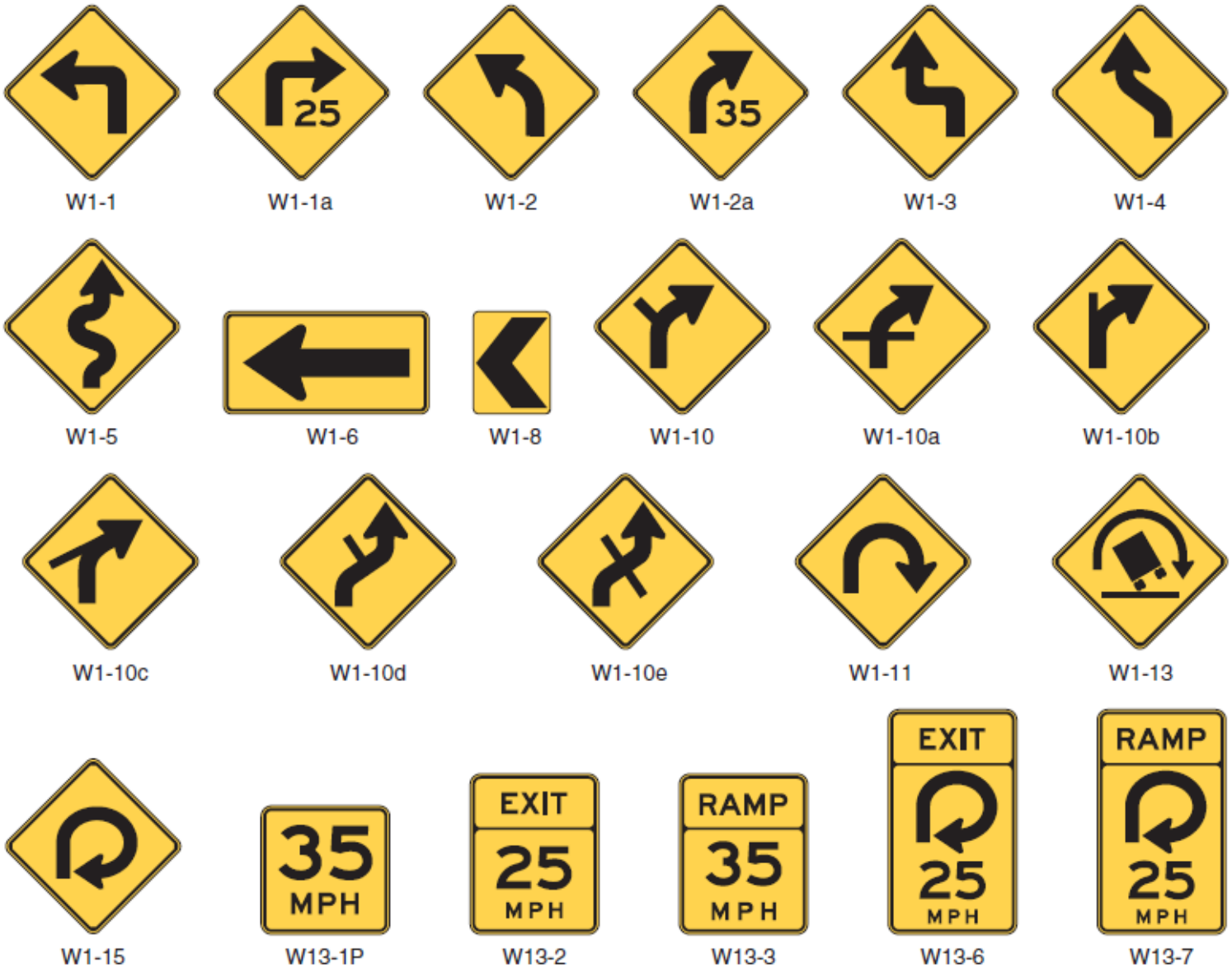
Section 2C.05 Placement of Warning Signs

Warning signs should be far enough apart for motorists to comprehend and react to each condition

I-95 southbound off-ramp to SR 273

Section 2C.06 Horizontal Alignment Warning Signs

Figure 2C-1. Horizontal Alignment Signs and Plaques



Section 2C.06 Horizontal Alignment Warning Signs

Standard:

02 **(DE Revision) In advance of horizontal curves on freeways, on expressways, and on roadways with more than 1,000 AADT that are functionally classified as arterials or collectors, horizontal alignment warning signs shall be used in accordance with Table 2C-5 based on the speed differential between the roadway's posted or statutory speed limit or 85th-percentile speed on the tangent approach to the curve and the horizontal curve's advisory speed.**

Option:

02B (DE Revision) Where an advisory speed determined in accordance with Section 2C.08 equals or exceeds the posted or statutory speed limit, horizontal alignment warning signs, excluding Advisory Speed plaques, may be installed based upon engineering judgment.

03 Horizontal Alignment Warning signs may also be used on other roadways or on arterial and collector roadways with less than 1,000 AADT based on engineering judgment.

- **Requirements for freeways, expressways, and arterials and collectors with > 1,000 AADT based on Table 2C-5**
- Can be used on other roads regardless of AADT or classification
- DE Option: Can be installed where advisory speed exceeds speed limit (excluding Advisory Speed plaques)

Section 2C.06 Horizontal Alignment Warning Signs

Guidance:

02A *(DE Revision) The provisions of Table 2C-5 that recommend or require the use of certain signs or plaques should be applied only where the advisory speed for the curve is less than the posted or statutory speed limit on the tangent approach to the curve.*

Support:

03A (DE Revision) FHWA's Interpretation Letter 2(09)-2 (I) - Determination of Speed Differential for Curve Warning Signs and Plaques clarifies data collection requirements recognizing that it is unrealistic to collect data in advance of every curve where Table 2C-5 is applied.

- DE Guidance: *Table 2C-5 applies where advisory speed < posted or statutory speed limit*
- DE Support: Data collection and formal studies not required at all curves

Table 2C-5. Horizontal Alignment Sign Selection
(DE Revision)

Type of Horizontal Alignment Sign	Difference Between Approach Speed and Curve Advisory Speed*				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W1-10 series) (see Section 2C.07 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

* Difference Between Approach Speed and Curve Advisory Speed is defined as the difference in speed between the posted or statutory speed limit or 85th-percentile speed on the tangent approach to the curve and the advisory speed for the curve.

Section 2D.43 Street Name Signs (D3-1, D3-1-DE, D3-1a)

Guidance:

04 *(DE Revision) Except as provided in Paragraphs 5, 6, and 7 lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 6 inches in height and lower-case letters at least 4.5 inches in height.*

05 *On multi-lane streets with speed limits greater than 40 mph, the lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 8 inches in height and lower-case letters at least 6 inches in height.*

Option:

06 (DE Revision) At the intersection of two subdivision streets, the lettering on post-mounted Street Name signs may be composed of initial upper-case letters at least 4 inches in height and lower-case letters at least 3 inches in height.

Guidance:

07 *If overhead Street Name signs are used, the lettering should be composed of initial upper-case letters at least 12 inches in height and lower-case letters at least 9 inches in height.*

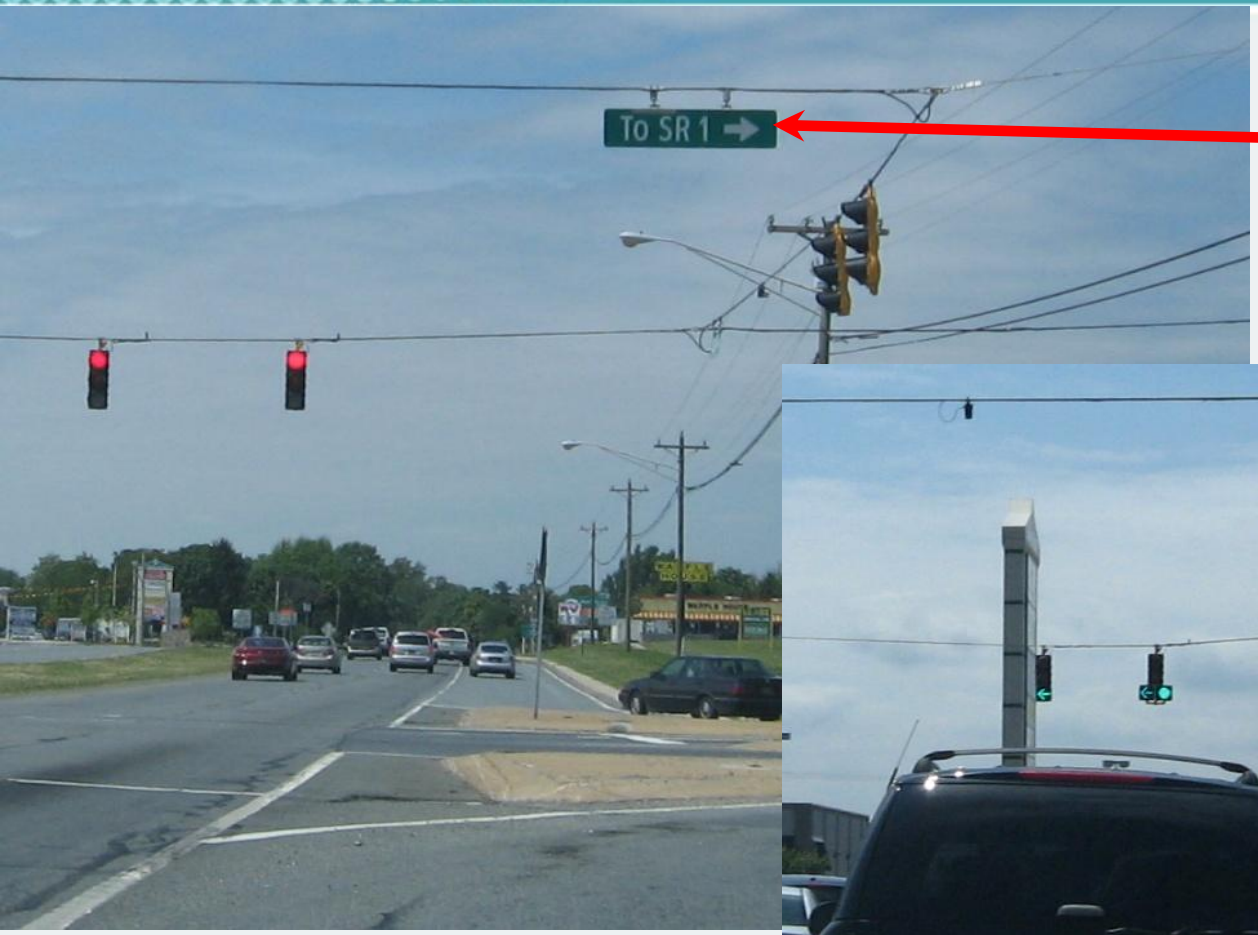
- *Minimum letter heights based on Table 2D-2*
- DE Guidance: *4" letter heights for intersection of two subdivision streets*

Table 2D-2. Recommended Minimum Letter Heights on Street Name Signs (Delaware Revision)

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height*	
			Initial Upper-Case	Lower-Case
Overhead	All types	All speed limits	12 inches	9 inches
Post-mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post-mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-mounted	2-lane	All speed limits	6 inches	4.5 inches
Post-mounted	Intersection of two subdivision streets	25 mph or less	4 inches	3 inches

* Reduced letter height and reduced edge spacing may be used on Street Name signs if the sign size must be reduced due to factors including lane width or vertical or lateral clearance (see Paragraph 5 of Section 2D.04)

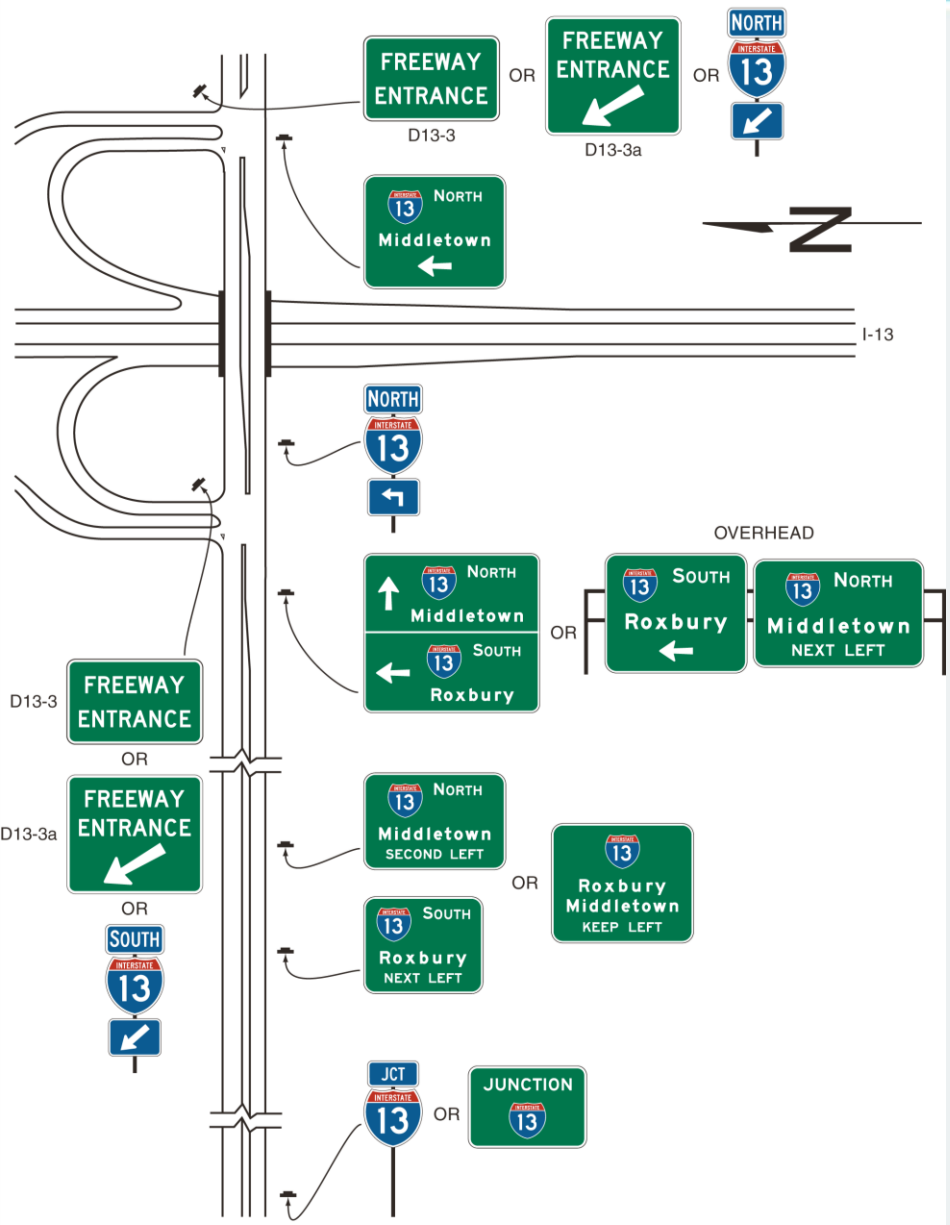
Section 2D.43 Street Name Signs (D3-1, D3-1-DE, D3-1a)

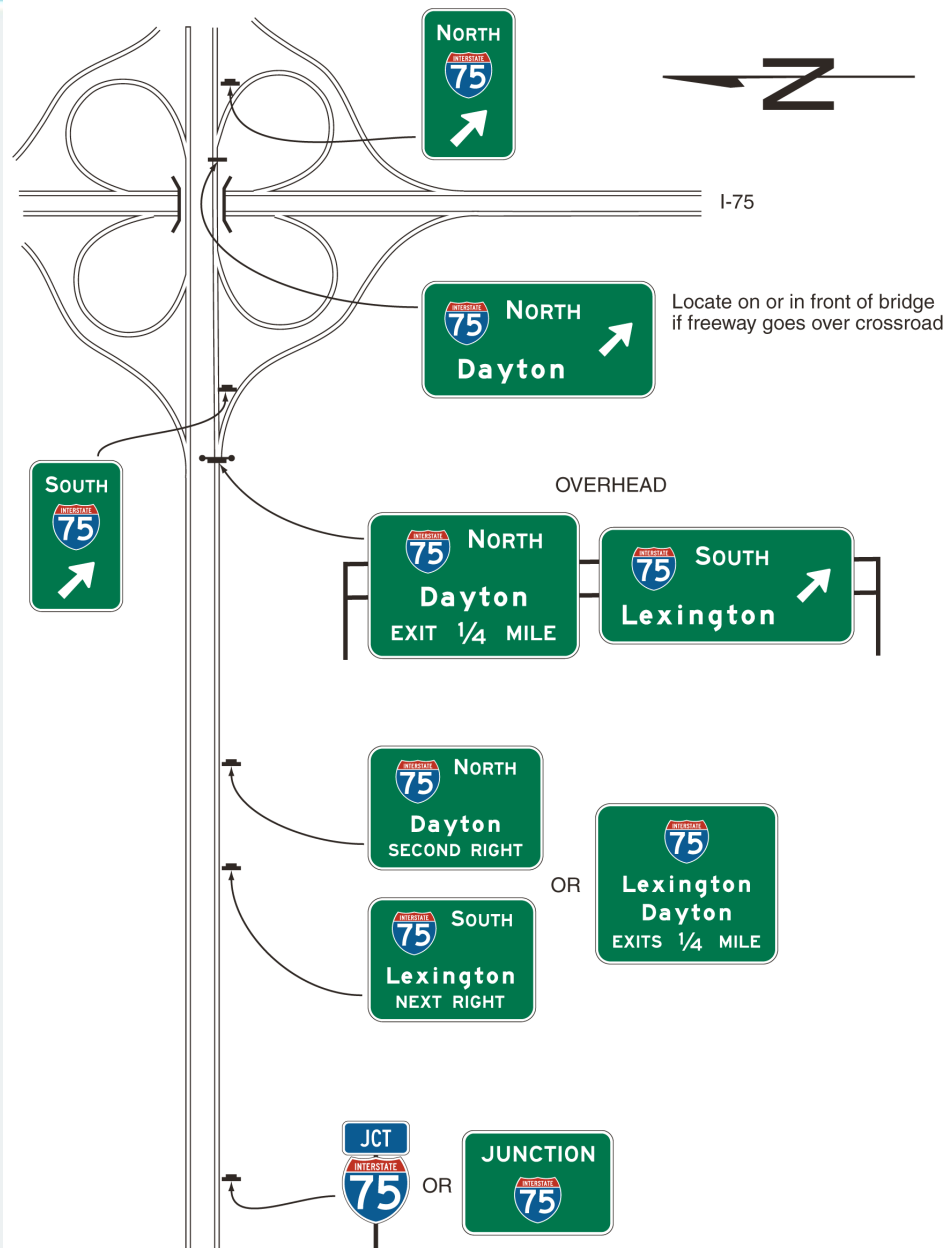


Overhead street name signs with 12" and 9" upper/lower legend

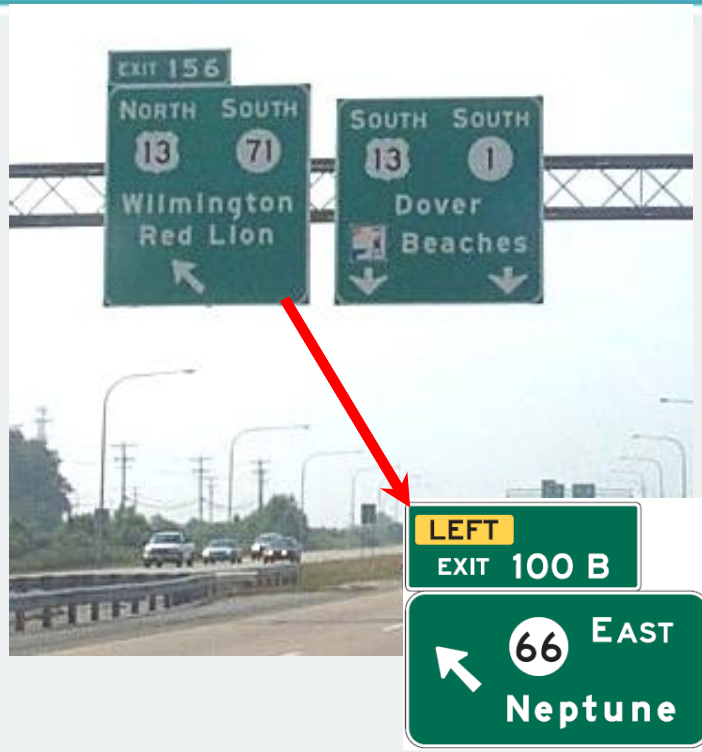
US 13 at SR 1 S. Smyrna ramps / Simon's Corner

Section 2D.45 Signing on Conventional Roads on Approaches to Interchanges

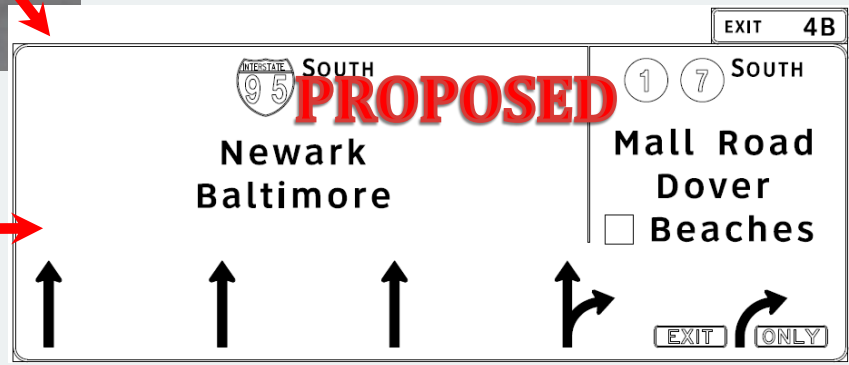





95
495
Wilmington
Philadelphia
295
Del Mem Br
NY - NJ


EXIT 156
NORTH SOUTH
13 71
Wilmington
Red Lion
SOUTH SOUTH
13 1
Dover
Beaches
LEFT
EXIT 100 B
66 EAST
Neptune


EXIT 156
NORTH TO
13
INTERSTATE 295
New Castle
NJ - NY
NORTH TO
1
INTERSTATE 95
Wilmington
1/2 MILE


EXIT 4B
INTERSTATE 95 SOUTH
PROPOSED
Newark
Baltimore
1 7 SOUTH
Mall Road
Dover
Beaches
EXIT ONLY

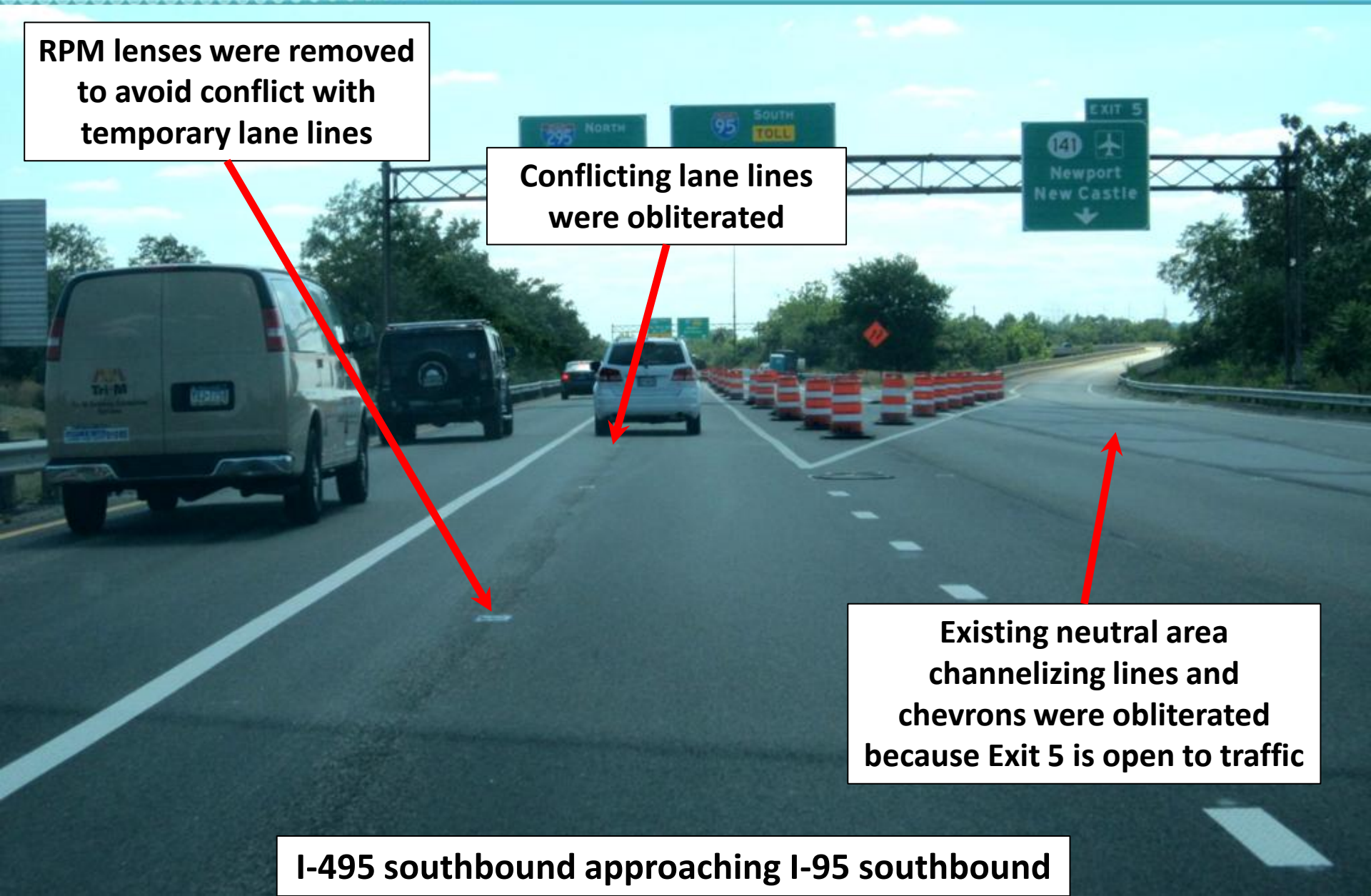

LODGING – EXIT 136
Hampton Inn
EXIT 104
ATTRACTIONS
MUSEUM
MUSEUM SQUARE
BIGGS MUSEUM
PUBLIC ARCHIVES
STATE HOUSE MUSEUM
FOOD – EXIT 136
WAFFLE HOUSE
Friendly's
Applebee's
McDonald's OPEN 24 HOURS
Wawa 24 Hours
SUBWAY SUBWAY SUBWAY


EXIT 4 B
Delaware Park
FOLLOW
DELAWARE PARK


Dover Downs
FOLLOW
DOVER DOWNS

Part 3: Markings

Section 3A.02 Standardization of Application

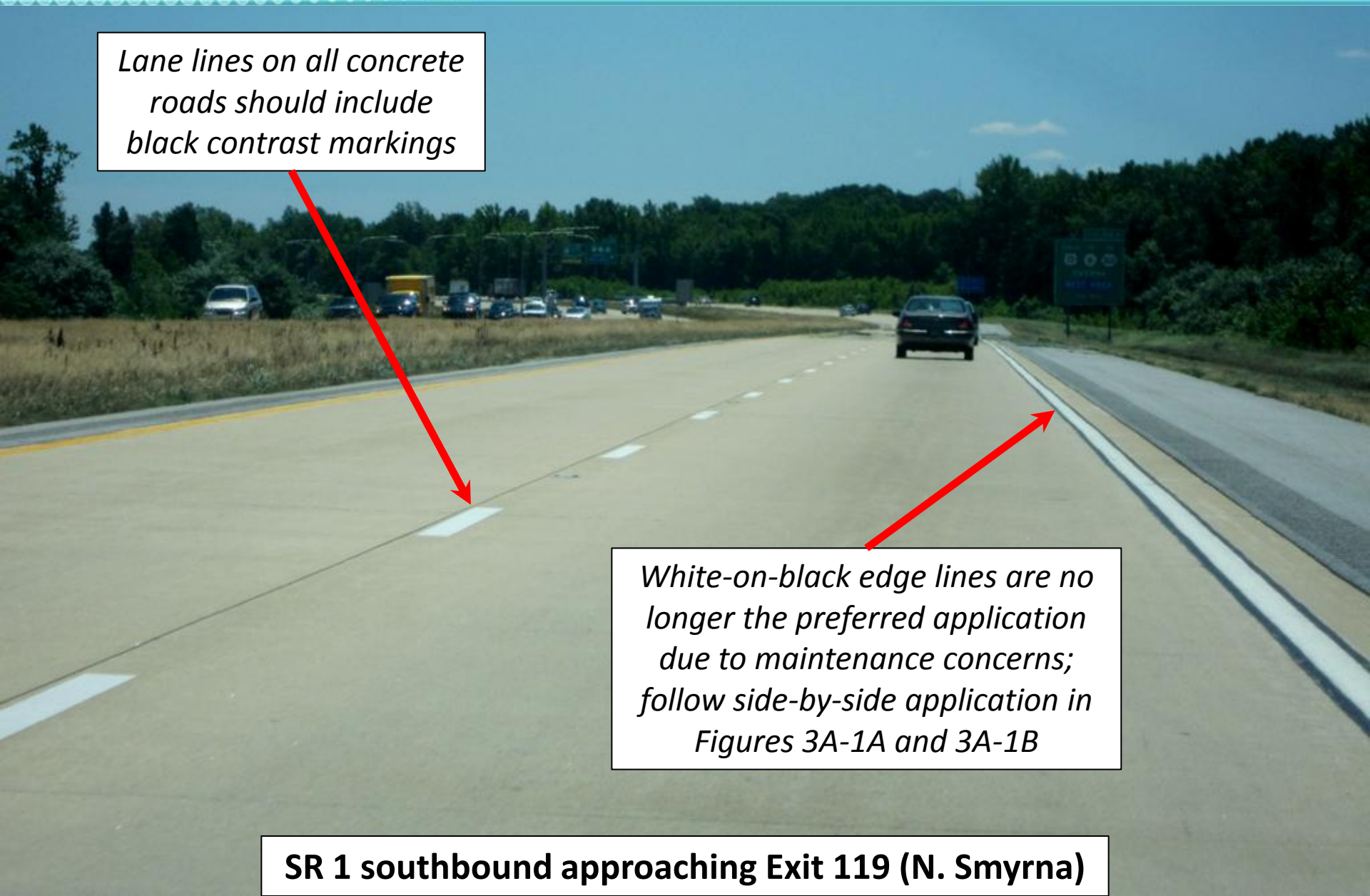


I-495 southbound approaching I-95 southbound

Section 3A.02 Standardization of Application

SR 141 northbound at Exits 6A and 6B

Section 3A.05 Colors



SR 1 southbound approaching Exit 119 (N. Smyrna)

Section 3A.06 Functions, Widths, and Patterns of Longitudinal Pavement Markings

A. **Normal line—4 to 6 inches wide.**
B. **Wide line—at least twice the width of a normal line.**
C. **Double line—two parallel lines separated by a discernible space.**
D. **Broken line—normal line segments separated by gaps.**
E. **Dotted line—noticeably shorter line segments separated by shorter gaps than used for a broken line. The width of a dotted line extension shall be at least the same as the width of the line it extends.**

Guidance:

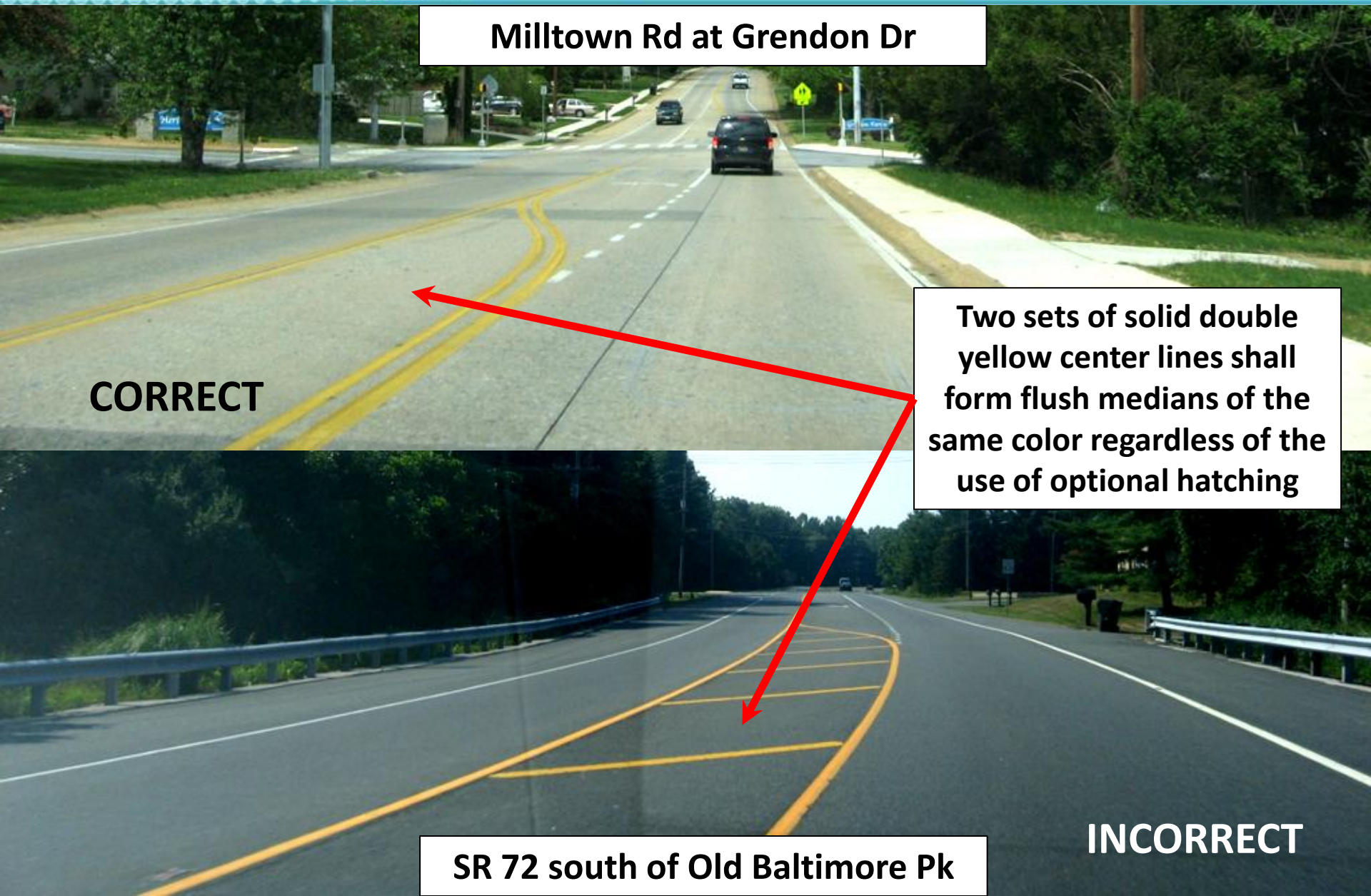
02A *(DE Revision) Double lines should consist of two parallel lines separated by a width of 6 inches.*

02B *(DE Revision) A normal line along all state-maintained roadways should be 5 inches wide.*

02C *(DE Revision) A wide line along all state-maintained roadways should be 10 inches wide.*

- *DE Guidance:*
  - *All normal lines = 5”*
  - *All wide lines = 10”*
  - *Double lines have 6” separation*
  - *3’ lines with 9’ gaps for dotted lines on interstates, freeways, and expressways*
  - *2’ lines with 6’ gaps for dotted lines on conventional roads*
- *Broken lines consist of 10’ lines with 30’ gaps*
- **Wide line – at least twice normal width**

Section 3B.01 Yellow Center Line Pavement Markings and Warrants



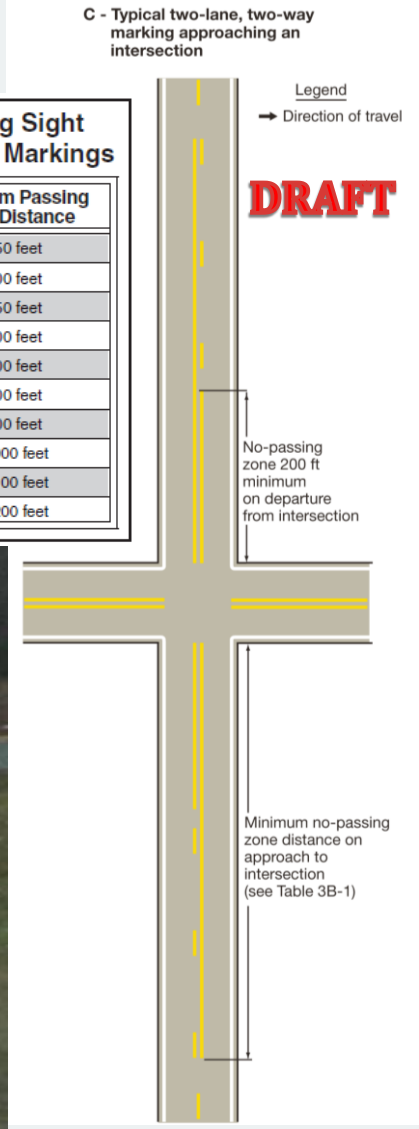
Section 3B.02 No-Passing Zone Pavement Markings and Warrants

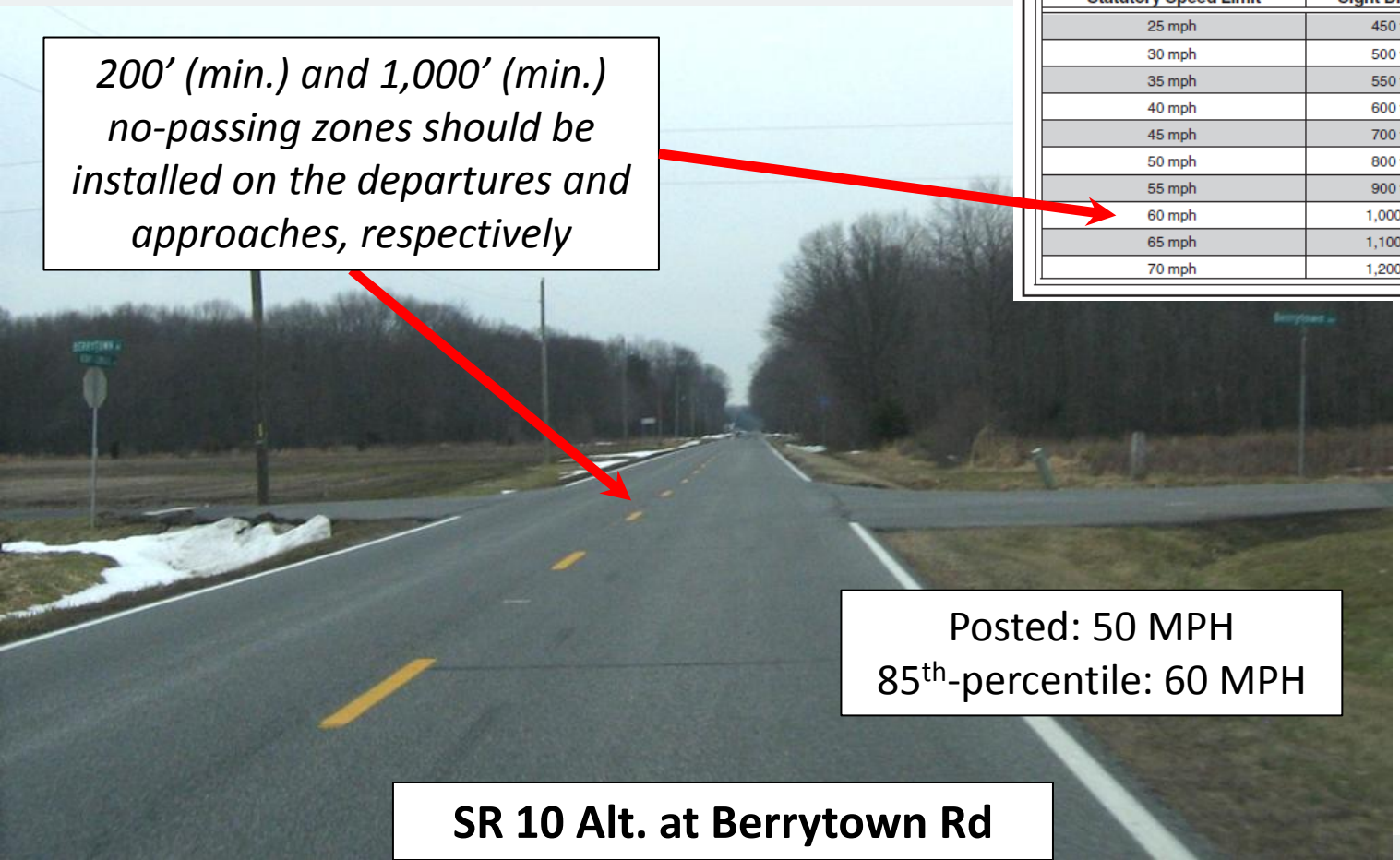
- *DE Guidance: No-passing zone ≥ Table 3B-1 on approach to intersection and ≥ 200' on departure*

200' (min.) and 1,000' (min.) no-passing zones should be installed on the departures and approaches, respectively

Table 3B-1. Minimum Passing Sight Distances for No-Passing Zone Markings

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





Posted: 50 MPH
85th-percentile: 60 MPH

SR 10 Alt. at Berrytown Rd

Section 3B.04 White Lane Line Pavement Markings and Warrants

Guidance:

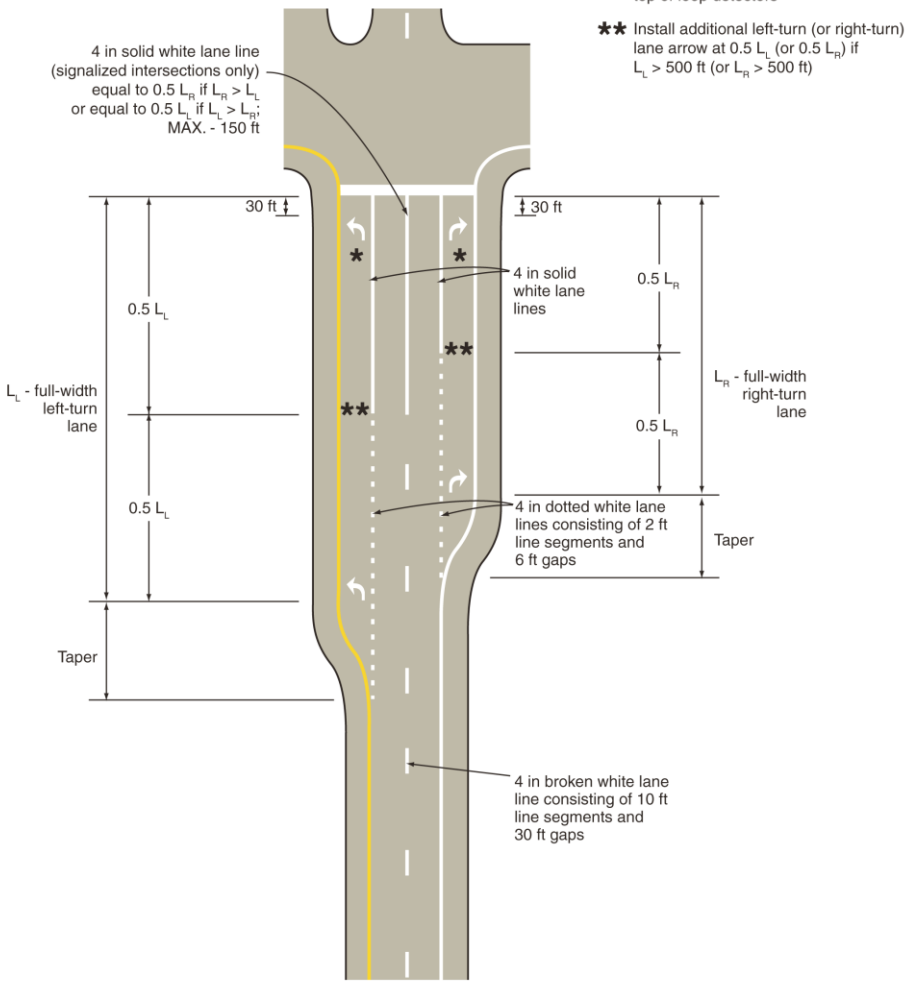
25 *On approaches to intersections, a solid white lane line marking should be used to separate a through lane from an added mandatory turn lane.*

- *DE Guidance:*
  - *Downstream solid lane line, equal to 0.5L, separates turn and through lanes*
  - *Upstream dotted lane line, equal to 0.5L, separates turn and through lanes*
  - *Upstream dotted lane line extends through the taper*

Figure 3B-11. Examples of Applications of Conventional Road Auxiliary Lane and Lane-Drop Markings
(Sheet 4 of 5)
(Delaware Revision)

DRAFT

D – Exclusive turn lanes at an intersection



Section 3B.04 White Lane Line Pavement Markings and Warrants

Option:

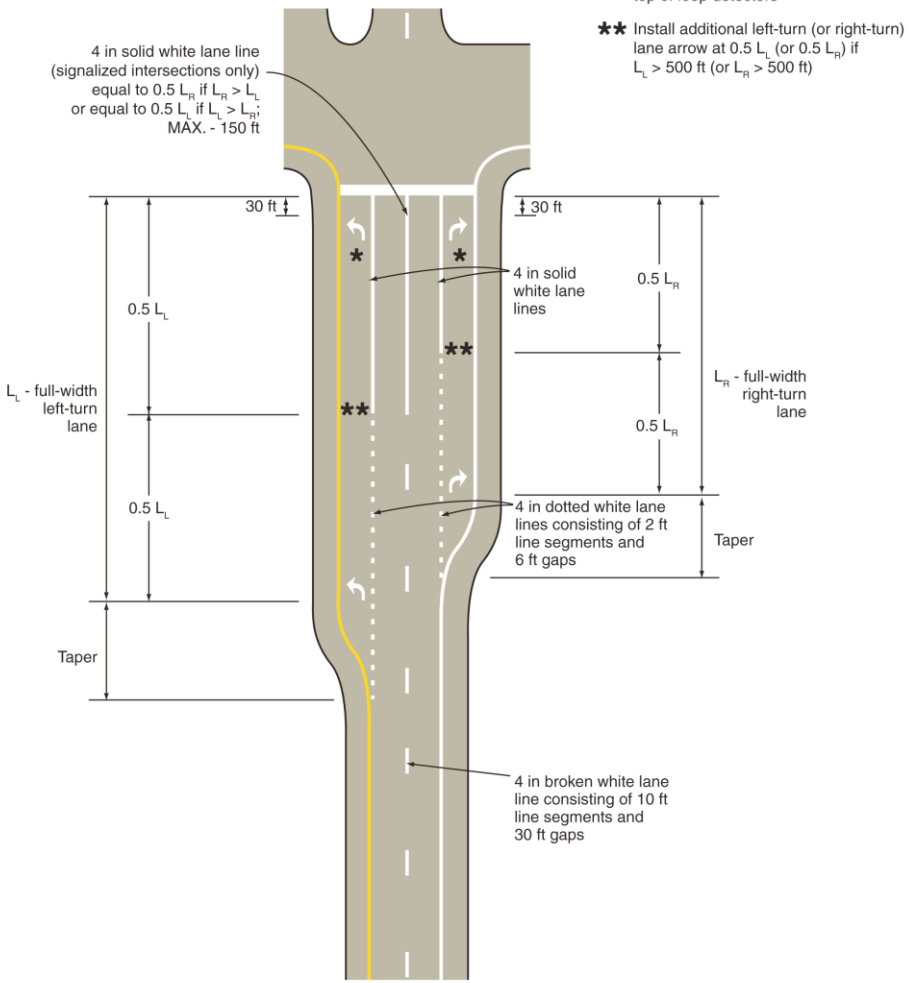
26 On approaches to intersections, solid white lane line markings may be used to separate adjacent through lanes or adjacent mandatory turn lanes from each other.

- *DE Guidance:*
  - *Unsignalized approach – broken lane line(s) continues through intersection*
  - *Signalized approach – solid white lane line(s) separates adjacent through lanes; length equal to:*
    - *$0.5L_L$ if $L_R < L_L < 300'$*
    - *$0.5L_R$ if $L_L < L_R < 300'$*
    - *150' (max.)*

Figure 3B-11. Examples of Applications of Conventional Road Auxiliary Lane and Lane-Drop Markings
(Sheet 4 of 5)
(Delaware Revision)

DRAFT

D – Exclusive turn lanes at an intersection



Section 3B.16 Stop and Yield Lines

§ 4132. Vehicle turning left.

The driver of a vehicle intending to turn to the left within an intersection or into an alley, private road or driveway shall yield the right-of-way to any vehicle approaching from the opposite direction which is so close as to constitute an immediate hazard.

Stop lines shall not be installed for yield-controlled movements, including those defined by Rules of the Road in DE Code

SR 72 at GBC Dr

Section 3B.21 Speed Measurement Markings

Standard:

02 **Speed measurement markings, if used, shall be white, and shall not be greater than 24 inches in width.**

Option:

03 Speed measurement markings may extend 24 inches on either side of the center line or 24 inches on either side of edge line markings at 1/4-mile intervals over a 1-mile length of roadway. When paved shoulders of sufficient width are available, the speed measurement markings may be placed entirely on these shoulders (see Drawing A of Figure 3B-10). Advisory signs may be used in conjunction with these markings.

- **DE Standard: Shall not extend across travel lanes similar to stop lines**
- DE Option:
  - 12” wide line marked on shoulder, if present
  - If no shoulder, 24” long, 12” wide line installed on edge line extending into travel lane

TO: All Users of the Delaware Manual On Traffic Control Devices

VIA: Don Weber, P.E.
Chief Traffic Engineer

FROM: Mark Luszcz, P.E., PTOE
Assistant Chief Traffic Engineer

DATE: June 17, 2009

SUBJECT: Guidance on the use of Transverse Markings

Transverse markings are addressed in Sections 3B.15 through 3B.23, 8B.08, and 8B.20 through 8B.22 of the Delaware MUTCD. This memorandum serves as a clarification on the appropriate use of transverse lines, on DelDOT owned and maintained roadways.

Transverse markings include shoulder markings; word and symbol markings, stop lines, yield lines, crosswalk lines, speed measurement markings, parking space markings, and speed hump markings. They are also used in support of highway-rail at-grade crossings.

In recent months we have observed the inappropriate placement of transverse lines at several locations statewide. In these instances the lines that have been placed appear similar to stop bars; however, they are not authorized for the manner in which they were installed.

Stop lines shall be placed on all approaches to a signalized intersection. Stop lines may be placed on all stop sign-controlled approaches outside of residential developments, including the access point of a residential development onto the adjacent roadway network. Stop (or Yield) lines may also be placed at highway-rail grade crossings having two or more trains per day.

Transverse lines that appear similar to stop lines shall not be used in the following applications:

1. For a yield condition;
2. Speed measurement purposes;
3. “Block the box” applications;

Speed measurement markings shall not resemble stop lines

I-95 northbound approaching SR 141

Part 7: School Areas

Section 7B.01 – Need for Standards

Standard:

10A **(DE Revision) Title 21, Chapter 41, Subchapter VIII, §4169 of the Delaware Code establishes that where no special hazard exists the speed limit in school zones shall be 20 mph where 20 mph regulatory signs are posted and state the specific time periods or under what conditions during which the 20 mph speed is in effect.**

Guidance:

10B *(DE Revision) In general the 20 mph speed limit should be applied only in locations where there is a reasonable expectation of children walking to/from school.*

Option:

10C (DE Revision) Title 21, Chapter 41, Subchapter VIII, §4169 of the Delaware Code establishes that on the basis of engineering study or investigation a maximum speed limit greater or less than 20 mph may be established by the Department of Transportation. Factors that may be considered in such an investigation and study can include: location and surrounding environment of the school, driver expectation, existing posted speed limit along the adjacent and surrounding roadways, traffic volumes and vehicle operating characteristics, the presence or absence of children walking to or from school, etc.

- DE Revision (was Support, now **Standard** & Guidance):
  - **Per DE Code, speed limit within School zone <u>shall</u> be 20 mph where 20 mph signs are posted**
    - **unless an engineering study finds a higher posted limit is appropriate and is posted**
  - Reduced speed limits should only be applied where *reasonable expectation of children being present*

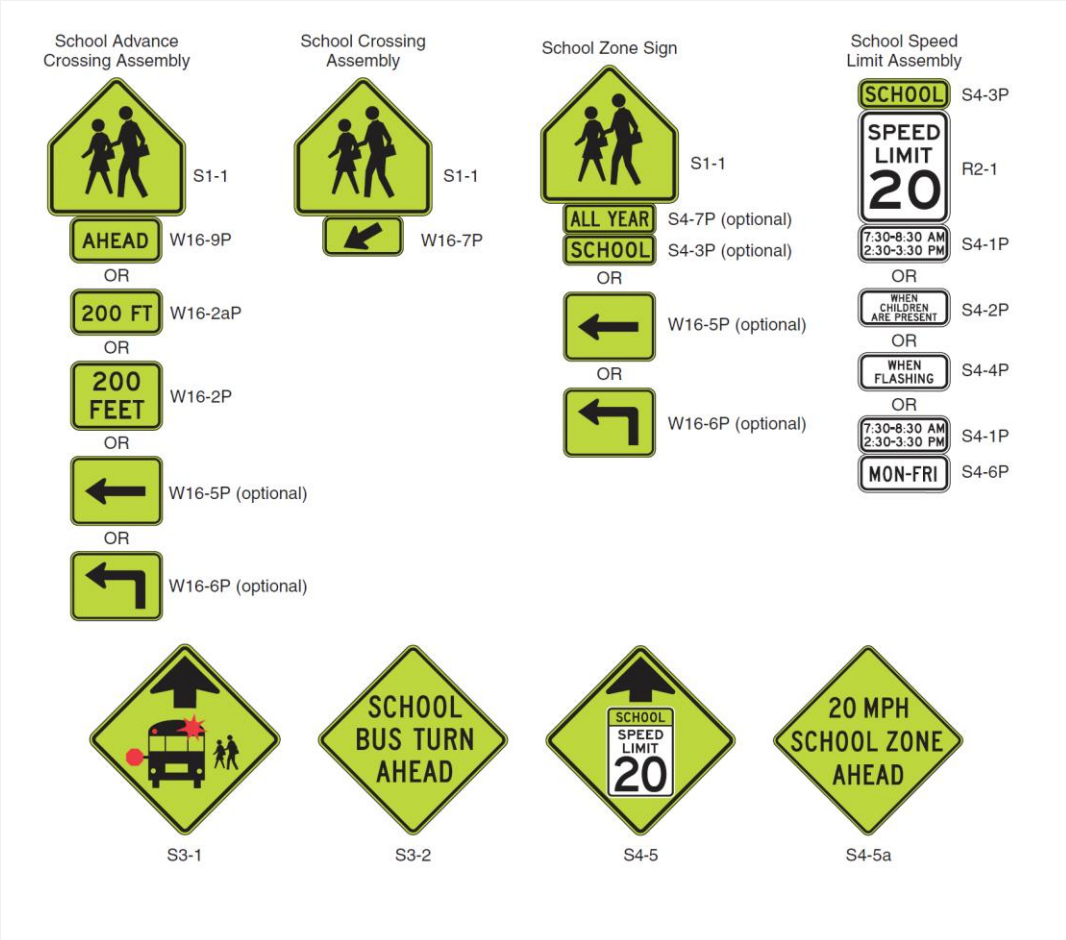
Section 7B.07 – Sign Color for School Warning Signs

Standard:

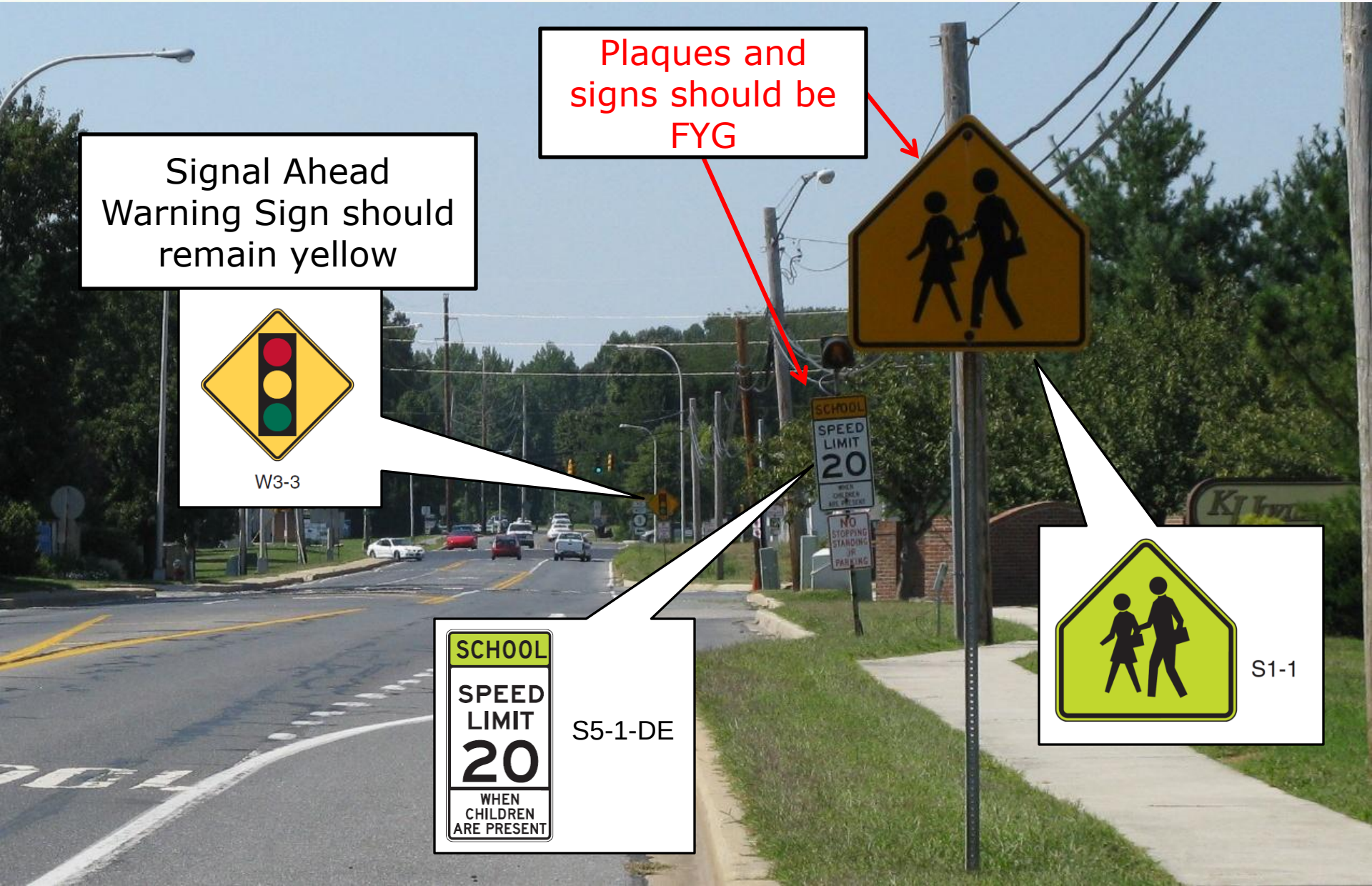
01 School warning signs, including the "SCHOOL" portion of the School Speed Limit (S5-1) sign and including any supplemental plaques used in association with these warning signs, shall have a fluorescent yellow-green background with a black legend and border unless otherwise provided in this Manual for a specific sign.

New standard:

- **Color of all school warning signs shall be FYG**
  - Previously an option
  - Includes "SCHOOL" portion of School Speed Limit signs
  - Also applies to pixels of a DMS when "SCHOOL" is displayed for a school speed limit



Section 7B.07 – Sign Color for School Warning Signs



Section 7B.09 – School Zone Sign (S1-1) and Plaques

Figure 7B-3. Example of Signing for a School Zone without a Marked School Crosswalk and with a Reduced School Speed Limit Zone

(Delaware Revision)

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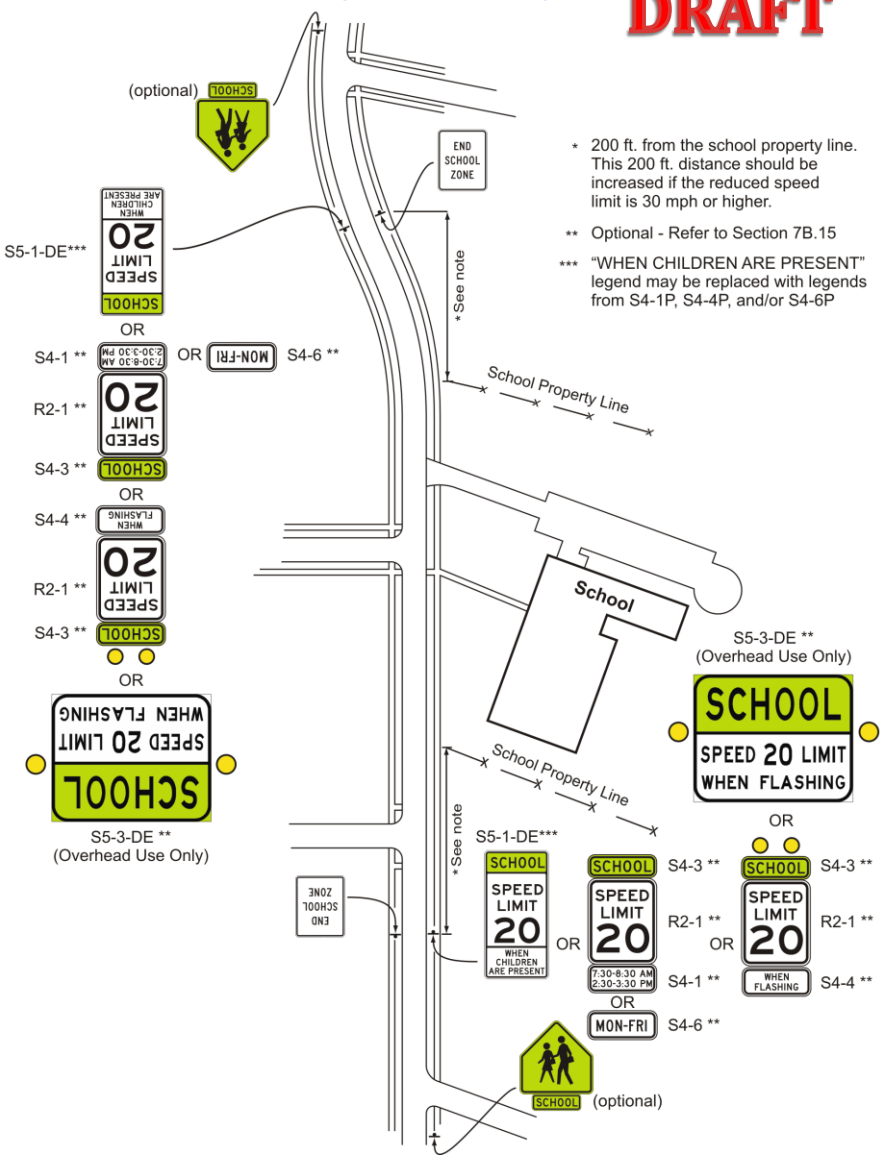


Part 8: Rail Crossings

CHAPTER 8B – SIGNS AND MARKINGS

Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

Section 8B.04 Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

Standard:

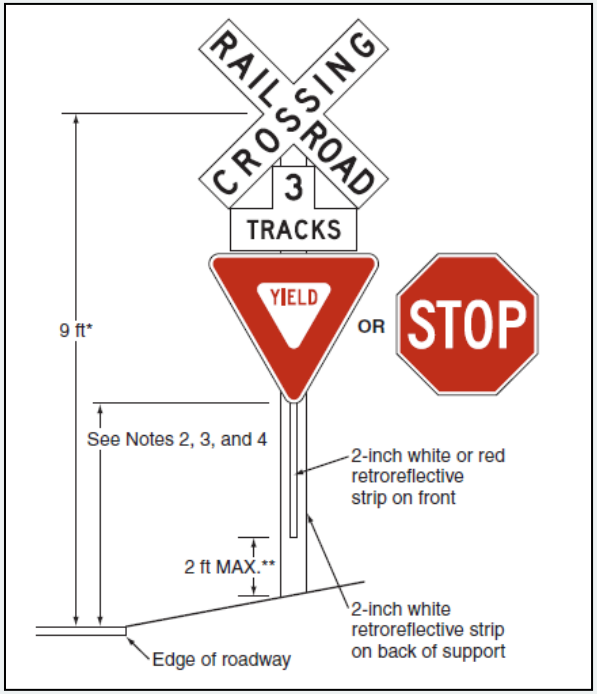
01 A grade crossing Crossbuck Assembly shall consist of a Crossbuck (R15-1) sign, and a Number of Tracks (R15-2P) plaque if two or more tracks are present, that complies with the provisions of Section 8B.03, and either a YIELD (R1-2) or STOP (R1-1) sign installed on the same support, except as provided in Paragraph 8. If used at a passive grade crossing, a YIELD or STOP sign shall be installed in compliance with the provisions of Part 2, Section 2B.10, and Figures 8B-2 and 8B-3.

- **YIELD or STOP sign shall be installed at all passive grade crossings**
  - **except when road users are directed by an authorized person**

Significant change impacting all passive grade crossings

- Compliance date: 12/31/19

DelDOT sending letter to RR reminding them of new MUTCD requirements, and requesting notification when changes have been made



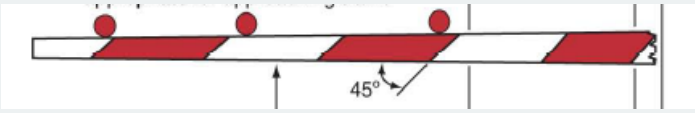
Section 8C.04 Automatic Gates

05 **Gate arms shall be fully retroreflectorized on both sides and shall have vertical stripes alternately red and white at 16-inch intervals measured horizontally.**

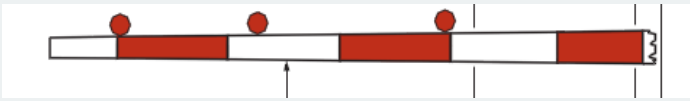
Support:

06 It is acceptable to replace a damaged gate with a gate having vertical stripes even if the other existing gates at the same grade crossing have diagonal stripes; however, it is also acceptable to replace a damaged gate with a gate having diagonal stripes if the other existing gates at the same grade crossing have diagonal stripes in order to maintain consistency per the provisions of Paragraph 24 of the Introduction.

- **Shall have vertical stripes instead of 45 degree diagonal stripes.**
- A damaged gate can be replaced with
  - a gate having vertical stripes or
  - a gate having diagonal stripes to maintain consistency with other existing gates at the same grade crossing
  - Compliance date: 1/17/11



Old



New

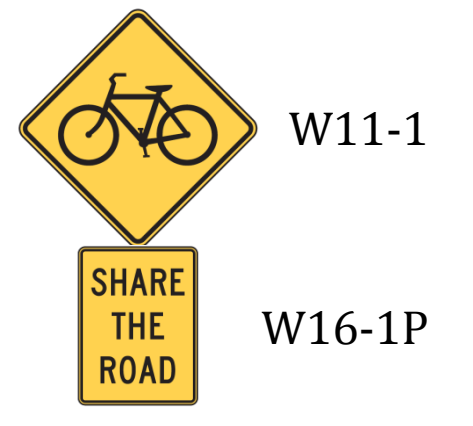
Part 9: Bicycle Facilities

Section 9B.06 - Bicycles May Use Full Lane Sign (R4-11)

The option also remains to use a Bicycle Warning (W11-1) sign along with a SHARE THE ROAD (W16-1P) plaque (see Section 9B.19)

- Selection of signs based on engineering judgment
- Potential applications:

R4-11



W11-1

W16-1P

- Designated Bike Route
- Narrow single lane of travel without shoulder

- Approaches to designated Bike Routes
- Single lane or multiple lanes of travel without shoulder or with a shoulder < 4 feet wide

Section 9B.07 - Bicycle Wrong Way Sign and RIDE WITH TRAFFIC Plaque (R5-1b, R9-3cP)

DRAFT

Guidance:

03 *The RIDE WITH TRAFFIC plaque should be used only in conjunction with the Bicycle WRONG WAY sign, and should be mounted directly below the Bicycle WRONG WAY sign.*

03A *(DE Revision) The RIDE WITH TRAFFIC plaque should only be used at locations with a documented problem or based on engineering judgment due to site specific issues.*

Delaware Revision

- Guidance that the RIDE WITH TRAFFIC plaque should only be used in locations with documented problems or based on engineering judgment

R5-1b

R9-3cP

Section 9B.18 - Bicycle Warning and Combined Bicycle/Pedestrian Signs (W11-1 and W11-15)

Option:

02 The combined Bicycle/Pedestrian (W11-15) sign (see Figure 9B-3) may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING (W11-15P) supplemental plaque (see Figure 9B-3) may be mounted below the W11-15 sign.

Revised section

- New combined Bicycle/Pedestrian (W11-15) sign and TRAIL X-ING (W11-15P) plaque for shared-use paths
- Other warning plaques may also be used:

W16-2aP

W16-7P

W16-9P

W11-15

W11-15P

Section 9C.04 - Markings for Bicycle Lanes

Figure 9C-4.
Example of Bicycle Lane Treatment at a Right Turn Only Lane
(Delaware Revision)

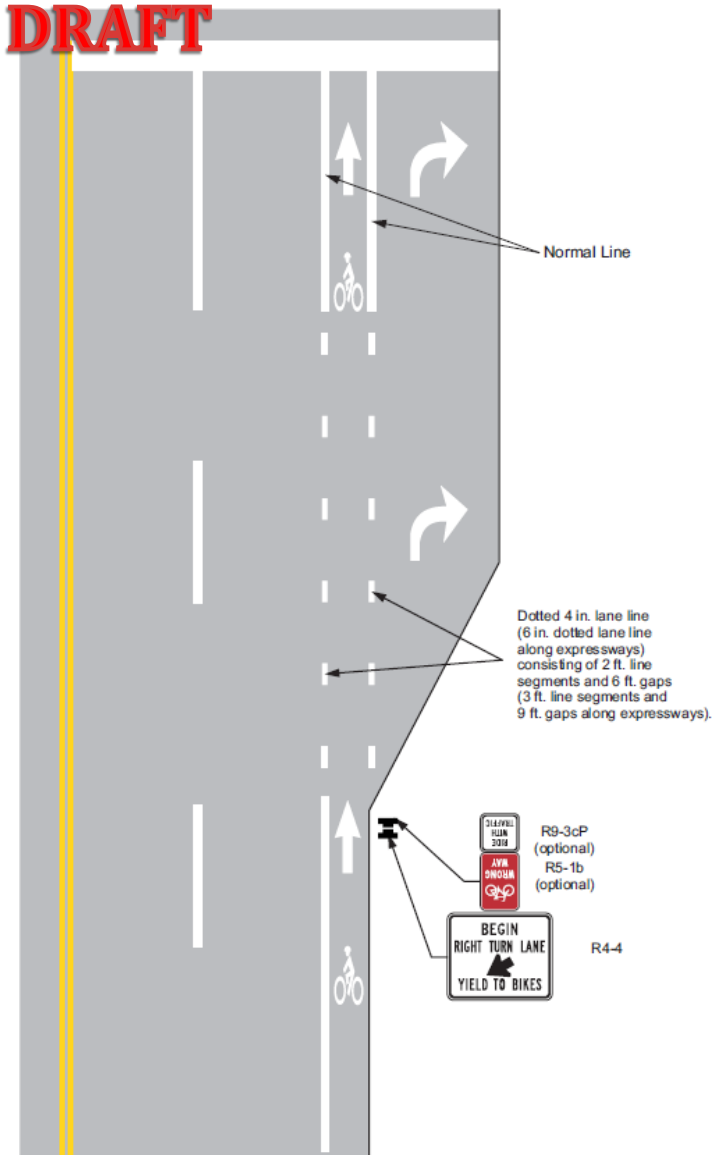
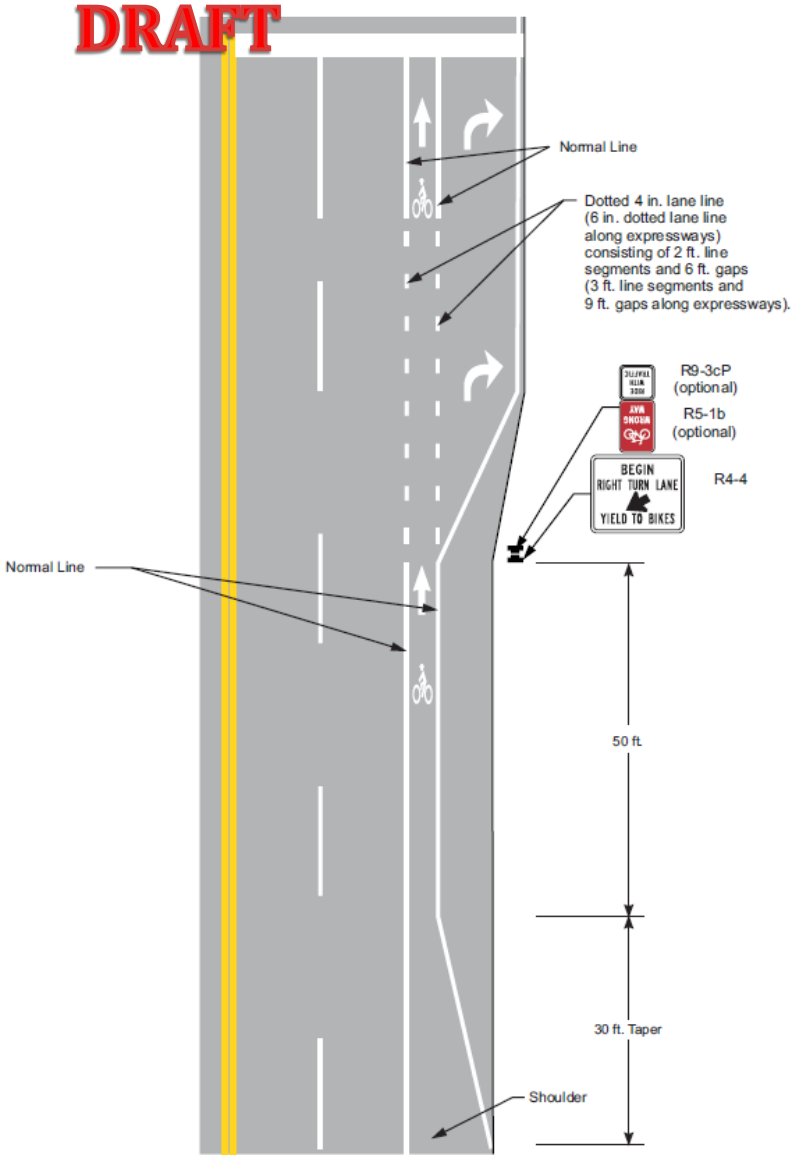


Figure 9C-4a.
Example of Bicycle Lane Treatment at a Right Turn Only Lane with Shoulder
(Delaware Revision)



Section 9C.04 - Markings for Bicycle Lanes

Figure 9C-1b.
Example of Intersection Pavement Markings - Designated Bicycle Lane at Intersection Departures with and without Acceleration Lanes
(Delaware Revision)

DRAFT

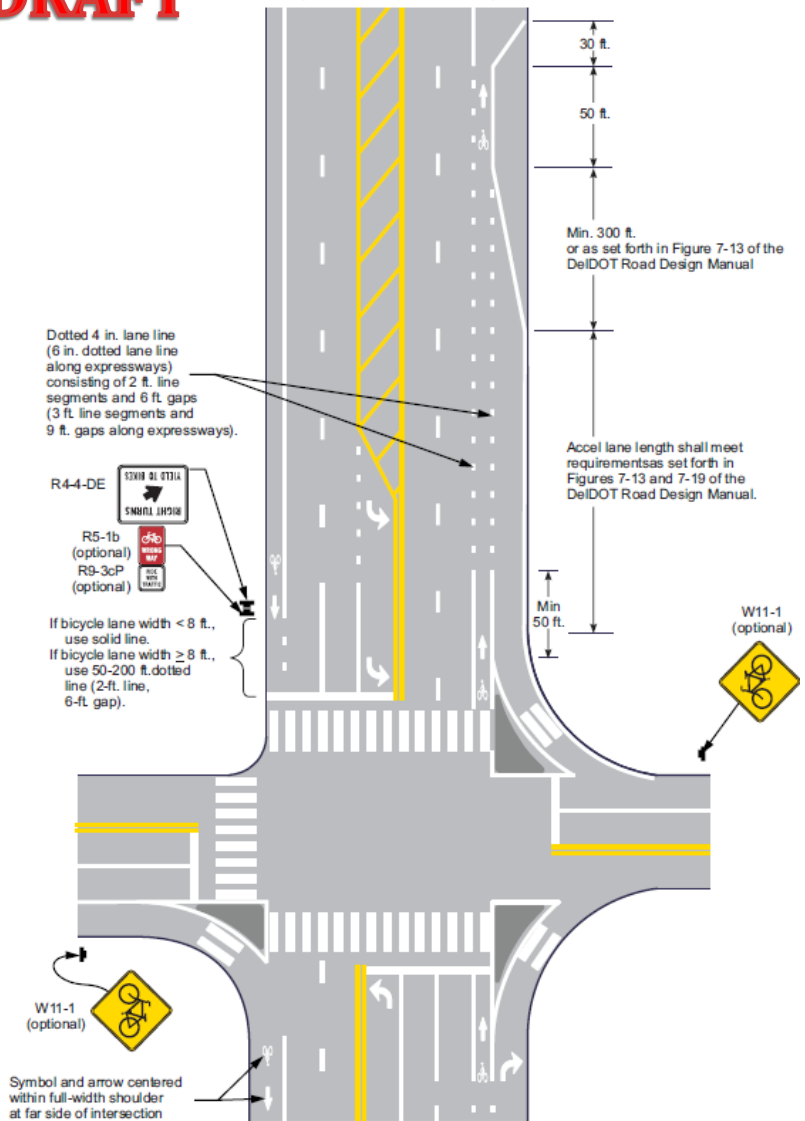
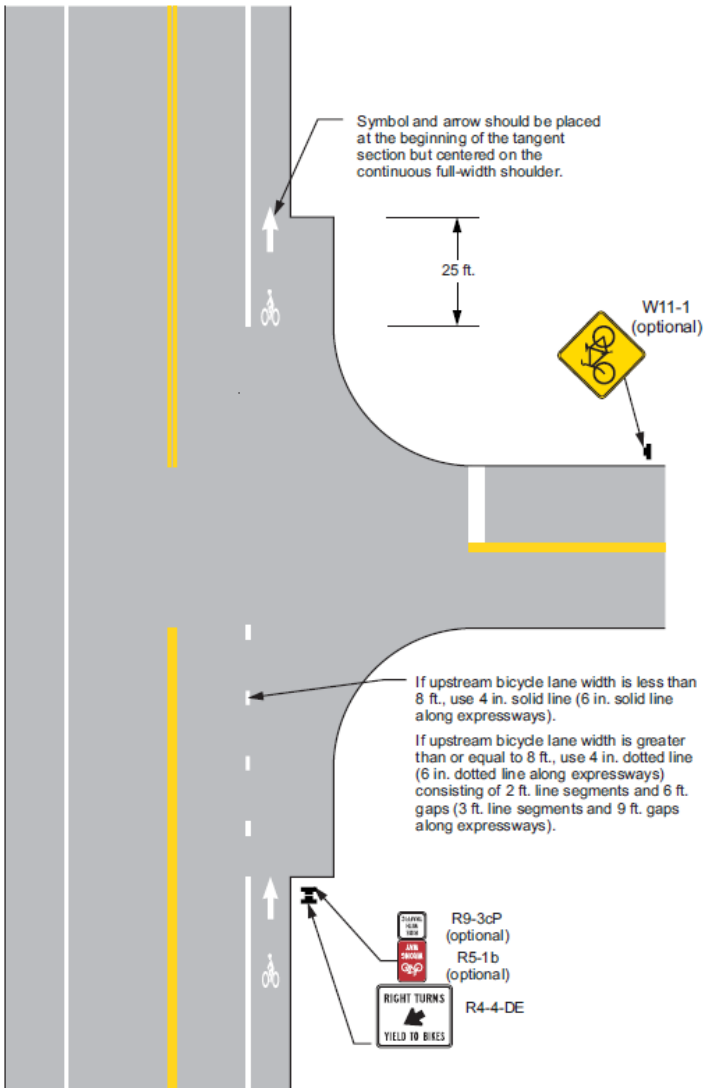


Figure 9C-1d.
Example of Intersection Pavement Markings - Designated Bicycle Lane at Minor Subdivision Entrance
(Delaware Revision)

DRAFT



Section 9C.07 - Shared Lane Marking

Option:

01 The Shared Lane Marking shown in Figure 9C-9 may be used to:

A. Assist bicyclists with lateral positioning in a shared lane with on-street parallel parking in order to reduce the chance of a bicyclist's impacting the open door of a parked vehicle,
B. Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane,
C. Alert road users of the lateral location bicyclists are likely to occupy within the traveled way,
D. Encourage safe passing of bicyclists by motorists, and
E. Reduce the incidence of wrong-way bicycling.

Guidance:

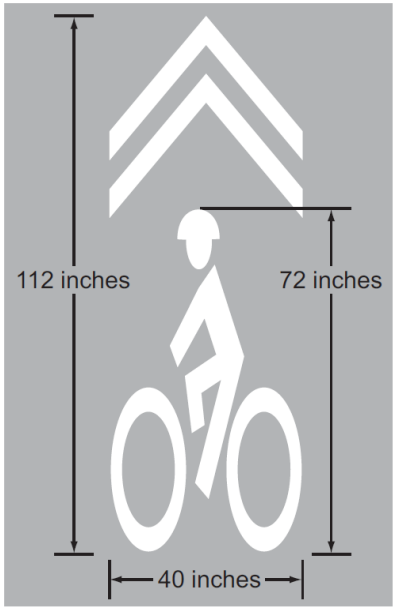
02 *The Shared Lane Marking should not be placed on roadways that have a speed limit above 35 mph.*

Standard:

03 **Shared Lane Markings shall not be used on shoulders or in designated bicycle lanes.**

New Section

- Shared Lane Markings ("Sharrow") assists bicyclists and motorists in determining the appropriate lateral position in shared or narrow lanes
- *Shared Lane Markings should not be used on roads with a speed limit above 35 mph*
- **Shared Lane Markings shall not be used on designated bicycle lanes or shoulders**



DE MUTCD Training

- February 10th – Part 2 (Signs)
- March 16th – Part 6 (Temporary Traffic Control)
- April 12th – Part 3 (Markings)
- May 16th – Parts 4 & 7 (Traffic Signals & School Areas)
- June 15th – Parts 8 & 9 (Railroads & Bicycle Facilities)
- T^2 course registration

http://www.ce.udel.edu/dct/T2Courses.html

Contact Information

Thank You!

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Assistant Chief Traffic Engineer

Ph: (302) 659-4091

mark.luszcz@state.de.us